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Technological Innovation and Resource Management in the Fisheries of the British Isles, ca.1400-1900

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This thesis is the result of the author's original research. It has been composed by the author and has not been previously submitted for examination which has led to the award of a degree.

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Abstract

This thesis represents the first in-depth study of interactions between fishermen, fisheries managers and fishery resources in British waters before the industrial age. In particular, it investigates those interactions during periods of technological innovation and intensified fishing activity in the period between 1400 and 1900, and seeks to explain the responses of both fishermen and managers to those changes. By bringing together methodological tools from social history, environmental history and modern fisheries science it demonstrates that fishermen have always had a sophisticated understanding of the potential impact of their activities on the marine environment, and of the overall health of the fisheries in which they were engaged. Moreover, it makes clear that keen resistance to what were perceived as destructive fishing practices (particularly in relation to growth overfishing) has an unbroken history stretching back to the Plantagenets, and that fishermen's complaints about such practices were very often met with sympathy and protective legislation for the majority of that time. What follows also demonstrates that, contrary to the conventional historical view, the most consistently reviled of all marine fishing practices, beam trawling, also has an unbroken history of usage reaching back to at least the fourteenth century. Finally, it goes on to show that the majority view of fishermen, who remained largely in favour of protection for inshore fisheries and the inshore marine environment, was sidelined in debates about fisheries management at some point in the mid- to late-nineteenth century. This shift in perspective heralded the abandonment of at least six hundred years of protectionism in the management of Britain and Ireland's fisheries and ushered in a new era of fish production at any cost.

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Chapter 1: Introduction

There is a growing consensus among scientists and policy makers that many global marine capture fisheries are in a critical condition. The United Nations Food and Agriculture Organisation (UNFAO) estimates, in its most recent figures, that 31.4 percent are either overfished or seriously depleted, and it attributes this situation in large part to patterns of inadequate management in the past.[1] The highly uncertain and, perhaps, even critical state of the world's marine fisheries raises a number of urgent questions, the most pressing of which is how we might first arrest, and then reverse, some key historical trends. Scholars and policy makers agree that, in general, the key to solving this crisis is lies in a shift of approach towards marine resource management, and this recognition has stimulated a considerable debate over the last two decades.[2] New and innovative approaches have been proposed to address the situation, including: an ecosystem approach, to replace single species stock assessment for estimating the health of commercial fish stocks; fisheries co-management, which involves bringing together stakeholders (fishers themselves) and managers to manage fisheries cooperatively and sustainably; and the establishment of more, bigger, and better-managed marine protected areas (MPAs) to allow stocks to recover without the pressure of fishing and other commercial activities.[3] All of these new approaches are being tested, implemented and refined, to varying degrees, in fisheries around the world. But a number of other questions are being raised with increasing urgency in relation to the state of the world's marine fisheries, and two of them underpin the development of these new approaches to fisheries management. They are: how far do the roots of the current crisis reach back

[1] UNFAO, *The State of World Fisheries and Aquaculture 2016: Contributing to Food Security and Nutrition for All* (Rome, 2016), 38; J. Rice, 'Is the Failure of Conventional Fisheries Management Making the Conservationist Approach more Appealing, Offering a Way Out of Making Tough Decisions?', in UNFAO, *Overcoming Factors of Unsustainability and Overexploitation in Fisheries: Selected Papers on Issues and Approaches* (UNFAO Fisheries Report No.782, Rome 2004), 49, 52-3 [http://www.fao.org/docrep/009/a0312e/A0312E04.htm, accessed on 13/07/2016].

[2] The field of reform in fisheries management is far too extensive to provide even an indicative bibliography here, but it could, arguably, be said to have begun with the edited volume, T.J. Pitcher, P.J.B. Hart and D. Pauly (eds.), *Reinventing Fisheries Management* (Dordrecht, 1998).

[3] For an overview of these approaches, see, for example, V. Christensen and J. Maclean (eds.), *Ecosystem Approaches to Fisheries: A Global Perspective* (Cambridge, 2011); D.C. Wilson, J.R. Nielsen and P. Degnbol (eds.), *The Fisheries Co-management Experience: Accomplishments, Challenges and Prospects* (Dordrecht, 2003); P.P.S. Jones, *Governing Marine Protected Areas: Resilience through Diversity* (Oxford, 2014).

into the past; and can we identify the long term trends (economic, social, industrial, environmental) which have led us to the situation we face today? These two fundamental questions underpin the following study into the development and trajectory of Great Britain and Ireland's inshore fisheries in the *longue durée*..

1.1 Thesis Overview

In the past, investigations into the fisheries of the North Atlantic world have tended to focus on the normative aspects of their history rather than on the impact of fishing on the ecosystem in the long term.[4] As a result, while there exists a considerable literature on certain aspects of fishing and fisheries history, such as the social and economic life of some key historic fishing centres, the recent development of industrial innovations in commercial fisheries, and the folklore of specific fishing communities, we know very little about the historic interactions between fishermen, shifts in fishing technology, fisheries managers, and the marine environment. The present study aims to fill this considerable gap in our understanding of the fisheries history of the North East Atlantic with a specific focus on some key inshore fisheries around the coasts of Scotland, Ireland and southern England. The chapters below are organised thematically and, in the broadest sense, chronologically, and the analysis in each is led by the nature of the discussion and the availability of the evidence. As a result, the geographical focus of the chapters is largely circumstantial within the overall context of Great Britain and Ireland. Nonetheless, it is important to note that two of the three chapters relate exclusively to the inshore fisheries of Scotland between the seventeenth and the nineteenth centuries. The reason for this emphasis on Scotland is that that its fisheries were politically and commercially far more important than those of Ireland, Wales, and even England, throughout the early-modern and modern periods. Hence, that importance is reflected in the following discussion, both in terms of the historical and fisheries-related issues they

[4] The list of historians and historical works which have addressed the social and industrial context of sea fishing in Great Britain and Ireland is too extensive to reproduce here, but for a few national examples, see: J.R. Coull, *The Sea Fisheries of Scotland: A Historical Geography* (Edinburgh, 1996); J. MacLaughlin, *Troubled Waters: A Social and Cultural History of Ireland's Sea Fisheries* (Dublin, 2010); D.J. Starkey, C. Reid and N. Ashcroft (eds.), *England's Sea Fisheries: The Commercial Sea Fisheries of England and Wales since 1300* (London, 2000). From the point of view of the North Atlantic region as a whole, see the extensive and invaluable work published under the auspices of the *North Atlantic Fisheries History Association* since the mid-1990s, details of which can be found at http://www.hull.ac.uk/nafha/Publications.htm.

raise, and the quantity and quality of the evidence that they generated. They are less relevant, however, for the discussion in Chapter Two, which deals with the long history of one of the most controversial and destructive fishing practices to have developed on the coasts of Great Britain and Ireland: beam trawling.

Beam trawling as a widespread fishing practice is conventionally believed to have begun in the later-eighteenth century, and its detrimental impact on fisheries ecology and inshore marine ecosystems is generally dated from the early- to mid-nineteenth century at the earliest. Yet, as Chapter 2 demonstrates, there is abundant evidence to suggest that beam trawling has, in fact, been practised continuously from the fourteenth century onwards in some inshore fisheries in the south of England, and that it was a significant factor in more distant fisheries (from ten to thirty leagues offshore) in England and Ireland in the seventeenth and eighteenth centuries. The mechanisms for its spread in these two very different geographical regions in the early-modern period are still unclear; but what is certain is that, wherever it emerged, contemporaries were far from ignorant of, or blind to, the impact of bottom trawling on the ecology of nearshore fisheries and the benthos more generally. In fact, most of what we know about the long history of beam trawling derives from the fact that, wherever it took a significant hold, it was vehemently opposed by fishermen and others who were interested in the long-term viability of those fisheries. The complaints they routinely voiced about bottom trawling echo very closely the concerns of contemporary environmentalists, conservationists and marine biologists.

Chapter 2 also alludes, in passing, to the fact that bottom trawling was only one of many fishing practices in the preindustrial era which were widely believed to have a seriously damaging impact on the health of inshore fisheries, albeit a particularly pernicious one.[5] Chapter 3 extends this discussion, and looks in detail at a particularly controversial period in the history of the herring (*Clupea harengus*) fisheries in the firths of Forth and Clyde, in Scotland. In the 1830s, drift net fishermen in the two firths began to complain about the novel use of seine nets to catch sprats

[5] The term 'preindustrial fishing' does not have a settled definition in the literature. It is used here simply to denote those commercial or semi-commercial sea fisheries which existed before the widespread adoption of motor power, and which relied on manpower and sail power alone. Precedents for this general usage can be found in, for example, B. Poulsen, *Dutch Herring: An Environmental History, c.1600-1860* (Amsterdam, 2008), 79-80, 236; K. Schwerdtner Máñez and B. Poulsen (eds.), *Perspectives on Oceans Past: A Handbook of Marine Environmental History* (Dordrecht, 2016), 49-53, 80-1; R.H. Thurstan, S. Brockington and C.M. Roberts, 'The Effects of 118 Years of Industrial Fishing on UK Bottom Trawl Fisheries', *Nature Communications*, 1 (2010), DOI: 10.1038/ncomms1013, 2.

and herring, known as ring-netting, or circle-netting, when practiced between two boats in mid-channel. Echoing earlier controversies elsewhere over the use of bottom trawls, Scottish drifters were convinced that such practices were highly damaging to the long-term health of commercial stocks because they indiscriminately caught immature fish along with the adults, and disturbed the spawn of herring and other fish on the seabed. Even though the evidence was uncertain, the body responsible for managing and policing those fisheries, the Commission for the Herring Fishery (better known as the Fishery Board) initially sided strongly with the drifters, not only condemning seining for herring, but successfully lobbying for an outright ban on the practice, implemented in 1851. The controversy led to a protracted public debate, including three dedicated commissions of inquiry which gathered a huge amount of evidence from herring fishermen and others. Crucially, during the 1850s and 60s, those who had initially supported the drifters, most notably the Fishery Board, began to withdraw that support and, instead, advocated a non-interventionist approach, including the repeal of all protectionist legislation, in keeping with a general shift in attitudes towards marine fisheries at the time. The reasons behind this historical shift in opinion, the mechanisms which enabled it to happen, and its long-term implications for British fisheries are also explored in detail in Chapter 3.

Leading on from this discussion, the final chapter looks in much more detail at the growth of all of Scotland's herring and demersal fisheries throughout the nineteenth century. Using the extensive data collected by the Fishery Board from 1809 onwards, estimates of the health of these fisheries are presented in the form of catch per unit effort (CPUE) calculations for the period between 1845 and 1886. CPUE is a straightforward and relatively recent measure of the abundance of fish stocks, but this is the first time it has been applied comprehensively to the *historic* fisheries of an entire nation.[6] The picture presented is highly variable, but there is strong evidence that in large parts of Scotland stocks of commercial fish (particularly demersal fish) were experiencing considerable pressure from as early as the mid-nineteenth century. By placing these calculations alongside an extensive body of qualitative evidence (in particular, the evidence of fishermen themselves to a range of public inquiries) two main conclusions are drawn: first, that the anecdotal evidence

[6] M.N. Maunder *et al.,* 'Interpreting Catch per Unit Effort Data to Assess the Status of Individual Fish Scotks and Communities', *ICES Journal of Marine Science,* 63:8 (2006), 1374, *fn*.1.

and professional opinions of fishermen were remarkably accurate when it came to assessing the overall health of the fisheries in which they were engaged in the nineteenth century. This is not only historically important, but highly relevant to modern discussions about the value of fishers' ecological knowledge (FEK) in a fisheries management context (see discussion below). Second, that calculations of CPUE based on the Fishery Board's figures bear out the strong impression of Scottish fishermen that many inshore demersal fisheries were declining in the second half of the nineteenth century, long before the advent of industrial (motorised) gear or the widespread adoption of beam trawling in Scotland.

1.2 Methodology

The approach taken in this study is essentially synthetic, blending methodological and intellectual tools from social history, environmental history, marine historical ecology and elsewhere. Underlying this approach is a recognition that we need to 'reset the baselines' for our understanding, both of the impact of commercial fishing before the modern era, and of the social and economic context within which developments in preindustrial fisheries took place.[7] This is increasingly recognised as one of the most important preconditions if we are to move forward into a new era of truly sustainable marine fisheries. The new discipline of marine historical ecology (of which, much more below) is predicated on the understanding that we cannot accurately plan for the sustainable management of the world's oceans in the future if we have an inadequate understanding of ocean ecosystems in the past. As two pioneers of the new discipline recently noted:

> There are three major reasons why we need to know about the ocean's past:
> 1. To determine historical reference points and long-term trajectories of change, we need to understand the past abundance and distribution of marine species and the structure of ocean ecosystems.
> 2. To judge the current state of marine ecosystems, we need to understand the magnitude and range of changes that have already occurred.

[7] For a discussion of the issue of 'baselines' in fisheries history and marine ecology, see Subsection 1.2.1, below.

3. To better inform the future, we need to understand the drivers and consequences of past changes.[8]

Clearly, fishing is one of the most important, pervasive and influential drivers in terms of human-induced changes to ocean ecosystems over time. Given that this study relies on intellectual and methodological components crossing a number of disciplinary boundaries, it is important to offer a brief explanation of some of the most important of these, along with an evaluation of their relevance to the chapters that follow.

1.2.1 Shifting Baseline Syndrome

In 1995, Daniel Pauly published a short article entitled 'Anecdotes and the Shifting Baseline Syndrome of Fisheries'.[9] Pauly was not the first to employ the concept of shifting (or sliding) baselines in ecological or environmental terms. In the context of landscape architecture, Ian McHarg had written about the need for a "layer cake" approach to ecological planning as early as the late-1960s, an approach that involved the collection of, among many other necessary baseline data, the "ethnographic history" of a place.[10] This was a concept (or, more properly in McHarg's case, an ideal) which gained some ground among environmental planners in the 1970s who realised that measurable ecological baseline information, though vital, is always conditional on the viewpoint of the measurer, and is therefore very likely to provide a partial or incomplete picture. In the words of Bruce Kramer (in the very different context of air quality measurements) "deterioration is always measured relative to current [standards]" which is, in itself, a degraded baseline when compared to the distant past.[11] But it was Pauly, in 1995, who really crystallised the concept of shifting baselines as a warning to ecologists who made assumptions about change over time based solely on recent data or findings, and he did so

[8] H.K. Lotze and L. McClenachan, 'Marine Historical Ecology: Informing the Future by Learning from the Past', in M.D. Bertness, J.F. Bruno, B.F. Silliman and J.J. Stachowitz (eds.), *Marine Community Ecology and Conservation* (Sunderland, MA, 2014), 165.
[9] D. Pauly, 'Anecdotes and the Shifting Baseline Syndrome of Fisheries', *Trends in Ecology and Evolution*, 10 (1995), 430.
[10] I.L. McHarg, *To Heal the Earth: Selected Writings of Ian L. McHarg* (Washington, D.C., 1998), 78-9.
[11] B.M. Kramer, 'Economics, Technology, and the Clean Air Amendments of 1970: The First Six Years', *Ecology LQ*, 6:161 (1976), 226.

specifically in the context of marine ecosystems. In Pauly's words, shifting baseline syndrome arises "because each generation accepts as a baseline the stock size and species composition that occurred at the beginning of their careers, and uses this to evaluate changes". He went on:

> The result obviously is a gradual shift of the baseline, a gradual accommodation of the creeping disappearance of resource species, and inappropriate reference points for evaluating economic losses resulting from overfishing, or for identifying targets for rehabilitation measures.[12]

Pauly's version of the shifting baseline syndrome in marine ecology was, in many ways, a fine example of an idea whose time had come. The 1980s and 1990s were decades of intense activity in marine conservation and fisheries management. On one hand, conservationists were beginning to recognise the genuinely critical state of much of the world's marine megafauna and its fragile oceanic ecosystems; on the other, there were the beginnings of a realisation of the genuine potential for the collapse of global fish stocks as a result of overfishing. In terms of ecosystem degradation, for example, Jeremy Jackson took Pauly's concept of shifting baselines and applied it directly to Caribbean coastal environments. Extrapolating from (among other things) early settlers' accounts of abundance and the projected carrying capacity of habitats, Jackson began to produce extremely sophisticated estimates for the historical abundance of various reef species in the Caribbean from as early as the fifteenth century, concluding early on that "[i]t is obvious that any direct relationship between human population growth and fishing in Jamaica ended in the eighteenth century when human populations were only 10% of the present," and that, as a result, "the causes of the present ecocatastrophe are deep and historical, not just the almost 'current events' that have passed as history before".[13]

In the 1990s, Jackson was working at a crucial point of a conjunction between an increased concern about marine ecosystems and Pauly's new and compelling call to look further and further back in history to counteract shifting baseline syndrome. Of course, he was not alone in this. Dayton *et al.* used the same general approach, including an awareness of Pauly's shifting baselines, to demonstrate that

[12] Pauly, 'Anecdotes', 430.
[13] J.B.C. Jackson, 'Reefs Since Columbus', *Coral Reefs*, 16 Suppl. (1997), 29.

contemporary understanding of kelp forests in California masked the reality of a severely denuded ecosystem because it failed to recognise the historic decline of large predator species. As the authors put it, continued ecosystem evaluation of the kelp forests *without* an awareness of shifting baseline syndrome:

> would be similar to studying the Serengeti after all the large grazers and carnivores were eliminated; one could still appreciate termites and other small grazers, but one's expectations of nature pale beside what it used to be.[14]

In fisheries science, too, the concept of shifting baselines had an immediate impact. Pauly himself, along with Tony Pitcher, advanced a new model of fisheries management, an 'ecosystem model' whereby the goal would be to rebuild fisheries ecosystems from the bottom up rather than focusing narrowly on sustainability, which was (and still is) the predominant model for regulating fisheries.[15] The ecosystem model of fisheries management inevitably relies on providing a realistic estimate, in the first instance, of what a pristine ecosystem looks like, and as a result correcting the myopia of shifting baseline syndrome becomes an urgent necessity. Many others have taken up the ecosystem model of fisheries management with enthusiasm.[16] As a result, shifting baseline syndrome has expanded its reach to influence a whole new set of scientists, technicians and policy makers who might otherwise have given it little thought. Recently, the concept of shifting baselines gave its name to an important collection of essays representing the latest work of many of MHE's leading lights, including Jeremy Jackson, Karen Alexander, Daniel Vickers, Loren McClenachan, Heike Lotze and Eric Sala. The book was dedicated to Daniel Pauly, and has done a great deal to raise the profile of the syndrome still further among specialists and non-specialists alike.

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[14] P.K. Dayton, M.J. Tegner, P.B. Edwards and K.L. Riser, 'Sliding Baselines, Ghosts, and Reduced Expectations in Kelp Forest Communities', *Ecological Applications*, 8:2 (1998), 320.

[15] T.J. Pitcher and D. Pauly, 'Rebuilding Ecosystems, not Sustainability, as the Proper Goal of Fishery Management', in Pitcher *et al*., *Reinventing Fisheries Management*, 311-329.

[16] The list is extensive, but see, for example, E.K. Pikitch *et al*., 'Ecosystem-Based Fishery Management', *Science*, 305:5682 (2004), 346-7; S. Farber *et al*., 'Linking Ecology and Economics for Ecosystem Management', *BioSciences*, 56:2 (2006), 121-133; G. Bianchi and H.R. Skjoldal (eds.), *The Ecosystem Approach to Fisheries* (UNFAO publication, Wallingford, Oxon., 2008).

1.2.2 Fishers' Ecological Knowledge (FEK)

At the beginning of this introduction, it was mentioned that one response to the sense of crisis surrounding the state of world fisheries has been a move towards a more cooperative and inclusive approach to their management. A crucial aspect of this new approach is the recognition that, over the past hundred years of so, fishers themselves have become marginalised in discussions about the state and future of the fisheries in favour of scientists and technical 'experts'. The process of bringing fishers back into these discussions began in the 1980s as a largely anthropological, ethnographic exercise, a means of testing the traditional ecological knowledge of artisan fishers in the developing world.[17] However, it soon began to take hold as a realistic mechanism for changing the paradigm of 'top-down' fisheries management in large-scale commercial fisheries across the world.[18] By the early- to mid-2000s, there was a growing recognition that, for fisheries to remain viable in the future, it was necessary to harness the ecological knowledge and understanding of fishers, and their cooperation in management processes: it is fishers, after all, who have the most immediate interest in truly sustainable fisheries management.

The transition from a largely technocratic system of knowledge gathering and assessment in the fisheries to one which genuinely values the input of practitioners (fishers themselves) has, predictably, not been easy. In particular, concerns have been raised about whether or not it is even possible to get the very different paradigms of FEK and scientific ecological knowledge to 'fit together' in any meaningful way.[19] Nonetheless, significant progress is being made, and models of co-management based on the cooperative use of FEK alongside scientific ecological knowledge are becoming commonplace.[20] Crucially, FEK has recently gained a

[17] See, for example, R.E. Johannes, 'Working with Fishermen to Improve Coastal Tropical Fisheries and Resource Management', *Bulletin of Marine Science*, 31:3 (1981), 673-80; R.E. Johannes, 'Fishing and Traditional Knowledge', in R.E. Johannes (ed.), *Traditional Ecological Knowledge: A Collection of Essays* (IUCN, Gland, Switzerland, and Cambridge, 1989), 39-42.

[18] B. Neis, 'Fishers' Ecological Knowledge and Stock Assessment in Newfoundland', *Newfoundland Studies*, 8:2 (1992), 155-78; G. Pálsson, 'Learning by Fishing: Practical Engagement and Environmental Concerns' and J.M. Acheson, J.A. Wilson and R.S. Steneck, 'Managing Chaotic Fisheries', in F. Berkes and C. Folke (eds.), *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience* (Cambridge, 1998), 48-66, 390-413.

[19] E.J. Hind, 'A Review of the Past, the Present, and the Future of Fishers' Ecological Knowledge Research: A Challenge to Established Fisheries Science', *ICES Journal of Marine Science*, 72:2 (2015), 351-2.

[20] For example, C. Brattland, 'Proving Fishers Right: Effects of the Integration of Experienced-Based Knowledge in Ecosystem-Based Management', *Acta Borealia*, 30:1 (2013), 39-59; L.M. Carr and W.D. Heyman, ''It's About

degree of institutional credibility within the kinds of overarching international bodies responsible for mapping out future directions in fisheries management and resource use.[21] The following chapters demonstrate that, historically, FEK was a highly valued resource in the management and administration of the United Kingdom's inshore fisheries, and the reasons behind its declining influence in the mid- to late-nineteenth century have important lessons for contemporary discussions about co-operative management.

1.2.3 Historical Ecology

Shifting baseline syndrome and fishers' ecological knowledge are two conceptual tools which have greatly influenced the approach taken in the following study. However, its overarching methodology represents a blend of much broader disciplinary schemas, all of which, to a greater or lesser extent, straddle the natural sciences, social sciences and the humanities. The first of these, 'historical ecology' describes an approach to evaluating the relationship between humans and their environment, and a method for measuring human impact on the landscape over time.[22] It originated in the United States in the early 1970s during the early development of the modern environmental movement, and quickly gained ground among natural scientists, social scientists and others eager to bridge the gulf between what C.P. Snow famously described as the 'two cultures' of science and the humanities.[23] A number of individuals emerged as leaders in the new field, including Lester Bilsky (historian), Alice Ingersen (anthropologist), Carole Crumley (archaeologist and anthropologist) and, latterly, William Balée (anthropologist). What is obvious even from this very brief list of personnel is that, despite its undoubted appeal to other disciplines, historical ecology began very much as an ethnographic approach to history, a way of studying the interaction between human culture and the landscape. Indeed, this anthropological preponderance has persisted: in a recently

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Seeing What's Actually Out There': Quantifying Fishers' Ecological Knowledge and Biases in a Small-scale Commercial Fishery as a Path Towards Co-management', *Ocean and Coastal Management*, 69 (2012), 118-32.

[21] J. Fischer, J. Jogensen, H. Josupeit, D. Kalikoski and C.M. Lucas, *Fishers' Knowledge and the Ecosystem Approach to Fisheries: Applications, Experiences and Lessons in Latin America* (UNFAO Technical Paper 591, Rome, 2015).

[22] W. Balée, 'The Research Program of Historical Ecology', *Annual Review of Anthropology*, 35 (2006), 76.

[23] C.L. Crumley, 'Foreword', in W. Balée (ed.), *Advances in Historical Ecology* (New York, 1998), xii. For an excellent discussion of Snow's concept of the 'Two Cultures', and its relevance to modern discussions about fisheries ecosystems and fisheries management, see Máñez and Poulsen, *Perspectives*, 5-6.

edited volume entitled *Time and Complexity in Historical Ecology*, over half (eleven) of the contributors were anthropologists, alongside seven natural scientists, two archaeologists and one geographer.[24] All-in-all, despite the nominal emphasis of historical ecology, it has so far tended to reflect the research agenda of anthropologists and, to a lesser extent, natural scientists: historians have yet to claim a significant share of the new field.

There are good reasons for this. As has already been noted, historical ecology began as a sub-discipline (or, perhaps, an offshoot) of the work of ecologically-minded anthropologists, and it seems there are those who would have it remain so. William Balée, for example, used much of his 2006 discussion on 'The Research Program of Historical Ecology' to stake a claim for it as a distinctive approach to studying the relationship between human societies and landscapes in comparison to other, related approaches. He first compared it to, and then distinguished it from cultural ecology, anthropological systems ecology, political ecology and ecological systems theory, setting out the subtle differences between the theoretical precepts of each of these approaches and historical ecology in turn.[25] For the purposes of this discussion, though, it is important to note that he acknowledged that "[h]istorical ecology has been most often conflated with environmental history". Balée rejected this conflation on the grounds that environmental history "is not a perspective that articulates hard-core postulates, such as historical ecology does".[26] Yet these 'hard-core' postulates seem in no way inconsistent with environmental history, properly practiced. As articulated by Balée, they are: (a) that practically all environments on Earth have been affected by humans; (b) that human nature is not programmed genetically or otherwise to lessen or augment species diversity and other environmental parameters; (c) that different types of societies impact landscapes in dissimilar ways; and (d) that human interactions with landscapes in a broad variety of historical and ecological contexts may be studied as a total (integrative) phenomenon.[27]

It could be that Balée's intention was to protect the 'hard' theory of historical ecology as a social science against what he perceived as the 'softer' approach of

[24] W. Balée and C.L. Erickson, *Time and Complexity in Historical Ecology* (New York, 2006).
[25] Balée, Research Program', 79-81.
[26] *Ibid*., 80.
[27] *Ibid*., 76.

interpretive history (though he was by no means explicit about this in his article).[28] Whatever the reason for his insistence on the theoretical uniqueness of historical ecology, it seems in direct contrast to his (and many others') explicit avowal that it is actually neither a discipline nor a stand-alone theory, but an integrative approach to the history of human-landscape interactions. For example, at the beginning of his 2006 article Balée described historical ecology as "a new interdisciplinary research program".[29] Elsewhere, he called it a "metalanguage" for bridging the gap between Snow's 'two cultures'.[30] Carole Crumley suggested that historical ecologists "draw on a broad spectrum of evidence from the biological and physical sciences, ecology, and the social sciences and humanities".[31] In his forward to Dave Egan's *Historical Ecology Handbook*, Kurt Meine described historical ecology as a "meeting ground of disciplines," and suggested that it is necessary because "the daily work of conservation, restoration and environmental reform requires the reality check of science and history".[32]

There is no good reason, then, why professional historians should be dissuaded from engaging with historical ecology as a useful tool in their work, and every reason to believe that the historian's craft can be useful to the development of this new metalanguage. Indeed, Alan Baker, echoing Balée, was keen to point out that, "[s]ome historical ecologists refer to their own work as being environmental history and all acknowledge their debt to 'environmental historians'".[33] Baker, a historical geographer by trade, was equally keen to acknowledge the difficulty of bringing together environmentalists from different disciplines to work together creatively (describing it a "Herculean task"); but was also at great pains to emphasise that "[c]rossing boundaries, not policing them" is what is required if we are to get the very best from this interdisciplinary collaboration.[34] Emilio Moran went even further, stating that, while "[t]he marriage of environmental history with historical ecology has

[28] However, it is something that is noted as a concern of historical ecologists by Emilio Moran. See E.F. Moran, *Environmental Social Science: Human-environment interactions and sustainability* (Chichester, 2011), 36.
[29] *Ibid*., 75.
[30] Balée, *Advances*, 1.
[31] C.L. Crumley, 'Historical Ecology: Integrated Thinking at Multiple Temporal and Spatial Scales', in A. Hornborg and C.L. Crumley (eds.), *The World System and the Earth System: Global Socioenvironmental Change and Sustainability Since the Neolithic* (Walnut Creek, CA, 2006), 16.
[32] C. Meine, 'Foreword', in D. Egan and E.A. Howell (eds.), *The Historical Ecology Handbook: A Restorationist's Guide to Reference Ecosystems* (Washington, 2005 edn.), xvii.
[33] A.R.H. Baker, *Geography and History: Bridging the Divide* (Cambridge, 2003), 79.
[34] *Ibid*., 78.

not been consummated," this is not because of any intrinsic barrier between the disciplines. Instead, he suggested that it "could be resolved by more interaction, given the desire of some environmental historians to ally themselves with ecological anthropological theory".[35] It could also be that this marriage would be even further enhanced (and, thus, consummation hastened) with the interaction of yet more disciplines, and nowhere is this better illustrated than in the vibrant new sub-discipline of marine historical ecology.

1.2.4 Marine Historical Ecology

Ostensibly, marine historical ecology (MHE) is merely historical ecology applied to the non-terrestrial environment. In practice, it has already demonstrated the potential to become much more than simply an adjunct to its tellurian counterpart. MHE as a distinct approach to past oceanic ecosystems is a very recent phenomenon: for the purposes of this discussion it is taken to have begun in earnest around the year 2000, which marked the start of a ten-year collaborative research programme, the History of Marine Animal Populations (HMAP).[36] HMAP began with a grant of 1.2 million U.S. dollars and incorporated three major research centres to coordinate the work of the project; at the University of New Hampshire, U.S.A., the University of Hull, U.K., and the University of Southern Denmark.[37] At the start of its work, HMAP identified a research agenda based on four basic questions:

- How has the extent and diversity of marine animal populations changed and varied over the last 2000 years?
- Which factors have forced or influenced the changing extent and diversity of marine animal populations?
- What has been the anthropogenic and biological significance of changes in marine animal populations?
- What has been the interplay of changing marine ecosystems and human societies?[38]

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[35] Moran, *Environmental Social Science*, 36.
[36] [http://www.hull.ac.uk/hmap/hmapcoml.org/History%20of%20Marine%20Animal%20Populations.swf, accessed on 11/06/2014].
[37] P. Holm, 'History of Marine Animal Populations: A Global Research Program of the Census of Marine Life', *Oceanologica Acta*, 25 (2003), 209.
[38] *Ibid*.

Answering these questions would inevitably prove complex, and required the technical expertise of a broad range of specialists from a variety of academic disciplines. Accordingly, HMAP has drawn on the work of statisticians, archaeologists, marine scientists, fisheries and marine management specialists, and historians (environmental and otherwise). Despite the scale of its work, HMAP is itself part of another, even larger project, the Census of Marine Life (COML).[39] COML reported in 2010 that it had "produced the most comprehensive inventory of known marine life ever compiled": 50 million records as of 2011, the result of the work of 2,700 scientists from over 80 nations, at a cost of 650 million U.S. dollars.[40] HMAP's role in this hierarchy was to "establish the historical baselines" for COML, to uncover and illuminate, insofar as it was possible, the historical state of the world's oceans and their resources before the modern age so as to provide a realistic foundation on which to evaluate the realities of long-term change.[41] However, the nature of this collaboration between historians and marine scientists (as well as ecologists, archaeologists and statisticians) did not sit well with all those involved. In 2005, Lance van Sittert, a South African historian and sometime regional HMAP project leader, published a critical review of the project's use of historical research, suggesting that historians had been reduced to "data serfs," miners of "reliable facts to be pressed into the service of positivist science".[42] Van Sittert's concern was that, used in this way, the history of marine ecosystems might be de-culturalized, that it could lead to a "naive empiricism" which documents physical change over time but fails to fully question the reasons for that change.[43]

There does seem to be some justification for van Sittert's criticism of the HMAP approach. Despite the rejoinder, eloquently made by its Executive Committee in 2013, that the "applied dimension" of historical research (that is, digging up quantitative archival material to aid historical-scientific modelling) is perfectly valid in itself, and is used extensively in disciplines such as town planning and climate studies, there is a case for suggesting that HMAP's role in the wider COML project was largely subsidiary and that qualitative analysis of the material from a historical

[39] [http://hmapcoml.org/about/, accessed on 11/06/2014].
[40] [http://www.coml.org/about-census, accessed on 11/06/2014].
[41] P. Holm, *History of Animal Populations (HMAP): Annual Report 2009*, 4 [http://www.comlsecretariat.org/research-activities/history-of-marine-animal-populations-hmap/, accessed on 12/06/2014].
[42] L. van Sittert, 'The Other Seven Tenths', *Environmental History*, 10:1 (2005), 107.
[43] *Ibid*.

point of view has been minimal.[44] This is illustrated by HMAP's contribution to COML's summary publication, *Life in the World's Oceans*.[45] Not only was HMAP's work reduced to a single chapter (only one of seventeen, or 23 pages out of a total of 384), but by the publishers' own account the volume is aimed at "marine scientists, ecologists, conservation biologists, oceanographers, fisheries scientists and environmental biologists": historians are not even mentioned as a target audience.[46] Despite this criticism, HMAP's approach to its work, and its relationship with the wider COML project, established a template for the place of history within MHE which has been of great use to the wider project.

If there is one essential difference between terrestrial historical ecology and MHE as they are currently practiced, it is in the relative emphasis placed on theory. As suggested above, terrestrial historical ecology continues to be more or less dominated by anthropologists and social scientists who have sought to distinguish it from other theoretical approaches.[47] Much of this emphasis on theory stems from an ongoing attempt to marry anthropological ecology with other disciplines in order to bridge the gap between the 'two cultures'. Carole Crumley, for example, writes of the advantages of synthesising complex systems theory with the influence of the French *annales* school of history, with its concepts of *événement*, *conjoncture* and *longue durée*.[48] In other words, the main stumbling block to genuine collaboration between the 'two cultures' in historical ecology has been viewed as one of theoretical or intellectual, rather than practical, differences. *Marine* historical ecology, on the other hand, developed very recently, and very rapidly, not primarily as a means of encouraging dialogue or mutual understanding between specialists working in the social and natural sciences, but as a way of solving (or at least, approaching) a particular ecological crisis in an interdisciplinary way. That crisis was the unfolding realisation, in the 1990s, that the world's oceans were facing imminent and irreversible degradation, and the creation of the HMAP project is one very good example of the way that MHE came into being specifically to address this issue. As

[44] P. Holm, M. Coll, A. MacDiarmid, H. Ojaveer and B. Poulsen, 'HMAP Response to the Marine Forum', *Environmental History*, 18 (2013), 123-4.
[45] P. Holm, A.H. Marboe, B. Poulsen and B.R. MacKenzie, 'Marine Animal Populations: A New Look Back in Time', in A.D. McIntyre (ed.), *Life in the World's Oceans: Diversity, Distribution, and Abundance* (Chichester, 2010), 1-23.
[46] [http://eu.wiley.com/WileyCDA/WileyTitle/productCd-1405192976.html#, accessed on 12/06/2014].
[47] See especially Balée, 'Research Program', 79-81, 90-91.
[48] Crumley, 'Historical Ecology', 1,3; Balée, *Advances in Historical Ecology*, xii-xiii.

has already been noted, HMAP was formulated as a tool to "establish the historical baselines" for its parent project, COML, and COML was not so much a collaborative project between the disciplines as a practical attempt (led by biologists and natural scientists) to provide a record of "marine life diversity, distribution, and abundance against which future change can be measured".[49]

Nonetheless, it should be noted that HMAP does not have a monopoly in its approach to MHE. For example, the *Sea Around Us* is a project which was initiated at about the same time as HMAP, and which set out "to study the impact of fisheries on the marine ecosystems of the world, and to offer mitigating solutions to a range of stakeholders".[50] Coordinated by scientists at the University of British Columbia Fisheries Centre, it employed a similar model of marine historical ecology as HMAP to evaluate past changes in the world's marine resources. Despite the cross-disciplinary nature of many of the research outcomes which have been produced within its ambit, the *Sea Around Us* project did not establish a formal relationship between historians and marine scientists to compare with that between HMAP and COML. Nonetheless, the *Sea Around Us* (in its widest sense, as a coordinating and proselytising body) has fostered some of the most important MHE research outcomes to date.[51] These outcomes have once again employed a wide range of historical and archaeological sources to model past populations of marine species.

Lotze and Milewski's study is an excellent example of this synthetic approach, whereby data from existing archaeological studies were placed alongside evidence from a huge range of historical and contemporary surveys to provide a concentrated model of ecological change over time in one small area of the Bay of Fundy, Canada.[52] Myers and Worm, on the other hand, took a much broader approach, compiling "all data from which relative biomass at the beginning of industrialized exploitation could be reliably estimated," to provide a global overview of the state of the world's predatory fish stocks. As a result of their meta-study, the authors were confident in stating that "the global ocean has lost more than 90% of its predatory

[49] M. Williams *et al.*, *Scientific Results to Support the Sustainable Use and Conservation of Marine Life: A Summary of the Census of Marine Life for Decision Makers* (Washington, D.C., 2011), 3 [http://www.coml.org/comlfiles/policy/ENGLISH_Policy_Report_reduced.pdf, accessed on 18/07/2016].

[50] [http://www.seaaroundus.org/help/missionstatement.aspx, accessed on 13/06/2014]. *The Sea Around Us* project first took shape in 1999.

[51] For the full list of publications generated by the *Sea Around Us* project, see http://www.seaaroundus.org/about/index.php/articles/.

[52] H.K. Lotze and I. Milewski, 'Two Centuries of Multiple Human Impacts and Successive Changes in a North Atlantic Food Web', *Ecological Applications*, 14:5 (2004), 1428-1447.

fish stocks" since the early-1950s.[53] Importantly, Myers and Worm's paper stimulated a lively debate about both methods and conclusions when dealing with the biggest questions facing marine historical ecology. Sibert *et al.* concentrated on just one of the global oceans, the Pacific, and used a much broader range of sources than Myers and Worm to estimate past landings and catches. They also used stock assessment methods, employing fisheries data to model the biological profile of targeted stocks. With this more focused approach to the data, they found Myers and Worm's estimations of biomass loss to be considerably overestimated, even concluding that the *absolute* biomass levels of some targeted species remained relatively healthy overall.[54] Sibert *et al.'s* work is a cautionary reminder that no single approach to MHE is exclusively valid, and that sweeping conclusions made from limited data always need to be tested in a more concentrated way.

More recently still, there has been something of a rush of work in response to the challenges set by the MHE agenda. Much of this has emerged, directly or indirectly, as a result of the work of HMAP and the *Sea Around Us*, and follows a similar template to earlier work; that is, placing historical and/or archaeological data alongside modern scientific or technical data (whether it be for fish stocks, fisheries landings, or ecological mapping or modelling) to provide viable technical accounts of change in the world's oceans over time.[55] There is, however, evidence that MHE is beginning to have a significant impact on discussions about marine resource use and fisheries management.[56] It could be argued that the specifically *historical* aspect of marine historical ecology still tends to be limited to the accumulation of datasets in the service of scientific models, but this is beginning to change.

[53] R.A. Myers and B. Worm, 'Rapid Worldwide Depletion of Predatory Fish Communities', *Nature*, 423 (2003), 280, 282.
[54] J. Sibert, J. Hampton, P. Kleiber and M. Maunder, 'Biomass, Size and Trophic Status of Top Predators in the Pacific Oceans', *Science*, 314 (2006), 1773-1776.
[55] See, for example, the cross-disciplinary working groups operating under the auspices of ICES Working Group in History, and Oceans Past Platform [http://www.ices.dk/community/groups/Pages/WGHIST.aspx and https://www.tcd.ie/history/opp/, accessed on 09/08/2016].
[56] G.H. Engelhard *et al.*, 'ICES meets marine historical ecology: placing the history of fish and fisheries in current policy context. *ICES Journal of Marine Science*, (2015), 72:9, doi: 10.1093/icesjms/fsv219.

1.2.5 Marine Environmental History

> [T]he history of human interactions with marine environments remains largely uninvestigated...Historians should take seriously the challenge to historicise the ocean.[57]

If there is one disciplinary framework which has the potential to encompass all the tools and methodologies outlined above, it is marine environmental history (MEH). Though grounded in mainstream historiography, MEH has developed as a particularly collaborative and outward-looking branch of the discipline. The new breed of marine environmental historians have been keen to embrace collaborative opportunities cutting across disciplinary and methodological boundaries, and to challenge the limits of their own knowledge and expertise. There are many recent examples of this, but one of the most exciting is a brand new volume, already mentioned above, which brings together historians, marine biologists, fisheries scientists and archaeologists in a single volume explicitly under the subtitle of *A Handbook of Marine Environmental History*.[58] As might be expected, there are close links and many similarities between MEH and marine historical ecology, but there is one very important difference, and it relates to provenance.

As was noted in the previous section, marine historical ecology arose from the desire of biologists and scientists to reach back into the past in order to find the origins of current issues facing the world's oceans. Marine environmental history, on the other hand, reflects the desire of historians to take their work forward, to apply historiographical tools to problems in the present. Marine environmental history grew out of the mainstream discipline of environmental history which emerged in the United States more than forty years ago.[59] Initially, it was slow to develop, as the quote from Bolster, above, suggests. He and others have put this down to a number

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[57] W. Jeffrey Bolster, 'Opportunities in Marine Environmental History', *Environmental History*, 11 (July 2006), 567.

[58] Schwerdtner Máñez and Poulsen (eds.), *Perspectives*. See also the contributions to a special 'Marine Forum' edition of *Environmental History*, 18:1 (2013), 3-126; B. Poulsen, 'Marine Environmental History', in M Agnoletti, E. Johann and S. Neri Serneri (eds.), *World Environmental History* (Oxford, 2012), available at Encyclopedia of Life Support Systems (EOLSS): [http://www.eolss.net, accessed on 19/07/2016].

[59] The origins of the discipline of environmental history, if not the title, is often attributed Roderick Nash, whose seminal work, *Wilderness and the American Mind*, was first published in 1967 by Yale University press. See also, R.F. Nash, 'American Environmental History: A New Teaching Frontier', *Pacific History Review*, 41:3 (1972), 362-72.

of factors, most notably the suggestion that the sea has traditionally suffered from being a 'de-historicized' space, incoherent and largely out of the reach of human comprehension; and, similarly, that it was perceived as unchanging, inexhaustible, beyond human influence.[60] This began to change in the 1990s and 2000s as issues such as climate change, ocean acidification, chemical and plastic pollution, and eutrophication became part of the mainstream news agenda: the world's great oceans were suddenly understood to be highly vulnerable to human activity, and therefore understandable on a human scale. Thus, marine environmental history developed as a means of understanding the origins of present-day problems within the context of past human activity, just as marine historical ecology did. But a defining characteristic of marine environmental history is that it continues to place historiography and the human context at the very centre of the field of study.

This is not to say that MEH is the sole preserve of historians, as the example of the new *Handbook*, above, demonstrates. Nonetheless, an emphasis on the human context of environmental and ecological change has led to a somewhat different approach to that of most marine historical ecology. In particular, the data which underpins the study of MHE, whilst still vital to the environmental history of the world's oceans, is viewed as only a part of the overall narrative of change. Marine environmental historians have been keen to contextualise that data with regard to the social, cultural and economic structures within which it was generated. To an extent, then, MEH has developed in the recent past as a direct response to Sittert's concerns about the 'de-culturalization' of ocean ecological history, and as a counter to the tendency of "at least some historical ecologists," who "seem resistant to the notion that numbers must be interpreted within the context of the social networks that produced them".[61] In bringing together the humanities and the natural and social sciences, MEH has the potential to provide a truly cross-disciplinary forum for the study of oceans past, and offers the opportunity for historians "to make their case more forcefully to marine biologists and historical ecologists that the study of the past requires a disciplined approach to [historical] evidence and *its contexts*".[62]

[60] Bolster, 'Opportunities', 572-4; J. Hubbard, 'Mediating the North Atlantic Environment: Fisheries Biologists, Technology, and Marine Spaces', *Environmental History*, 18:1 (2013), 89; K. Schwerdtner Máñez and B. Poulsen, 'Of Seascapes and People: Multiple Perspectives on Oceans Past', in Schwerdtner Máñez and Poulsen (eds.), *Perspectives on Oceans Past*, 2.

[61] Sittert, 'The Other Seven Tenths', 107; Taylor, 'Knowing the Black Box', 65.

[62] J.E. Taylor III, 'Knowing the Black Box: Methodological Challenges in Marine Environmental History', *Environmental History*, 18:1 (2013), 65 (my emphasis).

Chapter 2: The Long 'Lost' History of Bottom Trawling in Great Britain and Ireland, ca.1350-1860

2.1 Introduction

> Among all the fishing methods, bottom trawling...is the most destructive to our oceans...Bottom trawling is unselective and severely damaging to seafloor ecosystems. The net indiscriminately catches every life and object it encounters.
>
> *The Marine Conservation Institute*[63]

Bottom trawling has always been a controversial fishing practice. Despite a recent upsurge in concern over its impact on marine ecosystems and the world's fisheries, there is nothing new in the kind of analysis quoted above. From the earliest days of industrial (steam-powered) trawling, important questions have been asked about its impact on the marine environment, and on the long-term viability of commercial fish stocks. In late nineteenth-century Britain, two wide-ranging and extensive parliamentary commissions were established, in 1863 and 1882, which took account of fishers' complaints about the impact of steam trawling on fisheries around the United Kingdom.[64] The latter was specifically convened to look into 'Trawl Net and Beam Trawl Fishing'. The commissioners gathered 350 pages of evidence from 49 fishing stations, and published 156 pages of written appendices, the vast majority of which pointed to the destructive impact of bottom trawling in the ways described above. Yet, despite the weight of evidence, the commission refused to recommend widespread action against beam trawling, and instead came to the following conclusions: that although there was some evidence of a "falling off of flat fish" and a

[63] Discussion on 'Destructive Fishing', Marine Conservation Institute website [https://marine-conservation.org/what-we-do/program-areas/how-we-fish/destructive-fishing/, accessed on 09/02/2016].

[64] *Report from the Commissioners Appointed to Enquire into the Sea Fisheries of the United Kingdom, with Appendix and Minutes of Evidence* (London, 1866) (hereafter, *1866 Commission*); *Report of the Commissioners Appointed to Inquire and Report upon...the use of the Trawl Net and Beam Trawl, with Minutes of Evidence and Appendix* (London, 1885) (hereafter, *1885 Commission*).

"decrease of haddock" in inshore waters between the Moray Firth and Grimsby, there was "[n]o decrease in the total take of fish in the North Sea, except in the case of soles"; that trawling was "not destructive" to the spawn or fry of commercially important fish; that "[t]he injury done by the beam trawl to the food of fish is insignificant"; and, finally, that "[i]t has not been proved that the use of the beam trawl is the sole cause of the diminution of fish in territorial waters".[65] These two early commissions set a precedent, which has been followed ever since, of closely considering apparently damning evidence against trawling, whilst demonstrating a lack of political will to act decisively against it.

Further to these, and other, investigations into early industrial trawling, particularly in the North Sea, analysis of its impact became central to the work of the world's oldest and most influential scientific marine research body, the International Committee for the Exploration of the Sea (ICES).[66] The first chair of ICES Committee B, which was specifically concerned with the problem of overfishing, was Walter Garstang, who also developed the first modern statistical methods to estimate stock level changes using the landings and fishing power data of the North Sea trawl fleet.[67] Debates over the impact of fishing effort on stock abundance between the 1930s and the 1970s turned increasingly towards abstract models of what was achievable in terms of 'productive sustainability', rather than focusing on specific fishing methods. But with growing concern that single species models (or, at least, management strategies based on their predictions) had failed to predict some apparently catastrophic collapses in commercial fish stocks in the 1980s and 90s, particularly in the North Atlantic, scientists, politicians and conservationists began to look again at the actual fishing methods and gear by which such fish were being caught.[68]

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[65] *1885 Commission*, xliii.

[66] H.M. Rozwadowski, *The Sea Knows no Boundaries: A Century of Marine Science under ICES* (Washington, D.C., 2002), 50-54.

[67] *Ibid*., 50-1.

[68] The most famous – or infamous – example of recent stock collapse, which occurred against all official predictions and management advice, is that of the Newfoundland and Labrador Atlantic cod stocks in Canadian waters. The literature is extensive, but see, for example, C. Walters and J-J. Maguire, 'Lessons for stock assessment from the northern cod collapse', *Reviews in Fish Biology and Fisheries*, 6:2 (1996), 125-37; R.A. Myers, J.A. Hutchings and N.J. Barrowman, 'Why do fish stocks collapse? The Example of Cod in Atlantic Canada', *Ecological Applications*, 7:1 (1997), 91-106; and, more popularly, D. Bavington, *Managed Annihilation: An Unnatural History of the Newfoundland Cod Collapse* (Vancouver, 2010); and M. Harris, *Lament for an Ocean. The Collapse of the Atlantic Cod Fishery: A True Crime Story* (Toronto, 1998).

By the start of the new millennium, the clouds that were gathering over the world's fisheries collided with a growing environmental storm over the wider impact of fishing methods beyond single species stocks. As a result, the debate over bottom trawling has now become more highly charged than ever, and every aspect of its environmental influence is being placed under renewed scrutiny. This is illustrated, among many other examples, by a series of technical papers published by the United Nations' Food and Agriculture Organization (UNFAO) between 2002 and 2005 which looked in great detail at issues such as the benthic impact of dragged gear, discards (or bycatch) in fisheries, the mortality of fish which escape trawl gear, and the benefits of an approach to fisheries management which was mentioned in the Introduction, above, and was then in its infancy, the 'ecosystem approach'.[69] Although not all of these papers focused exclusively on the practice of trawling, it is clear that it was bottom trawling gear which was of most concern in terms of what were identified as 'problematic' fishing methods.

In the last few years, the debate over the impact of bottom trawling has taken what might be described as a 'historical turn'. Fisheries scientists have begun to look again at the evidence relating to industrial trawling from its earliest days (once again, particularly in the North Sea) this time under the auspices of marine environmental history and marine historical ecology. In 2009, Georg Engelhard attempted the first comparative study of changes in fishing power of the English trawl fleet from the first days of steam to the present day. In doing so, he concluded that modern twin-beam trawlers have a hundred times the plaice fishing power of their sailing counterparts in the 1880s, but that fisheries have become far less profitable because "everything points in the direction of great overcapacity of the current...North Sea trawling fleet".[70] In 2010, by placing evidence relating to modern landings and catch rates alongside data gathered for early steam-trawl fleets, Thurstan *et al*. found that landings per unit of effort (LPUE) in Britain's demersal fisheries declined by over 90%

[69] Food and Agriculture Organisation of the United Nations (hereafter, UNFAO) Technical Papers 443, 470, 478, 506, and *International Guidelines on Bycatch Management and Reduction of Discards* [http://www.fao.org/fishery/gisfish/servlet/CDSServlet?status=ND1saXRlcmF0dXJlX2NmJjY9ZW4mMzM9KiZzaG93Q2hpbGRyZW49dHJ1ZSYzNz1rb3M~, accessed on 22/03/2016]. See also *fn*.18 and 19, above.

[70] G.H. Engelhard, 'One Hundred and Twenty Years of Change in Fishing Power of English North Sea Trawlers', in A.I.L. Payne, J. Cotter, and T. Potter (eds.), *Advances in Fisheries Science: 50 Years on from Beverton and Holt* (Oxford, 2009), 1-25.

between 1889 and 2009.[71] In 2013, Thurstan again tackled the environmental impact of the United Kingdom's early trawl fleet, this time placing the anecdotal evidence of fishermen to the above-mentioned parliamentary commissions alongside data relating to landings and fishing power from across the twentieth century in order to demonstrate that "swift and dramatic [environmental] transformations...took place as a result of early trawling activities" from the 1860s onwards. They further described these transformations as "a turning point in British fisheries".[72]

This 'historical turn' in discussions about bottom trawling has begun to reach beyond marine environmental history and marine historical ecology, too. In recent years, many studies have noted that complaints about trawling's impact on fishery ecosystems and the benthic environment go a long way back – as far back, in fact, as the fourteenth century in England, at least. References to the existence of what was described in a petition to Edward III, in 1377, as a "wondyrchoun" – which was, to all intents and purposes, a small beam trawl – abound in modern conservation and fisheries science literature.[73] Yet, the history of this most destructive, and divisive, method of fishing between its first (and, by now, well known) description in the Plantagenet state papers and the modern era is very little known. For example, Robb Robinson, in his otherwise very detailed history of trawling in Britain, devotes only two paragraphs to its development between the fourteenth and the late-eighteenth centuries.[74] Kennelly and Broadhurst, in their overview of historical measures taken to reduce bycatch, merely state that "[t]he 14th century outcry against [the wondyrchoun] began a battle that was repeated in the 1620s," before going on to emphasise that "[t]he 19th century saw a dramatic increase in the use of the most

[71] R.H. Thurstan, S. Brockington and C.M. Roberts, 'The Effects of 118 Years of Industrial Fishing on U.K. Bottom Trawl Fisheries', *Nature Communications*, 1 (2010), DOI: 10.1038/ncomms1013, 1.
[72] R.H. Thurstan, J.P. Hawkins and C.M. Roberts, 'Origins of the Bottom Trawling Controversy in the British Isles: 19th Century Witness Testimonies Reveal Evidence of Early Fishery Declines', *Fish and Fisheries*, (2013), doi: 10.1111/faf.12034, 15. See also Chapter 4, Section 4.3, below, for a fuller discussion of this work.
[73] For example, L. Airoldi and M.W. Beck, 'Loss, Status and Trends for Coastal Marine Habitats of Europe', *Oceanography and Marine Biology: An Annual Review*, 45 (2007), 353; C.M. Roberts, *The Unnatural History of the Sea: The Past and Future of Humanity and Fishing* (London, 2007), 136-7; S.J. de Groot, 'The Impact of Bottom Trawling on Benthic Fauna of the North Sea', *Ocean Management*, 9 (1984), 178; N. Haggan and B. Neis, 'The Changing Face of Fisheries Science and Management', in N. Haggan, B. Neis and I.G. Baird (eds.), *Fishers' Knowledge in Fisheries Science and Management* (UNESCO Coastal Management Sourcebook series, Paris, 2007), 354; S.J. Kennelly and M.K. Broadhurst, 'By-catch Begone: Changes in the Philosophy of Fishing Technology', *Fish and Fisheries*, 3 (2002), 342; R. Robinson, *Trawling: The Rise and Fall of the British Trawl Fishery* (Exeter, 1999), 15.
[74] Robinson, 15-16.

major methods of fishing applied today".[75] Others have ignored, or are unaware of, the early history of bottom trawling, dating its earliest significant usage to the later-eighteenth century.[76] Overall, these authors tacitly agree with Robinson and Starkey's assertion that, prior to the eighteenth century at the earliest, the evidence relating to trawling is "[i]ncidental, qualitative and uncorroborated," and is therefore only of limited value.[77]

The remainder of this chapter looks again at the early development of bottom trawling, and demonstrates that, contrary to the current consensus, there is abundant evidence from Great Britain and Ireland that it has a rich and continuous history from at least the fourteenth century right through to the present day. Furthermore, it shows that the history of bottom trawling has always been marked by controversy, and that the issues complained of are no different in the modern era to those which have always been levelled against it. Finally, it tackles the thorny question of why the long history of the world's most productive, destructive, and controversial commercial fishing method has been overlooked up till now.

2.2 Bottom Trawling on the Southeast Coast of England, ca.1350-1650

> [W]hereas in many places within your said realm, in creeks and harbours of the sea, where there used to be good and plentiful fishing before this time, to the great profit of the realm, which is almost destroyed and ruined for a long time to come, some fishers for seven years now past have cunningly invented a type of instrument which they called a 'wondyrchoun', made in the manner of a drag for oysters, which is immeasurably long, to which a net is attached which is so thick that no manner of fish which enters can escape, however small it may be, but is forced to stay and be caught. And further, the great and long iron of the said wondyrchoun lands so evenly and forcefully on the river-bottom, that it destroys the slime growing and flourishing on the land above the water there, and also the

[75] Kennelly and Broadhurst, 342.

[76] For example, J. MacLaughlin, *Troubled Waters: A Social and Cultural History of Ireland's Sea Fisheries* (Dublin, 2010), 282; E.S. Russell, 'Trawling and the Stocks of Fish', *Journal of the Royal Society of Arts*, 91:4635 (1943), 198; E.P. Symes, 'The Torbay Fishermen in Ringsend', *Dublin Historical Record*, 53:2 (2000), 139; Thurstan *et al*., 2013, 2.

[77] R. Robinson and D.J. Starkey, 'The Sea Fisheries of the British Isles, 1376-1976: A Preliminary Survey', in P. Holm, D.J. Starkey and J.T. Thór (eds.), *The North Atlantic Fisheries, 1100-1976: National Perspectives on a Common Resource* (*Studia Atlantica*, 1; Esbjerg, 1996), 122-3.

> spawn of oysters, mussels and other fish, on which the great fish usually live and are nourished there. Using these instruments called wondyrchouns the aforesaid fishers catch so many of the aforesaid small fish in many of the aforesaid places that they do not know what to do with them, but annually feed their pigs with them, and fatten them right through; to the great damage of the whole commonalty of the realm and to the detriment of fishing in similar places. Wherefore they pray remedy.[78]

So runs the full text of that petition from the commoners of Essex to Edward III. In the context of the present discussion it is highly relevant that it is written in the form of a complaint: the net was "so thick that no manner of fish...can escape," and the "great and long iron" of the wondyrchoun was adjudged to be highly destructive to the sea bed and to everything which lay upon it. These complaints were taken seriously enough by the Crown that a commission was appointed to look into the matter, consisting of a number of Essex notables and led by Walter FitzWalter.[79] The productivity of this 'cunning instrument' was not in doubt: it caught immeasurable numbers of small fish – so many, in fact, that the fishermen who used it could find no other use for them than to fatten their pigs. Nonetheless, it was clearly and explicitly blamed for spoiling the fishing in creeks and harbours, where previously "there used to be good and plentiful fishing...to the great profit of the realm".

When one compares this ancient account with modern complaints against bottom trawling, the similarities are overwhelming. Take, for example, the quote from the Marine Conservation Institute at the beginning of this chapter, which describes trawling as "the most destructive" sea fishing method because of its indiscriminate nature and its impact on the benthos. Alternatively, take the Position Statement of the World Wildlife Fund on deep-sea trawling, published in 2007:

> Bottom trawling can do irreversible damage not only to benthic ecosystems and habitats located along parts of continental shelves and associated deep canyons

[78] C. Given-Wilson, P. Brand, S. Phillips, M. Ormrod, G. Martin, A. Curry and R. Horrox (eds.), *Parliament Rolls of Medieval England* (electronic version, Scholarly Digital Editions: Leicester, 2005), Vol. II, Edward III, January 1377 [http://www.sd-editions.com/PROME/home.html, accessed on 22/03/2016].

[79] *Parliamentary Rolls*, Vol. II, Edward III, Appendix, January-March 1377 (electronic version); D. Allen, 'A Fourteenth-Century Divorce in Stoke-by-Nayland', *Proceedings of the Suffolk Institute of Archaeology and History*, 38:1 (1993), 3-4. Sadly, no record remains of the commission's conclusions, nor of any further action taken by the Crown at this stage.

> as well as seamounts and ocean ridge systems, but also to populations of the fish species targeted as well as to non-harvest species. The practice removes most species from its path, homogenises habitat and reduces complexity.[80]

Even the UNFAO acknowledges that beam trawling "result[s] in removal or damage of sedentary living organisms (including seaweed and coral)" on the seabed, and that "[t]he major potential detrimental impact of bottom trawling on species can be the capture and removal...of small sized organisms and non-target species".[81] In fact, wherever one looks, protests and objections are being raised which mirror almost exactly those of the Essex petitioners in 1377, all of which makes it even more remarkable that, having known of this ancient petition for decades, and even centuries, those who have had cause to complain about bottom trawling in the modern era have looked no deeper into its history.

In fact, despite the fantastic detail contained in the Essex petition against the wondyrchoun, it is not the first historical mention of bottom trawling *per se*. Thirty years before it was submitted to the English king, a proclamation was issued against a similar piece of equipment, the "wonderkuil" (clearly from the same etymological root as the wondyrchoun) which was towed between two boats off the coast of the Netherlands. Here, fishermen complained because, just like the wondyrchoun, it had a mesh so small that it swept up all the immature fish and spawn to the detriment of the fishery as a whole.[82] There is some suggestion that similar gear (possibly dragged along the shoreline, and specifically designed to target small fish and fry) was used at the beginning of the fourteenth century in the Baltic lagoons of East Prussia, and even along the beaches of Filey Bay, in North Yorkshire.[83] Both Lundbeck and Robinson suggest that these earliest trawls derived from the shore-based drag nets, such as the "sagena" (seine) net which was known to have been in use in classical antiquity, and the "chalut" and "gangui" nets of Western France.[84] On the other hand, the Essex petition against the wondyrchoun suggests another

[80] World Wildlife Fund Position Statement: Bottom Trawling, November 2007 [http://www.wwf.se/source.php/1155231/WWF%20bottom%20trawling%20position%20statement%20Nov%202007.pdf, accessed on 22/03/2016].
[81] UNFAO, "Fishing Gear Types" [http://www.fao.org/fishery/geartype/205/en, accessed on 23/09/2016].
[82] D. Sahrhage and J. Lundbeck, *A History of Fishing* (Hamburg, 1992), 104.
[83] *Ibid*.; Robinson, *Trawling*, 16.
[84] *Ibid*. For a fuller discussion of the historical use of the seine net, see 104-6 below.

possible evolutionary route, from the heavy drag net, often fortified with chains, which had been used for dredging oysters on the coasts of Europe for centuries.[85]

Following that famous petition to Edward III, references to the wondyrchoun disappear from the English sources, to be replaced with the much more familiar 'trawl net'. In fact, the term 'trawl net' appears simultaneously with that of 'wondyrchoun', when another petition from the Thames Estuary complained of the use of prohibited "kiddles and trawl-nets" to the "detriment of the salmon fry and other fish spawned in the aforesaid waters".[86] In these early references – and in contrast to the description of the wondyrchoun – it is difficult to know precisely what is meant by the term 'trawl net'. In 1394, for example, an ordinance was passed demanding that "trawl-nets be *removed*" from the Thames as high as Woolwich and Greenwich, suggesting that these may have been static nets.[87] In the same year, such static nets were referred to in another commoners' petition as "trincks," which were:

> continuously fastened and attached both day and night at certain times of the year to large post, boats and anchors which cross the river Thames and other rivers of the realm, the position of which is as much the cause and reason of the destruction of the offspring and young of fish and the disturbance of the common passage of vessels;

and which, as a result, were "completely forbidden forever in the future".[88] To add to the confusion, this particular petition went on to allow that fishermen might be permitted to use the "said trincks...at all seasonable times, trawling and conveying them by hand".[89]

At this point, it seems likely that the term 'trawl net' did not have a fixed or specific meaning: it appears to have been applied to a shifting category of gear, the most common characteristic of which is that it maintained significant contact with the river or sea bed, particularly upon being dragged. As the examples above suggest, in the fourteenth century 'trawl nets' were often placed in the same category as trinck (or trink) and kiddle (or keddle, or kettle) nets. Prohibitions against trincks and

[85] Sahrhage and Lundbeck, 104.
[86] *Parliamentary Rolls,* Vol. II, Edward III, January 1377 (electronic version).
[87] *Parliamentary Rolls,* Vol. III, Richard II, January 1394 (electronic version). My emphasis.
[88] *Parliamentary Rolls,* Vol. IV, Henry VI, Appendix, January 1394 (electronic version).
[89] *Ibid*.

kiddles, both of which were static nets used in sandy bays at low tide, went back further even than those relating to the trawl. In 1236, two London Sheriffs "seized all the sailors found in the kidels standing in the Thames, and brought them with their nets, to London, and imprisoned them in Neuwegate," later burning their nets as a punishment.[90] In 1320, Estmar Coker and John Wychard were brought before the Mayor and Aldermen of London for using "twelve nets called 'tromekeresnet,' a species of kydel".[91]

It is clear that the wondyrchoun, and any other bottom trawl gear against which action may have been taken (however it was described at the time), were clearly viewed as part of a wider problem which was already perceived as having a significant impact on the estuarine ecology of the region, as well as on the economy and food supply of the capital: namely, the taking of large quantities of small and immature fish.[92] In the fourteenth century, prosecutions were brought against the use of trinck and kiddle nets by fishmongers, in particular, who complained that the taking of small fish in such numbers was having a major impact on their trade.[93] In 1386, a number of fishermen "of the country eastwards of London bridge" were sworn by the mayor to explain, in their view, "how and by whom the fish in the Thames were so destroyed that hardly a seasonable fish could be found in it".[94] Again, they pointed directly at "trenkes" and weirs, "whereby all fish, great and small, being unable to pass, were destroyed".[95] The problem of the use of such 'engines' to indiscriminately catch fish was one which affected the whole of the Thames and Medway region, so that the authorities in Kent and Essex were also given powers to ban their use and to prosecute offenders.[96]

Given the weight of evidence, it is more than likely that the development of the bottom trawl in medieval England, in the shape of the wondyrchoun, was related to the increasing popularity of long-standing problematic gear such as kiddle and trinck

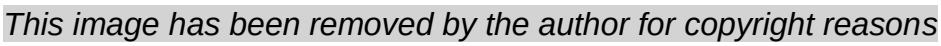
[90] H.T. Riley (ed.), *Chronicles of the Mayors and Sheriffs of London, A.D.1188 to A.D.1274* (London, 1863), 8.
[91] *Ibid*.
[92] For an extended discussion of this issue, see Section 3.1, below.
[93] H.T. Riley (ed.), *Memorials of London and London Life in the 13th, 14th and 15th Centuries. Being a Series of Extracts Local, Social, and Political from the Early Archives of the City of London, A.D. 1276-1419* (London, 1868), 133-42; R.R. Sharpe (ed.), *Calendar of Letter-Books of the City of London: H, 1375-1399* (London, 1907), 147-61.
[94] A.H. Thomas, *Calendar of Plea and Memoranda Rolls Preserved among the Archives of the Corporation of the City of London at the Guildhall: A.D. 1381-1412* (Cambridge, 1832), 116.
[95] *Ibid*.
[96] Sharpe, *Calendar of Letter-Books,* 87.

nets. Indeed, though neither was itself a form of dragged gear both shared crucial characteristics which seem to have found their way into the make-up of the wondyrchoun. The trinck, for example, was a net which was attached to a weir, and was made up of detachable parts, one of which was an "unreasonable length of...hose," also known as the "pridde net".[97] Presumably, this net was similar in shape to the net of the later wondyrchoun and to other trawl 'bags', but rather than being dragged along the bottom it was placed across the mouth of a weir and fish were simply swept into it by the force of rushing water.

We know far more about the nature and operation of the kiddle net, as it was still in use, in one form, at least, on the Kent and East Sussex coasts at the beginning of the twentieth century. In medieval London, it was described as a "weir or wooden fence set in the river hung with nets and fishing traps," but it could also refer to "a net on such a weir".[98] By the twentieth century, it was "a stake-net used in mackerel fishing...A species of nets fixed to poles placed in the sand, running some distance into the sea at low water, forming a kind of half-circle at the bottom" (see Figure 2.1).[99] In modern Sussex, kiddle-netting was clearly an extensive operation, each net being over half a mile long and twelve feet high, and being set in place for the whole of the mackerel season (from 14th April to the end of November).[100] If the later-medieval kiddle fishery was anything like as extensive, it is not difficult to see how it could pose a serious threat to stocks of pelagic and anadromous fish if used indiscriminately. Even though, on first appearance, the kiddle appears to have little or no resemblance to the dragged net of the bottom trawl, when we consider how the fish were eventually collected at low tide we can see that this operation had much in common with trawls and other drag nets which had been used close to the shore for centuries. This is clearly illustrated in Figure 2.2, which shows kiddle-net fishermen at Camber, near Rye in Kent, hauling the catch at low tide using a drag net. Indeed, it is probably no coincidence that the name given to early trawls used in the Baltic lagoons of East Prussia was the Germanic "kütel" or "keitel".[101]

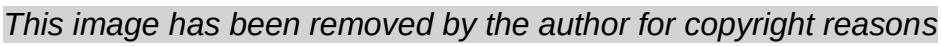
[97] L. Wright, *Sources of London English: Medieval Thames Vocabulary* (Oxford, 1996), 71, 78.
[98] *Ibid*., 66.
[99] J. Wright (ed.), *The English Dialect Dictionary* (London, 1905), Vol. III, 404.
[100] F. Buckland, *The Natural History of British Fishes; their Structure, Economic Uses, and Capture by Net and Rod* (London, 1880), 132.
[101] Sahrhage and Lundbeck, 106.

Figure 2.1: Kettle nets at Camber, Sussex, ca.1905



Source: original postcard by Whiteman of Rye

Figure 2.2: Fishermen hauling kettled fish at Camber, Sussex, ca.1905



Source: original postcard by Whiteman of Rye

Of course, it is impossible to know exactly how, when and where the very earliest bottom trawling gear developed: the most likely explanation is that it evolved in different places, at different times, and from different versions of existing static or drag-nets. It is possible that the wondyrchoun was simply an adaptation of existing gear in operation in and around the Thames estuary in the thirteenth or fourteenth centuries, or that it was introduced wholesale from the Netherlands or the Baltic region. More likely, the fishermen who used it off the coast of Essex in the 1370s used a combination of local *and* foreign intelligence to perfect their 'cunning instrument'.

It has already been noted that references to the wondyrchoun disappear from the official papers following that first petition of 1377. Intriguingly, references to 'trawling' and 'trawl nets' also vanish from the records after the early years of the fifteenth century; but so, too, do those relating to trincks, kiddles and other forms of problematic fishing gear. There is no clear indication why this should be the case, but it certainly should not be taken as proof that the use of such 'engines' declined, let alone disappeared. For example, in 1523 an inquisition at Hythe, in Kent, into an "[a]ffray between fishermen on the high sea," noted that officers of the law had recovered a quantity of stolen goods from a boat, including a topsail, shrouds and pulleys, but they also marked down as: "stolen, a net called a 'trawle'".[102] Indeed, there is some indication that a form of bottom trawling was relatively widespread on the east coast of England by the mid- to late-sixteenth century. In his preface to the 1561 English language edition of Martin Cortes' work, *The Art of Navigation*, Richard Eden mentioned, in passing, "certayne Fyshermen that goe a trawling for fysh in Catches...and Dradgies for Oysters about the sandes, between South Furland and Wyntertonnesse, and the sandes about Temmes mouth".[103] This implies that, by this date, trawling was common on a stretch of coast over a hundred miles long, between Winterton Ness, just north of Great Yarmouth, and South Foreland, near Dover. If so, it also suggests that trawling technology had spread a long way north and south of the Thames estuary in the two centuries since the wondyrchoun was first prohibited by Edward III. Again, Eden's reference to 'trawling' is tantalisingly vague, and it is impossible to know precisely what type of gear he was referring to. But evidence that

[102] J.S. Brewer (ed.), *Letters and Papers, Foreign and Domestic, of the Reign of Henry VIII*, Vol.3, Part 2 (London, 1867), 1290.
[103] R. Eden, 'Preface', in M. Cortes, *The Arte of Navigation. Conteyning a Compendious description of the Sphere*... (London, 1589), vi.

bottom trawling in the sense that we would understand it today (and that would have been immediately recognisable to the Essex petitioners in 1377) had spread far beyond the Thames estuary soon emerges in the state papers of the Stuarts.

As early as 1602, the Corporation of Rye (the last stronghold of kiddle-net fishing in the twentieth century) gave its opinion that:

> the trawl nets, commonly used by the fishermen of Hastings and other foreigners and fishermen, were reputed to be great destroyers of the fry and food of fish and should therefore be utterly prohibited and damned as altogether inconvenient.[104]

As a result of this proclamation, it was ordered that such nets "be no more used within the Cinque Ports under pain of forfeiture...and twenty shillings fine".[105] The seventeenth century saw many such proclamations, and many punishments enforced, for the use of bottom trawls in the southeast of England. John Farsby, of Hythe, Kent, was arraigned in March 1617 for unlawfully using "trail nets"; but he was defended by none other than William Angel, the King's Fishmonger, who confirmed that Farsby was licensed to "trail for plaice and soles on the coast of Kent, on condition of bringing them to London".[106] Shortly after this, the fishermen of Hastings complained about that same prohibition on trawling, which prevented them from using trawl nets without a license.[107] In February 1622, the Hythe men applied:

> for license to go to sea forthwith, being unable...to supply the increased demand for the fish occasioned by the Proclamation for strict keeping of fish days, as the soles which are now in season will meanwhile be swept up by trawlers.

In addition, the Mayor and Jurats (or Justices) of Rye sent word to the Admiralty, that "[a]ccording to [its] order for apprehension of strangers destroying the fry of fish with trawling nets," they had remonstrated with "some fishermen of Rochester and Stroud [who] said they would continue to trawl, and would answer any accusation at

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[104] Capt. Loder-Symonds, E.R. Wodehouse and *et al*., *The Manuscripts of Rye and Hereford Corporations* (Historical Manuscripts Commission, Thirteenth Report, Appendix, Part IV: London, 1892), 133.
[105] *Ibid*.
[106] M.A. Everett Green (ed.), *Calendar of State Papers, Domestic Series, of the Reign of James I, 1611-1618* (London, 1858), 456. For the importance of the fisheries in Sussex, and in particular those close to Winchelsea, for provisioning the King's table, see M. Kowaleski, 'The Seasonality of Fishing in Medieval Britain', in S.G. Bruce (ed.), *Ecologies and Economies in Medieval and Early-Modern Europe* (Boston, 2010), 133.
[107] Everett Green (ed.), *Calendar of State Papers, 1611-1618*, 457.

London". The authorities at Rye declared: "[t]he town is ruined by such proceedings".[108] In 1631, the Admiralty Court further confirmed that these measures against trawling were directed towards what we would now describe as a beam trawl, noting, alongside a transcription of that early Plantagenet petition, that "a wondrychon...is the same as a trawl now is".[109]

There is also evidence, however, of a growing tension between the Cinque Ports and the state as far as trawling was concerned. Despite the proclamation from 1602 (noted above) that recognised trawling as a destructive practice, it seems that by the 1620s its use was so widespread that prohibitions against it were actually working against the interests of local fishermen. In April 1624, a memorandum was sent to the Admiralty Court setting out documents concerning their right of trawling "in answer to the bill against it last Parliament".[110] Later the same month, the authorities at Rye appealed to the court, stating that six "English trawlers" were spotted fishing within two leagues of the town, and reaffirming that "if they are permitted to trawl, and the Rye fishermen being restrained, the town will be impoverished, and the fishing trade overthrown".[111] Local men faced considerable danger in trying to prevent the depredations of outsiders. On being confronted by the men of Rye, the six "English trawlers," noted above, shot off twenty muskets "of purpose to affrighte and terrifie them"; and in a separate incident, John Browne, another Rye fisherman, was wounded by a Rochester man for cutting his trawling nets.[112]

Such was the scale of the problem that measures against bottom trawling on the southeast coast of England increased considerably under Charles I. Under James's rule, proclamations had been made, and prohibitions enforced, at the local level, so that while it was made illegal to trawl without license around the Cinque Ports in the 1620s, in the Thames estuary it appears that some trawling was permitted, at certain times of the year, depending on the mesh size of the nets.[113] In

[108] M.A. Everett Green (ed.), *Calendar of State Papers, Domestic Series, of the Reign of James I, 1619-1623* (London, 1858), 345-5.
[109] J. Bruce (ed.), *Calendar of State Papers, Domestic Series, of the Reign of Charles I, 1631-1633* (London, 1862), 243.
[110] M.A. Everett Green (ed.), *Calendar of State Papers, Domestic Series, of the Reign of James I, 1623-1625* (London, 1859), 208.
[111] *Ibid*., 228.
[112] Loder-Symonds *et al*., 171; Everett Green (ed.), *Calendar of State Papers, James I, 1623-1625*, 222.
[113] J. Bruce (ed.), *Calendar of State Papers, Domestic Series, of the Reign of Charles I, 1633-1634* (London, 1863), 126-7.

March 1631, however, the Council of the Lords noted that "among other abuses, the using of nets, called trawls, is a principal cause of the destruction of fish," and, as a consequence, they issued an order to the Admiralty that "no trawls at all are to be used from the Long Sand Head," in the middle of the Thames estuary (equidistant between Margate and Harwich), to Beachy Head, at Eastbourne, in Sussex.[114] In May, a further, and even more explicit, proclamation was made, this time by the King himself at Greenwich. A summary of it read:

> 1. 'A proclamation for the better ordering of Fishing upon the Coasts of his Majesty's Dominions.' Dated at Greenwich, May 24, 1631.
>
> THE Preamble takes notice of the Abuses committed by the Fishermen, who had so far destroy'd both the Fish-Fry and Spawn, that they were forced to seek other Business for a Livelihood; that the Fish-days were not observed as they ought; and that the Court was often unprovided of their necessary Diet, by reason of the Scarcity and Dearness of Fish.
>
> 2. Another against the Use of a Trawl-Net in Fishing whereby not only small and unsizable Fish, but even the Fry and Spawn were utterly destroy'd.[115]

Thereafter, the details of an increasing number of those whose nets had been confiscated and whose boats were impounded appear in the Admiralty papers. In June 1631, nets were taken from six boats at Rye and eight at Barking; in the Spring of 1632, Captains Pennington, Cooke, Digby and Austen each sent multiple lists to the Admiralty of fishermen whose trawls they had confiscated. In March 1633, forty-four nets were ordered to be publicly burnt on the common at Rochester, and the lead and lines of the fishermen sold to pay for a room which was used exclusively for storing confiscated trawls.[116] Nonetheless, at the same time as this show of strength, the Council of Lords remained concerned that, "Notwithstanding his Majesty's proclamation, and the directions given by the Lords of the Admiralty, fishermen at sea still use trawls, and thereby destroy the fry of fish". As a result, a further order was issued "to cause search to be made for trawls as well on shore as at sea,

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[114] J. Bruce (ed.), *Calendar of State Papers, Domestic Series, of the Reign of Charles I, 1629-1631* (London, 1860), 559-60.

[115] This version reproduced in R. de Thoyras, *Acta Regia. Being the Account which Mr. Rapin de Thoyras Published of the History of England*... (London, 1733), 800.

[116] Bruce (ed.), *Calendar of State Papers Charles I, 1631-1633*, 78, 303, 316, 324, 329, 338, 351, 380, 544.

seizing all that are found, and taking bond of all fishermen not to use trawls any more".[117]

Fishermen continued to be pursued, prosecuted and bound over for bonds of up to £100 sterling in considerable numbers. Nonetheless, notwithstanding the Admiralty's most recent proclamation, some confusion still remained over whether or not trawling was prohibited outright. Five fishermen from Barking, examined in July 1633, maintained that Sir Henry Marten, sitting in judgement at the Court of Admiralty, had previously allowed that fish could be caught with trawls within harbours, as long as the meshes were of "a particular size". As a result, they also maintained that "Since that time they have usually fished in the harbour of the Medway with such trawls, and also in other places along the north coast as far as Winterton".[118] In August of the same year, John Vaughan and George Russell, also of Barking, again insisted that trawls were allowed by statute, and that the King's proclamation only applied to "unlawful" nets.[119]

Despite the efforts of the Admiralty to prevent bottom trawling in the southeast of England, fishermen continued to use bottom trawls, and many local fishermen who had once condemned them as destructive to the fisheries now saw them as their only chance of making a living. In August 1633, nine fishermen from Barking gave evidence that most of their townsmen, "bound or not," continued to trawl, and in the same year even John Nicholson, the water-bailiff of Rochester, stated to the Admiralty officer who came to question him that he often trawled, and "if they come to molest him he will with stones and 'libits' beat them".[120] In response to rising tensions, a further proclamation was issued in April 1635, prohibiting the use of:

> the net or engine called a Trawl, whereby not only small and unsized fish but even the fry and spawn are utterly destroyed, so that fish formerly taken upon the coasts of this kingdom in great plenty are in most places now wholly destroyed.[121]

The response of the fishermen was swift: a petition was sent from Barking a month later, bearing the signatures of 500 fishermen and complaining (as the men of Rye

[117] Bruce (ed.), *Calendar of State Papers, Charles I, 1633-1634*, 4.
[118] *Ibid*., 126-7.
[119] *Ibid*., 170.
[120] Bruce (ed.), *Calendar of State Papers Charles I, 1635*, 130.
[121] J. Bruce (ed.), *Calendar of State Papers, Domestic Series, of the Reign of Charles I, 1635* (London, 1865), 3.

had, a decade earlier) that, despite the actions of the Admiralty, the fishermen of East Mersea, West Mersea and Burnham-on-Crouch, along with those of Faversham and Whitstable in Kent, continued to "catch fish with the said engine". As a result, the Barking men, again demonstrating great ambivalence towards bottom trawling, "prayed to the Lords to allow them to use the said engine or restrain all others".[122] Their petition met with a renewed effort to put down trawls. On receipt of it, Sir Henry Marten sent an officer to Barking "to seize such trawls as he should find contrary to the proclamation," who "there seized the 36 trawls which are here enumerated with the names of the owners".[123]

The final, and most decisive, act against trawling under Charles I came, once again, from the King himself. In December 1635, a further proclamation was drafted "against the use of the net called a trawl". This proclamation was the most explicit and detailed condemnation of the many deleterious effects of bottom trawling since the Essex men sent their petition to Edward III in 1377. It read:

> Whereas the said net has been of great injury to fishing, by reason of the straightness of its meshes, the speedy sailing of the vessels to which it is annexed, and its closeness to the ground, causing it to take all the small fish, and to move the slime, fry and spawn, as well as the brood of oysters, mussels and other fish, and whereas in the reign of Edward III, a similar net called a wondrychon, which did the like harm was forbidden, it is his Majesty's pleasure that from the 1st of November next, no more use shall be made of the instrument or engine called a trawl, and that up to that date, it shall be used only in deep water.[124]

Importantly, and in contrast to all the other prohibitions and proclamations against trawling going back to the fourteenth century, this was the first (and, on the evidence available, the only) absolute nationwide ban on bottom trawling, not only in inshore waters, but also further offshore.

Following this final, decisive prohibition, the trail of the beam trawl goes cold in the Stuart state papers. In February 1642, Thomas Rabnet, the new Captain of the

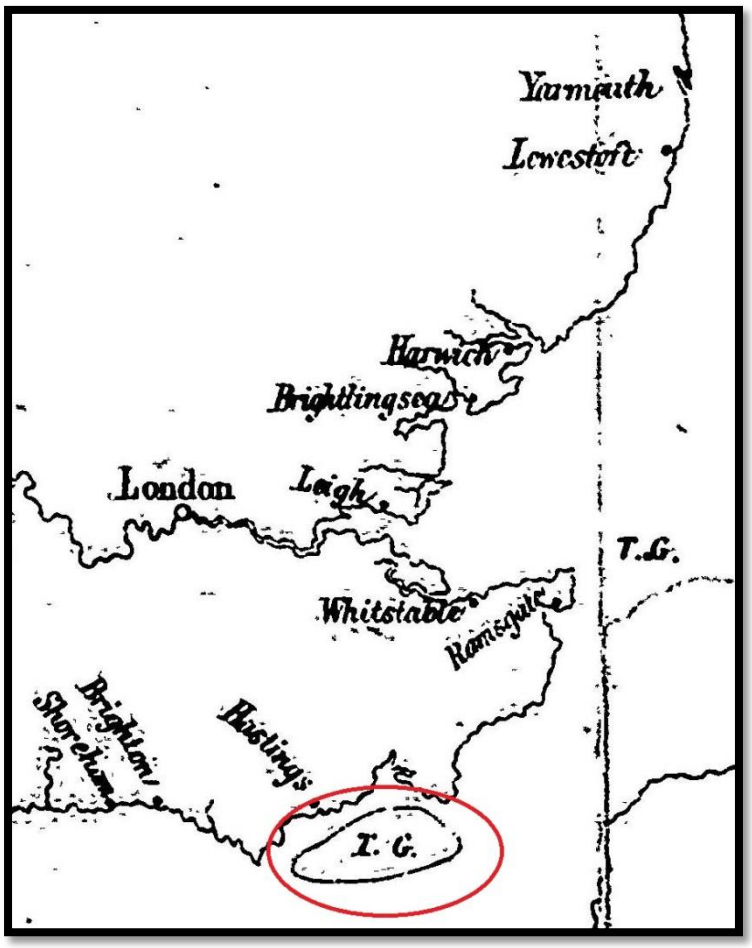
[122] *Ibid*., 92.
[123] *Ibid*., 124-5.
[124] W.D. Hamilton and S. Crawford Lomas (eds.), *Calendar of State Papers, Domestic Series, of the Reign of Charles I, Addenda: March 1625-1649* (London, 1897), 515.

Admiralty cutter, the *Henrietta*, was given instructions to "ply between Tilbury Hope" and the mouth of the Thames, in order "to take care the fishermen use no trawls, contrary to the King's proclamation"; and in 1667 there brief reference was made to "Wivenhoe trawlers" who reported seeing a large fleet of foreigners "standing towards the Buoy of the Nore".[125] But other than this, nothing more is heard of the 'lost' beam trawling controversy under the early Stuarts. So, what are we to make of this relatively short, but intense burst of legislative activity against trawling on the southeast coast of England? No doubt James and Charles Stuart's measures against bottom trawling were stimulated, in part, by a need to ensure that the royal court was well provisioned with good quality fish for the table. Since the Elizabethan re-enactment of 'fish days' – days of culinary observance when no animal flesh was to be eaten – pressure on fish stocks in the London markets had grown considerably. In 1564, Wednesday was added to Fridays and Saturdays as a fish day, and James I strengthened their observance in a number of proclamations between 1619 and 1621.[126] It has been noted that the King's fishmonger, William Angel, was specifically empowered to issue licenses for trawling despite harsh punishments aimed at suppressing it. In 1620, the authorities at Rye were specifically cautioned by officers of the royal court to "provide a better supply of fish for the King's Household during Lent, and to prevent the sale of it in open market, until the choicest is taken at moderate prices for the King and Prince".[127]

Nonetheless, despite this obvious self-interest, there was also an implicit recognition under the Stuarts of the environmental, and even the ecological, impact of trawling on important fisheries close to London. At that stage, the most urgent concern about its use related to the impact on young fish and fry and the fact that it was both indiscriminate and overly productive. It is also clear, from the wording of many of the proclamations against bottom trawling, that there were genuine concerns about the long-term viability of those valuable fisheries, and the economic impact if indiscriminate trawling was permitted. These concerns were exacerbated by the rapid spread of bottom trawling in the east Channel fisheries during the fifteenth and sixteenth centuries. In implicating "English trawlers," who shot at them with muskets,

[125] W.D. Hamilton (ed.), *Calendar of State Papers, Domestic Series, of the Reign of Charles I, 1641-43* (London, 1887), 442.
[126] J. Whittle, *Consumption and Gender in the Early Seventeenth-Century Household: The World of Alice Le Strange* (Oxford, 2012), 97.
[127] Everett Green (ed.), *Calendar of State Papers, James I, 1619-1623*, 133.

Figure 2.3: Probable location of the Zowe Bank



Source: detail from 'Map of the United Kingdom showing the Places Visited by the Sea Fisheries Commission', *1866 Commission,* viii *(T.G. merely denotes 'trawling ground' on this later map)*

the Rye fishermen in 1624 pointed specifically to a developing problem of overexploitation around the Cinque Ports. It is clear from the sources that fishermen from outside the locality, and even the region, were keen to take advantage, not only of the rich fishing off the southern Kent and Sussex coasts, but also the mature market links with London, including the royal court itself. The very first Stuart prohibition against trawling around the Cinque Ports in 1602 explicitly objected to "the trawl nets, commonly used by the fishermen of Hastings and other foreigners," and it is clear that fishermen from Rochester, Barking and other fishing centres in the Thames estuary were drawn to the region.[128] But the problem did not end there.

The main attraction of the area around the Cinque Ports appears to have been a particular bank which, according to Thomas Wemyss Fulton at the beginning of the twentieth century, extended "about one-third across the channel between Rye and

[128] Loder-Symonds *et al.,* 133.

Dieppe," and was known as the Sowe or Zowe Bank (see Figure 2.3).[129] Wemyss Fulton noted that in 1630 it was described as "3 leagues long and 3 broad, and 26 and 28 fathoms deep," and that it was also described as the "chief nursery for turbetts, hollibatts, pearles (brill), soules, weavers and gurnetts" – all of which are, of course, flatfish and ground fish ideally targeted by beam trawls.[130] The Sowe was clearly under the jurisdiction of the English crown, but such was its productivity that French fishermen had also long been attracted to it and, by custom, a few French boats each year had been licensed to fish there, ostensibly for the French king's table.[131] Fulton, again, suggests that licenses had been issued since Norman times; but clearly, by the early-sixteenth century the situation had changed dramatically. By 1616, Admiralty patrols were reporting that many French boats were fishing there under counterfeit licenses, and by 1620 the fishermen of Rye were complaining that "there is great destruction of fish in the Sowe...by means of unlawful nets and engines, especially by the French fishermen, only thirteen of whom are allowed [*licensed*], but forty or fifty [of whom] fish boldly".[132]

In many ways, the situation around the Cinque Ports and the Sowe Bank appears to have been a classic case of the irresistible impact of growing market demand on a common resource – something like Garret Hardin's "Tragedy of the Commons".[133] It appears that, by the beginning of the seventeenth century, fishing pressure had reached a tipping point which was exacerbated, if not caused, by the added productivity (as well as the indiscriminate nature) of bottom trawling. In fact, Hardin's original thesis of the inevitable degradation of common resources over time has come in for considerable criticism over the years[134], and a better model for the exploitation of the seventeenth century southeastern fisheries might be Christopher Smout's revision of it. In his 2011 article on the Firth of Forth fisheries in Scotland,

[129] T. Wemyss Fulton, *The Sovereignty of the Sea: An Historical Account of the Claims of England to the Dominion of the British Seas*... (Edinburgh, 1911), 65.
[130] *Ibid*.
[131] *Ibid*., 64-5. See also *Ibid*., Appendix C, 749-50, where he reproduces a license issued to a French fisherman in 1615.
[132] Everett Green (ed.), *Calendar of State Papers, James I, 1619-1623*, 133.
[133] G. Hardin, 'The Tragedy of the Commons', *Science*, 162:3859 (1968), 1243-48.
[134] See, for example, F. Berkes, 'Fishermen and the 'Tragedy of the Commons'', *Environmental Conservation*, 12:3 (1985), 199-206; D. Feeny, F. Berkes, B.J. McCay and J.M. Acheson, 'The Tragedy of the Commons: Twenty-Two Years Later', *Human Ecology*, 18:1 (1990), 1-19; J. Kurien, *Ruining the Commons and Responses of the Commoners: Coastal Overfishing and Fishermen's Actions in Kerala State, India*, (United Nations Research Institute for Social development, Discussion Paper 23: Geneva, 1991), 1-2; F. van Laerhoven and E. Ostrom, 'Traditions and Trends in the Study of the Commons', *International Journal of the Commons*, 1:1 (2007), 19-20.

Smout suggested that whilst "mere population growth may add to the pressure" on a common resource, "at least as significant in respect of resource use is likely to be the growth of an external market...[because] rising profits will enable [fishermen] to increase their capital inputs, improving the productivity and intensity of their exploitation".[135] In this case, the growth of external markets relates to London, especially taking into account the increased observance of fish days, and the likely expansion of the market for English fish in northern France. Trade routes to these markets had opened up substantially and this, in turn, led to increased demand, which inevitably attracted capital and intensive fishing activity (in the shape of new trawling gear) from outside local communities. As a result of this increased fishing pressure, it is likely that any measure of customary control that local fishermen had been able to exert in the past, such as resisting unpopular or over-productive fishing methods, was compromised. Increased competition for a limited (common) resource led to the widespread adoption of the most productive gear – bottom trawls – so that, not only were local fishermen unable to prevent its spread, at a certain economic tipping point they were forced to plead to be allowed to use it themselves, as evidenced by their petitions to the Admiralty and the King.

Clearly, serious attempts were made by the authorities to restrict the use of what were deemed to be overly destructive fishing methods, and to control the numbers of fishermen working in the most productive areas (such as the Sowe Bank) by means of proclamations, patrols, punishments and the judicious use of licenses. But just as clearly, these measures were ineffective in the face of a growing tide of fishermen using prohibited gear. By the mid-1630s the Admiralty papers are full of accounts of punishments meted out to trawling fishermen, including the seizure and destruction of nets and gear, the impounding of boats (including 36 in one day, in June 1635), and the arrest and binding over of men found using trawls (34 in July and August 1633 alone).[136] Yet, despite all this activity aimed at suppressing trawling, there is a note of exasperation in the officers' accounts of men who "trawl as freely as though they had never been prohibited," and who "rail...and curse" at the officials who intervene.[137] Furthermore, there is something disturbingly familiar in this account of the rapid growth of bottom trawling against the wishes of local fishermen,

[135] T.C. Smout, 'Garrett Hardin, The Tragedy of the Commons and the Firth of Forth', *Environment and History*, 17 (2011), 359.
[136] Bruce (ed.), *Calendar of State Papers, Charles I, 1635*, 125.
[137] Bruce (ed.), *Calendar of State Papers Charles I, 1631-1633*, 350, 395.

and the failure of local – and even national – measures to resist it. It is something that has been repeated again and again in developing fisheries worldwide, particularly over the past fifty to seventy years, and still the pattern repeats itself.[138] It is therefore remarkable to see the origins of this pattern, not in the Indo-Pacific in the 1970s, nor off the coast of Gujarat in the 1950s, nor even in the North Sea in the 1880s, but on the southeast coast of England as far back as the early 1600s.

2.3 Bottom Trawling in Ireland, 1733-1800

It has already been noted that references to bottom trawling in the state papers decline dramatically following Charles I's decisive proclamation in 1635. It could be that his nationwide ban was successful in limiting the activities of trawlers in the crucial fisheries in the south and east of England. Far more likely, however, is that wider political events had an even greater influence over the state of the nation's fisheries. As Adrian Franklin has noted, "under the Commonwealth, from 1650 onward, the notion of fish days was abolished "as a Popish Institution"".[139] As a result, it is likely that pressure on fish stocks from the London market subsided, and trawling was allowed to continue without further restriction. The next time we come across significant evidence of trawling as a widespread, and problematic, fishing practice is not in its supposed heartland – the south and east coasts of England, close to the London market – but on the coast of Ireland. In 1733, an Irish parliamentary committee appointed to inquire into the state of the nation's fisheries, headed by Sir Richard Cox, reported that "the Method of Trawling, now made use of in fishing the Coasts of this Kingdom, is highly prejudicial to the Fishery...and ought to be Prevented," and further resolved that "no drag-net or any sea-net ought to be made use of on any part of the coast of this Kingdom...which hath a mash [*sic*] less

[138] See, for example, C. Bailey, 'The Political Economy of Marine Fisheries Development in Indonesia', *Indonesia*, 46 (Oct. 1988), 34-36; J. Christensen, 'Unsettled Seas: Towards a History of Marine Animal Populations in the Central Indo-Pacific', in J. Christensen and M. Tull (eds.), *Historical Perspectives of Fisheries Exploitation in the Indo-Pacific* (Dordrecht, 2014), 27-31; O. Bin Jee, *Development Problems of an Open-Access Resource: The fisheries of Peninsula Malaysia* (ASEAN Economic Research Unit, Occasional Paper No.86: Singapore, 1990), 27-29; D. Johnson, 'Wealth and Waste: Contrasting legacies of fisheries development in Gujarat since 1950s', *Economic and Political Weekly*, 36:13 (2001), 1095-97, 1099-101.

[139] A. Franklin, 'An Unpopular Food? The Distaste for Fish and the Decline of Fish Consumption in Britain', *Food and Foodways*, 7:4 (1997), 252.

than three inches and an half from knot to knot".[140] Accordingly, an Act was passed which adopted the committee's recommendations with regard to the mesh-size of nets, although it made no specific reference to trawling.[141] The resolution that trawling should be completely put down was, however, reiterated by another committee in 1737.[142] Very soon after this date, confirmation that beam trawling was widespread on the south coast of Ireland is contained in one of the best early accounts of the practice and its pitfalls to be found anywhere.

In 1746, Charles Smith published *The Antient and Present State of the County and City of Waterford*, one of a number of Irish county studies which he wrote, or co-wrote, between 1744 and 1756. They were a mixture of historical and topographical observations, and were informed by his interests in both cartography and natural history.[143] The volume on Waterford must have been particularly close to his heart, as Smith was himself a Waterford man: he was born in the city and trained as an apothecary in nearby Dungarvan.[144] Among his many other interests, Smith had a keen knowledge of the local fisheries and he dedicated an entire chapter to them in his local study. In keeping with the times, he was something of a fisheries reformer, bemoaning the local fishermen as "primitive," lacking in zeal (even at Dungarvan, which was a fishing centre of considerable stature), and he promoted the fashionable plan of establishing fisheries companies in the region which, he believed, would be much better placed to exploit the "inexhaustible" riches of the seas around the south coast.[145] But he also complained that, "[a]bout 30 or 40 years ago [Dungarvan] was frequented by a considerable number of fishing vessels, not only from many parts of this kingdom, but also from England," and that "the fishery has of late much failed, which is a general complaint all over the kingdom".[146]

Although he offered no direct opinion on why the fisheries were in decline, he went on to describe at length a "pernicious practice" which, he said, had been taken

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[140] *The Journals of the House of Commons of the Kingdom of Ireland, from the Fifth Day of October, 1731, Inclusive, to the Ninth Day of April, 1748, Inclusive* (London, 1796), 101-2.
[141] *Acts and Statutes made in a Parliament begun at Dublin, the Twenty Eighth Day of November, Anno Dom, 1727* (Dublin, 1734), 459-62.
[142] *The Journals of the House of Commons of the Kingdom of Ireland*, 258-9.
[143] E. Magennis, 'Smith, Charles (*c.*1715–1762)', *Oxford Dictionary of National Biography*, Oxford University Press, 2004 (online edition) [http://www.oxforddnb.com/view/article/25781, accessed on 22/03/2016].
[144] *Ibid*.
[145] C. Smith, *Antient and Present State of the County and City of Waterford: Being a Natural, Civil, Ecclesiastical, Historical and Topographical Description thereof* (Dublin, 1746), 259-60. For a discussion of early-modern fishing companies in a wider British context, see Chapter 3, Section 3.2 below.
[146] *Ibid*.

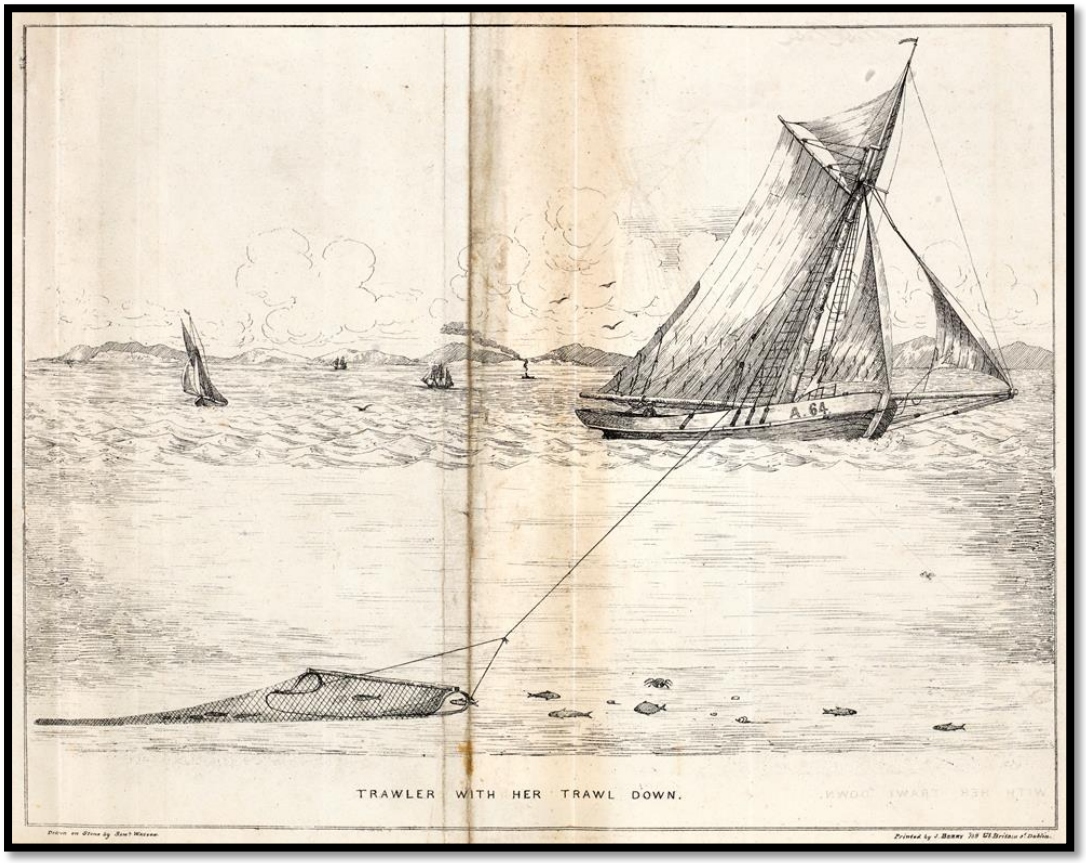
up “before the war”.[147] This practice was “tralling,” and he directly implicated it in the decline in stocks of hake (*Merluccius merluccius)* which had traditionally been exported in great quantities from Waterford to Spain. He went on to describe this new practice at length, and his description is worth dwelling on in some detail. Smith suggested that all kinds of flat fish were “taken in Trail-nets,” and that “an hundred pair of large soals, with a good quantity of fluke, plaise, &c. have been commonly taken at a draft”.[148] Clearly, bottom trawling was already a lucrative practice off the Waterford coast. He describes the “beam-trail or trall” as consisting of:

> a large beam or pole, generally between 20 and 30 feet long, headed at both ends with large flat pieces of timber, which resemble the wheels of a common cart, except that instead of being round like them, they are rather semicircular, or resembling an heart cut in two lengthways; they are shod like the wheels of a cart, with iron; to this beam the Trail-net or bag is fixed, and at each end ropes are fastened; by the help of which the ground is intirely swept so clean, that I have been assured a fisherman will venture to throw his knife or any other such small matter over-board in 30 or 40 fathom water, and readily take it up again; and thus the ground is swept clean for a considerable tract, at every put as they call it, the boat commonly sailing a mile or perhaps a league, before the bag and beam are hauled up.[149]

It would be difficult to find a better literary description of basic beam trawl gear from any period. From the iron trawl heads, which resembled “an heart cut in two lengthways,” to the “trail-net or bag,” which was fixed to a 20 or 30 foot beam, and on to the ropes at each end by which it was dragged over the sea-bed, this piece of equipment would have been instantly recognisable in Kent and East Sussex in the 1630s, in Devon in the 1830s, and, indeed, anywhere along the North Sea coast from the 1840s to the 1870s. Compare Smith’s description, for example, with the illustrations of beam trawls from Brabazon’s 1848 work on the Irish fisheries, and J.W. Collins’ 1887 description of the *Beam Trawl Fishery of Great Britain* (Figures 2.4 and 2.5).

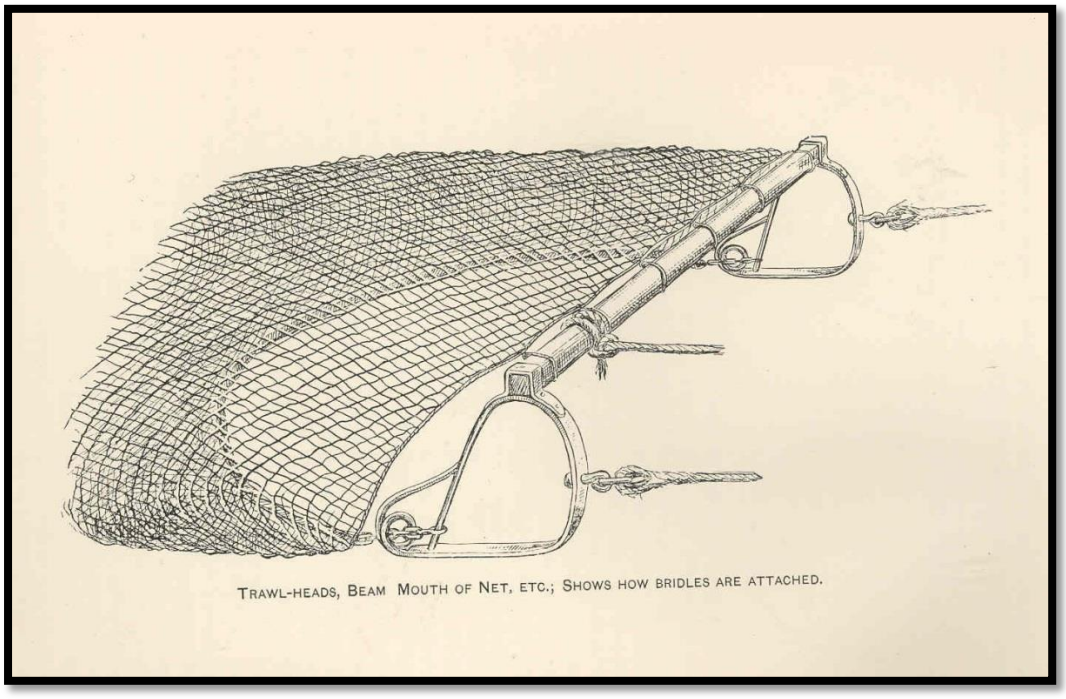
[147] *Ibid.,* 261. Smith does not explain to which war he refers. However, his later discussion relating to the discovery of the Nymph Bank (see below) strongly suggests that the “war” in question is actually the Battle of Jenkins’ Ear (1739-42).
[148] *Ibid.,* 265.
[149] *Ibid.,* 266.

Figure 2.4: Illustration of sail trawler towing beam-trawl gear



Source: W. Brabazon, *The Deep Sea and Coast Fisheries of Ireland* (Dublin, 1848)

Figure 2.5: Illustration of beam-trawl gear



Source: J.W. Collins, *Beam Trawl Fishery of Great Britain* (Washington, 1887)

But Smith not only offered one of the great early descriptions of the beam trawl, he also summarised quite wonderfully the pitfalls of this kind of gear, echoing the complaints of fishermen from the fourteenth century onwards. It was, he wrote, "the best contrivance yet invented for the taking of flat fish, which generally lie grovelling upon the ground". But, he went on:

> it has great inconveniences, for 1st, it sweeps and tears away all the sea-plants, moss, herring-grass, &c. which some fish feed on, making those species to seek elsewhere for food. 2ndly, it disturbs and affrights the large kinds of fish, as cod, ling, &c. in the same manner as if pursued by large fishes of prey. And, 3rdly, which is worse than all, these Beam-nets and others of the kind which are dragged along the ground, tear away, disturb, and blend up the spawn of many kinds of profitable fish, in a terrible manner, and often many Hogsheads of their spawn are drawn up in the Trall-bags; in which may be distinctly seen several thousand embryos of young fish, some half formed and others alive; and not only what is thus taken up of the spawn is ruined, but also large tracts of it which lie on the sand beds, over which these destructive beams are drawn, and which being covered over with spawn, is all disturbed, and consequently, hindered from ever coming to maturity.[150]

Smith finished by asserting that, "it is a matter of fact well known in these parts, that since these Trail-nets have been used (which is but of late years) the other more beneficial branches of the fishery have every year failed more and more".[151] Notwithstanding the accuracy of his ecological understanding, that the trawl net and beam destroyed the spawn of many commercially important species of fish (which is a view shared in all early complaints against beam trawling), in just about every other respect Smith's list of "inconveniences" are the same as those of the Essex fishermen in 1377, and those of critics of the practice in the modern era.[152]

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[150] *Ibid*., 266-7.
[151] *Ibid*., 267-8.
[152] There is some evidence that the common early (that is, pre-1900) complaint that the beam trawl destroyed the 'spawn' of many commercially important fish was clearly wrong. For example, Thurstan *et al*. note that "In reality, with a few exceptions like herring whose spawn does attach to the seabed, this 'spawn' was most likely bottom-living fauna such as ascidians". Thurstan *et al*., 'Origins', 12-13. However, it must also be borne in mind that, by the seventeenth century, herring were the single most important commercial species around much of the coastline of Great Britain and Ireland. Indeed, Smith himself directly implicates beam trawling in the decline of herring fisheries around the Waterford coast later in the same passage, suggesting that "finding the

It appears that the practice of beam trawling with substantial gear (Smith notes beams of up to 30 feet long) was stimulated in large part by the discovery of a new fishing bank off the south coast of Ireland between County Waterford and the north coast of Cornwall. In 1736, William Doyle, an Irish hydrographer and marine cartographer, set out with seven men on a yacht to map the new bank which he described as being located "about eleven leagues S.S.E. from the High Land of Dungarven".[153] Anchoring in almost forty fathoms of water he and his crew set about fishing on the bank, "and found wonderful affluence of fish, such was the number of excellent large well-fed cod, hake and ling, reas or schetes [*rays or skates*] of a monstrous size, bream, whiting, red gurnet, and other fish".[154] Indeed, in his enthusiasm Doyle wrote that "I never saw better diversion, and I think it extraordinary that a bank so near the land as eleven leagues, and its dimensions unknown, should have been many ages neglected".[155] This bank he named the Nymph Bank, in honour of the yacht in which he was sailing when it was discovered (Figure 2.6); and not only is it still known by that name, but there are also indications that it remains the site of high spawning aggregations of commercial fish.[156]

At this point, it is worth noting the similarities between some of the conditions that led to the widespread adoption of commercial bottom trawling on the Nymph Bank in the 1730s and 40s, and on the Sowe Bank in the late-sixteenth and early-seventeenth centuries. Both banks are located offshore, but are close to major fishing centres of many decades', and even centuries', standing (London in the case of the Sowe, and Dungarvan in the case of the Nymph Bank).[157] Both appear to have been exploited, at least in part, as a result of the conjunction of a number of major and interrelated factors: growing demand for cheap protein in the shape of sea fish, and declining stocks in the most accessible inshore fisheries (around the bays and harbours of County Waterford in Ireland, and in the estuaries of the Thames and Medway in southeast England). And in both fisheries, the discovery or further

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great havock made there by those kind of Beam-tralls," the "mother-fish" will avoid their normal spawning grounds "as being unfit for the safety of their young". Smith, *Antient and Present State of Waterford*, 269-70.

[153] W. Doyle, *A Letter to Every Well-wisher of Trade and Navigation* (Dublin, 1739), 1.

[154] *Ibid*., 1-2.

[155] *Ibid*., 2.

[156] L. Dransfield, O. Dwane, C. McCarney, C.J. Kelly, B.S. Danilowicz, and J.M. Fives, 'Larval Distribution of Commercial Fish Species in Waters Around Ireland', *Irish Fisheries Investigation*, 13 (2004), 33 .

[157] Smith cites an unnamed work by the sixteenth-century polymath and occultist John Dee, which identifies Dungarvan and a handful of other towns as the main centres of fishing in Ireland. Smith, *Antient and Present State of Waterford*, 259.

Figure 2.6: William Doyle's original map showing the location of the newly-discovered Nymph Bank off the south coast of Ireland. *(The legend at top left reads: "The Nymph Bank abounding with Excellent Cod, Hake, Ling & other Fish in 38 fathom Water the Ground small Pebble stones with Cockle and other Shells.")*

Source: W. Doyle, *A Letter to Every Well-wisher of Trade and Navigation* (Dublin, 1739).

exploitation of a particularly productive bank was aided by the fact that they were topographically ideal for bottom trawling, being largely flat and sandy, and apparently free from major obstacles such as rocks.[158] In addition, it seems that in both fisheries

[158] Wemyss Fulton, 65; R. Fraser, *A Review of the Domestic Fisheries of Great Britain and Ireland* (Edinburgh, 1818), 9.

local precedents for beam trawling did exist before it was adopted on a much larger scale on these offshore banks. In the southeast of England, we know that some inshore beam trawling, almost certainly with relatively small gear, had been practiced for many centuries in the Thames Estuary and the Medway, and perhaps much further afield. In Ireland, it is clear that something similar had been practiced from at least the 1730s. It would be incautious to overdraw the parallels between these two very different fisheries in an attempt to explain the emergence and re-emergence of large-scale bottom trawling in different places at particular points in history. Nonetheless, as we will see later in this chapter, very important questions remain about the nature of the pressures that led to this most controversial and, often, bitterly resisted form of fishing being historically adopted in quite specific localities, and it may well be possible to identify some of the environmental and economic tipping points that were instrumental in breaking down that resistance.

In Ireland, however, we know that trawling continued to spread as a locally important, and hotly contested, fishing practice long after the opening up of the Nymph Bank. For example, Smith confirmed that it was the chief means for taking sole (*Solea solea*) off the coast of Cork by the later-1750s.[159] The first local statute against trawling in Dublin Bay was passed in 1773, a measure that was re-enacted more than once before the end of the century. In the 1777-8 session, a similar prohibition was imposed in the waters around Cork harbour, so that "if any person or persons shall from...the first day of August next [1778] take or destroy any fish whatsoever...by trawling in the harbour," they would be liable to a fine of ten pounds and the confiscation of all fishing gear, sails and rigging.[160] This measure was repeated for the harbours at Waterford in 1784 and Dungarvan in 1787.[161] There is little doubt, then, that by the end of the eighteenth century beam trawling already had

[159] C. Smith, *The Antient and Present State of the County and City of Cork*, Vol. II (Dublin, 1750), 306.

[160] F. Vesey, *An Appendix to the Abridgement of the Statutes of Ireland; Containing an Abridgement of the Several Acts Passed in this Kingdom, in the Seventh Year of the Reign of...George the Third, to the Eleventh and Twelfth Years inclusive* (Dublin, 1773), [no page number, second section, under "Fish"]; *The Statutes at Large, Passed in the Parliaments held in Ireland...Continued to the Twentieth Year of George the Third, A.D. 1780, inclusive* (Dublin, 1782), 229; *Journals of the House of Lords, Vol. V, From 16 Geo. III 1776, to 26 Geo. III. 1786* (Dublin, 1786), 53; *Statutes passed in the Parliaments held in Ireland, Vol. VI, Containing the Thirteenth and Fourteenth Years of George. A.D. 1773-4, to the Nineteenth and Twentieth Years of George III. A.D. 1779-80, inclusive* (Dublin, 1796), 401-3.

[161] F. Vesey, *An Appendix to the Abridgement of the Statutes of Ireland; Containing an Abridgement of the Several Acts Passed in this Kingdom, in the Twenty Third and Twenty Fourth Years of...George the Third* (Dublin, 1784) [no page number, under "Waterford," paragraph LXIV]; *Statutes passed in the Parliaments held in Ireland, Vol. VIII, Containing From the Twenty-sixth Year of George III. A.D. 1786, to the Twenty-eighth Year of George III. A.D. 1786, inclusive.* (Dublin, 1798), 418-9.

a long history on the south and east coasts of Ireland, just as it did on the south and east coasts of England. It was practiced on a large scale on the offshore fishery of the Nymph Bank as early as the 1740s, but it was also locally common in many bays and harbours in the 1770s and 1780s; and judging by the first mention of it (by the committee appointed to look into the Irish sea fisheries in 1733) it may even have been widespread around parts of the Irish inshore coastline much earlier than that. Elsewhere in the north Celtic and Irish Seas towards the end of the eighteenth century there is evidence that similar local prohibitions were put in place at St. Ives in Cornwall, in 1776, to protect the pilchard fishery, and that trawlers were travelling all the way from Liverpool and Portrush, in County Londonderry, to fish off the coast of the Isle of Man and in Dundrum Bay by the end of the century.[162]

Returning to the south and east coasts of England, there is abundant evidence that bottom trawling was commonly and continuously practiced from at least the beginning the Stuart campaign against it right through to the modern period. Casual references to trawling abound, from an account at Winchelsea dating from 1730 and another from Kent in 1755, to a passing mention at Brightlingsea in 1761 and yet another from Brighthelmstone (Brighton) in 1776. By 1794, complaints were once again being voiced that "[w]ithin the last thirty years, the fisheries have very much declined," this time at Hastings; although the author did acknowledge that there were still "great quantities of herrings, mackerel and trawl fish caught, and sent to the London market".[163] It is at this point that Brixham and the fishing communities around the Torbay area of Devon become more prominent in the historical records. In 1795, the Revd. John Malham wrote that, at Brixham, "a great many of those small vessels, called Torbay boats, are kept here for the purpose of trawling out at sea," and by the early years of the nineteenth century Brixham was acknowledged as an important source of fresh fish for many major markets, including London.[164] Robinson

[162] *The Statutes at Large from the Seventh Year of the Reign of King George the Third, to the Eighteenth Year of the Reign of King George the Third, Volume the Eighth* (London, 1786), 471; Revd. J. Dubourdieu, *Statistical Survey of the County of Down, with Observations on The Means of Improvement; Drawn up for the Consideration, and by Order, of the Dublin Society* (Dublin, 1802), 251.

[163] *Magna Britannica et Hibernia, Antiqua & Nova; or, A New Survey of Great Britain*, Vol. 5 (London, 1730), 501; J. Ellis, *An Essay towards a Natural History of the Corallines, and other Productions of the Like Kind, Commonly found on the Coasts of Great Britain and Ireland* (London, 1755), 83; *London Chronicle*, May 16-19, 1761, 475-6; Anon, *The Brighthelmstone Directory or Guide for that Place* (London, 1776), 24; Anon, *The Hasting's Guide; or, a description of that Ancient Town and Port, and its Environs* (London, 1794), 61.

[164] Revd. J. Malham, *The Naval Gazetteer; or Seaman's Complete Guide*... (London 1795), 133; P. Wakefield, *A Family Tour through the British Empire*... (London, 1808), 291-2.

notes that the town had at least 100 trawl boats by 1786, and he also makes the point that by this time the Devon boats were travelling long distances to fish offshore, as far as Sussex and Kent, and even Norfolk.[165]

Once again, this invites speculation about the causal factors involved in the rise to prominence of trawl fisheries in certain locations over time. Clearly, by the beginning of the new century the development of railway networks was still some way off, so communications from Devon to London and other major centres would have been a relatively slow affair (up to two days' travel from Exeter to London by the turnpike roads). It is therefore very unlikely that it was straightforward proximity to large markets which led to Torbay developing as the major trawling centre in England in the last decades of the eighteenth century. It could be that the pressures which had long been reported on fisheries closer to the metropolis (on the Kent and East Sussex coasts, for example) were instrumental in the geographical spread of commercial demand. As Robinson notes, the Devon trawlers were far from restricted to their own local fisheries. Nonetheless, if we take into account that, two centuries previously, the trawl fishery in the south of England had been quite firmly focused on the Cinque Ports and the Thames estuary (especially at Barking), and that in the early eighteenth century Hastings remained an important trawling centre, then we must search for other explanations to account for the rise of Brixham over these other locations later on in the century. But this is a discussion for later in the chapter, and before we move on to an overall appraisal of the trajectory of the trawl fisheries before the nineteenth century, it is important to note how they developed, and how they were viewed and reported, in the great age of pre-industrial fisheries' development between 1800 and 1860.

2.4: Trawling by Sail in the Nineteenth Century, ca.1800-1860

2.4.1: The Spread of Beam Trawling on the South Coast of England, ca.1800-1843

Despite the rise to prominence of Torbay as the main centre of commercial trawling in the United Kingdom and Ireland in the later-eighteenth century, trawling activity was, as we have already seen, far from restricted to this area alone. This is briefly

[165] Robinson, *Trawling,* 18.

acknowledged by Robinson; but in general it has tended to be ignored by others who have provided commentaries on sea fishing in this period.[166] For example, in South Wales attempts were made to established viable commercial trawl fleets at Swansea in 1770, and at Milford Haven in 1813, the latter of which was to trawl as far as the Devon and Irish coasts, and there is also documentary evidence of trawling activity around Tenby in 1804.[167] Back in Ireland, while the 'problem' of inshore trawling was still being tackled with local prohibitions and by-laws, more distant fisheries were beginning to be opened up off in the Irish Sea, from the port of Dublin. Robert Fraser noted that in 1802 the number of wherries in Dublin County, from 20 to 50 tons, was 87, and he went on to add that although they used long lines to catch demersal fish, they were also "furnished with nets for trawling, in order to catch ground fish".[168] In 1819, a new venture, the Dublin Fishery Company, was launched by a consortium of businessmen to trawl in the Irish channel. The company purchased seven Devon smacks, from 35 to 40 tons each, and recruited a number of Devon fishermen to crew them, bringing the men and their families over to Ireland on a permanent basis.[169] As a result, it was reported as early as 1820 that "Banks are every day discovered by their boats, that were totally unknown to our native fishermen, who did not venture out far enough to sea".[170] Though of relatively modest proportions, the Dublin Fishery Company met with reasonable success and survived intact until 1830. In the longer term, it laid the foundations for an offshore trawl fishery by sail which flourished in the Irish Sea until the eve of the twentieth century, and many of descendants of those first Brixham migrants continued to man the boats.[171]

Despite accounts of its early success, the Dublin Fishery Company's attempts to develop offshore trawling did not go unopposed. Local fishermen from Howth pursued the new smacks when they first arrived, pelting them with rocks and threatening to cut the throats of the crews.[172] The pursuers were clearly well

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[166] *Ibid*., 16.
[167] *Ibid*.; *The Tradesman; or, Commercial Magazine* (London, 1813), 332-3; E. Donovan, *Descriptive Excursions through South Wales and Monmouthshire, in the year 1804, and Four Preceding Summers* (London, 1805), 393-4.
[168] Fraser, *Review*, 8-9.
[169] Symes, 'The Torbay Fishermen in Ringsend', 140-1.
[170] Anon, *A View of the British and Irish Fisheries, with recommendations for the establishment of An Irish National Fishing Company* (Dublin, 1820), 93-4.
[171] J.L.J. Hughes, 'The Dublin Fishery Company, 1818-1830', *Dublin Historical Record*, 12:2 (1951), 44-5; Symes, 143-4.
[172] *The Morning Post*, 30th July 1819; Symes, 142.

coordinated, with the *Morning Post* reporting that there were "three squadrons of six [wherries] each...[and] one wherry carried a red flag, and appeared to have a person on board who commanded the entire, as orders were issued from it, and promptly obeyed".[173] On this occasion, the company boats quickly returned to port with the locals in hot pursuit, the last of them only surviving unscathed because its skipper promised that his boat would not put to sea again for the purpose of fishing.[174] The precise grievances of the Howth men are not recorded in the report: it could be that they were against trawling *per se*, or it may have been a more basic hostility against well-trained and highly capitalized competition from outside. Nonetheless, the level of threatened violence of the Howth men serves to remind us of the kind of bitterness and rancour that bottom trawling has always aroused when it has encroached on the livelihoods of traditional fishing communities. Conversely, the very nature of the Dublin Fishery Company's operation also points to another tendency in the history of trawling which was on the increase: that opponents of beam trawling, who had, to an extent, enjoyed a monopoly on commentaries about it until the start of the nineteenth century, were now joined by advocates who saw in trawling new opportunities for the exploitation of offshore fisheries and the provision of cheap protein for ever-expanding populations.

Hely Dutton, in his survey of Galway, was the first, but (as we shall see) by no means the last, to bemoan the "ridiculous prejudice" of the fishermen of the Claddagh (the most important fishing settlement in the region) who successfully resisted trawling in Galway Bay.[175] Noting, once again, that their objection related to the disturbance of spawn on the seabed, he haughtily dismissed their concerns, stating that:

> If this is correct, they should encourage the disturbance of it to induce turbot, soles, &c. to come after their food, for it is generally agreed that the spawn is mostly of black pollock, a worthless fish.

[173] *The Morning Post*, 30th July 1819.
[174] *Ibid*.
[175] H. Dutton, *A Statistical and Agricultural Survey of the County of Galway, with Observations on the Means of Improvement; Drawn up for the Consideration, and by the Direction of the Royal Dublin Society* (Dublin, 1824), 397-8.

Dutton went on to assert that "[i]t is well known that on the coast of England, where trawling has been practised for centuries, no diminution has taken place".[176] Notwithstanding his recognition – which runs contrary to that of most modern commentators – that English bottom trawling already had a long and illustrious history by the early-1800s, on the question of whether or not it was uncontroversial he was clearly wrong. As we have seen, from the very earliest accounts of bottom trawling it was always viewed as a destructive and damaging practice wherever it took place, both to the stocks of fish and to the sea bed itself. In fact, in 1824, when he published his survey, Dutton's opinion about perceptions of trawling in England had recently received another significant challenge.

In 1817, the first of many nineteenth-century parliamentary committees and commissions on the sea fisheries of the United Kingdom and Ireland was established. This one was convened specifically to look into the state of the South Devon fisheries.[177] Even though the commission itself operated on a relatively small-scale, both in terms of its geographical and its inquisitorial remit (the report and minutes of evidence combined run to only eight pages), the 1817 Report is important for a number of reasons. For one thing, it was the first modern parliamentary inquiry established specifically in response to concerns over apparent declines of fish stocks. Leading on from this, it is highly significant that it focused on what was then the 'heartland' of British trawling: Torbay and South Devon. Finally, it is notable that, once again, this inquiry was stimulated by the concerns of fishermen in the first instance, this time including trawlers themselves. The year before the commission sat to take evidence, the Brixham Fishery Society (representing all fishermen, except "two or three who were averse to the measure") resolved unanimously to impose a local ban on trawl and drag-net fishing between the beginning of April and the end of September each year, and also proposed that the mesh size of all nets used during the agreed season should be at least one inch-and-a-half from knot to knot.[178] The first of these resolutions, relating to a close time, was "a proposition emanating directly from the trawlers themselves, the largest and most important class" of fishermen in consequence of "the progressively rapid decay of the fisheries" in the

[176] *Ibid*.
[177] *Report from Select Committee* [*sic*] *on South Devon Fisheries,* 1817.
[178] *Ibid*., 3-4.

years preceding the Brixham meeting.[179] This voluntary close time applied to the whole of Torbay and Start Bay on the south Devon coast, between the headlands, and the main witness to the 1817 committee, George Vernon of Torbay, stated that it was considered to have been a great success by all the local fishermen. In its report, the committee endorsed a statutory ban on trawling and drag-netting "during the spawning season" in Start Bay, Torbay and Exmouth Bay, but it declined to go further than the existing legislation, which still lay on the statute books, with regard to mesh size.[180]

Despite the unanimity of local fishermen in South Devon, and the approval of the 1817 committee, for a seasonal ban on trawling during the summer months, no further action was taken to regulate the fishery. In response to the Committee's work, a bill was brought before Parliament in 1819 "to prevent the Destruction of the Brood and Spawn of Fish". Had it become law, the bill which would have required magistrates at quarter sessions in each maritime county in Britain to enforce close times for trawl and drag nets, to regulate the size of meshes, and to enforce a minimum size for commercial fish put up for sale. But it failed on its third reading.[181] The same bill was again brought forward in 1822 and managed to clear the Commons, but this time it was lost in the House of Lords. We know the fate of these unsuccessful bills because, within a few years, concerns about the state of the fisheries on the whole of the south coast of England led to another, far more extensive committee of enquiry.[182] This second inquiry took in many more causal factors complained of by fishermen than just trawling. These included, once again, the use of small-meshed nets for all kinds of fishing; the operations of 'stow boat' fishermen, who used very small-meshed seine nets to fish for sprats close inshore, but whose catches were then only used to provide manure; the licensing of fishing boats; the pilchard fisheries of Devon and Cornwall; the marketing of fish in London; and, in particular, the illegal importation of foreign-caught fish and the incursion of French fishermen on the English coasts.[183]

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[179] *Ibid*., 2.
[180] *Ibid*., 1. The existing legislation referred to was "the several statutes of Jac. Cap. 112, of 13 and 14 Chas II. Cap. 28, and of Geo. I. stat. 2, cap. 18".
[181] *Report from the Select Committee on British Channel Fisheries, with Minutes of Evidence and Appendix*, 1833, 10.
[182] *Ibid.*
[183] *Ibid*., 4-17.

The evidence of fishermen and others to the 1833 committee was unanimous in reporting significant scarcity of all kinds of demersal and ground fish along the south and east coasts of England, from Cornwall to Norfolk. Indeed, many fisheries relatively close to shore were reported to have failed completely. In its report, the committee summarised this evidence as follows:

> by the concurring testimony of Witnesses from all parts of the Coast...a very great and increasing scarcity of all Fish which breed in the Channel, (not including Mackerel or Herrings, which are Fish of passage,) compared with what was the ordinary supply from 15 to 20 years ago, has long prevailed,[184]

and it went on to give a detailed opinion of how such scarcity had come about:

> it has been strongly pressed upon the attention of Your Committee, and they think has been satisfactorily proved, that this scarcity of Fish has been occasioned by the great destruction of the Spawn and Brood of Fish, consequent upon the non-observance of the Laws which at present exist for their preservation, and by which the Fishing with Ground or Drag-nets within a certain distance of the Shore during particular seasons, or with Drift of Floating-nets at all seasons of the year, having the mesh of the net under certain dimensions, has been declared unlawful.[185]

The statutes to which the committee referred were the 3 Jas. I. c. 12 (1605), "An Act for the better Preservation of Sea Fish," and the 33 Geo II. c. 27, (1759). The first of these noted that:

> it is certainly known that the Brood of Sea Fish is spawned and lieth in still waters, where it may have rest and receive nourishment to grow to perfection, and that those who use Draw-nets, Nets with canvass, or engines in the midst of them, do, every day they fish, destroy the Brood of all sorts of Fish in great multitudes.[186]

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[184] *Ibid.,* 8.
[185] *Ibid.*
[186] *Ibid.,* 8-9.

The second was “An Act (among other things) to punish persons who shall take or sell any Spawn, Brood or Fry of Fish, &c.,” and any undersized fish or fish out of season.[187]

Two things of note arise here. The first is that, although the committee’s conclusions relating to the taking of fry and immature fish echoed complaints about local scarcity in inshore fisheries going as far back as the twelfth century, this is the first official recognition of the widespread failure of such fisheries across a large part of the country.[188] The second is that the statutes of James I and George II, which still lay on the books in the nineteenth century, appear, in principle, to have answered the complaints of the Torbay fishermen to the earlier committee of 1817. Indeed, both of these measures were specifically referred to by George Vernon in his evidence to that committee, but his main complaint was that, by then, the existing laws were “inefficient”.[189] The principal conclusion of the 1833 Commission was not that these measures should be completely revised, but that they did need to be strengthened and better enforced:

> Your Committee deem it essentially necessary for preserving the Spawn and Brood of Fish, that by such Bill the use of Trawl or Drag-nets in the Bays within one league from Low-water Mark, or in less than 10 fathoms of water, should be prohibited during the months of May, June, July and August, in ever year, the same being the spawning or breeding season of the Fish, and before their young Brood become of sufficient size to take refuge in deeper waters; it being of the utmost importance, that during this period the Spawn and young Brood should not be destroyed or taken by Nets which drag upon the ground, although the Fish may at the same time, and in the same waters, be taken with Floating or Drift-nets of a proper sized mesh. And it also appears to Your Committee that Conservators or Overseers should be appointed for the purpose of enforcing the Act.[190]

It is immediately obvious that, despite the committee’s acceptance of the testimony of fishermen relating to marked declines in many of the Channel fisheries, it was not solely concerned with the practice of bottom trawling. In common with many earlier

[187] *Ibid*.
[188] Although Smith had noted something similar, in passing, for the whole of Ireland in 1746. See p.43, above.
[189] *Report on South Devon Fisheries*, 1817, 3.
[190] *Report on British Channel Fisheries*, 1833, 9.

measures taken to regulate inshore fisheries, it turned its attention to the mesh size of a range of fishing nets, including static nets, and also to the imposition of close times during the spawning season.

The evidence given by witnesses to the 1833 committee was also more wide-ranging than that given in 1817. For one thing, despite the fact that there was unanimity about the failure of many branches of the fisheries in the south of England, the reasons given for these failures differed depending on the perspective of the witness. So, for example, William Smith, an ex-fisherman and merchant who still owned many boats in Brixham, stated his belief that the chief culprits were trawlers and drag-netters in the inshore fisheries; whereas Richard Turner, on behalf of the Brixham Fishing Society (which was instrumental in promoting this view 17 years previously) was by now far more concerned with the amount of fish imported from Holland, believing that it was this which had depressed trade.[191] Overall, Turner's evidence echoed the complaints of many of the fishermen on the Channel coasts, that it was the level of foreign "interference" in the fisheries, and in the commercial supply of fish, that was mostly to blame, both for declining stocks and for the impoverishment of fishermen more generally. Nonetheless, the two complaints were not always incompatible, and many fishermen, particularly at the eastern end of the Channel, blamed the French for trawling too close to the English shoreline and specifically for targeting undersized fish which, they said, were used for bait. John Lewis, of Dover, reported that the town had 40 or 50 of the largest trawl boats, but he was clear that they no longer fished in inshore waters, instead travelling up to 200 miles from the coast. On the other hand, he complained bitterly that up to 100 French trawlers:

> go into two or three fathoms of water, where we never fish ourselves, because we will not spoil the brood; we do not fish within nine or ten or from that to 20 fathom, but those fishermen come in in the morning, shoot their trawls, and get from four to five bushels of little things not bigger than two inches long.[192]

[191] *Ibid*., 111, 151. Turner's evidence was further corroborated by a second petition, this time from the owners of large boats at Brixham, who stated that "the free admission of fish into the British market...is productive of the greatest injury and loss to the British fishermen". *Ibid*., 141.
[192] *Ibid*., 54, 56-7. Lewis also confirmed that there was a scarcity of fish right along the south and east coasts, stating that "I can speak from Land's End to as far as North Yarmouth". *Ibid*., 58.

Some local trawlers, fishing on a smaller scale than the Dover men, admitted that they occasionally trawled closer inshore than was wise, and others echoed Thomas Hall, of Folkestone, when he said that they "cannot avoid that...we cannot help destroying a little, but we always try to prevent it as much as we can".[193] Nonetheless, Hall did admit that the accepted rule relating to the depth of water in which trawlers ought to work was "broke through a good deal," and that "it ought to be observed a great deal more than it is".[194] This was further emphasised by James Cornish of Avonwick, in Devon, the author of a well-known treatise on the Channel fisheries.[195] In evidence to the 1833 committee he observed that local fishermen regularly trawled within a league (or three and a half miles) of the shore, that they fished with meshes of a lesser size than was allowed by law, and that they avoided the regulations against bringing undersized fish on shore by dumping them out at sea. He stated that:

> You will find by Act of Parliament, that it is an offence to destroy the fish, by the Act of Geo. 2. The legal offence in the Act is, not to exchange, to bring to shore, or to sell. They throw them all away, and destroy the whole.

When asked whether the actions of the fishermen were illegal in discarding their undersized catch at sea, he replied: "No; but it ought to be".[196] Despite his prescient objections to the rules regarding bycatch, Cornish was clear that, "The two great things are, first of all, to keep these men beyond a certain distance from the shore; and secondly, to have a net of sufficient dimensions to allow all the small fish to escape".[197]

Overall, there is some evidence that attitudes towards trawling were changing on the south and east coasts of England by the time the committee published its report. On the one hand, local, small-scale trawlers appear to have been on the decrease, at least in part because of a recognition by fishermen themselves of the damage that could be done to the fisheries by taking too many immature fish too close to the shore (though, no doubt, it had something to do with the overall

[193] *Ibid*., 64.
[194] *Ibid*.
[195] J. Cornish, *A View of the Present State of the Salmon and Channel-Fisheries* (London, 1824).
[196] *Ibid*., 81.
[197] *Ibid*.

degradation of nearshore fisheries as well). Where this method of fishing persisted it was generally condemned, occasionally by those who admitted to practicing it themselves. Most fishermen called for tighter regulations to stop trawling close inshore, particularly during the spawning season, and to better enforce the existing regulations on the mesh size of nets. On the other hand, none of the witnesses to the 1833 commission condemned trawling *per se*, and none called for it to be banned outright. Even those who were not trawlers themselves, and therefore had the greatest cause to complain about it, were circumspect in giving evidence against it. For example, when asked whether or not he believed that, in general, trawling was injurious to the fishing on his part of the coast, Alfred Fox, a seine-net pilchard fisherman from Falmouth, answered: "I think there is probably injury done by trawling-boats, and the fishermen complain of the fishing not being so abundant as it used to be". But when he was asked directly whether or not the trawlers fished where the spawn was deposited, and, if so, whether they should be prevented, he said, "I cannot speak to that...I am scarcely competent to answer that". Similarly, John Goldsack of Dover, who was forced to abandon the herring and mackerel fishery because of declining catches, answered a question about the causal connection between trawling and the disturbance of spawn by saying, "I cannot say as to that; but they disturb everything upon the ground, because their nets are constantly upon [it]".[198]

Despite the recommendations of the committee, no further measures to regulate the fisheries were immediately forthcoming after 1833. The earlier statutes relating to mesh size and landing undersized fish remained in force, but were not immediately strengthened. As a result of further complaints and petitions from the men of Kent and East Sussex about the incursions of the French fishermen, however, the question of territorial limits was finally resolved in a treaty with France which passed into law in both countries in 1843.[199] This treaty was the result of the deliberations of a mixed committee of French and British officials which had begun negotiating as early as 1837.[200] They eventually agreed on a number of resolutions, the most important of which (in terms of territorial limits) was the establishment of the first binding agreement on a three-mile exclusion zone along the coasts of Great

[198] *Ibid*., 41-2, 70.
[199] *An Act to carry into effect a Convention between Her Majesty and the King of the French concerning the Fisheries in the Seas between the British Islands and* France (6 & 7 Vict. C.79., 1843).
[200] Wemyss Fulton, 611-5.

Britain and France. In particular, no trawling by boats from either country was to take place within this three-mile limit. However, the Convention also set, for the first time, specific conditions for beam-trawl gear for both French and British fishermen; for example, limiting the mesh-size of nets to one and three quarter inches from knot to knot and the length of the beam to no more than 38 feet. It also limited the weight of the trawl heads to 287 pounds (130kg) and the total weight of chains and leads used for weighing down the ground rope to 110 pounds (50kg). Finally, it prohibited trawling wherever herring and mackerel drifters were fishing, and required trawlers to stay at least three miles away from them.[201] For those few fishermen and others who continued to oppose bottom trawling outright, the 1843 Convention must have seemed a bittersweet victory. On the one hand it pushed trawling activity further offshore and addressed long-standing complaints of interference in pelagic fisheries from trawlers. On the other, by its very nature the Convention validated the existence of a regulated trawl fishery which, given the development of new markets and ever-increasing demand for sea fish, could only expand in the future. Even though it has been almost totally neglected in the secondary literature, the 1843 Convention with France might justifiably be said to be the most important statutory measure for the encouragement of bottom trawling in the history of Great Britain's sea fisheries.

2.4.2: Ireland

At the beginning of the previous section it was noted that the fishermen of Howth successfully prevented the trawlers of the new Dublin Fishery Company from working on their first day in 1819, and also that the Claddagh fishermen of Galway were vehemently opposed to trawling in Galway Bay at around the same time. This alerts us the fact that, although bottom trawling was undoubtedly spreading around the coast of Ireland in the first half of the nineteenth century, it met with stiff, and sometimes violent, opposition in many places. Overall, the fisheries in Ireland were more directly encouraged and more closely monitored than their English counterparts from 1819 as a result of the activities of the Irish Fishery Board (officially known as the Irish Fisheries Commission). This body was, in many ways, analogous to the

[201] *Regulations for the Guidance of the Fishermen of Great Britain and of France, in the Seas Lying Between the Coasts of the two Countries, Prepared in Pursuance of the Provisions of the Eleventh Article of the Convention, Concluded at Paris on the 2nd of August, 1839, Between Her Majesty and the King of the French* (1843), Articles XVI-XXVI, 7-9.

fishery board which operated in Scotland from 1809 onwards: it was primarily established to encourage the cured fish trade by means of a series of bounties made available to Irish fishermen on condition that they caught and cured their fish according to the Board's rules.[202] In its first manifestation, the Irish Fishery Board lasted only eleven years. Nonetheless, it presided over an increase in the number of Irish fishermen from just over 36,000 to almost 64,000. But shortly after its dissolution in 1830 concerns were being voiced about the state of the fisheries and a perceived decline in the number of Irish fishermen.[203] As a result, a major commission of inquiry into the state of the Irish fisheries was convened in 1835. It was a thorough and exhaustive enquiry, covering the whole of the Irish coastline and all aspects of sea fishing. Its report, including minutes of evidence and appendices, ran to over 480 pages – three times the length of its predecessor on the Channel fisheries.[204]

Among the many issues covered by the 1835 Commission was the increasing 'problem' of bottom trawling in Ireland. Most Irish fishermen who were not trawlers themselves, and most others who had an interest in the fisheries, gave evidence that it was a destructive practice, citing once again the familiar complaints that it destroyed the spawn of fish on the seabed, indiscriminately took fry and undersized fish, and interfered with valuable pelagic shoals of herring and mackerel. Unlike the report on the Channel fisheries, the commissioners themselves remained unconvinced by any of the arguments against bottom trawling. Indeed, at times they were openly sceptical of the evidence of fishermen in particular. Whilst they acknowledged that "the bulk of the evidence is hostile to the continued legality of trawling," they stated their view that:

> The validity of any doctrine on these subjects reposes on facts in the natural history of the animal to which it refers; and the habits of fish are very little known, even to the best writers on Ichthyology. In almost all such questions, conflicting

[202] *A Bill for the Further Encouragement and Improvement of the Irish Fisheries*, 1819. For further discussion of the activities of the Fishery Board in Scotland, see Chapters 3 and 4, below.
[203] 'Irish Sea Fisheries', *The Encyclopaedia Britannica, or Dictionary of Arts, Sciences, and General Literature*, Vol IX (8th edition: Edinburgh, 1885), 628.
[204] *First Report of the Commissioners of Inquiry into the State of the Irish Fisheries; with the Minutes of Evidence and Appendix* (Dublin, 1836).

> interests are engaged; and complaints are most commonly directed against the practices of rivals.[205]

The commissioners accused fishermen in general of being "apt to complain of the shoals being less abundant on their stations as formerly," and as a result, they were highly equivocal about recommending any measures to control trawling in Ireland.[206] They did, however, concede that:

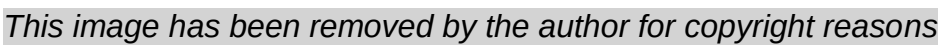
> As...the open sea is the place of the Trawl-fishers' most profitable operations; and as the Trawl if fairly constructed, can, there, do little, if any injury; the protection of the bay line-fisher would be no substantial injury to the trawler.[207]

As a result, they grudgingly recommended that trawling be prohibited in Dublin Bay. But even this recommendation appears to have been stimulated at least as much by expediency as by a consideration for the welfare of non-trawling fishermen. The report went on to add that "trawling, at the present moment, is confined to a few spots only on the whole Irish coast; and...in Dublin, Dundrum, Galway, and Dingle Bays it has been suppressed or resisted by open force".[208]

Here, once again, we have definite proof, not only of the hostility of Irish line and static-net fishermen to bottom trawling, but a clear indication that in some of the most profitable trawl fisheries it had been successfully opposed by popular action. In the history of trawling as a problematic practice, this is very important evidence indeed. Whereas in the English trawling heartlands of Devon, Sussex, Kent and Essex it had made steady progress since the mid- to late-eighteenth century (and possibly much earlier) – albeit only with the equivocal support of fishermen as a whole, and often against the wishes of non-trawling fishermen – in Ireland, local resistance was such that this kind of progress was often resisted over the same period. There appears to have been a close relationship between popular action and the willingness of local administrators to sanction bans or restrictions on inshore trawling. Hence the prohibitions noted above which were implemented at Dublin, Cork, Waterford, etc. But in certain specific localities there is no doubt that it was the

[205] *Ibid.,* xvii.
[206] *Ibid.,* vi.
[207] *Ibid.,* xviii.
[208] *Ibid.,* xix.

Figure 2.7: The Claddagh, Galway, ca.1910



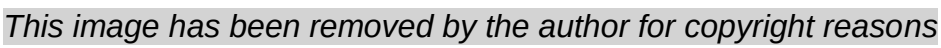
Source: Original postcard by Woolstone Brothers, London, EC1

combination of custom, tradition and the resolve of tightly-knit fishing communities which was the main obstacle to 'progress', as the increasingly influential advocates of trawling would no doubt have termed it.

The best example of this kind of popular resistance (and certainly the best documented example) was at the Claddagh, in Galway Bay, which was noted above. The village of Claddagh was said to have been of ancient origin, and was already seen as picturesque by visitors in the early years of the nineteenth century (Figures 2.7 and 2.8). It was situated on the south side of the River Corrib, opposite Galway City, but it was quite distinct both in its appearance and in its governance. In 1843 it was described as "a populous district lying to the right of the harbour, consisting of streets, squares, and lanes; all inhabited by fishermen".[209] Its cottages were said to be "cleaner and better furnished than those of most of the Galway dwellings," although in 1820 it was reported by Hardiman (who was no great friend of the

[209] S.C. and Mrs. Hall, *Ireland: Its Scenery, Character, &c.*, Vol. 3 (London, 1843), 456.

Figure 2.8: Fishwives of the Claddagh, ca.1900



Source: Original postcard at the National Library of Ireland, Dublin.

Claddagh) that the streets were "as remarkable for want of cleanliness, as the interior of the houses [were] for neatness and regularity".[210] The most remarkable thing about the Claddagh, though, for friend and foe alike, was its system of governance. "This singular community," wrote the Halls, "[is] still governed by a 'king' elected annually, and a number of bye-laws of their own":

> At one time this king was absolute – as powerful as a veritable despot; but his power has yielded, like all despotic powers, to the times, and now he is, as one of his subjects informed us, "nothing more than the Lord Mayor of Dublin or any other City".[211]

The "king," or mayor, of the Claddagh was often described in glowing terms by visitors. He "sacrifices himself, literally, without fee or reward, for 'the good of the

[210] *Ibid*., 457; J. Hardiman, *The History of the Town and County of the Town of Galway, from the Earliest Period to the Present Time* (Dublin, 1820), 293.
[211] Hall and Hall, *Ireland*, 457.

people;' he is constantly occupied hearing and deciding causes and quarrels".[212] A visitor who wished to hire a boat to fish in the bay initially found great resistance to his request and was finally directed to write to the mayor, "not of Galway, but of the Claddagh".[213] He was favoured by a personal visit from the local head man, who he described as:

> an elderly man, of the roughest exterior; the tanned complexion bespoke a long life of exposure to the roughest breezes; but there was an intellectual boldness that might, under other circumstances, have raised him to eminence among a community more powerful than the Claddagh fishermen.

Eventually, with the intercession of a friendly priest, the Mayor of the Claddagh acceded to his request and he was able to hire a boat to go fishing after all.[214]

The most tenacious and, for many contemporaries, the most problematic aspect of the insular and protective customs of the Claddagh related to the protection of the Galway Bay fishery. Allan suggested that the fishermen there "look upon the bay of Galway as their inheritance," and that they had "up to this period, effectually prevented the use of the trawl, although frequently attempted by gentlemen who had possessed yachts".[215] He went on to add, not at all disapprovingly, that, "[t]heir opinion is that such a mode of fishing is destructive of the spawn, and that the disturbance of the shallows would end in the destruction of the deep sea-fishing, from which, for a great part of the year, they draw their subsistence".[216] Hardiman, on the other hand, was far less charitable. Like Hely Dutton, he believed that the men of the Claddagh were simply backward, and that they acted solely out of self-interest:

> though they sometimes exhibit a great shew of industry, they are still so wedded to old customs, that they invariably reject, with the most inveterate prejudice, any new improvement in their fishing apparatus, which is consequently now very little superior to that used centuries ago by their ancestors...When they do not

[212] *Ibid*.
[213] Anon [Robert Allen], *The Sportsman in Ireland, with his Summer Route Through the Highlands of Scotland* (London, 1840), 309.
[214] *Ibid*., 309-10.
[215] *Ibid*., 307.
[216] *Ibid*.

> themselves think proper to fish, they invariably prevent every other from attempting it, viewing...the bay as their exclusive domain.[217]

He went on to describe how the Claddagh fishermen had brought down a fishing company, financed by "a number of gentlemen," which fitted out several vessels specifically to trawl in Galway Bay:

> the Claddagh fishermen, jealous of an infringement on what they called their rights, resolved to suppress this spirit of enterprise by violent means. They accordingly attacked the company's boats, destroyed their nets, cut their sails and cables, threw their anchors overboard, and ill-treated the crews.[218]

The company folded and, for many years, trawling did not resume in Galway Bay. But even here, in the stronghold of customary resistance to trawling, times were changing, and the forces of modernisation and reform were gaining pace.

As we have seen, by 1836 the impatience and frustration of the Commissioners on the Sea Fisheries with this kind of resistance was growing, and within a few years the fishermen of the Claddagh were under concerted pressure to concede ground on the issue of trawling. In a memorial submitted to the Lord Lieutenant in 1840, the "nobility, gentry, and clergy of the county of Galway" appealed for help to prevent the abuses of the Claddagh fishermen. In it, they complained that "[t]he fisheries in the Bay of Galway have been for many years impeded...by the exercise of rights with which the Claddagh fishermen conceive themselves to be invested".[219] Confirming earlier accounts, they went on to point out that:

> they are the regular fishermen of the bay, and being a powerful body, acting in concert, they have hitherto been enabled to enact laws, not only for their own observance, but which they compel all others to respect.[220]

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[217] Hardiman, *History*, 293-4.
[218] *Ibid*., 295.
[219] *Return to an Order of the Honourable The House of Commons, dated 21 February 1840: Galway Bay Fisheries*, 1 [Petition to the Lord-Lieutenant-General and General Governor of Ireland, from the inhabitants of Galway].
[220] *Ibid.*

This time, however, the complainants had the law on their side. In 1843 – coincidentally, the same year that the English convention with France finally validated trawling off the coasts of the two countries – an Act was passed to "Regulate the Irish Fisheries".[221] In effect, the Act repealed all protective legislation that lay on the statute books relating to sea fisheries in Ireland, including the statutory ban on trawling in Dublin Bay. It also laid the groundwork for a new commission to oversee the fisheries.[222] This new commission was empowered to pass by-laws relating to the regulation of local fisheries, similar in principle to the by-laws which had been passed in the eighteenth century to prohibit the use of "illegal nets" in bays and creeks. However, the Act was also a clear attempt to wrest control of Ireland's sea fisheries from local interests, not least the kind of customary controls still exercised in places like Galway and Dublin Bay. It explicitly stated that, "[s]ince the passing of this Act, trammels and trawls can be used in all the bays and harbours, and on the coast, until prohibited by the bye laws of the commissioners".[223]

The commission confirmed the nature of the new regime, with regard to trawling, in its first annual report the following year. "The introduction of trawls and trammel nets," it stated, "has for years been regarded with great jealousy by the fishermen along the coast of Ireland, who felt inclined to continue their long-established habits"; and it went on:

> Preceding Acts of Parliament so far conceded to their views as to admit of trawls and trammels, to be used as an exception; that is, in such places only as might be formally authorised. The present Act, however, is founded on a different principle, and makes the restriction of any mode of fishing in the sea the exception, and consequently admits of these implements being used everywhere, excepting where they shall formerly be prohibited by a bye-law.[224]

The commission made it clear that bye-laws against trawling, which it alone had the power to impose, would very much be the exception in the future. It had, it reported,

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[221] *An Act to regulate the Irish Fisheries* (5 & 6 Vict. C. 106), 10th August, 1842.
[222] J. Jagoe, *The Act 5 & 6 Victoria, Cap. CVI., for regulating the Fisheries of Ireland, with Notes, Introductory Remarks, and References* (London, 1842), 86. In repealing all previous protections on Irish sea fisheries, the 1843 Act anticipated a similar measure for mainland Britain, the Sea Fisheries Act of 1868, by over 20 years. See below, 76-7 and 220.
[223] *Ibid*., 13.
[224] *The First Annual Report of the Commissioners of Fisheries, Ireland (Presented Pursuant to Act of Parliament 5&6 Vict. c. 106, s. 112)*, (1843), 2.

been applied to from many communities on the coast "to apply restrictions to [trawls]...or rather to prohibit them altogether," and it specifically named those received from Dublin, Galway, Kinsale and Dungarvan. But, having "made every necessary inquiry on the spot," and having taken particular account of the conclusions of the 1836 Commission, it confirmed the principles upon which such decisions would, in future, be made:

> 1. That the greatest caution should be used in applying any restrictions on any mode of fishing in so vast a field as the open sea, and that it should only be done on certain grounds.
> 2. That the extent to which the trawls and trammels are used prove that they are productive and profitable modes of fishing, and consequently should meet with encouragement, on public grounds.
> 3. That the arguments put forward for an absolute prohibition of them are founded on prejudices and vague theories, not by any means confirmed by facts.
> 4. That although it would be greatly to be regretted that the extension of the use of these or any other improved modes of fishing should injure the interests of any other class, by increasing the produce and lowering prices, particularly if that should be a poorer class, such reason cannot be admitted as an argument for their being suppressed.[225]

The commission conceded that some restrictions might be necessary in "small bays of comparatively shallow water, or the narrow entrances of deep inlets," but it is clear that the balance of power had shifted in favour of the sanctioned extension of trawling in Ireland by this point.[226]

The following year, the commission reported that it "still had occasion to resist the opposition to trawling and trammel nets," but maintained that applications to have them restricted or banned were already becoming less frequent. In 1846, it reprinted a favourable report from Dunmore and Waterford, where, it was said, "[t]he prejudices of the native fishermen in this locality against the use of the deep sea trawl net may be said to be nearly extinguished," and "[t]he great majority of the

[225] *Ibid*.
[226] *Ibid*., 3.

crews are now natives".[227] On the other hand, in the appendices to the same report the commission also reprinted the minutes of a separate inquiry into the Irish Salmon fisheries which contained evidence both from the north of Ireland (Lough Foyle) and the south (around Waterford) relating to bottom trawling for ground fish in loughs and creeks. Unlike the optimistic view of the commission, this evidence was very mixed, and still tended to depend very much on whether or not the respondent was a trawler themselves.[228] Clearly, the consensus which the commission had hoped was developing towards trawling had not yet been fully realised. Nonetheless, there was undoubtedly an attritional change in attitudes, even in the strongholds of greatest resistance. In 1854, the commission was pleased to report that "the prejudice which so long prevailed among the Galway fishermen to the use of the trawl net, in any part of their bay, has altogether subsided," and that "the inhabitants of the Claddagh are themselves now only prevented by the want of means from very generally adopting that mode of fishing".[229] It put this change down to "the efforts of some respectable individuals in that quarter," who had provided finance to a few of the fishermen to purchase their own trawling gear.[230]

Yet, despite its triumphalism on the subject of the Claddagh fishermen's conversion to trawling, this account was immediately followed by a rather disquieting note of equivocation from the commission itself. In contrast to the conviction, exhibited in 1843, that bye-laws against trawling would only be issued in the most exceptional circumstances, the commission had, by the mid-1850s, come to the view that:

> Notwithstanding our desire to overcome undue prejudices, and to see any spirit of insubordination checked, we are firmly persuaded that those who assert that the constant and indiscriminate use of the trawl net is harmless are in great error.[231]

[227] *The Fourth Annual Report of the Commissioners of Public Works, in re. the Fisheries of Ireland 1846* (Dublin, 1846), iv.
[228] *Ibid*., 113-6, 153, 186.
[229] *Report of the Commissioners of Fisheries, Ireland, for 1854* (Dublin, 1855), 5.
[230] *Ibid.*
[231] *Ibid*.

It went on to state that, “we have abundant proof that this mode of fishing may be carried too far, and that several places have been trawled out”.[232] Though not exactly a *volte face* (the Commission had, after all, agreed to the implementation of a number of bye-laws regulating or prohibiting trawling in creeks and harbours since 1843) this direct acknowledgement of the potentially harmful impact of trawling stands in stark contrast to the tone of the reports from the 1840s. In a final and unwelcome irony, the Claddagh fishermen rose up once again in protest at the use of trawls in Galway Bay in the late-1850s, not, as they once had, because they believed it would be damaging to the fishing in the future; but because its increased use, not least by the Claddagh men themselves, had after all proved to be highly destructive. Having apparently been persuaded by ‘reason’ to adopt bottom trawling following decades of resistance (as the Fishery Board would no doubt have termed it) the Claddagh men soon found that “it is not only injurious, but has destroyed the fisheries of the bay”.[233]

2.4 Conclusion

This chapter demonstrates for the first time that bottom trawling on the coasts of the England, Wales and Ireland has an unbroken history stretching back more than six centuries. Contrary to the orthodox view (established in the later-nineteenth century and subsequently adopted by most, if not all, of those who have commented on its history since then) it was neither restricted to inshore waters during much of this period, nor was its impact insignificant, either in economic or environmental terms. As Callum Roberts noted in 2007, “most of what we know about the early history of trawling comes from measures taken to ban or restrict its use”.[234] But the scale and continuity of that opposition is remarkable, as is the willingness of local and central administrators for most of its history to take action against those who persisted in trawling against popular opinion. All of which raises very important questions about *why* the long history of bottom trawling has been so neglected, especially at a time when its impact on fish stocks and on the benthos more generally is under renewed and intense scrutiny.

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[232] *Ibid*.
[233] *Report of the Commissioners of Fisheries, Ireland, for 1860* (Dublin, 1861), 10.
[234] Roberts, *Unnatural History*, 138.

In terms of modern discussions about the overexploitation of marine resources, there is a sense that pre-industrial trawling by sail has been viewed as being of little importance simply because it was assumed to have been practised on a relatively small scale and only in inshore fisheries. Having noted, in passing, the Plantagenet petition of 1377, Georg Engelhard moves quickly on to the nineteenth century, remarking that the Brixham fishermen "gradually began to explore fishing grounds farther east in the Channel," and that there was "significant innovation" in the design of sailing trawlers between 1850 and 1870".[235] But his discussion of the history of trawling really only takes off a paragraph later, with the coming of steam and the advance of industrial trawlers deep into the North Sea.[236] Similarly, Thurstan *et al*, having once again nodded towards the 1377 petition, state that "[u]ntil the early nineteenth century, bottom trawlers were sail powered and fished close to ports," and that it was "the development of railways from the 1830s onwards [which] increased the demand for fish...[so that] bottom trawling quickly became more widespread".[237] Having alluded to this expansion, they move on to describe "[t]he development of steam trawlers in the 1880s [which] marked the beginning of a rapid expansion of fishing effort".[238] Even avowedly historical accounts of commercial fishing tend to dismiss the potential importance of pre-modern trawling. For example, having acknowledged that "[t]rawling was, of course an ancient activity," Robinson and Starkey echo the orthodox view that "until the late eighteenth century the practice had been largely restricted to the ports of Brixham and Plymouth...and the approaches to the Thames," and once again, their discussion of the commercial (and, by implication, the environmental) impact of trawling really only takes off in the 1840s, when "the railways...created the environment for the rapid expansion of the activity...by providing marketing opportunities for the large catches of cheap fish taken in the trawl".[239] Many similar examples could be cited.[240]

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[235] Engelhard, 'One Hundred and Twenty Years', 1-2.
[236] *Ibid*., 4 *passim*.
[237] Thurstan *et al*, 'Origins', 2.
[238] *Ibid*.
[239] Robinson and Starkey, 'Sea Fisheries', 135.
[240] For example, J.W. Collins, *The Beam-Trawl Fishery of Great Britain, with Notes on Beam-Trawling in Other European Countries* (Washington, 1889), 293-4; de Groot, 'The Impact', 179; W.L. Holt, 'An Examination of the Present State of the Grimsby Trawl Fishery, with Especial Reference to the Destruction of Small Fish', *Journal of the Marine Biological Association of the United Kingdom*, 4:4 (1897), 363-7; Kennelly and Broadhurst, 'By-catch Begone', 342-3; Roberts, *Unnatural History*, 141-2; Russell, 'Trawling and the Stocks of Fish', 198-9; Robinson, *Trawling*, 17-22 *passim*.

Clearly, it would be foolish to deny the rapid expansion of trawling in Great Britain and Ireland, first in the 1840s and 50s with the coming of the railways, and then in the 1870s and 80s with the advent of motorisation. Nonetheless, it can convincingly be argued that the fact that historians and fisheries scientists have so comprehensively overlooked the scale and spread of trawling before the nineteenth century has had the effect of trivialising its impact on nearshore fisheries in the past. In many ways, it is a classic case of shifting environmental baselines: even the most committed marine historical ecologists and environmental historians have been unable to countenance the possibility that trawling could have fundamentally affected nearshore ecosystems in the early-modern period. Yet that is undoubtedly what happened. Tales of scarcity, mostly as a result of taking large quantities of immature fish, bedevil the early history of trawling. The Plantagenets, the Stuarts, and the Georgians all complained of the impact of dragging heavy gear across the surface of the sea bed, and by the early years of the nineteenth century heavily fished bays in Devon, East Sussex and around the east and south coasts of Ireland were said to be all-but fished out. If we were to look for structural reasons why commentators have tended to ignore or downplay the evidence relating to early trawling, we might point to the fact that the history of the development of commercial fishing *per se* only rose to prominence in the later-nineteenth century as a result of serious and ongoing concerns about the impact of steam trawling in the North Sea.[241] Hard on the heels of the great commissions of enquiry of 1863 and 1882, the literature on beam trawling grew considerably, and once again it did so mostly within the framework of a public debate about the future of the fisheries.[242] If a single body of literature could stand for the totality of this debate, then it must be the thirteen volumes of scholarship and opinion arising from the International Fisheries Exhibition, which was held in London between May and October 1883.[243] This literature encompassed all the latest scientific and technical thinking on the subject of commercial fishing. Yet even here, the majority of the discussion on trawling (which took place, intermittently, in eleven of the thirteen volumes) related to the rights and wrongs of the growing

[241] Rozwadowski. *The Sea Knows no Boundaries*, 26-31.
[242] See, for example, Collins, *Beam-Trawl Fishery*; Holt, 'An Examination'; J.T. Cunningham, 'The Immature Fish Question', *Journal of the Marine Biological Association of the United Kingdom*, 3:1 (1893), 54-77; J.P. Hore and E. Jex, *The Deterioration of Oyster and Trawl Fisheries of England: Its Cause and Remedy* (London, 1880); E.W.H. Holdsworth, *Deep-Sea Fishing and Fishing Boats. An Account of the Practical Working of the Various Fisheries Around the British Islands* (London, 1874).
[243] Various, *The Fisheries Exhibition Literature*, (13 volumes; London, 1883 and 1884).

steam-trawl fishery in the north sea, and the only historical note once again ascribed to it very recent origins: “The oldest known trawling grounds,” it was confidently asserted, “are...on the Devonshire coast, where the Brixham men have regularly worked for probably not much more than a hundred years”.[244]

The late-nineteenth century debate on the state of the nation’s fisheries was, of course, both informed by, and influential in shaping, the nascent discipline of scientific fisheries management. This new discipline was, in turn, engaged in an ongoing discussion about the nature of the sea’s great bounty. Cautionary voices, like those of Walter Garstang and, earlier, John Cleghorn, who asserted that it was not only possible but entirely likely that increased fishing effort would lead to the “impoverishment of the sea,” were drowned out by piscatorial optimists such as Thomas Huxley and, later, Walter Wood, who was scathing in his criticism of the pessimists.[245] “Every year, for generations,” he wrote in 1911:

> has brought forth its dismal seer who has foretold the utter depletion of the [North Sea] banks; yet these Jeremiahs have been constantly confounded, for, despite the vast growth of the fishing industry, the total quantities of fish increase annually.[246]

This kind of bullish attitude towards trawling has historically been a stubborn adversary, especially as productivity in the world’s great fisheries continued to rise throughout most of the twentieth century, only reaching its peak in the 1980s.[247] It is now well known, of course, that such gains were only possible for much of that time because of an exponential rise in fishing power; but even though many fishermen and not a few commentators continued to voice their disquiet over trends in commercial fishing, this kind of ebullient approach commanded attention at the highest levels of government and administration until relatively recently.[248] Yet, as the evidence presented in this chapter clearly demonstrates, those dissenting voices had actually been around since the very earliest development of inshore trawling in

[244] *Ibid*., Vol. I, 274.
[245] W. Garstang, ‘The Impoverishment of the Sea: A Critical Summary of the Experimental and Statistical Evidence Bearing upon the Alleged Depletion of the Trawling Grounds’, *Journal of the Marine Biological Association of the United Kingdom*, 6:1 (1900), 1-69; J. Cleghorn, ‘On the Causes of the Fluctuations in the Herring Fishery’, *Journal of the Statistical Society of London*, 18:3 (1855), 240-2.
[246] W. Wood, *North Sea Fishers and Fighters* (London, 1911), 43.
[247] Roberts, *Unnatural History*, 176.
[248] For a discussion of examples of this kind of fisheries optimism in more recent times, see *Ibid*., 173-5.

the fourteenth century; and, significantly, for most of that period they had held sway with legislators and wider public opinion. How, then, are we to explain the paradox of what appears to be a greater acceptance of the "optimistic" view of industrial fishing at precisely the point when its impacts were under greatest scrutiny from the new fisheries science?

The answer is very simple: it has little to do with the science itself, and everything to do with the needs of political economy. The population of Scotland, Ireland, England and Wales increased by two and-a-half times between 1801 to 1901, from approximately 16 million to almost 41.5 million.[249] The seas provided a rich harvest of cheap protein, and one which was free at the point of access. While the oceans could be relied upon to deliver their great bounty, regardless of the ever-increasing effort required to harvest it, then the voices of caution were always likely to be marginalised in debates about the rights and wrongs of fisheries exploitation. As Roberts notes, the Sea Fisheries Act of 1868 was specifically aimed at "expunging from the statute books more than fifty acts of Parliament accrued over several centuries," so that "[f]ishing became possible whenever, wherever, and with whatever methods fishers pleased".[250] In Ireland, a similar purge happened with the passing of the 1843 "Act for Regulating the Irish Sea Fisheries". Although this outline view of fisheries development in the modern era may appear a little simplistic, it is arguably sufficient to explain both the development of industrial fishing in the North East Atlantic from the mid-1850s onwards, and the necessary myopia of politicians and fisheries managers with regard to the question of overexploitation. One reason we can be so sure that this version of events is broadly accurate is because it has been repeated many times since, as other nations around the world sought to develop their own fisheries in response to similar structural changes. In describing the development of commercial fisheries in Indonesia between the 1960s and the 1980s, for example, Conner Bailey wrote that:

> Through the promotion of rapid technological change, fisheries development in Indonesia has become a zero-sum game, where those who control the most powerful technologies have a clear competitive advantage and individually prosper, even as others are swept aside and fish stocks depleted...these policy

[249] B.R. Mitchell and P. Deane, *Abstract of British Historical Statistics* (Cambridge, 1971), 8-9.
[250] Roberts, *Unnatural History*,, 149.

> outcomes were the direct consequence of choices favouring efficiency over equality, exports over domestic fisheries supply, and resource exploitation rather than resource management.[251]

He went on to conclude that the policies pursued (including, crucially, the lack of any institutional restraint on the fisheries) clearly favoured entrepreneurs rather than "traditional" small-scale fishermen, and that "[t]hese entrepreneurs, in turn, have invested in new fishing technologies, most notably trawlers and purse seiners".[252] With a couple of minor adjustments, this analysis could just as well describe the situation in the United Kingdom and Ireland between the 1840s and the 1980s.

Yet, in contrast to Garrett Hardin's much debated analysis of the "tragedy of the Commons," the long history of trawling in British and Irish waters also suggests that this kind of unfettered exploitation of marine resources was far from inevitable.[253] It has been stated many times in this chapter that, until the mid-nineteenth century, local and even national administrative bodies were far more likely to be on the side of traditional fishermen when it came to the economic and environmental impact of trawling than they were to provide encouragement for its development. In fact, it has only been possible to map the early history of 'pre-industrial' trawling because of the scale of opposition to it, and the number of proclamations and prohibitions issued against it in the early-modern period. It is no coincidence that, by 1675, the term "Trawler Men" had come to denote "Fishermen who used unlawful Methods of destroying the Fish in the River of Thames," a derogatory usage which stuck, being reproduced many times between the end of the seventeenth and the middle of the nineteenth centuries.[254] Perhaps another reason why the early history of trawling has been 'lost' is precisely because, until the modern era, local fishing communities were often very successful in suppressing bottom trawling wherever it emerged. From the complaints of the Essex men in the mid-fourteenth century, which brought into being

[251] Bailey, 'The Political Economy of Marine Fisheries Development', 26.
[252] *Ibid*.
[253] See Chapter 1, above. For a recent summary of this literature, see F. van Laerhoven and E. Ostrom, 'Traditions and Trends', 3-28.
[254] N. Bailey, *An Universal Etymological English Dictionary...The Twenty First Edition* (London, 1675; reprinted in 1734, 1764, 1770 and 1790); Anon, *The Interpreter of Words and Terms, used either in the Common or Statute Laws of this Realm and in Tenures and Jocular Customs* (London, 1701); E. Buys, *A New and Complete Dictionary of Arts and Sciences, Comprehending all the Branches of Useful Knowledge* (Amsterdam, 1768); J. Craig, *A New Universal Etymological, Technological and Pronouncing Dictionary of the English Language embracing all the terms used in Art, Science, and Literature*, Vol. II, (London, 1849).

what appears to be the first royal commission on the subject, to the hardy men of the Claddagh, who successfully prevented trawling in Galway Bay over many decades, a combination of concerted local opposition and concerns about the impact of trawling on commercial stocks seems to have been enough to keep the spread of trawling in check.

Part of the reason why local communities opposed trawling so vehemently was that it was a relatively capital intensive method of fishing, particularly in the earliest years, and was therefore mostly out of their reach. Most fishermen and small fishing communities operated on a relatively small scale, relying on static nets and hook-and-line technology, both of which could be pursued from relatively small craft. Trawling, on the other hand, required much greater capital input than they were able to realise: not only did the gear (beams, trawl-heads, nets, weights or chains, dragging ropes, etc.) require considerable investment, the boats required to drag it needed to be much larger than most inshore fishing boats, and in almost all cases required sail power. Hence, at least in part, the opposition of the Cinque Ports fishermen to ‘outsiders’ who came in with their larger, more expensive trawling gear in the early-seventeenth century. Hence, also, the reaction of the men of Howth to the Devon smacks of the Dublin Fishery Company in 1819. In both cases, local fishermen feared that they would be unable to compete, either in financial or in productivity terms, and they faced the real danger of being forced out of their own fisheries and local markets by the trawlers.

But this should not blind us to the fact that fishermen, and even the authorities which often supported them, were also acutely aware of the environmental implications of trawling. Even though they objected, first and last, on economic terms, they knew from the earliest days that trawling potentially lessened the stocks of fish for all, and even that it was possible to decimate particularly vulnerable fisheries in sheltered inshore areas by taking too many immature fish. Indeed, these concerns – the economic and the environmental – were two sides of the same coin, so that the objections of later modernisers, such as Hely Dutton and the Irish commissioners of 1833, that traditional fishermen were simply self-interested in their objections to trawling, ring hollow. But no matter what local successes they achieved, and no matter how much sympathy they had from the authorities (until the nineteenth century, at least) local fishermen were unable to will the beam trawl out of existence. Like a malignant marker buoy, it seems that whenever trawling was forced beneath

the surface in a particular place or at a particular time it simply popped up again later on or elsewhere. No matter how successfully it was suppressed or prohibited, such measures were always temporary, it was simply too productive and far too profitable to go away for good.

In the nineteenth century, the demographic pressures mentioned above collided with a growing commitment to the doctrine of *laissez-faire* capitalism. Inevitably, this led to the withdrawal of support for restrictive measures both on trade and productivity across all sectors of the economy, and in the fisheries it meant that a growing need for cheap protein was met with tacit encouragement for trawling.[255] Still, despite the ideological fervour of the Victorians for growth at any cost, even they were unable to ignore the impact of bottom trawling on nearshore fisheries and on the marine environment more generally. In mainland Britain, the consolidation of distant, relatively deep water trawling was tempered by a ban on such activity within the three-mile limit; in Ireland, the enthusiasm of the Fishery Board for derestricted trawling was first softened by its own bye-laws against the practice in some bays and harbours, and later by a recognition that it could, after all, be catastrophic for inshore fisheries. Once again, however, such measures could not stem the tide of history, and trawling finally triumphed with the coming of steam power and industrial fishing.

[255] This general tendency, towards the withdrawal of protection for sea fisheries in the later-nineteenth century, is discussed at greater length in the following chapter. See especially 131-2, below.

Chapter 3: Growth Overfishing and the Seine Net Controversy in the Firths of Forth and Clyde, Scotland, ca.1830-1880

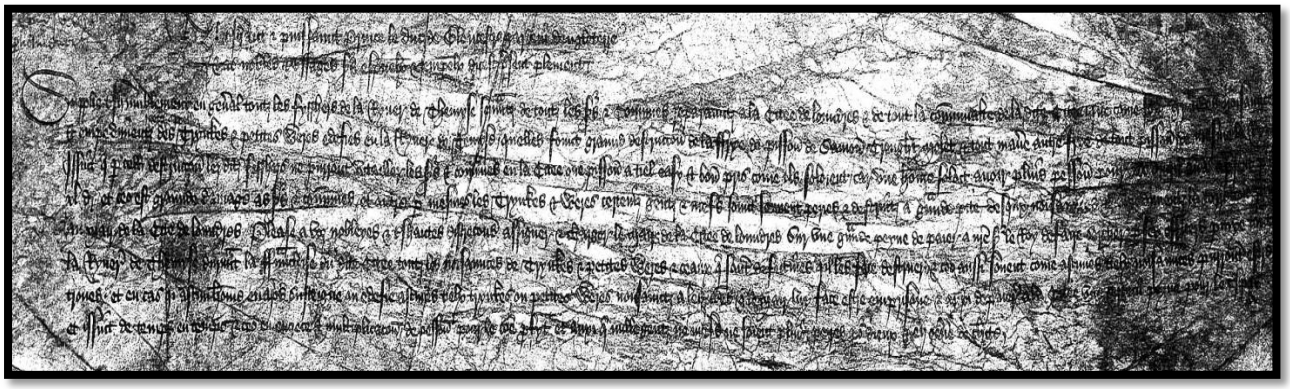
3.1 Introduction

Despite the fact that, historically, bottom trawling has been a particular target for opprobrium and opposition among fishermen, it is clear from some of the evidence presented in the previous chapter that it was part of a much wider set of concerns in the pre-industrial era over what were believed to be unsustainable fishing practices, especially in heavily fished areas. The earliest restrictive measures taken against such practices targeted weirs and trapping devices in the Thames and the Medway, both of which restricted the free movement of anadromous fish, particularly salmon (*Salmo salar*) and eels (*Anguilla anguilla*), and were perceived as being indiscriminate in harvesting fish of all sizes.[1] Following on from this, the most consistent complaints of fishermen in the middle ages, as well as those (such as fish-mongers) who had an eye to the economic impact of these destructive practices, were against nets and other fishing 'engines' with meshes or openings too small to let fry and immature fish escape. In 1253, London Sheriffs Richard Pikard and John de Northampton caused "many nets" to be burned at Westcheap (now Cheapside) as a result of the smallness of their meshes. In 1269, Sir Hugh Fitz-Otes, Constable of the Tower of London and Warden of the City, reaffirmed that:

> [since] ancient times, it had been enacted and provided as to nets, used for fishing in the Thames, that in the body of such nets the meshes should be woven of such a size that a man's thumbnail might be able wholly to pass through them; and that, if any net there should be found a single mesh otherwise woven, the whole of such net was to be condemned.[2]

[1] M. Kowaleski, 'The Seasonality of Fishing in Medieval Britain', in S.G. Bruce (ed.), *Ecologies and Economies in Medieval and Early-Modern Europe* (Boston, 2010), 132-3.
[2] H.T. Riley (ed.), *Chronicles of the Mayors and Sheriffs of London, A.D. 1188 to A.D. 1274* (London, 1863), 120.

Figure 3.1: Petition (in French) from the Thames fishermen against trawl nets and fishing weirs, ca.1420



Source: The National Archives, Kew, SC 8/143/7137

A few years later, the mesh-size for all nets used in the Thames between London Bridge and the mouth of the Medway was set at two inches, "as wele Peters as all other fishers to fisshe thurghout the yeere," and over the following years many 'false' nets (nets with meshes below the regulation size) were seized and burned.[3]

In a modern context, we would describe these concerns as relating to 'growth overfishing,' which occurs "when the young fish that become available to the fishery (the 'recruits') are caught before they can grow to a reasonable size".[4] As Kowaleski has noted, much of the early concern about the impact of these small-meshed nets and other unpopular fishing 'engines' related to the preservation of salmon and smolts, which were valuable fish of passage and therefore constituted a form of property for those with fishing rights further upstream.[5] But there is no doubt that the conservation of fish stocks more generally was also high on the agenda. A petition from the Thames fishermen, presented to parliament in 1420 by the Bishop of Norwich (Figure 3.1), complained that "the use of trawl-nets and fishing-weirs is destroying the young salmon, trout, mullet and other fish in the river, so that they can no longer supply fish to London so cheaply".[6] A few years earlier, in 1386, a number of fishermen "of the country eastwards of London Bridge," warned the Mayor and

[3] R.R. Sharpe (ed.), *Calendar of Letter-Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter-Book A, Circa A.D. 1275-1298* (London, 1899), 186. The term 'Peters' refers to petermen, who used peter-nets, another form of basic stake net, for catching fish in rivers and estuaries. *Report of the Commissioners on Salmon Fisheries. Part II, Minutes of Evidence and Indexes* (London, 1902), 80.
[4] D. Pauly, *Some Simple Methods for the Assessment of Tropical Fish Stocks* (UNFAO Fisheries Technical Paper, 234, 1983 [http://www.fao.org/docrep/003/x6845e/X6845E07.HTM, accessed on 07/04/2016].
[5] Kowaleski, 'The Seasonality of Fishing', 132.
[6] The National Archives (hereafter, TNA), SC 8/143/7137, Petition of the Fishermen in the River Thames to Parliament, ca.1420.

Aldermen that "the fish in the Thames were so destroyed that hardly a seasonable fish could be found in it"; and they placed the blame quite squarely on the use of fixed nets such as "treinkes" and "hebbyngnettes" (or hebber nets), and on the over-use of weirs, or trains of nets placed for long periods across the river.[7] Clearly, in the Thames and the Medway, fishermen and others who were interested in conserving the stocks of fish for the London market saw the danger of such indiscriminate and overly-productive fishing methods. But they were not alone.

As early as the fourteenth century, the authorities at Norwich were concerned enough about the state of stocks in the river Wensum to put in force a seasonal ban on the use of "drag-nets, &c." between the feast day of St. Peter ad Vincula (1st August) and Michaelmas (29th September).[8] Later, in 1542, a resolution was passed which, though in the main was directed towards the Thames, commanded the Lord High Admiral, his deputies and all justices of the peace to inspect the nets used in all the rivers of England in order to ensure that the meshes were adequate to catch mature fish without endangering the brood.[9] In the reign of Elizabeth I, a bill was introduced to regulate the "Wideness of the Mesh or Nets, for the taking of Herrings, Sprats, and Smolts, in Orford Haven," Suffolk.[10] It is likely that similar restrictions relating to the taking of small fish in estuaries and on the seashore were enacted for many other places in medieval and early-modern England, particularly where fisheries of long-standing or high intensity existed. This is something that requires much more research in local county, borough and manorial records. Nonetheless, the example of injunctions against trawling, detailed in Chapter 2, and the well-documented examples from London suggest that fishermen and others were more than aware of the potential impact of their activities on the long-term supply of fish, particularly in terms of growth overfishing, and that practices which threatened those long-term supplies were the target of significant restrictive measures.[11]

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[7] A.H. Thomas (ed.), *Calendar of Plea and Memoranda Rolls Preserved among the Archives of the Corporation of the City of London at the Guildhall: A.D. 1381-1412* (Cambridge, 1932), 116.

[8] F. Blomefield, *An Essay Towards a Topographical History of the County of Norfolk, Vol.3: Containing the History of Norwich* (orig. published 1741: London, 1806 edn.),111-2.

[9] J. Gairdner and R.H. Brodie (eds.), *Letters and Papers, Foreign and Domestic, of the Reign of Henry VIII, Vol.17: 1542* (London, 1900), 15.

[10] *Journal of the House of Lords: Volume 2, 1578-1614* (London, 1767-1830), 135.

[11] Wendy Childs and Marianne Kowaleski, who have provided the most comprehensive overview of the development of the fisheries in the middle ages on the eastern, western and south-western coasts of England make no mention of any restrictions being placed on fishing methods in these regions. However, this does not mean that such restrictions were not put in place. As we saw in Chapter 2, above, the early history of bottom

In Scotland, there is similar evidence of early concern about growth overfishing in estuarine waters. In 1318, a proclamation was issued in the reign of Robert I, "concerning the method of fishing in waters where the sea flows". Under this decree it was:

> ordained and assented that all those who have cruives, fisheries, ponds or water-mills where the sea climbs and draws itself back and where young salmon, smolts *or the fry of other kinds of fish of the sea or fresh water* descend and ascend, such cruives and machines placed below should be at least the measure of two inches in length and three inches in breadth, so that no fry of fish are impeded from ascending and descending, according that they can freely ascend and descend everywhere. And if anyone does the contrary and should be convicted or attainted concerning this, he should have imprisonment for forty days, and notwithstanding should be amerced [*fined*] accordingly.[12]

A cruive was a type of Scottish fish trap. It could take the form of a permanent stone structure across the whole span of a river, interspersed with slatted chambers to catch the fish, or it could be a more simple basket trap in a weir or tideway.[13] It was, in many ways, analogous to the 'weirs' consisting of a semi-permanent chain of nets which were targeted in English legislation; and, in fact, in Scotland just as in England, many other forms of stake-nets and 'fixed engines' were the subject of official concern from the fourteenth century onwards.

The purpose of much of this legislation was twofold: on the one hand, as has already been noted, it was intended to preserve the rights of fishers and property-holders upstream, particularly in the case of valuable 'red fish', or salmon and sea trout; but it was also clearly aimed at preserving the stocks of fish more generally. Charles Stewart, in his mid-nineteenth-century *Treatise on the Law of Scotland Relating to the Rights of Fishing*, notes that, historically, under common law in

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trawling has, up to now, been almost entirely overlooked by historians for a variety of reasons, one of which is an assumption that it was of relatively recent origin. It could be that this is also the case for potential indicators of fishing pressure on inshore fish stocks, a tendency that this study explicitly aims to address. W. Childs and M. Kowaleski, 'Fishing and Fisheries in the Middle Ages', in D.J. Starkey, C. Reid and N. Ashcroft (eds.), *England's Sea Fisheries: The Commercial Fisheries of England and Wales Since 1300* (London, 2000), 19-28.

[12] 'Legislation: Statutes of the 1318 Parliament', from K.M. Brown et al. (eds.), *The Records of the Parliaments of Scotland to 1707*, (St Andrews, 2007-2016), 1318/13 (my emphasis) [http://www.rps.ac.uk/trans/1318/13, accessed on 06/06/2016].

[13] J.M. Connaway, *Fishweirs: A World Perspective, with Emphasis on the Fishweirs of Mississippi* (Granville, Ohio, 2007), 476.

Scotland the only restriction on fishing was that it should not be prosecuted *in aemulationem vicini* (to the infringement of one's neighbours' rights); but he also notes that, as early as that first proclamation by Robert I in 1318, "it became necessary, in the public interest, to impose restrictions for the preservation of the fish".[14] Importantly, Stewart also observed that the "policy of legislative enactments [in Scotland], from the earliest period, has been to prohibit the use of fixed machinery especially in rivers and estuaries," but that "the first difficulty which arose in the interpretation of these Acts was the question of whether they applied to the shore of the open sea, or were limited in their operation to rivers and estuaries".[15] In the nineteenth century, it was determined by case law that the prohibition on the use of fixed nets did not apply to the open sea outside of estuaries; but, as Stewart points out, the wording of many early enactments was highly ambiguous, placing restrictions where "'watteris...fillis and ebbis,' – 'within the flude mark of the sea'...'within salt watteris,' – 'quhar the sea ebbis and flowis'...[and] 'upon sands and schaulds far within the water'".[16]

These early enactments in Scotland were clearly aimed at preserving stocks of fish in estuarine waters, and therefore once again implicitly demonstrate a degree of awareness (whether theoretically or empirically arrived at) that overexploitation by unsustainable fishing methods was a potential problem. On the other hand, it is true that they relate solely to nets and devices which would have been used close to the shore, and largely to the capture of the highly prized and commercially valuable salmon and sea trout (*Salmo trutta*). Insofar as it is possible to tell from the state papers, fishing in the open sea in Scotland was left largely untrammelled by legislative or authoritarian interference until the nineteenth century.[17] Indeed, such legislation as was enacted relating to sea fish was almost exclusively aimed at promoting the fisheries by regulating methods of curing, storing and marketing herring, and this goes for the local regulations imposed by the Conventions of Royal

[14] C. Stewart, *A Treatise on the Law of Scotland Relating to Rights of Fishing* (Edinburgh, 1869), 149.
[15] *Ibid*., 150. Stewart goes on to note thirteen such enactments, between the reigns of Robert I and James VII, dating from 1318 to 1685.
[16] *Ibid*.
[17] *Ibid*., 20-1. Stewart notes that grants were made at various times by the Scottish crown for the right to fish for whitefish in the sea, but that these were never judicially recognised and their validity was generally doubted by the legal authorities.

Burghs as well.[18] In 1756, the right of liberality in sea fisheries was reaffirmed by "An Act for Encouraging the Fisheries in that Part of Great Britain called Scotland," which also repealed much of the existing restrictive legislation relating to the marketing of sea fish.[19] Unlike the Stuart proclamations and enactments relating to mesh size in England, which applied, in principle, to all nets and to all sea fisheries, no such restrictions were considered desirable or necessary in Scotland, either locally or nationally.

The first restrictive measures on fishing gear in the open sea (other than the possible interpretation of earlier legislation relating to fixed nets along the Scottish shoreline) related specifically to herring (*Clupea harengus*) nets, and was enacted at the end of the eighteenth century. At first, it was framed as a means of quality control in the increasingly regulated cured herring industry: "the meshes of the nets to be no narrower than 36 meshes in the ell, or one inch from knot to knot when the net is on the stretch, so as only to kill Herrings of a proper size and merchantable".[20] But by the early years of the nineteenth century, when minimum mesh sizes of one inch from knot to knot were being statutorily enforced by the Fishery Board, there was a tacit recognition of the potential impact on the long-term supply of fish of taking the "spawn, fry or brood" in large quantities:

> [B]y a firm adherence to the salutary Regulation of the size of the Mesh, the Herring Fishery in the Frith [*sic*] of Forth, which has for many years been dwindling away from the improvident use of small meshed Nets and other ruinous modes of destroying the small Fry, will in the course of a short time be restored to its former prosperity.[21]

This legislation also outlawed the use of a "a double bottom or pouch, and the placing of one net behind another," which effectively created a sealed bag to catch fish of all sizes, including fry and immature herring.[22]

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[18] A. Forte and J.R. Coull, 'Fishing and Legislation', in J.R. Coull, A. Fenton and K. Veitch (eds.), *Scottish Life and Society: Boats, Fishing and the Sea* ('A Compendium of Scottish Ethnology', Vol. 4, Edinburgh, 2008), 173-4.
[19] *Ibid*., 25-6. The only exceptions to free fishing at sea related, once again, to the catching of salmon and to the capture of oysters, both of which were subject to separate legislative measures.
[20] *Further Report on the State of the British Herring Fisheries* (1798), 207.
[21] *Fishery Board Annual Report*, 1811, 5.
[22] *Fishery Board Annual Report*, 1809, 11-12. The actual legislation was the 48th Geo. III., Chap. 110, Section 12 (1808).

The reasons behind Scotland's traditionally libertarian approach to the sea fisheries in the early-modern period are not difficult to discover. There simply was not the same level of pressure on fish stocks as there was in many English regions, so that measures to conserve them, except in certain narrow estuaries and well-fished rivers, were deemed unnecessary. At the beginning of the eighteenth century the proportion of the population living in towns of more than 10,000 people was less than half that of England and Wales, and Scotland's population density overall was much lower than most of the rest of Europe.[23] But this changed dramatically over the following century, so that by 1800, 17.3 per cent of the population now lived in large towns and cities, mostly in the newly-industrialising central belt – a level almost comparable with England and Wales at the time.[24] The rapid growth of the country's urban population after 1800 placed significant pressure on Scotland's commercial fish stocks, so that by the 1850s it is possible to talk of similar complaints being made by fishermen, in terms of both declines in certain heavily exploited fisheries, and the destructive effects of certain fishing practices, as those identified in Chapter 2 for the early-modern period in the southeast of England and some regions of Ireland. But there was one major difference between the development of commercial sea fishing in nineteenth-century Scotland, and that in England and Ireland in the period before 1800: bottom trawling, which was consistently bemoaned as the most destructive fishing practice around the rest of the mainland Britain and Ireland, was simply not a factor in Scotland before the 1860s and 70s, except in the most limited and localised way.

This is something which will be explored in much greater detail in subsection 4.3.4 of Chapter 4, below; but it is important to note here that there was no 'beam trawling controversy' in Scotland before the later decades of the nineteenth century as there had been in certain English and Irish fisheries from at least the seventeenth century. Instead, the response of Scottish fishermen to what they perceived as unsustainable pressure on local fish stocks from the 1840s onwards was to blame other practices and other gear. In particular, in the Firths of the Forth and the Clyde, historically the most heavily fished of all Scotland's regions, the novel use of the seine net, in two distinct variations, caused considerable controversy. In the Clyde, it

[23] E. Foyster and C.A. Whatley, 'Introduction: Recovering the Everyday in Early Modern Scotland', in E. Foyster and C.A. Whatley (eds.), *A History of Everyday Life in Scotland, 1600-1800* (Edinburgh, 2010), 4-5. The proportion living in similar sized settlements in England was 2.3 per cent.
[24] *Ibid*., 5.

was the development of 'ring-' or 'circle-netting' which led to dispute and consternation; in the Forth, it was the use of small-meshed seine nets for catching sprats (Sprattus sprattus, known locally as 'garvies'). Even though they were subtly different fishing practices, were geographically separate, and targeted different species (ostensibly at least), they developed at around the same time and along similar trajectories, and as a result they were very much linked in terms of the public debate which surrounded them.

Seine netting led to considerable controversy about the impact of unpopular fishing methods on the fisheries overall, and about the desirability of imposing measures to control these methods in some of Scotland's most lucrative and strategically important fisheries. Such was the significance of the herring fishery to the economy of Scotland, and to the United Kingdom as a whole, that the controversy over the use of the seine net led to three dedicated commissions of enquiry between 1856 and 1878, and it was a central theme in the two major commissions into the United Kingdom's sea fisheries which were noted in Chapter 2, above, and which began in 1863 and 1882.[25] It led to a great deal of rancour and ill-feeling and even, at times, violence between supporters and opponents of seine netting locally. The wider debate centred on the complaints of fishermen from both sides, and on their different understanding and perceptions of the ecology of the herring fisheries in the two regions. A close investigation into the nature and progress of this controversy, and into the various responses of those who gave evidence to the commissions of inquiry, can be very illuminating. It provides valuable insights into the nature of fishermen's complaints during periods of perceived crisis; into their ecological and environmental awareness of targeted fish stocks in the pre-industrial period; into the historical relationship between fishermen and the regulatory authorities, particularly in Scotland; and into the way that that relationship changed, or was changing, in the nineteenth century as a result of a range of social, cultural and economic pressures. As we shall see, it also has considerable resonance with modern discussions about the value and reliability of fishers' ecological knowledge,

[25] 'Scottish Fishery Board Inquiry, 1856', unpublished, National Archives of Scotland, AF7/9 (hereafter, *1856 Inquiry*); *Report of the Royal Commission on the Operation of the Acts Relating to Trawling for Herring on the Coasts of Scotland* (Edinburgh, 1863) (hereafter *1863 Commission*); F. Buckland, S. Walpole and A. Young, *Report on the Herring Fisheries of Scotland* (London, 1878) (hereafter, *1878 Commission*); *Report of the Commissioners Appointed to Inquire into the Sea Fisheries of the United Kingdom* (London, 1866), (hereafter, *1866 Commission*); *Report of the Commissioners Appointed to Inquire and Report upon…Trawl Net and Beam Trawl Fishing* (London, 1885) (hereafter, *1885 Commission*).

and about the relationship between practitioners' knowledge and that of 'experts' (non-practitioners) in debates about fishing. But before we look in detail at this controversial episode in the history of Scotland's fisheries, it is important to place it in its proper context in terms of the historical development of the herring fisheries, and to touch on the nature of the regulatory framework which provided the immediate setting for the dispute over 'legitimate' and 'illegitimate' fishing methods in the middle of the nineteenth century.

3.2 Encouragement for the Scottish Herring Fisheries in the Early Modern Period

Scotland already possessed a mature herring fishing industry by the early-modern period. Legislation in 1424 introduced custom duties on herring exports, indicating that the overseas trade in Scottish sea fish was sufficiently robust to generate significant income for the crown. By the end of the fifteenth century, these duties were being regularly and universally levied on exports of herring, and they had been further extended to other commercial species, particularly cod (*Gadus morhua*).[26] Rorke estimates that by the middle of the sixteenth century, despite considerable fluctuations, the amount of herring exported from Scotland could be as high as 800 lasts (or 9,600 barrels) a year, a trade which supported 464 merchant exporters on the east coast alone.[27] Nonetheless, he also notes that, at the time, Scots "confined themselves to inshore or coastal fishing, in small boats...never venturing far from the shore".[28] This small-scale fishing was in direct contrast to the Dutch herring industry, which "conducted all the fishing, curing, barrelling and storing on large vessels of around 60 tons," known as 'busses'.[29] In the mid-sixteenth century, the Dutch buss fishery underwent a radical reorganisation, and a number of important merchant

[26] M. Rorke, 'Scottish Overseas Trade, 1275/86-1597', Vol. 1 (unpublished PhD thesis, University of Edinburgh, 2001), 197.
[27] M. Rorke, 'The Scottish Herring Trade, 1470-1600', *The Scottish Historical Review*, 84:2 (2005), 153, 154. James Coull notes that in the exceptional year of 1541, herring exports amounted to 18,000 barrels, a figure which outstripped many conventional years in the later-eighteenth century (see Figure 3.3, below). J.R. Coull, *The Sea Fisheries of Scotland: A Historical Geography* (Edinburgh, 1996), 74.
[28] Rorke, 'The Scottish Herring Trade', 150.
[29] *Ibid*. See also J.R. Elder, *The Royal Fishery Companies of the Seventeenth Century* (Glasgow, 1912), 14-15, 29. For a comprehensive discussion of the early-modern Dutch herring industry, see B. Poulsen, *Dutch Herring: An Environmental History* (Amsterdam, 2008).

towns formed a body of oversight and administration, the *College van de Grote Visserij*, which was granted jurisdiction over the entire industry.[30] In many ways, it was jealousy of the Dutch, as well as the ubiquitous presence of their vessels in the lucrative herring grounds off the coast of Shetland, which gave rise to British attempts to develop a large-vessel fishery in Scottish waters in the seventeenth century.[31]

It is important to note that, even though Scottish fishing was prosecuted on a relatively small scale, this does not mean that it stagnated or stood still in the early modern period. Indeed, the main thrust of Rorke's 2005 article is to illustrate that "[t]he last six decades of the sixteenth century witnessed a significant expansion in Scottish herring exports" *despite* an almost total reliance on small boat fishermen.[32] This was achieved in large part by opening up the largely unexploited fisheries of the northwest Highlands, an endeavour which was logistically complex and beset with difficulties, yet which appears to have kick-started the Scottish herring boom in earnest.[33] Rorke demonstrates that the canny burghers of the Clyde and the major towns in the southeast of Scotland were perfectly aware that it was "considerably cheaper to expand production into the remote west Highland fisheries – which were nonetheless still inshore fisheries – than to establish a deepwater buss fleet".[34] Fishermen in small vessels sailed to the northwest, accompanied by larger half-decked 'crayers' and barks, which carried supplies for the season and returned periodically with cured fish.[35] Thus, a relatively remote commercial fishery was already developing on Scotland's northwest inshore coastline long before the adoption of large vessels on the Dutch model. Nonetheless, in the seventeenth century an appetite arose for even greater exploitation of the rich resources in the seas of north Britain. Accordingly, the first attempts to develop a national (that is, truly British) fishery on a grand scale were born.

The first British fishing company was launched by Charles I in 1630, under the title of 'The Association for the Fishing,' and was finally chartered in 1632. The Association set the precedent for later experiments in terms of its organisation (it was

[30] Poulson, *Dutch Herring*, 43
[31] Rorke, 'Scottish Overseas Trade', 201.
[32] Rorke, 'The Scottish Herring Trade', 164.
[33] *Ibid*., 160-165.
[34] *Ibid*., 164. See also J.R. Coull, 'The Development of Herring Fishing in the Outer Hebrides', *International Journal of Maritime History*, 15:2 (2003), 24.
[35] Rorke, 'The Scottish Herring Trade', 161-62.

a joint stock company, financed by English, Scottish and Irish capital); its operation (its explicit aim was to create a rival to the great Dutch buss fishery); and its almost total lack of success (the company failed within a few years of its creation).[36] In conception, it was to consist of a fleet of 200 herring busses, based mainly on the Isle of Lewis, which would both fish and process the large catches of herring which could be made in the waters of the northwest. The Association was also granted an absolute monopoly on the commercial trade in fish across the whole of Britain.[37] But, from the very beginning it was beset by a number of obstacles which soon proved to be insurmountable. The first, and possibly the most intractable, was the resistance of Scottish interests to the idea of a British company taking charge of their lucrative sea fisheries. On the one hand, the burghs, which up to this point had retained almost total control of Scotland's herring trade, sought numerous concessions and exceptions to the Association's jurisdiction, particularly in terms of the inshore fisheries.[38] Many of these were granted in the final charter, but it is clear that this did not assuage the anxiety and discontent of the burghers, and their resistance to outside interference in what they viewed as *their* fisheries continued.[39] On the other, local conflict in Lewis itself, between native long islanders and the adventurers, allied to an insufficient understanding of local conditions among those who were charged with administering the Association's work, finally put an end to the project as a going concern.[40]

In the event, only a few of the 200 planned vessels were ever commissioned, and it soon became obvious that these were inappropriate for herring fishing around Lewis and the Outer Hebrides. As a result, "the fishing on the coast and in the lochs about the islands near Lewis was 'very commodious and profitable' to the native fishermen, but was by no means [as] suitable for large busses such as those owned by the company".[41] Attempts were made to employ the busses more usefully in the North Sea, but here they were hampered by the interference of the "omnipresent

[36] A.D. Nicholls, *The Jacobean Union: A Reconsideration of British Civil Policies Under the Early Stuarts* (Westport, CT, 1999), 156-58; Elder, *Royal Fisheries Companies*, 57.
[37] Elder, *Royal Fisheries Companies*, 55, 49.
[38] *Ibid*., 41-45.
[39] *Ibid*., 46-7; Nicholls, *The Jacobean Union*, 157.
[40] Elder, *Royal Fisheries Companies*, 61-64, 54; A. MacCoinnich, *Plantation and Civility in the North Atlantic World: The Case of the Northern Hebrides, 1570-1639* (Leiden, 2015), 290-335.
[41] Contemporary account quoted in Elder, *Royal Fisheries Companies*, 57.

Dutchmen".[42] As a result of resistance from Scottish interests (both locally and nationally), the interference of the Dutch (who considered the eastern deep-sea herring fisheries their own), and the ineptitude and lack of foresight of its commissioners, Charles I's Association for the Fishing was effectively dead in the water within a decade of its launch. But this was only the beginning of the dream.

Further attempts were made to create a viable large-vessel herring fishery in Scotland in 1661 and 1670. The first of these, attempted by Charles II, foundered quickly on the back of mismanagement and the rather more pressing preoccupations of the plague and the Great Fire in London. It was finally sunk when Britain again entered into war with the Dutch in 1667.[43] Though a more concerted effort, and with monopoly powers to rival Charles I's Association for the Fishing, the second of Charles II's attempts "quickly became little more than a means to extort dues from fishermen and merchants".[44] In the following decades, further efforts were made to reinvigorate the dream of a large-vessel herring industry in Scotland, but none reached even the limited levels of success of Charles I's Association. Intriguingly, a purely Scottish attempt to kick-start a buss fishery on the Dutch model was initiated in 1720, when the royal burghs launched their own joint stock company, the 'Co-partnery of Freemen Burgesses of the Royal Burghs of Scotland for Carrying on the Fishing Trade'.[45] All things being equal, one might have expected such a venture to have fared much better than its 'British' predecessors. It, too, was granted a Royal Charter; it benefitted from the infrastructure which was already in place within the Royal burghs for the operation and administration of a large-scale herring industry; and, of course, it did not have to face the opposition of local interests. Nonetheless, this too was a failure, winding up after only a few years.[46] A contemporary put this particular failure down to a number of causes: the 'laziness' and inexperience of Scottish fishermen, the very nature of joint stock companies (which, he argued, were cumbersome and inefficient), and the existing advantages of the Dutch in terms of long experience, lower costs, and better access to lucrative markets. But, as the first adventurers had discovered on the north-west coast of Scotland in the 1630s, he

[42] *Ibid*., 58.
[43] *Ibid*., 104-5; R. Harris, 'Scotland's Herring Fisheries and the Prosperity of the Nation, c.1660-1760', *The Scottish Historical Review*, 74:1 (2000), 43-4.
[44] Harris, 'Scotland's Herring Fisheries', 44.
[45] *Ibid*., 50.
[46] *Ibid*.

also noted that many Scots were convinced that it was prudent to "make use of smaller vessels than the *Hollanders,*" simply because of "the Fishing lying nearer to us than the Dutch".[47]

3.2.1 The Beginnings of Direct State Intervention

It might reasonably be expected that the repeated failure to develop a large-vessel herring fishery over an entire century would have dampened enthusiasm for this approach; but, in fact, nothing could be further from the truth. What Bob Harris has termed "piscatorial optimists" were just as fervent in their belief in the transformative power of Scotland's fisheries in the first half of the eighteenth century as they had ever been.[48] The difference, after the Act of Union, is that the emphasis of such ventures shifted from a focus solely on officially sanctioned, but privately run, joint stock companies, and towards a state-administered system, albeit one that was run alongside private ventures. Accordingly, the 'Board of Trustees for the Improvement and Manufactures and Fisheries' was established in 1727, the first direct state intervention in the development and administration of Scotland's fisheries. Harris sees the initial impetus for the establishment of the Board as a determination "to demonstrate the benefits of the Union to an uneasy, strained, and sporadically turbulent Scotland," and Coull broadly agrees, stating that "official encouragement to fishery development was inevitably caught up in the working out of Scotland's new relationship to England".[49] The Board's sphere of influence was explicitly limited to Scotland, and there is no doubt that, following the upheaval of the Jacobite Rebellion in 1745-6, government efforts were directed with renewed vigour towards the development of the Highland economy.[50] Central to this new 'Highland policy' was, once again, the creation of a large-scale herring buss fishery in the northwest, and in 1750 an Act was passed authorising, firstly, the payment of a tonnage bounty to merchants who fitted out large herring busses, and secondly, the establishment of

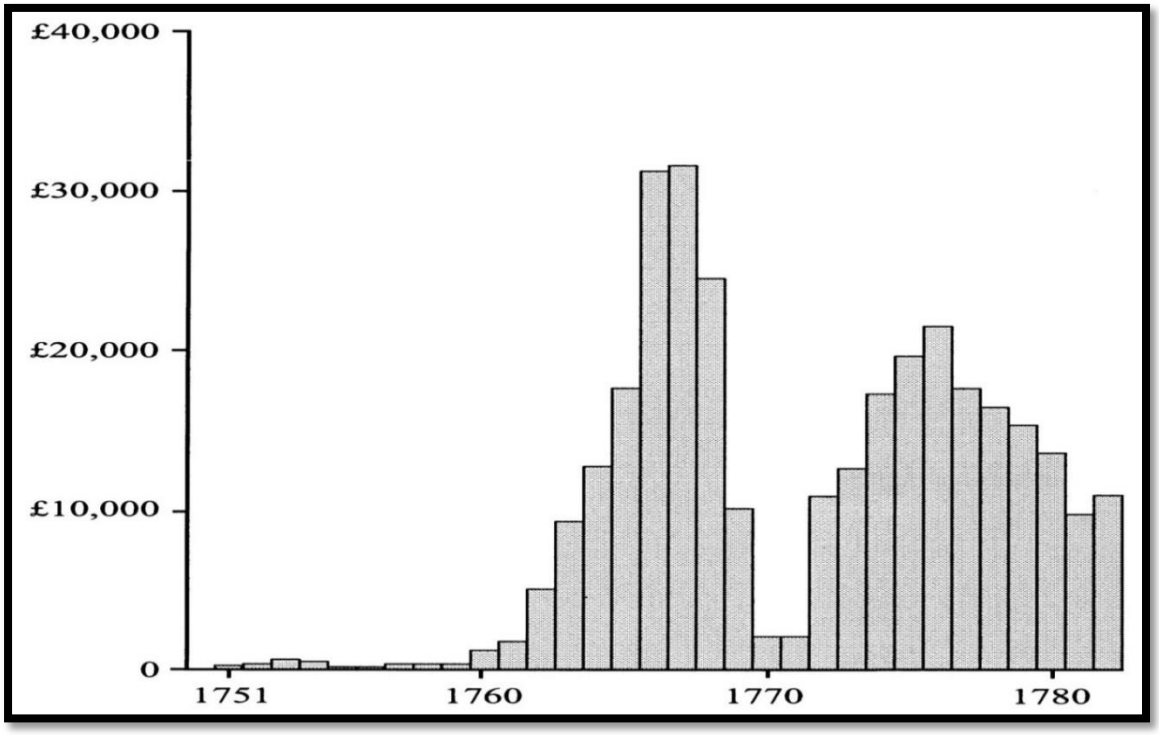
[47] Anon, *A Letter from a Gentleman in Town, to a Friend in the Country, Concerning the present State of the Fishing-Copartnery in North Britain* (Edinburgh, 1723), 11, 3-4, 8-9. See also, J.R. Coull, 'Fishery Development in Scotland in the Eighteenth Century', *The Journal of Scottish Historical Studies*, 21:1 (2001), 2.
[48] Harris, 'Scotland's Herring Fisheries', 39.
[49] *Ibid*., 50. Coull, 'Fishery Development', 6.
[50] The literature on economic development in the post-'45 highlands is extensive, but for an excellent discussion of the issues from the point of view of the fisheries, see, R. Harris, 'Patriotic Commerce and National Revival: The Free British Fishery Society and British Politics, c.1749-58', *The English Historical Review*, 114:456 (1999), 285-313.

yet another joint stock company, the Society of the Free British Fishery, to provide impetus to the new venture. In order to foster the success of the Society, subscribers were this time guaranteed returns of three per cent on capital employed in buss building, underwritten by public funds.[51] Perhaps unsurprisingly, and despite the commitment of government funds to the project, "[t]he part played by the Society...was in fact minor [because] it was poorly organised and had little lasting impact".[52] However, the payment of bounties had a much more lasting effect, even though they led to unintended and, from the point of view of those piscatorial optimists, undesired consequences in terms of the large-vessel fishery for herring.

Initially, the bounty for merchants who fitted out vessels for the buss fishery was set at thirty shillings per ton, but following a poor take-up in the early-1750s this figure was increased to fifty shillings.[53] There is no doubt that this incentive did have the effect of stimulating a significant increase in the number of large vessels which set out for the fisheries of northwest Scotland over the following fifty years or so. The bounty was payable on vessels of fifteen tons burden and over, and the number of vessels entitled to it increased from less than fifty in the early-1760s to more than 300 in the 1790s.[54] Nonetheless, it is far from certain whether the buss fishery in the northwest of Scotland had any significant impact at all on the amount of herring that was caught during this period.[55] This is illustrated in Figures 3.2 and 3.3, below. Figure 3.2 is an adaptation of Coull's graph representing the amount of tonnage bounty payments paid to herring buss owners between 1751 and 1782.[56] Figure 3.3 shows the trajectory of white herring exports over the same period.[57] Given that the vast majority of the herring caught in Scotland until at least the mid-nineteenth century was intended for export, it is clear that, until the mid-1770s at least, there

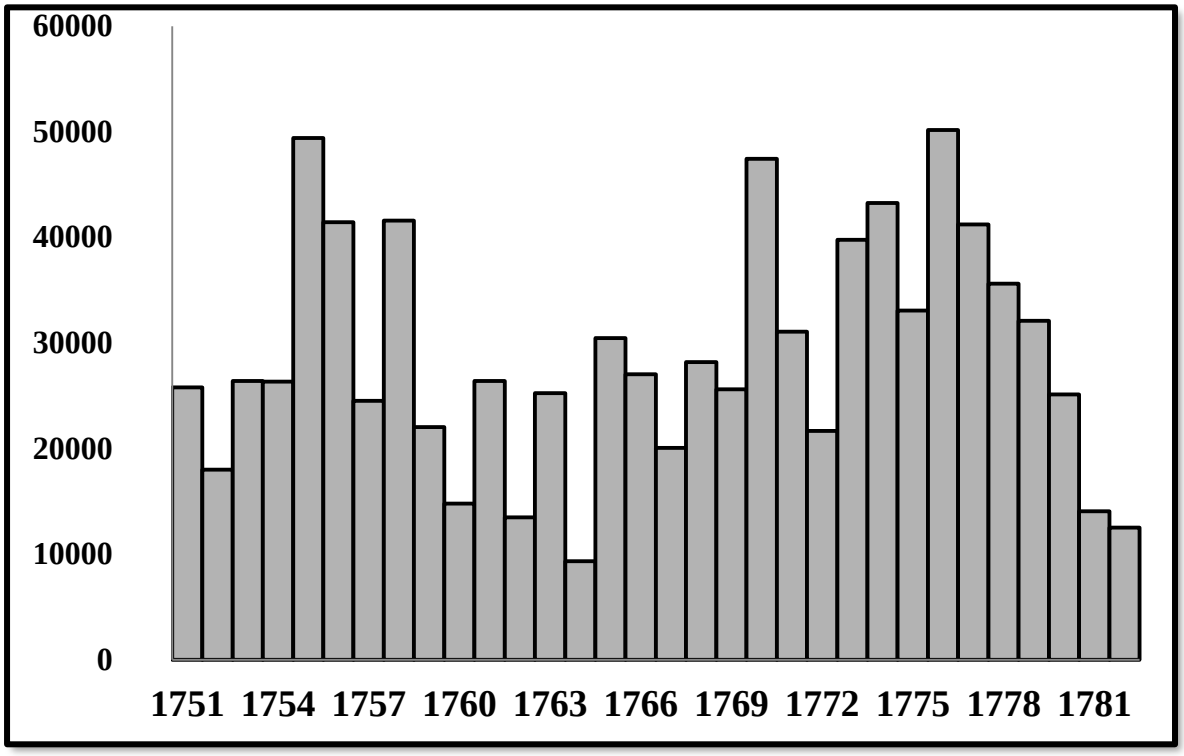
[51] Coull, 'Fishery Development', 9, 10; Harris, 'Scotland's Herring Fishery', 54.
[52] Harris, 'Patriotic Commerce', 307-13.
[53] Coull, 'Fishery Development', 10.
[54] *Ibid*., 9.
[55] See, for example, Coull, 'Fishery Development', 1; E.D. Hyde, 'The British Fisheries Society: Its Settlements and the Scottish Fisheries, 1750-1850' (unpublished PhD thesis, University of Strathclyde, 1973), 32-4, 52.
[56] Coull's original graph showed bounty payments from 1751 to 1799.
[57] National Archives of Scotland, RH2/4/551, 'An Account of the Quantity of British Herrings...Exported from Scotland from Christmas 1750 to Christmas 1782 distinguishing each Year and the Ports from whence exported'.

Figure 3.2: Total bounty payments paid to herring buss owners, 1751-1782



Source: Adapted from Figure 2, Coull, 'Fishery Development in Scotland', 12

Figure 3.3: Scottish white herring exports (barrels), 1751-82



Source: 'An Account of the Quantity of British Herrings...Exported from Scotland from Christmas 1750 to Christmas 1782...', National Archives of Scotland, RH2/4/551

was no obvious relationship between the fishing effort of busses on the bounty and the actual amount of herring landed.[58]

As Hyde pointed out in the early-1970s, a temporary hiatus in payments of the tonnage bounty between 1767 and 1772 did nothing at all to dampen catches of herring overall, despite clearly impacting on the number of busses sent to the fisheries; and, in fact, the year 1770 saw the third highest annual exports of the entire period despite the fact that it also saw one of the lowest numbers of busses commissioned annually.[59] There was plenty of adverse opinion among contemporaries about the tonnage bounty and the preoccupation with developing a large-vessel fishery, not least among small boat fishermen themselves who believed, with considerable justification, that it was they who were the backbone of Scotland's herring fishery, but that they were excluded from its rewards.[60] They were joined in this belief by Adam Smith, who devoted several pages of *The Wealth of Nations* to a discussion of the futility (indeed, the counterproductivity) of a tonnage bounty in promoting the herring industry.[61] Smith, like many before him, recognised that "[a] boat fishery...seems to be the mode of fishing best adapted to the peculiar situation" in northwest Scotland, where the herring fishery was concentrated at the time.[62] Eventually, this strand of opinion prevailed, and after 150 years of failure to build a Dutch-style large vessel herring fishery in Scotland the emphasis finally shifted towards encouraging and developing still further the existing – and expanding – open-boat fishery.

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[58] The lack of a relationship between the number of tonnage bounty-entitled busses and the amount of white herring exported is even clearer if we extend the time series to the end of the century. However, the picture is made more complicated by changes to the bounty entitlements in 1786 (discussed below), which is why Figures 3.1 and 3.2 end in 1782. For white herring export figures from 1788 to 1799, see Figure 3.4 below. *Report of the Committee Appointed to Enquire into the State of the British Herring Fisheries* (1798), 210.

[59] Hyde, 'The British Fisheries Society', 52.

[60] Harris, 'Scotland's Herring Fisheries', 57.

[61] A. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Vol. 2, Book IV (1798; 2nd edition, Edinburgh, 1815), 290-98 (also quoted in the *First Report from the Committee Appointed to Enquire into the State of the British Fisheries, and into the Most Effectual Means for their Improvement and Extension* (1785), 105). John Leazer, in his discussion of Smith's argument against herring bounties, argues that Smith got it wrong, and that the tonnage bounty had the effect of increasing the amount of herring caught, particularly after 1782 when our discussion ends. However, his argument is hampered by the fact that he clearly believes the official line, that it was the busses themselves which were catching the herring they brought back to their home ports, something which is directly contradicted by the evidence (see the following discussion). J. Leazer, 'A Case for Subsidies? Adam Smith and the Eighteenth Century Scottish Herring Fishery', *Historian*, 25:1 (2013), 64.

[62] Smith, *Wealth of Nations*, 294.

Like Smith, the new piscatorial optimists of the later-eighteenth century realised that the small boat fishery was the most likely seedbed for expansion in the future. Foremost among their number were John Knox, a Scottish-born London bookseller, and James Anderson, professor at the University of Glasgow.[63] Knox and Anderson argued that the real obstacle to the full exploitation of Scotland's fisheries was not the absence of large vessels, which required considerable capital and sailed from distant urban ports, but the undeveloped state of those remote parts of the country where fishing was already a major part of the economy.[64] Many improvers and modernisers condemned the remnants of the clan system which led to landlords and their deputies, or 'tacksmen,' retaining an almost feudal control over the lives and livelihoods of their tenants.[65] As a result, their prescription for development rested on the construction of planned, well-resourced and orderly 'free towns' in remote areas where fishermen, curers and merchants could support and encourage one another according to the best enlightenment principles.[66] The result of this groundswell of opinion was yet another joint stock company, 'The British Fisheries Society' formed in 1786 to finance and oversee the development of a number of new fishing settlements in the north of Scotland.

The sites for these new towns were not well chosen and, according to Hyde, its western settlements at Tobermory on Mull, Ullapool on Loch Broom, and Lochbay on the Isle of Skye, were "fiascos" due to poor planning and administration and a fundamental lack of ambition.[67] Despite the strong language, there is no doubt that he had a point. Knox had originally envisaged a chain of forty such settlements stretching around the Scottish coastline from Dornoch in the north east to Arran in the southwest, so the actual establishment of only four fishing towns at apparently random and rather poorly selected sites can hardly be said to represent the fulfilment of that vision.[68] But there were other, unforeseen forces at work which served to thwart the Society's aims. In particular, and rather fundamentally, the herring on

[63] Oxford Dictionary of National Biography Online (hereafter ODNB) [http://www.oxforddnb.com/view/article/15785?docPos=5, accessed on 13/04/2015]; J. Dunlop, *The British Fisheries Society, 1786-1893* (Edinburgh, 1978), 18-19.
[64] J. Anderson, *An Account of the Present State of the Hebrides and Western Coasts of Scotland* (Edinburgh, 1785); J. Knox, *A Discourse on the Expediency of Establishing Fishing Stations or Small Towns in the Highlands of Scotland and the Hebride Islands* (London, 1786).
[65] See pp.183-6, below.
[66] Dunlop, *British Fisheries Society*, 18-19, 24.
[67] Hyde, 'The British Fisheries Society', 346.
[68] Dunlop, *British Fisheries Society*, 24.

which the whole undertaking depended declined dramatically on the northwest coast in the 1790s and failed to recover thereafter, making the settlements there instantly unviable.[69] Other than the three western villages already mentioned, the fourth of the Society's settlements was at Pultneytown, on the east coast.[70] This proved to be a much more successful venture, and despite the fact that it was at odds with the original ethos of the Society, it was the only one of its settlements which survived as a going concern into the nineteenth century.[71]

Once again, the grand vision of protagonists for the planned development of the remote fisheries on Scotland's northwest coast was quickly thwarted by a combination of environmental, practical and administrative obstacles. But the real legacy of this final phase of public/private intervention was the encouragement of the existing small boat fisheries in their traditional form. In the early years, this encouragement was inadvertent and even undesired. From the start, the tonnage bounties paid to large vessel owners were intended to encourage only this type of fishing, and stipulations were made that in order to qualify for the bounty, buss captains were not permitted to purchase herring from local fishermen in the remote locations where they operated. In practice, there is evidence that this rule was widely ignored and that a significant proportion, perhaps even a majority, of buss cargoes were actually caught in small boats by locals. Pitcarne, in 1787, was in no doubt that this was common practice from at least the 1760s, and more recently both Gray and Hyde suggest that it was the norm rather than the exception.[72] Under the influence of Knox, Anderson and the new piscatorial optimists, the stipulation against buss captains purchasing local herring was scrapped in 1786, and this led to a further boost for small boat fishermen in remote localities. Alongside this liberalisation of the rules, the bounty system itself was overhauled, specifically to encourage the boat fishery. The tonnage bounty was reduced from thirty to twenty shillings and a one shilling barrel bounty was introduced for all cured herring, later increased to two shillings, regardless of whether it was caught by large vessels or open boats.[73]

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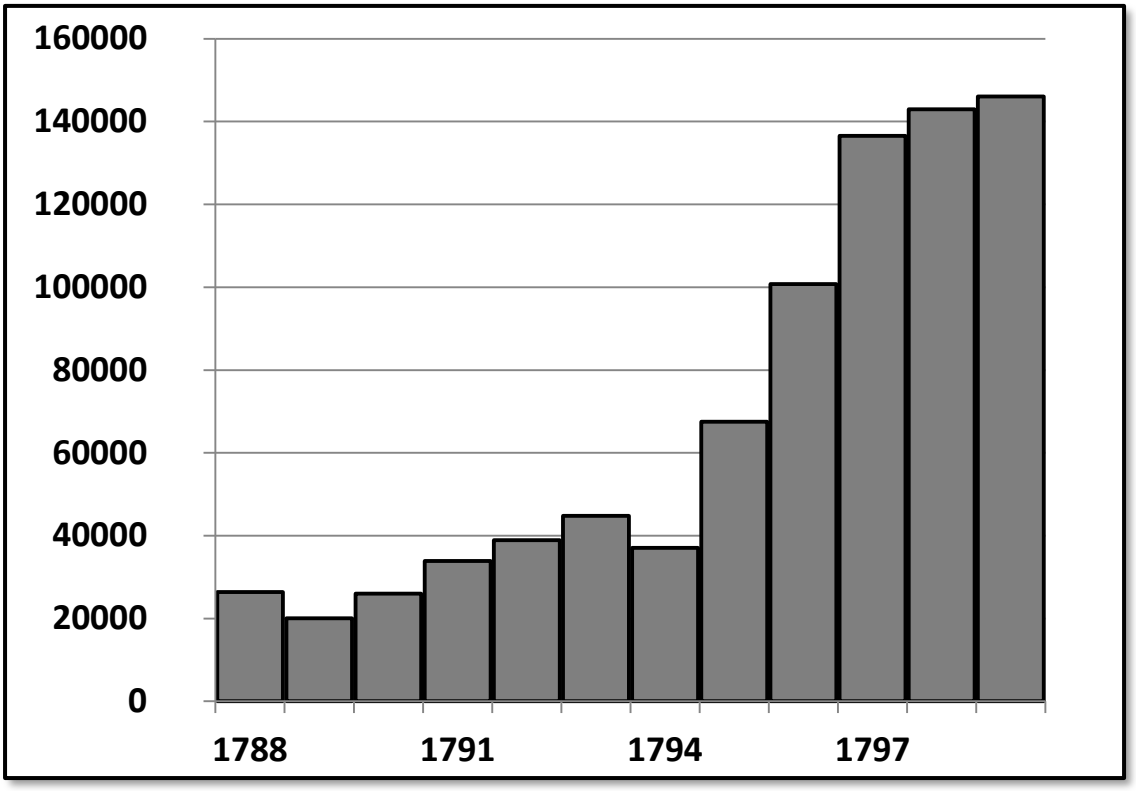
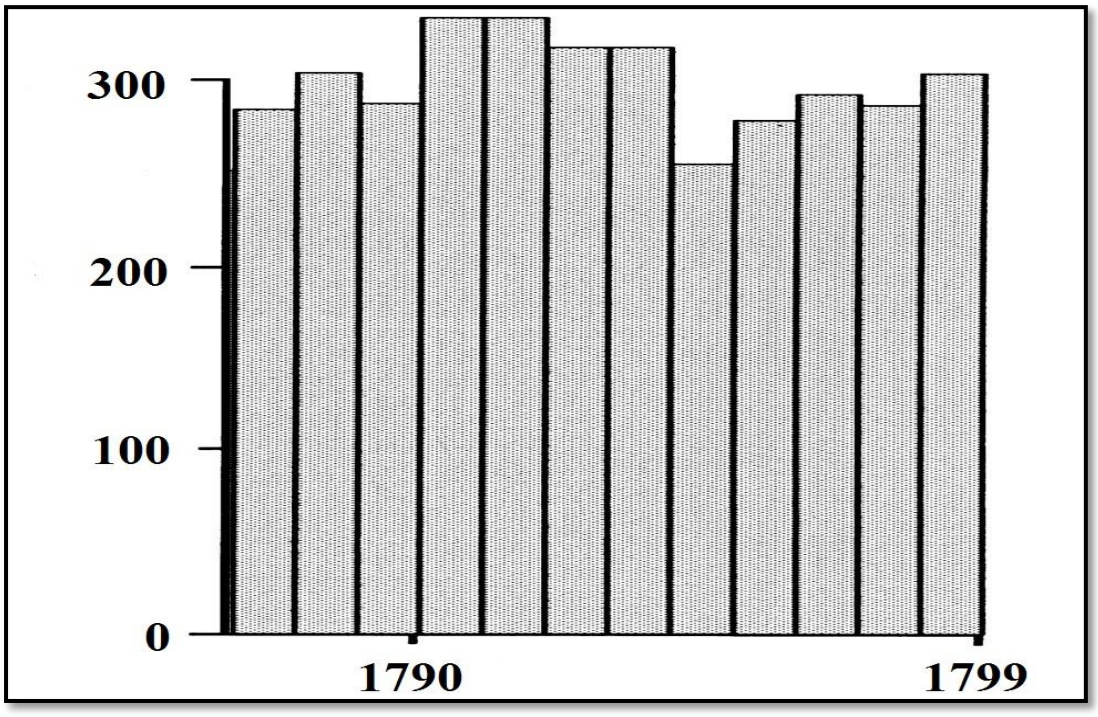
[69] *Ibid*., 68, 142, 199.
[70] See pp.181-2, 188-90, below.
[71] See also Dunlop, *British Fisheries Society*, 191; Hyde, 'The British Fisheries Society', 348.
[72] G. Pitcarne, *A Retrospective View of the Scots Fisheries*... (Edinburgh, 2nd edition, 1787), 10; M. Gray, *The Highland Economy, 1750-1850* (Edinburgh, 1957), 110; Hyde, 'The British Fisheries Society', 33-4.
[73] *Third Report from the Committee to Enquire into the State of the British Fisheries* (1786), 4; Coull, *The Sea Fisheries of Scotland*, 106; Coull, 'Fishery Development', 18.

Figure 3.4: Exports of white herring from Scottish ports (barrels), 1788-99



Source: *Report Respecting the British Fisheries* (1798), 209; *Report Respecting the British Herring Fisheries* (1800),153

Figure 3.5: Number of vessels entitled to the tonnage bounty, 1788-99



Source: Adapted from Coull, 'Fishery Development in Scotland', 9 (Figure 1)

It is very difficult to make a confident estimate of the numbers of small or open fishing boats around Scotland's coastline before the nineteenth century.[74] As we have seen, throughout the early modern period it was large vessels which were the focus of official attention. But towards the end of the eighteenth century it was officially acknowledged that "a great fishing is carried on, on the coasts of Scotland, by vessels which do not require custom-house dispatches [*i.e. not carrying salt*], and of which, consequently, no accounts are kept".[75] Just how 'great' this unaccounted-for fishery was is suggested by Figures 3.4 and 3.5. Figure 3.4 demonstrates that, while white herring exports increased steadily from 1788 to 1794, they really took off from 1795 when the two shilling barrel bounty became effective. On the other hand, the number of bounty-entitled busses operating over the same period did not fluctuate significantly (Figure 3.5), so it seems very likely that the great increase in the quantities of herring caught for export can only be accounted for by a significant increase in the fishing effort of open boats. Conversely, it is also clear that significantly increased demand, coupled with the encouragement of an enhanced barrel bounty, provided a major impetus to the small-boat herring fishery in Scotland towards the end of the eighteenth century.

3.2.2 Encouragement, Governance and the Commission for the Herring Fishery

It is against this backdrop, of an encouraged and expanding small boat fishery, and a significant but declining large vessel (buss) fishery, that the 'Commission for the Herring Fishery' (better known as the Fishery Board) was established by act of Parliament on 11 January 1809.[76] The early history of the Fishery Board is well documented,[77] but it is important to note that, in keeping with earlier attempts to kick-start the fisheries, it was established "as a promotion agency" for the Scottish herring fishery, and that "it can be judged as an essential success in developing a system of quality control in herring curing, as well as stimulating general improvement in the

[74] Attempts were made by contemporaries, but they tended to be highly localised and impressionistic. Coull, 'Fisheries Development', 15-16.
[75] *Report Respecting the British Herring Fisheries* (1800), 379.
[76] National Archives of Scotland, AF82/1: *Commission for the Herring Fishery, Annual Report* (hereafter, *Fishery Board Annual Report*), 1809.
[77] See, for example, J.R. Coull, 'The Development of Marine Superintendence in Scotland under the Fishery Boards', *International Journal of Maritime History*, 10:1 (1998), 41-59; Coull, *Sea Fisheries of Scotland*, 105-125; M. Gray, *The Fishing Industries of Scotland, 1790-1914* (Oxford, 1978), 54-5, 77-8.

various aspects of trade".[78] In other words, it was a "semi-commercial" body, whose main function was "the creation of a fishing and curing industry" for herring.[79] Nonetheless, it is also the case that marine superintendence and oversight was recognised as part of the Board's role from the very beginning. In its first annual report, it was noted that:

> [it] appeared to the Board to be an object of much importance to the welfare of the service, that measures should be taken to prevent depredations upon the property of persons engaged in the Fishery upon the West Coast, and to keep order among the Fishers there.[80]

To that end, a fishery officer was appointed at the usual salary of £100 per annum specifically to oversee and keep order in the fisheries. Furthermore, application was made to the Lords of the Committee of Council for Trade for the use of an armed vessel to patrol the west coast of Scotland during the herring fishing season.[81]

When one considers the scale of Scotland's inshore fisheries at the time, this is hardly surprising. In 1825, the first year for which we have fishery officers' figures for the number of boats operating from Scottish ports, there were 8,293 registered vessels. By the mid-1850s, this figure had risen to over 11,000.[82] It is instructive to compare this with the modern fleet which, in 2014, consisted of 2,030 fishing boats registered in the whole of Scotland, two thirds of which were classed as "small vessels" (under ten metres).[83] Not all of the boats counted by the Board in the nineteenth century would have been used to catch herring, but there is little doubt that the great bulk of them would, either exclusively, or in conjunction with other types of fishing outside the herring season. Immediately, one begins to see the challenges which faced both fishermen, and any supervisory body which sought to keep the peace in Scotland's highly-seasonal herring fishery in the nineteenth century.

These challenges are brought into even sharper relief when we recall that the vast majority of the fishing, at least until the later decades of the nineteenth century,

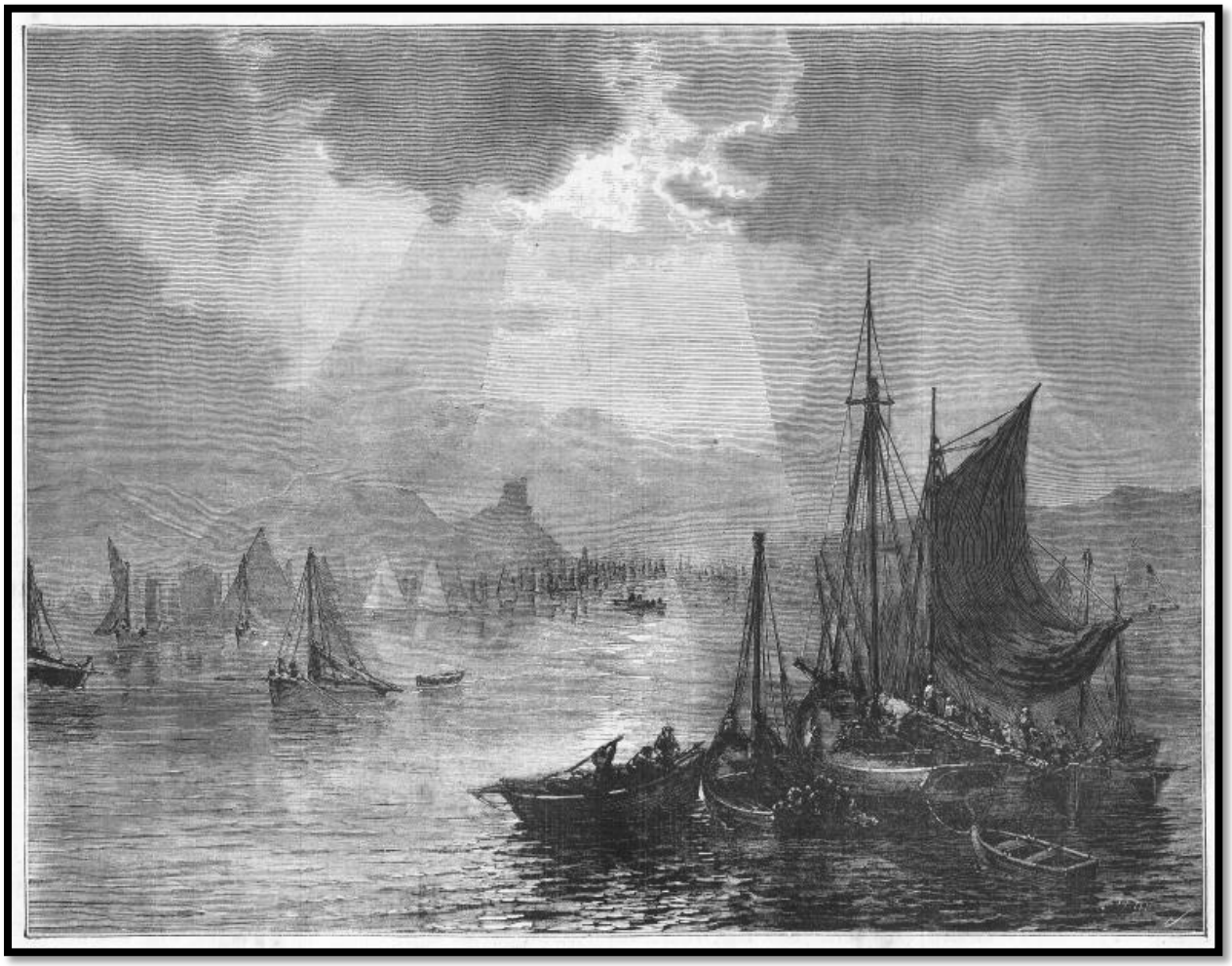
[78] Coull, *Sea Fisheries of Scotland*, 104.
[79] J. Johnstone, *British Fisheries: Their Administration and their Problems* (London, 1905), 75.
[80] *Fishery Board Annual Report*, 1809, 4.
[81] *Ibid*.
[82] Statistics gathered by the Fishery Board, and presented in the *Fishery Board Annual Reports,* 1825 and 1855.
[83] *Scottish Sea Fisheries Statistics, 2014* (Scottish Government publication, Edinburgh, 2015), 22.

was undertaken by open boats relatively close inshore. Generally, this huge fleet of small boats was confined to what would now be considered to be Scotland's inshore waters: rarely did fishermen venture as far as 50 miles from the coast, even in the largest fishing smacks, and most fishing grounds would have been much closer to home than this.[84] In the context of the discussion that follows on the seine-net controversy, it is especially important to note that between 1825 and 1885, the proportion of fishing boats in Scotland (that is, all vessels except the dwindling number of large 'buss'-type ships) that were registered in the Firths of Clyde and Forth ranged from 31 to 41 per cent.[85] In other words, despite all the early attempts to develop the remote fisheries of the northwest Highlands, and the expansion of the northeast fisheries throughout the nineteenth century, between one-third and two-fifths of all of Scottish fishing craft (which equates to 2,969 boats in 1825, and 3,157 in 1885) were plying their trade for most of the time in these two geographically-delimited, spatially-constrained areas. This congestion is suggested by a contemporary illustration from *The Graphic* periodical, in 1871, which shows the massed herring boats emerging from Tarbert Bay, Loch Fyne (see Figure 3.7).

This is important for a number of reasons. First, it is a forceful reminder of the commercial importance of the fisheries in the Clyde and the Forth at the time. Second, it explains why the Fishery Board felt it was critical, from its earliest years, to keep abreast of policing and compliance issues in these two congested fishing centres. Finally, it reminds us of the sheer scale of fishing effort that was undertaken in the Clyde and the Forth, particularly in the herring fisheries, from the beginning of the nineteenth century onwards. The many picturesque descriptions of the herring fleet – such as that from the *Cornhill Magazine*, which eulogised the "sun burnishing the waves with lustrous crimson and silver, and against the darkening eastern sky the thousand sail of the herring-fleet [blazing] like sheets of flame"[86] – hide a much starker reality: that many tons of herring were caught annually, and that pressure on stocks was constantly, and exponentially, increasing. In fact, in 1845, the first year for which we have Fishery Board figures, fishermen caught an estimated 25 tons of herring in the Clyde. In 1855, this had risen to 43 tons, and in 1885 the *actual* take of

[84] See, for example, Coull, *Sea Fisheries of Scotland*, 114; *1866 Commission*, 641, 653, 655, 656.
[85] Statistics gathered by the Fishery Board, and presented in the *Fishery Board Annual Reports*, 1825-85.
[86] Bertram, *The Harvest of the Sea: A Contribution to the Natural and Economic History of the British Food Fishes* (London, 1869), 264-5.

Figure 3.6: *Herring Fleet coming out of Tarbert Bay, Loch Fyne, Scotland* (artist unknown) reproduced in *The Graphic*, 21st May 1871



herring was 138 tons.[87] Small wonder, then, that the Fishery Board felt the need to keep a keen eye, not only on the disputes of fishermen at sea, but also on the health of these lucrative and strategically important fisheries. As soon as disputes emerged, in terms of conflicts about gear or complaints about the impact of new fishing methods, the Board was bound to act – it was, after all, the only constituted body with any real jurisdiction in such matters. And this is precisely what happened in the early-nineteenth century, with the appearance in Loch Fyne and the Firth of Forth of the seine net.

[87] Statistics gathered by the Fishery Board, and presented in the *Fishery Board Annual Reports* 1845, 1855 and 1885. In the period between 1843 and 1857, the fishery board collected data for the *actual* catch of all herring which was to be sold cured, and local Fishery Board officers *estimated* the catch of herring which was caught to be sold fresh. In the later period (after 1883), the Board collected data for all herring caught, whether it was to be sold fresh or cured. See pp.155-6, below.

3.3 The Seine Net Controversy in Nineteenth-Century Scotland

The seine net has one of the most distinguished pedigrees of any net-fishing practice in European history. It was certainly known in classical Greece and the Roman world (as 'sagena', from which the modern name derives) and its use spread across Europe in the following centuries.[88] Von Brandt's majestic textbook on fish-catching methods describes the seine as follows:

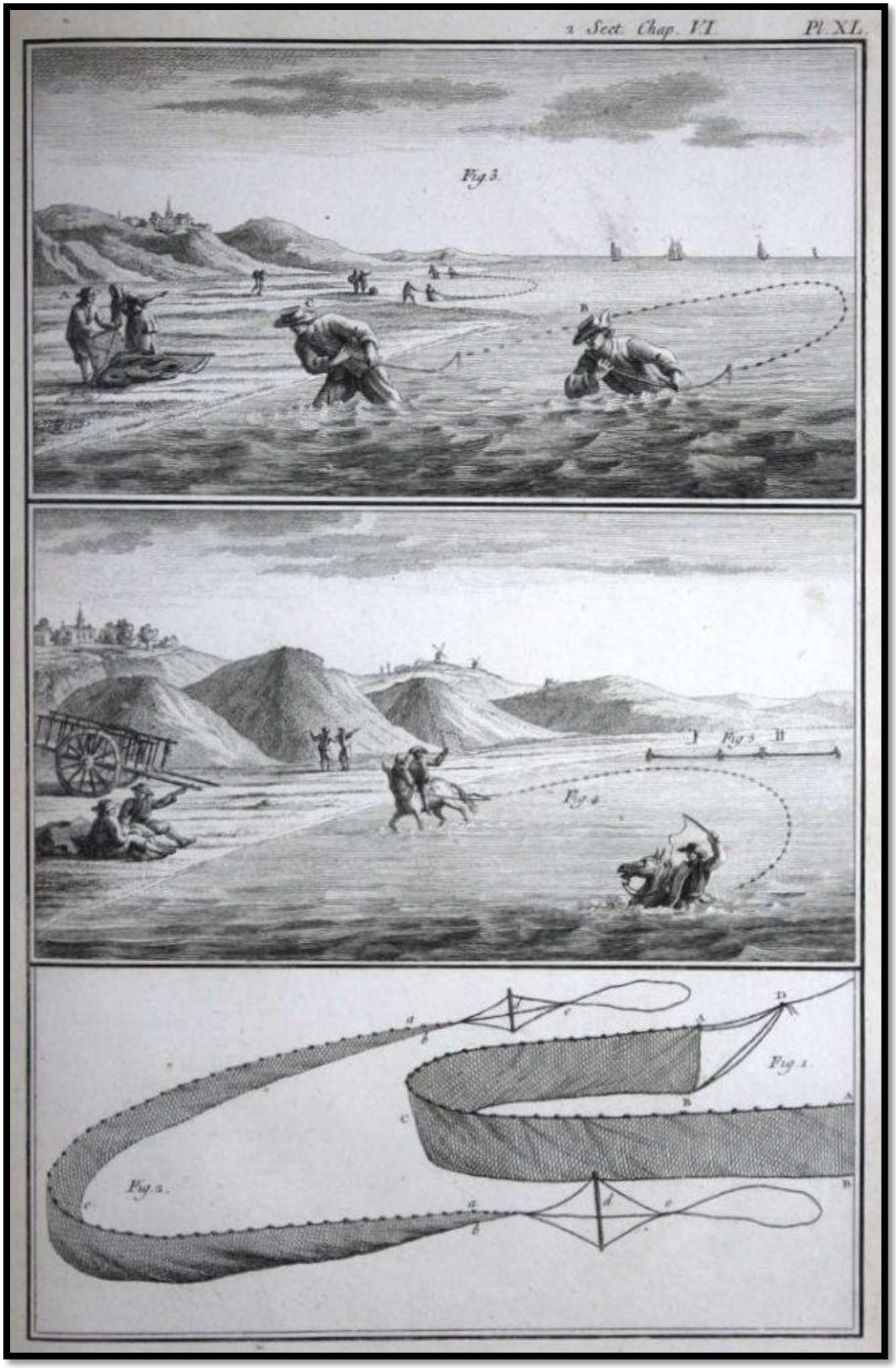
> In its simplest form, the seine net is a net wall consisting of two wings and a section to hold the catch (the bunt or bag) more or less in the middle. The wings are long and each is lengthened by a long towing line or warp. For the bunt it is sufficient that the net is allowed to hang loosely. For this reason, this section of the net is deeper than the net forming the wings.[89]

Originally, seine netting was developed as a method for catching shoaling fish from the shore by encircling them and then hauling them onto dry land (Figure 3.8). But it was also used from early times as a method of fishing by boats, operating in pairs, in open water. It was – and, in many parts of the world, still is – an extremely efficient, though relatively small-scale, method for catching shoaling fish close to the shore, which in large part accounts for its longevity and global spread. In Scotland, it is likely that some form of shore-seining would have been practiced in antiquity, but there is little evidence that its use was widespread. Instead, it appears that the emphasis here was traditionally on the use of various tidal and running-water fish traps, such as the cruive, mentioned above, and the yair (a stone enclosure in which fish were caught by the ebbing of the tide), as well as stake nets and more basic basket traps (akin to modern creels).[90]

Intriguingly, there is little evidence that the use of seine nets was widespread in early-modern Scotland as a means for catching herring or other shoaling fish,

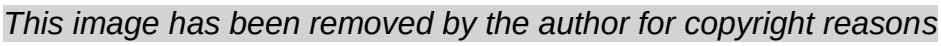
[88] There is also abundant evidence to suggest that something very similar to the European seine developed independently in other cultures at various periods in history. The following description of seine nets and netting is derived from O. Gabriel, K. Lange, E. Dahm and T. Wendt (eds.), *Von Brandt's Fish Catching Methods of the World* (4th edition: Oxford, 2005), 431 *passim*.
[89] *Ibid*., 431.
[90] A. Fenton, 'Fish Traps, Spears and Poaching', in Coull, Fenton and Veitch (eds.), *Scottish Life and Society*, 124-31; Coull, *Sea Fisheries of Scotland*, 30.

Figure 3.7: Seine nets, and seine-net fishermen using a shore seine, ca.1769



Source: D. du Moneceau, *Traité général des pesches, et histoire des poissons qu'elles fournissent* (Paris, 1769)

Figure 3.8: Mackerel and sprats caught by seiners at Chesil Beach, Dorset, ca.1950



Source: Stock photo

the customary method having always been the drift net.[91] This contrasts with regional herring producers in Scandinavia, where small-scale experiments with seines were tried (though sometimes later abandoned) as early as the fourteenth century, and were repeated throughout the early-modern period.[92] But in Scotland, all this was to change when seines made a controversial appearance in the commercially valuable Loch Fyne fishery, and in the locally important sprat fishery in the Firth of Forth, from the 1830s onwards.

[91] The one exception to this rule appears to have been the sprat fishery in the Firth of Forth. See Chapter 3, Subsection 3.3.3, below.

[92] C. Jahnke, 'The Medieval Herring Fishery in the Western Baltic', in L. Sicking and D. Abreu-Ferreira (eds.), *Beyond the Catch: Fisheries of the North Atlantic, the North Sea and the Baltic, 900-1850* (Boston, 2009), 164; Poulsen, *Dutch Herring*, 49. See also A.S. Littler, 'Fish in English Economy and Society down to the Reformation' (unpublished PhD thesis, University of Swansea, 1979), 35.

3.3.1 The Origins of Seine Netting in the Clyde, ca.1830-1851

At some point in the mid-1830s, fishermen from Tarbert, on the Clyde side of the Argyll peninsula, adapted their traditional drift nets to make a rudimentary seine for use in Loch Fyne. Ninian Bannatyne, a fish curer who claimed to have been the first to buy herring taken by this new technique, gave evidence that it had originated in 1833 by men trailing their drift nets across the mouth of the bays in the Loch, and presumably hauling them on to the shore.[93] It appears, then, that the first attempts at seine netting in the Clyde had their origins in two traditional practices, one of which, drift netting, was viewed as perfectly legitimate, whereas the other, the practice of placing fixed nets across rivers and enclosed bodies of water, had always been problematic and had been the target of official sanction for many centuries. By the 1840s, seine netting had caught on with the Tarbert men and was being practised in a much more systematic and recognisable way, from boats as well as from the shore.[94] The practice was extremely unpopular with the great majority of fishermen, who were still committed to traditional drift-nets, and was highly controversial from the very beginning. It was also condemned by local landowners and other interested parties, including fish curers and merchants from Glasgow and beyond.[95]

As we have seen, from the earliest times, most of the concern of fishermen about unpopular fishing gear has rested on the use of nets, traps and other devices which caught immature fish and potentially destroyed spawn (growth overfishing). In Loch Fyne, in the 1830s, the story was no different. Despite the fact that, in the main, the new ring nets were constructed so as to be of a legitimate mesh-size (one inch from knot to knot, according to legislation) it was widely felt that, in the process of being hauled, the mesh of the nets narrowed and led to the capture of many more immature fish than the practice of drift netting.[96] This was one of the most consistent and fundamental objections of drift-netters to the new practice, and it was one that was occasionally acknowledged by trawl-net fisherman. Peter Carmichael of

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[93] *1866 Commission*, 1171. See also, A. Martin, *The Ring-Net Fishermen* (Edinburgh, 1981), 6. In Scotland, during the period covered in this study, the phrase 'seine netting' was rarely used. Instead, phrases such as 'ring netting' and 'circle netting' (for seine netting by pairs of boats in open water), 'scringing' (for seine netting from the shore) and, most often, 'trawling' (specifically in the case of seine netting for herring) were substituted. However, the terms 'seine netting' or 'seining' are used throughout the following discussion for continuity and to avoid confusion.

[94] Martin, *Ring-Net Fishermen*, 6; *1878 Commission*, 124.

[95] Martin, *Ring-Net Fishermen*, 7.

[96] *1856 Inquiry*, 451.

Campbeltown, gave evidence to this effect to the 1866 *Commission on Sea Fisheries*:

> By using the [herring] trawl in the winter do you kill a great number of young immature herring? – Yes, all that come into the net.
> Is a large proportion of them of that sort? – Yes, if the net is narrow a good many of them will be young fish.[97]

In many ways, the use of a hauled net to catch herring was akin to other forms of 'bag netting' – the use of "a double bottom or pouch...[or] the placing of one net behind another" – which was explicitly prohibited by the legislation on mesh size in 1808 in order to reduce the capture of immature fish.[98] But this was not the only objection to the practice of seining for herring.

Just as we saw in Chapter 2 in relation to beam trawling, drift-net fishermen also believed that the seine net was also greatly destructive to the spawn of herring, as well as that of other fish, because it was dragged, in places, across the seabed.[99] They also felt that by actively encircling the shoal and hauling the fish (as opposed to enmeshing them passively in the drift net) the seine-netters disturbed the herring to such a degree that they either went deeper in the water or were driven away from the fishing grounds altogether (commonly known as "breaking the eye of the shoal"). The curers, on the other hand, objected to seines, at least in the early days, because, they said, the practice of hauling them in the great bag of the net injured and spoiled the fish, thereby reducing their commercial value.[100] First among fishermen's concerns, however, was growth overfishing.

The Tarbert men refused to give up seining for herring, even in the face of such concerted opposition, and petitions were submitted to the Fishery Board from both sides as the atmosphere became ever more heated.[101] Eventually, the Board sent its general inspector, John Miller, to gather evidence and to make his own judgement on the rights and wrongs of the various arguments. He concluded that the drift-net fishermen were perfectly justified in their opposition to the new practice,

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[97] *1866 Commission*, 754.
[98] *Fishery Board Annual Report*, 1809, 11-12.
[99] *1863 Commission*, 7.
[100] *Ibid*.
[101] *Ibid*.

believing it to be potentially catastrophic to the fishery overall, and he employed a telling analogy with which to condemn it:

> The results of the [herring] trawl fishery is not dissimilar to what the State Lottery formerly was to its general supporters; dispensing a few immense prizes, the news of which keeps up excitement, and induces many to embark in the same line, who in the end it may be apprehended will share in loss and disappointment.[102]

But herein lay the problem for the many opponents of seine netting in the Clyde: even in the earliest days of the controversy it was acknowledged by supporters and opponents alike that it was a far more productive method of catching herring than drift netting in the short term, and that it was far cheaper.[103] Having once refined and invested in the new method, its evident advantages for the Tarbert fishermen far outweighed any opprobrium that its use brought upon them. What is more surprising is that drift net fishermen from upper Loch Fyne and elsewhere continued to object so strongly to it, given the gains which could be made relatively quickly by seining and the fact that the gear cost so much less to obtain. The seine netters and their few non-fishing supporters consistently blamed opponents' objections on the fact that seining was so productive that it drove down the price of the drifters' catches, and that it was so efficient that their own fish reached the Glasgow markets by steamer far quicker than those of their opponents.[104] Whilst this was undoubtedly true, and was therefore a major economic cause of annoyance to non-seining fishermen, the fact that, in the main, they stood by the drift net in defiance of the new technology rather than adopting it themselves adds weight to their claims that they believed it to be an unnecessarily destructive fishing method which endangered the fishery in the long-run.

As we have seen in the case of fishery inspector John Miller, the drift netters were supported in their beliefs by many who viewed the controversy from outside these close-knit fishing communities. Indeed, even natural sceptics were quickly

[102] Martin, *Ring-Net Fishermen*, 9.

[103] Both boats and gear for ring netting were smaller and less sophisticated than those needed for drift netting. Martin, *Ring-Net Fishermen*, 9.; *1863 Commission*, 8, 11-12, 13; *1878 Commission*, 116, 123, 125, 130.

[104] 1863 Commission, 13; 1878 Commission, 128-9, 132. This is, it has to be said, precisely the same argument used by proponents of beam trawling against their opponents in the mid- to late-nineteenth century. See, for example, pp.53-4, above, and, specifically in a Scottish context, *Fishery Board Annual Report*, 1878, 4.

persuaded that seining for herring was a highly destructive practice. None other than the Hon. Bouverie Primrose, Secretary of the Fishery Board, stated that, while "[at first] I mistrusted very much the objections [because] I never was very strong for putting down fishing for small fish," in the end, he found that:

> every fisherman of the most respectable character testified to the utter destruction of the fishery by the trawl; every fishery officer stated the same thing; the naval superintendents stated the same thing; and masters of vessels stated the same thing – that trawling [for herring] ought to be put a stop to.[105]

As a result of this tide of opinion, the Fishery Board, led by Secretary Primrose, lobbied for the use of seine nets for catching herring to be outlawed.

Local fishery officers in Loch Fyne were so adamant that seining was destructive of small fish that they wanted the Board's sanction to confiscate seine nets from boats wherever undersized herrings were found, ostensibly under the legislation against small-meshed nets, even though such nets may actually have been of the legal mesh size. Realising that this would be a misdirection of the existing law, Secretary Primrose appealed for additional local powers to ban seining for herring without having to resort to further legislation. This, too, proved impossible when the Lord Advocate decided that such a measure would affect fishermen's interests in a different way to the earlier legislation on mesh size, and would therefore need to be the subject of a general law.[106] Eventually, following delays and protests from the Tarbert fishermen, such a law was enacted – the 14 and 15 Victoria c.26 (1851) – under which (among other measures relating to the curing and marketing of herring) seining for herring in Scotland was rendered illegal, and the drift net was confirmed as the only legitimate method for catching them.[107] Under the new legislation, illegal nets could be confiscated and destroyed, and a fine of up to £20 imposed on offenders. In the event of non-payment, offenders could be imprisoned for up to 20 days.[108] In practice, however, despite the severity of the punishments, the new law was not a success.

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[105] *1856 Inquiry*, 448-9.
[106] *Ibid*., 456-8.
[107] 1863 *Commission*, 6-7; Martin, *Ring-Net Fishermen*, 10.
[108] Martin, *Ring-Net Fishermen*, 10.

3.3.2 The 'Second Phase' of Action against Seine Netting in the Clyde, 1851-1867

Having achieved his aim of outlawing seining for herring, Secretary Primrose immediately experienced misgivings about the severity of the measures he was instrumental in enacting. First, he appears to have been genuinely concerned about the violence of which he believed the Tarbert seiners were capable. In the first year of the new regulations, he accompanied the officers charged with patrolling the Loch Fyne fishery aboard the naval cutter, *Porcupine*, and later reported that "the Tarbert fishermen were beginning to combine in loading stones to pelt [my] men with".[109] He was also concerned by the measures taken by the seiners to prevent drift net fishermen from fishing in 'their' waters in reprisal for their own persecution, reporting that "[t]he Campbeltown men had sworn they did not dare go up Loch fine with their drift net because of the [herring] trawlers".[110] Second, Primrose was concerned that the method chosen to police the new ban – which consisted, in part, of hiring non-military men on a casual basis under the supervision of the patrolling cutter – was unlikely to prove successful. They were, he said, an "undisciplined and unpracticed" body of men, and their presence was likely to lead to "a spirit of insubordination among the fishermen that might eventually become quite unmanageable".[111] Finally, it became clear early on that Primrose and other opponents of herring seining in the Clyde, most of whom had considerable local knowledge of the fishery, did not have the full support of others in positions of influence and authority elsewhere in Scotland. Indeed, even the Lord Advocate (who had helped Primrose to steer the legislation through in the first place, however reluctantly) soon worried that there was an "awkwardness" about the law, and that "my feeling...is to let the fish be taken". "Trawling [for herring]," he said, "may be a better mode of taking the fish, why interfere with it?"[112]

Primrose's fears about the prospect of violence proved well founded, though not at all in the way he expected. The first major incident came in 1853 when a young man, Colin McKeich, who was at the tiller of one of the Tarbert boats, was shot and wounded in the shoulder by a gunner in the *Porcupine's* company.[113]

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[109] *1856 Inquiry*, 524.
[110] *Ibid.*, 526.
[111] *Ibid.*, 533-4.
[112] *Ibid.*, 536.
[113] Martin, *Ring-Net Fishermen*, 11-12.

McKeich's 'crime' was to have called out in Gaelic to another of the fishing boats that the patrol was on the lookout for seine nets. The gunner, and another officer who fired at the same time, were sentenced to three months' imprisonment, but were released after a month following a coordinated campaign by the residents of Inveraray and Ardrishaig, in upper Loch Fyne.[114] Nonetheless, Secretary Primrose remained convinced that it was the "bad character" of the Tarbert men which was the prime cause of violence and intimidation following the passing of the 1851 Act.[115] One of his most trusted correspondents, Mr. Lamont of Ardlamont House, also accused the Tarbert seiners of refusing to allow others to fish on what they considered their own ground, and of systematically cutting the gear of the drift net fishermen.[116] Clearly, enforcing the Act in such an incendiary atmosphere, with neighbour pitted against neighbour, was always going to be a difficult task; but it was very much hindered by the ambivalence, firstly, of the Lord Advocate and others in authority, who were instinctively against placing any restrictions on sea fishing, and secondly, of Primrose himself, who, despite his continued opposition to seining for herring in principle, appears to have considered the human cost of prohibiting it too great. Indeed, as early as the end of 1853, he was erring on the side of repeal. He told the 1856 Commission that "I have been much abused for not enforcing this Act, but experience shows that it was a mistake passing it". But he went on to add that "I dare no more as matters [then] stood propose the repeal of the Act than fly; we should then raise the whole difficulty anew".[117]

As a result of the growing ambivalence of the Board, allied to the great difficulty in enforcing the new law, seining reportedly continued unabated throughout the 1850s. In 1858, the Tarbert men took their seine nets for the first time into upper Loch Fyne, directly into the territory of their bitterest rivals. Inevitably, further conflict and violence resulted. The drift net fishermen were first accused of roughing up some of the Tarbert men in Inveraray, and the seiners were then blamed for retaliating against some Inveraray men in Tarbert.[118] James Fraser, the Chief

[114] *Ibid*., 12.
[115] *1856 Inquiry*, 523-4.
[116] *Ibid*., 529-30.
[117] *Ibid*., 544.
[118] *1863 Commission*, 6. In June 1861, a further shooting occurred, this time with tragic consequences. Peter McDougall, a young fisherman, was shot dead by a patrol of marines when they opened fire on a boat which was caught in the act of seining in upper Loch Fyne. Despite their admission of guilt, the officers concerned were later acquitted of all charges. Martin, *Ring-Net Fishermen*, 19-21.

Constable for Argyllshire (who was, it must be said, based at Lochgilphead in upper Loch Fyne) considered the seiners "riotous men"; but, echoing Primrose's concerns about the long-term effects of the Act, he also blamed much of the disorder on the fact that "they are acting in violation of a law, being poachers in fact, and have acquired the habits of poachers".[119] Similarly, the Treasury Committee of 1856 recommended the repeal of the prohibition on seining, mainly on the grounds that it had "no other result than to keep a considerable population in the habitual and successful violation of the law".[120]

Things reached such a pitch that by 1859 the Fishery Board was anxious at least to modify the law, and the following year a bill was prepared to allow the Board to suspend the ban on seining for herring locally under "exceptional circumstances".[121] The reaction of drift-net fishermen and, in particular, curers to this proposed relaxation was swift and decisive. After much lobbying, and, by now, against the wishes of the Fishery Board and Secretary Primrose – indeed, against the majority of informed opinion outside of upper Loch Fyne – a second Act was passed in August 1860 which, far from relaxing the ban on seining, actually strengthened it, so that warrants could be issued to search for seine nets, suspects could be detained for up to 24 hours without arrest, and more stringent penalties for the use of illegal gear were imposed.[122] When this Act proved no easier to enforce than its predecessor, still further measures were imposed which gave the authorities the power to seize, not just the nets of transgressors, but their boats and cargos as well. As a result, it was reported in 1862 that:

> [seining] has, for the first time since its introduction, been almost entirely suppressed by the proceedings taken under the recent Statutes; and, in consequence, the Drift-Net Fishermen have fished with little or no encroachment from other kinds of netting.[123]

One might question the Loch Fyne drifters' success in strengthening the legislation at precisely the point when many of their erstwhile supporters, including

[119] *1863 Commission*., 6; Martin, *Ring-Net Fishermen*, 13-15.
[120] *Fishery Board Annual Report*, 1859, 3.
[121] Martin, *Ring-Net Fishermen*, 15.
[122] *1863 Commission*, 7; Martin, *Ring-Net Fishermen*, 17.
[123] *Fishery Board Annual Report*, 1862, 4.

those in positions of authority and influence, were turning against them. But on closer inspection, there are good reasons for that success. Just as they had predicted when seining for herring began in the 1830s and 40s, stocks of fish in upper Loch Fyne (the stronghold of its opponents) had apparently begun to diminish, and by the early-1860s the spawning fish were said to have disappeared altogether. Peter White, John McTavish and Neil Weir, fishermen from Ardrishaig, told the sea fisheries commission in 1863 that "[f]ormerly the herrings used to spawn from Silver Craigs to Loch Gare. Thirteen or fourteen years ago they spawned in great numbers; but since [herring] trawling began, they spawn in the loch no more".[124] Similarly, the fishermen of Inveraray stated that, "[f]or 15 years no full fish have come to the Upper Loch, and we ascribe their disappearance to trawling".[125] The commissioners themselves, whilst they disagreed with the causes ascribed for the lack of herring in the upper loch, implicitly acknowledged that a reduction had taken place. "When we look back to the records of the fishing in Loch Fyne for the last fifty or sixty years," they wrote:

> we find many periods of bad fishing and gloomy depression the part of the fishermen...In fact, every time that there is a panic, the reasons assigned for the failure of the herring alter, but are strongly pressed upon the Fishery Board as demands for immediate prohibitory measures.[126]

Clearly, in 1860 and 1861, the reasons assigned by the upper Loch Fyne drifters for the disappearance of the herring in their part of the loch – the increase of seining for herring over the previous thirty years – won out over the libertarian arguments of their opponents.

Unsurprisingly, those who were on the side of the seiners, particularly in Tarbert itself, were deeply angered and further embittered by this second round of punitive legislation. Tales of the poverty and demoralization of herring seiners and their families abounded, and the commissioners in 1863 roundly condemned the measures as ineffective, inhumane and unnecessary. They firmly recommended its repeal, with the sole concession that the Fishery Board should retain discretionary powers to be able to suppress it "in waters which are too narrow for [seine netting]

[124] *1863 Commission,* 5.
[125] *Ibid.,* 8.
[126] *Ibid.,* 11.

and drift-net fishing being peaceably carried on simultaneously".[127] Most notably, they also concluded that the long-standing claim of drift net fishermen, that seining for herring had a detrimental impact on available stocks in the long term, was simply untrue, and they echoed earlier comments from seine-netting's supporters that:

> The demand for repressive legislation is only another form of that which always arises when a new and more productive form of labour presses inconveniently upon those who prosecute and have embarked their capital in the old and less productive form of labour.[128]

By 1866, it was clear, once again, that seining for herring was being practiced in Loch Fyne in defiance of the law, and this time it was reported that the Tarbert men had been joined by large numbers of their old adversaries, the fishermen from Ardrishaig and Inveraray in the upper loch.[129] It would seem that the opponents of seine netting were unable to resist any longer the combined pressure of herring seiners, the Fishery Board (which wished to see an end to a bitter and protracted dispute), and the great majority of those in positions of authority who had, for some time, been instinctively against any restrictive measures on fishing at sea. Accordingly, in 1867, all legislation against seining for herring was repealed.[130] Clearly, the motivations of both advocates and opponents are complex, and cannot simply be reduced to a set of opposing beliefs about the long-term impact of a disputed practice on valuable stocks of a commercial species. Nonetheless, the environmental and ecological impact of seining for herring was an issue which lay at the very heart of a long and often rancorous debate. On the other side of the country, in the Firth of Forth, a dispute of a very similar kind was taking place almost concurrently, but this time the central issue was the use of the seine net to catch sprats.

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[127] *Ibid*., 31.
[128] *Ibid.*
[129] Martin, *Ring-Net Fishermen*, 24; *Fishery Board Annual Report*, 1867, 5. In large part, this *volte face* by the drift-net fishermen of Ardrishaig and Inveraray can be put down to simple desperation: by the early 1860s, few herring had been caught in upper Loch Fyne for upwards of a decade. This is something which will be touched upon further below.
[130] *1878 Commission*, ix.

3.3.3 Seine Netting and Small-meshed Nets in the Sprat Fisheries of the Firth of Forth

Sprats had always been caught close to the shore on the east coast of Scotland, particularly in the Firth of Forth and the Moray Firth, above Kessock Bridge (the Beauly Firth). They were targeted by local fishermen for subsistence and for modest returns in the local markets. Unlike herring, sprats traditionally had little commercial value, but in hard times they were considered to be a great bonus for the poor.[131] In years of particular abundance sprats were even sold to local smallholders to be used as manure.[132] The local importance attached to the sprat fishery in the Forth is evidenced by its toponymy: the Scottish name for sprats is 'garvies', and between North and South Queensferry, almost directly beneath the Forth Rail Bridge, lies an island called Inchgarvie.[133] The traditional method for catching sprats was with a small-meshed seine net (often, half an inch from knot to knot) either from the shore or from small boats just offshore: indeed, it would appear that this was the one fishery in Scotland in which the seine net had a long and significant history.[134] In keeping with the small scale of the fishery, it attracted little attention before the nineteenth century, but because of the growing importance of the herring fishery to the economy of Scotland as a whole, and to that of the east coast in particular, the sprat fishery in the Firth of Forth came to the attention of the newly constituted Fishery Board almost immediately following its foundation.

It has already been noted that the legislation of 1808, by which the Board was founded, contained regulations with regard to the mesh size of nets which were permitted for catching herrings, and the enforcement of these regulations was a major preoccupation of the Board from the very start. But in the sprat fishery it was acknowledged that nets with a smaller mesh were necessary, given the diminutive size of the adult fish. Accordingly, small-meshed nets were not prohibited for catching anything but herring under the law. As soon as it began its investigations, however, the Board found cause for concern about the accidental capture of small

[131] Rev. D. Walker, 'Extracts from *An Essay on the Natural, Commercial, and Economical History of the Herring*', in *Prize Essays and Transactions of the Highland Society of Scotland*, Vol.2 (Edinburgh, 1803), 271; *1863 Commission*, 578-9, 590-1.
[132] J.F. Denovan, *An Essay on the Migration and Food of the Herring*… (London, 1825), 19.
[133] *1856 Inquiry*, 453-4; C.J. Smout and M. Stewart, *The Firth of Forth: An Environmental History* (Edinburgh, 2012), 130. For the remainder of this section, the terms 'garvie' and sprat are used interchangeably.
[134] Smout and Stewart, *The Firth of Forth*, 132; *1856 Inquiry*, 452.

herring by sprat fishermen in the Forth, and also the suspected use of small-meshed nets by herring fishermen under the guise of catching sprats. As a result, its officers mounted spot checks and seizing sprat nets wherever evidence of herring catches could be found. By 1811, it was felt that foot patrols alone were not sufficient to discourage the use of illegal nets for catching herring, and for the first time a cutter, the *Lady Frances*, was commandeered for the exclusive use of the Board.[135] In 1815, as many as 117 nets were seized and burned under the Board's authority.[136]

Although the sprat fishermen greatly resented the interference of the board in this respect, an uneasy equilibrium was established for the next two decades. By the mid-1830s, however, a new method for catching sprats, akin to ring-netting for herring in the Clyde, was taking hold. This method involved boats encircling whole shoals of sprats with small-meshed nets and hauling them aboard.[137] Now that a much greater volume of fish was being caught by means of a mid-channel bag net, it was viewed by many as indiscriminate and wasteful and, in particular, it was once again asserted by herring drifters that, not only were large numbers of young herring accidentally caught alongside the garvies, but that they were being specifically targeted in large numbers on the pretext of fishing for sprats.[138] In a direct echo of the situation in Loch Fyne, shortly after the adoption of ring-netting for sprats it was reported that the herring had deserted their usual grounds in the upper firth altogether, and the herring drifters were adamant that the two were causally connected.[139]

Not only did the new technique catch far more small fish (which, they argued, even in the best cases included large numbers of immature herring among the sprats), but the drifters also found it impossible to fish on the same ground as the sprat fishermen, as their static nets were directly threatened by the paying out and hauling of the ring nets.[140] By 1837, the Fishery Board was persuaded that "the fishing [in the Forth] had completely changed its character, and, from being a garvie fishing with a small proportion of herrings, had become a herring fishing with a

[135] *1856 Inquiry*, 360-1.
[136] *Ibid*., 516-7.
[137] Smout and Stewart, *The Firth of Forth*, 130.
[138] *Fishery Board Annual Report*, 1836, 2.
[139] *Ibid*., 454.
[140] Smout and Stewart, *The Firth of Forth*, 130.

proportion of garvies".[141] By 1842, the Board was "daily more and more convinced of the necessity of putting a stop to the capture of the Herring Fry, or small Herrings taken under the pretence of fishing for sprats," and in 1844, a test case was brought in Edinburgh against the skipper of a fishing boat, the *Lady Alice*, who was accused of catching herrings with 608 square yards of small-meshed net.[142] The defendant denied targeting herrings specifically, and argued that if they were accidentally caught alongside sprats, this was not a direct infringement of the law.[143] After much deliberation, the judgement went the way of the skipper, who was acquitted of all charges.[144]

Nonetheless, the dispute in the Forth rumbled on, and (similarly to the situation in the Clyde) intensified throughout the 1840s and 50s. In December 1850, the drift netters of Newhaven and Fisherrow sent a petition to the Board complaining that "the Herring Fishery in the Firth of Forth is in imminent danger of being destroyed owing to the mischievous conduct of a number of unprincipled men" who, they alleged, "have commenced to catch the brood of herrings by small and illegal nets".[145] They went on to add that it was "well known that if the brood and young of fish are not protected the catching of the mature fish will soon cease".[146] In response to this, and to other petitions from the Firth of Forth herring drifters, the Board distributed a public notice restating the regulations under the law, and warning that all those found catching herrings with small-meshed nets would be vigorously pursued.[147] Nonetheless, complaints continued to flood in from fishermen and others who were convinced that what they described as "wild and reckless men" were flouting the law, and specifically targeting immature herring.[148] Later the same month, a sympathetic observer from Leith also corresponded with the Board, stating that he had bought a boat-load of sprats at Newhaven, and that "I find fully three fourths of

[141] *Fishery Board Annual Report*, 1837, 1.
[142] *Fishery Board Annual Report*, 1841, 2; 'Garvie Fishing', *Chambers' Edinburgh Journal*, Vol.12 (Edinburgh, 1844), 55. Smout and Stewart suggest that an earlier Court of Sessions ruling in 1842 had already strengthened the sprat fishermen's case, by arguing that the regulations regarding mesh size discriminated against fishermen who only had a few herrings in their overall catch. Smout and Stewart, *The Firth of Forth*, 132.
[143] *Chambers' Edinburgh Journal*, 55.
[144] *Ibid*.
[145] *1856 Inquiry*, 468-9.
[146] *Ibid*., 470.
[147] *Ibid*., 473-6.
[148] *Ibid*., 472.

them by actual measurement, after selection of the average, are herrings".[149] He went on:

> are [not] the game laws enforced if even one hare is found among rabbits in any poacher's possession? An armed party should be got up and stationed at one o'clock in the morning in Newhaven...and all seized at once as they come in, thus making a clean sweep of their entire nets.[150]

Clearly, feelings were running very high indeed.

Further attempts to suppress the capture of herrings in small-meshed nets in the upper Forth were stimulated by the growing commercial importance of the sprat fishery. In 1854, the Board's General Inspector for the east coast reported that, on the evidence he was able to gather, 7,532 crans of sprats, at a value of almost £2,000, had been caught that season, and he was adamant that this was likely to be an underestimate.[151] This was insignificant when compared to the scale of the herring fishery, which that year amounted to some 338,000 crans in the Forth alone; but it could certainly no longer be dismissed as a small-scale subsistence fishery. As *Chambers' Edinburgh Journal* had noted a decade earlier, in reporting the case against the skipper of the *Lady Alice*, "[t]he seas around our coasts abound in fish, to be had for the mere taking, and it is very gratifying to perceive, that at least, as respects these shoals of garvies, a proper measure of industry is now beginning to be exercised".[152] Inevitably, the growing scale of the sprat fishery led to further concerns about its impact on stocks of herring. Throughout the 1850s, the herring drifters were still supported by the Fishery Board and its officers, just as they were in the Clyde. Lieutenant Risk, the naval superintendent in charge of keeping order in the fisheries, was described as "strong against trawling [for herring], and he took a strong view" of the need to suppress it.[153] Using his augmented powers under the 1851 legislation, he increased his efforts to address the problem in the Forth, which he saw as a direct extension of the work being carried out against seining for herring

[149] *Ibid*., 477.
[150] *Ibid*., 478-9.
[151] *Ibid*., 577. A cran (from the Gaelic, 'crann') is "[a] measure of capacity for fresh herring before cleaning, fixed by the Fishery Board at 37 ½ Imperial Gallons, roughly the contents of four baskets or, more precisely, one barrel" [http://www.dsl.ac.uk/entry/snd/cran_n2_v2, accessed on 19/08/2016].
[152] *Chambers' Edinburgh Journal*, 55.
[153] *1856 Inquiry*, 515.

in Loch Fyne.[154] This brought further protests from the sprat fishermen and their supporters who, like the herring seiners of Tarbert, claimed that to deny them their rights would condemn whole communities to poverty and even starvation.[155]

By this point, it appears that the misgivings of Secretary Primrose and the Board over the propriety of having applied the measures of the 1851 Act in the Clyde were also beginning to influence their judgement in the Forth. Mr. Johnstone, the Fishery Officer at Leith, who had "all along been strongly prejudiced in favour of the drift net fishery and against trawling [for herring]," sent a report in 1856 in which he urged the Board to relax its measures against the poor fishermen of Queensferry and Newhaven.[156] By 1859, the protests of sprat fishermen against the seizure of their nets reached such a pitch that they took to parading outside the Board's headquarters in Edinburgh, and serious disturbances were reported at South Queensferry and Bo'ness.[157] In 1861, the Lord Advocate intervened directly to stop the confiscation of small-meshed nets, and a new Act was passed which established a zone to the west of Queensferry where the sprat fishermen could use those nets unmolested.[158] Nonetheless – and crucially – this Act also forbade the use of any nets other than drift nets "whenever herrings are being caught, and every net other than drift nets shall during the whole time of such herring fishery be removed and laid aside," on pain of prosecution.[159] This was clearly aimed at the Forth sprat fisheries, and it was the first time that seine nets *per se*, rather than merely those with the small mesh, had been prohibited by law for fish other than herring, albeit only during the herring season. Even this measure did not assuage the drift net fishermen, and they continued to protest against the use of small-meshed nets anywhere in the Forth at any time. By now, though, the Fishery Board, which had both initiated and supported the most stringent measures against the use of such nets, had cooled in its attitude towards them. The reasons for this are complex, and will be explored in more detail in the next section; but the overall result was that, despite an ongoing dispute between the herring drifters and sprat fishermen in the Forth, by the mid-

[154] *Ibid*., 515-7.
[155] *Ibid*., 593-6.
[156] *Ibid*., 593-601.
[157] Smout and Stewart, *The Firth of Forth*, 133.
[158] *Ibid*.
[159] 23 & 24 Vict., 'A Bill to Amend the Law relative to the Scottish Herring Fisheries', 5.

1860s it was no longer a subject which greatly preoccupied either the Board, the wider authorities, or the public at large.[160]

It has been noted that the situation in the Forth between the 1830s and 1860s was very similar to that in the Clyde. Early on in the dispute between herring seiners and drift net fishermen, local officers in Loch Fyne had also wished to make a "clean sweep" of seine nets by seizing them wherever undersized fish were found. In the Forth, just as in the Clyde, those who used the technique of ring netting were accused by drift-netters of being lawless, reckless men, and not 'regular' fishermen at all. In contrast, both the Tarbert men and the sprat fishermen of the upper Forth claimed poverty in their defence, arguing that if they were prohibited from using the ring net they would be condemned to starve; and, indeed, there is no doubt that the capital needed for ring netting was a fraction of that of required to set up as a drift net fisherman. In both firths, the Fishery Board was convinced early-on that the taking of small herrings needed to be put down decisively, but in both cases it appears that the wider authorities (the Lord Advocate in the case of the Loch Fyne dispute, and the Edinburgh justices in the Forth) disagreed, being unwilling to interfere with the general principle of the freedom of fishermen at sea to catch fish however and wherever they were able. The obvious difference between the situation in the two firths, however, is that in the Clyde, under the Act of 1851, seining for herring, even with a net which complied with the regulations as to mesh size, was made illegal; whereas in the Forth no general regulations, before or after 1851, prohibited any method of fishing for sprats. Here, except for the local, short-lived seasonal prohibition of 1861 noted above, it was perfectly legal to fish with undersized meshes as long as sprats were the prize; and, similarly, it remained legal to use the seine for sprats, following the legislation of 1851, as long as no significant number herrings were caught.

The problem for the Fishery Board and its officers is that this left a huge space for interpretation and dispute: what, after all, constituted a 'significant' proportion of young herrings? Far more importantly, with the science of marine biology in its infancy, how was one to tell the difference between a young herring and a sprat? These questions, though specific to the controversy in the Forth, nonetheless point to a fundamental issue which, willingly or not, became a preoccupation for the Fishery

[160] See Smout and Stewart, *The Firth of Forth*, 133-5, for the last vestiges of the dispute.

Board in its work in both firths in the early decades of the nineteenth century: a concern for the preservation of young fish and the long term future of herring stocks. The fact that the Board all-but reversed its position on this crucial question between the 1830s and the 1860s indicates that, in terms the formulation of attitudes towards the exploitation of marine resources, many more considerations were being weighed against each other than simply the conservation of fish stocks. This is something that was noted briefly at the end of the last chapter in relation to beam trawling; and it is something which requires a much more thorough examination in the context of the seine-net controversy in Scotland.

3.4 Conclusion

3.4.1 Fishermen's Testimony and the Evidence against Seine Netting

To recap, in the Firths of both the Forth and the Clyde, and, indeed, in Scotland's herring fisheries more generally, the customary method for catching herring was with the drift net, a fishing method which was, to an extent, both controlled and discriminating. When practiced with the legal mesh-size, it was argued that small fish could escape the drift net and therefore the issue of growth overfishing was largely avoided. On the other hand, drift-net fishermen fervently believed that the use of the seine net, particularly when practised in mid-channel between two boats ('ring-netting'), was both indiscriminate and wasteful because the act of hauling it effectively formed a 'bag' which caught both adult and immature fish. In the Forth, the concern of drift-net fishermen was exacerbated by the use of small-meshed seine nets for catching sprats. Nonetheless, their objection to seines *per se* remained strong. The following is a small, but representative, selection of the testimony of drift-net fishermen and their supporters towards seine netting in both firths, taken from the minutes of evidence to the commissions of 1863 and 1866:

> The [herring] trawl kills the fry and the mother fish, and destroys the spawn in the shallows (*Saml. Boyd and Wm. Cook, fishermen, Campbeltown*).
>
> We think the trawling for sprats injures the herring fishing, by killing young herrings mixed with the sprats (*John Ireland, W. Scott and John Bonthron, fishcurers, Buckhaven*).

I object to the [herring] trawlers, because they take herrings when full, and also when they are too young; and I approve of the Acts which render trawling illegal (*Captain Munro, steamer skipper, formerly a fishermen, Inveraray*).

If [herring] trawling were still allowed to be carried on, there would not be a fish in the sea at all. They take off both the large and the small herrings (*David Galbraith, fisherman, Campbeltown*).

[Seine netting] kills a great number of herrings which the drift net would not. They are destroyed or thrown away, not being fit for the market in any respect, and they are herrings which the drift net boats would not have killed (*William Macmillan, fisherman, Campbeltown*).

[The sprat fishermen] shoot the net in a sort of half circle; they haul in both ends, and they haul in with the fish tons of small fry; it makes an extraordinary destruction (*Thomas Eason, fisherman, Dunbar*).[161]

In 1878, the Provost of Inveraray submitted a memorial to the commission on the Scottish herring fisheries which was agreed to by the whole community. This memorial echoed the views of the fishermen given above, but it was a particularly detailed and comprehensive rationalisation of the objections against seine netting. Under the "causes assigned" for the decline of the herring fishery in Loch Fyne, it complained that:

Year after year immense quantities of young and all but useless herring are taken in the lower waters of Loch Fyne, and Kilbrannan Sound, whenever they make their appearance. These herrings are so small that they are sold for the merest trifle, and not seldom thrown into the sea as unsaleable or useless.[162]

It went on to add that "the mode of fishing known here as trawling, which includes 'circling' or 'ringing' in deep water, and 'seigning' or 'scringing' upon the shores or shallows, is peculiarly destructive in many ways". It concluded with a most damning, but also a most persuasive, evaluation of the relative benefits and disadvantages of seining for herring, which is worth quoting at length:

[161] *1863 Commission*, 18, 34, 9 & *1866 Commission,* 751, 752, 612.

[162] *1878 Commission*, 108. It is notable that the memorial alludes to young fish being killed in large numbers in lower Loch Fyne and Kilbrannan Sound. As has already been noted, by this point the herring had disappeared completely from upper Loch Fyne where Inveraray is situated.

> It is at once admitted that the [herring] trawl is the cheaper net and that in particular circumstances it may secure a larger 'take' of fish and yet it is maintained that its use ought not on that account alone be permitted. The 'otter' is a more effective instrument for catching fish on a loch, and a fixed engine a more efficient instrument on a salmon river than the rod, but this would not be considered as deciding their permissibility as modes of taking fish. An explosion of dynamite among a shoal of herrings cooped up in a narrow loch or bay would be a more effective way of securing a large quantity even than the [seine] net, but it is presumed that such a mode of fishing would not be permitted. The ultimate effect on the supply must always be taken into consideration in deciding the permissibility of any mode of taking herring, as well as its cheapness or effectiveness.[163]

Finally, the Inveraray memorialists reached back directly to the centuries' old consensus that catching immature fish with nets and engines was both irresponsible and unsustainable. Seining, they wrote, "makes any regulation as to the size of the 'mesh' practically useless," because:

> This regulation is founded on the supposed necessity of preserving the young fish, but in the [seine] net the size of the mesh makes no practical difference whatever. When a large body of fish are enclosed and the net strained tight around them, it is quite obvious that none but an insignificant few can possibly escape. Practically the small fish are as unable to escape as if they were enclosed in a pack sheet, and there is, therefore, no use whatever in insisting on any size of mesh as long as this mode of fishing is permitted; and your memorialists hold that to ensure the prosperity of this fishery protection to the young herring is absolutely indispensable.[164]

In their defence, the seine net fishermen put forward a number of counter arguments. In the Clyde, first and foremost they sought to imply that the drifters were "more or less selfishly interested, and it is not in human nature to be impartial where

[163] *Ibid*.

[164] *Ibid*., 109. In their dismissal of the value of regulating the mesh size of seine nets to protect small and immature fish, the Inveraray memorialists directly echoed the views of Charles Smith in relation to the beam trawl, which he published a full century earlier. C. Smith, *Antient and Present State of the County and City of Waterford: Being a Natural, Civil, Ecclesiastical, Historical and Topographical Description thereof* (Dublin, 1746), 268.

self is concerned".[165] But, surprisingly perhaps, they rarely denied that smaller fish were taken. Instead, for example, a Tarbert merchant suggested the rather unlikely scenario that the pursuit of the seiners by the Fishery Board cutter had forced them to use smaller-meshed nets, and therefore to take small fish, because "they required to empty their nets rapidly, and could not spare the time to shake out the herring from the [legal] meshes".[166] A Tarbert seine-netter, on the other hand, was adamant that, "It was not herring fry but cuddies [*small pollock, or saithe*] that we caught".[167] In 1866, direct evidence from the Tarbert fishermen was limited, but it was generally consistent with that presented to the earlier commission.[168] On the other hand, not only did drifters remain adamant that the seine captured immature fish, but by 1866 some gave evidence that, having briefly tried it themselves to catch herring, they had returned to the drift net because of their concerns about the state of the fishery.[169] On the whole, though, there is a clear difference of emphasis in the evidence given by the Clyde drift netters and the herring seiners to the two commissions: the former tended to prioritise concerns about the systematic capture of immature herring, whereas the latter did not feel the need to address this concern to the same degree. This discrepancy was almost certainly related to the fact that the 1860 Act against seining for herring also imposed a close time down the whole of the Scottish west coast.[170] In the Clyde, this measure prohibited the capture of herring from 1 January to 31 May, and it was specifically intended to prevent the capture of both spawning herring, and immature fish. It is likely that the seiners felt this measure answered the problem of catching immature fish, and most of them supported it, in principal at least.[171] Yet drift netters clearly believed that the problem remained, despite the seasonal close time.

In the Forth, the sprat fishermen found it very difficult to mount a technical case in the face of concerted opposition from the herring lobby. The question of whether or not small herrings and sprats were the same species was not resolved until the 1880s, following fifty years of discussion and debate between the authorities

[165] *1863 Commission*, 11.
[166] *Ibid*., 12.
[167] *Ibid*., 13.
[168] *1866 Commission*, evidence of John Macmillan, John Maclean, Duncan Macmillan, 1176, 1179, 1187.
[169] *Ibid*., 1119-20, 1122.
[170] *1863 Commission*, 6-7.
[171] *Ibid*.

and the scientific community.[172] There were those on the sprat-fishers' side who asserted that the two fisheries were quite distinct, and that fishing for sprats did no harm at all to the interests of the herring drifters. But in the end, until the question of speciation was definitively resolved, the argument surrounding small-meshed seine nets came down to matters of opinion and to the persuasiveness of less technical arguments.[173] In general, sprat fishermen and their supporters relied on the fact that they were the poorest sorts of fishermen, and that their low-grade catches helped to feed the least well-off local citizens.[174] This was an argument common to the seine net fishermen in both the Clyde and the Forth, but the fishermen of Queensferry and Newhaven (the Forth sprat fishery's stronghold) used it to great effect in mounting a case against further restrictions on their activity. In 1856, for example, they sent a petition to the Fishery Board complaining that they had endured "very considerable privations in consequence of the inclemency of the weather and the high price of provisions," and that sprats provided a "very seasonable relief".[175] In 1861, the Fishery Board itself reported that "[t]he stoppage of the sprat fishing has caused much suffering" among the fishermen of Queensferry and Newhaven, because:

> [m]any of the men whose occupations require a nourishing diet, have ceased to live on beef broth and potatoes, and take to stirabout [*a kind of thin porridge made by stirring oatmeal into boiling water*] instead: whilst money for fuel has become so scanty that a subscription has been established to aid them".[176]

Nonetheless, in keeping with its approach to seine netting more generally, in the early years of the controversy the Fishery Board undoubtedly sided with the herring drifters (and, indeed, with the majority of informed opinion at the time) on the question of whether or not the sprat fishery was overly destructive of immature herring, despite the acknowledged threat to the livelihood of poor fishermen.[177] As the quotation above suggests, however, by the middle of the 1850s the Board had begun to change its view on (or, at least, its practical approach to) the question of seine netting in both fisheries and, despite the entrenched positions of the fishermen

[172] *Fishery Board Annual Report*, 1836, 2. See also, Smout & Stewart, *The Firth of Forth*, 131.
[173] *1863 Commission*, 28.
[174] *Ibid*.; Smout and Stewart, *The Firth of Forth*, 133;
[175] *1856 Inquiry*, 590.
[176] *Fishery Board Annual Report*, 1861, 4. See also Smout & Stewart, *The Firth of Forth*, 133.
[177] *1856 Inquiry*, 444-61.

themselves, wider opinion was also shifting decisively towards the withdrawal of any restrictions on fishing methods and gear in the herring fisheries. The nature and timing of this shift tells us a great deal about attitudes towards the ecological or environmental awareness of Scotland's pre-industrial fishermen, and about the shifting relationship between resource users (fishermen, fish-curers and merchants), fisheries managers (in this case, the Fishery Board), and those with a wider economic or political agenda (central government and policy makers). The discussion in the next section demonstrates that it also has some important and, at times, surprising parallels with current debates over fisheries management and resource use in the United Kingdom and elsewhere.

3.4.2 The Fall and Rise of 'Fishers' Ecological Knowledge': A Long-term Perspective

In 2009, a United Nations Food and Agriculture Organization resource book noted that, "[d]uring the past few decades, there has been a global shift in approach to fisheries management to one that recognizes the importance of fishers' participation and shared decision-making".[178] This approach, it went on, "can be defined as co-management, a type of management that is characterized by the pivotal interaction between government and fisheries users".[179] Despite the fact that the debate over the value of fishers' knowledge and fisheries co-management is of relatively recent origin, it actually has a very robust historical pedigree. Before the rise to prominence of modern fisheries science in the last decades of the nineteenth century, fishermen were very often recognised as the experts in their field. This is reflected in the fact that the majority of witness testimony to the many commissions of enquiry on the fisheries noted here and in the previous chapter came either directly or indirectly from fishermen themselves. It is also borne out by the volume of information gleaned from fishermen in some of the best known early treatises on fish and fisheries.[180] This is not to suggest that fishermen's knowledge, or their perspective on the

[178] L. Adrianato and D.I. Hartoto, 'Fundamentals of Fisheries Co-management in Indonesia', in D.I. Hartato, L. Adrianato, D. Kalikoski and T. Yunanda, *Building Capacity for Mainstreaming Fisheries Co-management in Indonesia* (UNFAO, Rome, 2009), at 3-4.
[179] *Ibid*.
[180] See, for example, any section in Thomas Pennant's *British Zoology*, Vol. 3, Class IV: 'Fish' (London, 1776), or William Yarrell's *A History of British Fishes in Two Volumes* (London, 1836 and 1841); and, in France, M. Duhamel du Monceau's majestic, *Traité général des pesches, et histoire des poissons qu'elles fournissent* (Paris, 1769).

fisheries more generally, was uncritically accepted by those who sought them out in the past. Indeed, fishermen's tales have always, and proverbially, been subject to a degree of scepticism.[181] Nonetheless, the volume of witness testimony from fishermen which was considered by the nineteenth-century commissions indicates that they could, at least, rely on their voices being heard by the constituted authorities and, in many cases, on their concerns being taken seriously. This is also evident in the long history of fishermen's complaints against beam trawling and other practices which were perceived to be overly destructive, detailed above and in Chapter 2. In almost every case, from the fourteenth to the middle of the nineteenth centuries, these complaints were met with sympathy by the authorities, and measures were enacted to restrict, and even to prohibit, the use of the these practices locally. As late as 1843, the fisheries convention between France and Great Britain expressly prohibited the use of the beam trawl within three miles of the coasts of France and Great Britain.[182]

At roughly the same time that the 1843 convention was being ratified in London, the Fishery Board in Scotland was, as noted above, agitating for a ban on seine netting in the herring fisheries. In line with the majority of informed opinion, it was persuaded by the view of drift-net fishermen that, just like beam trawling elsewhere, seining was an indiscriminate and highly destructive practice which threatened the long term viability of the fishery. In other words, the majority view of fishermen – FEK, in modern terms – was a crucial element in informing the debate and in helping to steer through protective measures against seining for herring, just as it had for beam trawling. Yet, by the early-1860s, fishermen's voices, though still heard in great numbers as witnesses, were starting to be marginalised when it came to debates about protection in the fisheries. In 1863, for example, the commissioners did not seriously contest the drifters' contention that large numbers of immature herring were caught by seiners. Instead, they concluded for the first time that even if it was the case, then it was not a significant loss to the fishery. Contradicting centuries of consensus based on public and professional opinion, they stated that, "[a]t the same time that we give this expression of the general public opinion" in terms of the destruction of immature fish, "we do not attach the same importance to

[181] See, for example, the opinions of the commissioners reported in the *1866 Commission*, xvii-xviii, and those in the *First Report of the Commissioners of Inquiry into the State of the Irish Fisheries* (Dublin, 1836) (hereafter, *1836 Irish Commission*), vi.

[182] *Regulations for the Guidance of the Fishermen of Great Britain and France* (London, 1843), Article XVI, 8.

the capture of young herring as the local fishermen do".[183] As evidence for their contrary view, they pointed to the fact that on the east coast of Scotland it was common practice to catch 'full' herring which were ready to spawn, "so that the capture of young herring on the West Coast sinks into insignificance as compared with this general practice".[184]

The commissioners also proposed – again, for the first time – that the totality of man's annual harvest of herring must be insignificant when compared to that of other predators. With the flimsiest empirical foundation, they estimated that the number of cod and ling (*Molva molva*) which were caught annually in Scotland alone would have consumed at least ten times the amount of herring caught by Scottish fishermen. Added to this, they pointed to the multitude of other predators of the herring, and (again, with no sound empirical foundation) concluded that fishing accounted for no more than five per cent of the total consumption of herring annually by all of its predators.[185] This precarious statistical exercise was repeated by the 1878 commissioners, who this time estimated that cod, ling and hake consumed almost thirty billion herring annually, or thirty-seven times the amount taken by Scottish fishermen; that gannets took one billion fish, or thirty-seven per cent more than Scottish fishermen; and that, when these were added to the amount consumed by other predators, such as whales, seals, porpoises (*Phocoena phocoena*) and dogfish (*Scyliorhinus canicula*), "man does not destroy one herring for every 50 destroyed by other enemies".[186] By the 1870s, this line of reasoning was simply an extension, into the debate over seining for herring, of the conclusions of the 1866 report on all branches of the United Kingdom's fisheries. Having mounted a vigorous polemical justification for its views, the earlier commission concluded that "[t]he total supply of fish obtained upon the coasts of the United Kingdom has not diminished of late years, but has increased," and, as a result, it made a number of crucial recommendations: that beam trawling should be permitted unfettered by legislative interference; that seining for herring should also be allowed, as "[t]here is no evidence that...it is a wasteful mode of fishing"; and that "we have been unable to meet with any case in which we were satisfied that sweep-net fishing, [and] fishing with small meshed nets, or weirs, in bays and estuaries, has been permanently

[183] *1863 Commission,* 15-16.
[184] *Ibid.,* 16.
[185] *Ibid.,* 29.
[186] *1878 Commission,* xi-xii.

injurious to the supply of fish".[187] In one fell swoop, the *1866 Commission* reversed the tide of six hundred years of considered opinion with regard to the conservation of inshore fish stocks, and led to the withdrawal of almost all legislative protection for the sea fisheries of the United Kingdom.[188]

The reasons for this profound, and largely unprecedented, shift in attitude towards the economic and environmental protection of the fisheries in the middle of the nineteenth century were hinted at towards the end of the previous chapter, and they will be revisited in the overall conclusion to this thesis.[189] But it is important at this stage to note that, whatever the wider pressures that led to this shift, it undoubtedly required the development of a very different attitude towards fishermen's knowledge and their understanding of the fisheries (FEK) than that which had existed previously. Traditionally, while the fisheries were recognised as a common resource, the most heavily exploited (which, until the modern period, largely consisted of inshore fisheries and those in firths, estuaries and bays) were also recognised as finite resources, both legislatively and in terms of patterns of local resource use. Hence the long history of local protection for immature fish from overly destructive fishing practices, and measures from at least the early-medieval period which aimed at ensuring the free movement of anadromous fish by controlling the use of cruives and weirs This approach to the management of local fishery resources was hardly unique to Scotland. In fact, it can be argued that this kind of local protection was historically ubiquitous before the modern era of mass exploitation, and that it still persists in regions of the world where highly mobile, heavily capitalised fleets have yet to make their mark.[190] Nonetheless, what is clear from the above discussion is that, in Scotland, by the 1860s, this broad consensus on the need to protect heavily exploited fisheries had broken down completely, and that those who were charged with their administration and governance were now only interested in

[187] *1866 Commission*, ciii.

[188] C.M. Roberts, *The Unnatural History of the Sea: The Past and Future of Humanity and Fishing* (London, 2007), 176. See also p.76, above.

[189] See Subsections 3.4.2 and 3.4.3, above, and Chapter 5: Conclusion, below.

[190] P. Copes, 'Coastal Resources for Whom?', *Samudra Report*, 23 (1999), 14; F. Berkes, 'Fishermen and 'The Tragedy of the Commons'', *Environmental Conservation*, 12:03 (1985), 200-1. Jentoft and Kristoffersen have also pointed to the influence of local fishermen in the formulation of fisheries regulation for the Lofoten Islands fisheries in the first half of the nineteenth century. However, they emphasise the practical considerations of conflict management in restricted waters, rather than the issue of resource management. S. Jentoft and T. Kristoffersen, 'Fishermen's Co-management: The Case of the Lofoten Fishery', *Human Organization*, 48:4 (1989), 357.

maximising productivity, whatever the cost. If this new *laissez faire* attitude towards fisheries exploitation was to succeed, then those who promoted it clearly needed to find new ways to challenge the deeply held and long-respected views of fishermen on the subject. One way that they achieved this was to downplay the importance of FEK, and to replace it with the knowledge of 'specialists' of a very different kind.

What might be described as gentlemen amateurs – self-educated men with a keen interest in the fisheries – had been consulted by the Fishery Board, and by the various commissions of inquiry, since at least the 1830s. In 1833, James Cornish, the author of an earlier treatise on the state of the Channel fisheries, gave evidence in person and by submission to the commission which was convened to look specifically into that subject.[191] In 1837, Cornish's treatise was again cited, this time by the commission into the state of the Irish sea fisheries, and his evidence was joined by an 'Historical Sketch of the British and Irish Fisheries' by Sir T. Charles Morgan, M.D.[192] In 1856, Fishery Board Secretary Primrose lamented the recent death of James Wilson, a naturalist and early 'expert' on the herring.[193] Despite their accumulated knowledge of the fisheries, these men can only be described as amateurs: they were certainly not what would now be recognised as professional marine or fisheries biologists. Their evidence was presented, often in the appendices to the commissions' reports, alongside petitions, pleas and letters relating to various aspects of the fisheries from other interested parties, and was generally given no special weight.[194] More often than not, it was used simply to illustrate the current understanding of the natural history of commercial fish. Occasionally, data collected by the various bodies of governance (in particular, the Fishery Board in Scotland and the Irish Fishery Board) was also included in the commissions' reports in order to illustrate one or other aspect of the discussion. But in general, until the 1860s, a consensus prevailed, largely based on FEK and the knowledge of others with a detailed understanding of local fisheries.

By the time the 1863 report on the seine-net controversy in Scotland was published, however, a quite different approach to the evidence was emerging. In this report, the commission took great pains, once again, to listen to the evidence of

[191] *Report from the Select Committee on British Channel Fisheries* (1833), 80-3; J. Cornish, *A View of the Present State of the Salmon and Channel-Fisheries...* (London, 1824).
[192] *1836 Irish Commission*, Appendices XXIV and I.
[193] *1856 Inquiry*, 1109.
[194] *1833 Commission*, 140; *1836 Irish Commission*, 261; *1863 Commission*, 33-37.

fishermen and to examine the latest opinion on the natural history of the herring; but this time it decided unanimously that this evidence was highly inconclusive and unreliable.[195] As a result, it chose to subordinate these time-honoured sources of knowledge to its own opinions based, initially, on the capture of 'full' herrings on the east coast and conjecture about the predation of herring by its natural enemies. It had, in effect, itself assumed the role of 'expert' ahead of all other sources of information and evidence. Largely on the basis of its own opinion, it finally concluded that:

> the herring fishery should not be trammelled with repressive Acts, calculated only to protect class interests, and to disturb in an unknown and possibly injurious manner the balance existing between the conservative and destructive agencies at work upon the herring.[196]

In other words, the commissioners substituted a consensus based on FEK for its own viewpoint, one predicated on the assumption that the absence of solid scientific evidence indicated that artificial (that is, legislative) protection could feasibly be even more damaging to fish stocks, in incalculable ways, than removing all restrictions on contentious fishing practices. This was the antithesis of what would nowadays be described as the 'precautionary principle' in fisheries management. The precautionary principle demands that the responsible authorities should, wherever scientific uncertainty and gaps in the knowledge base exist, aim to "reduce risks to the resources and their environment (and indeed to the fishing communities)" by limiting what might be considered, without evidence to the contrary, unsustainable methods of fishing.[197] In contrast, it can be argued that the age-old consensus, that taking large numbers of immature fish (growth overfishing) was damaging to the fisheries, was perfectly in line with the precautionary principle, even though 'hard' scientific evidence was, at this stage, absent.

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[195] *1863 Commission*, 27-28. In particular, they cited the work of three men: William Yarrell, whose *History of British Fishes* has already been noted; John Mitchell, who later published *The Herring: Its Natural History and National Importance* (Edinburgh, 1864); and the earlier work of the celebrated French naturalist Achille Valenciennes, whose twenty-two volume work with Baron Georges Cuvier, *Histoire Naturelle des Poissons* (Brussels, 1828), remained an influential text.

[196] *1863 Commission*, 32.

[197] S. Garcia, *The Precautionary Approach to Fisheries and its Implications for Fishery Research, Technology and Management: An Updated Review*, UNFAO discussion document [http://www.fao.org/docrep/003/w1238e/W1238E01.htm, accessed on 02/06/2016].

The growing problem for the commissioners, the Fishery Board, and for all those who, by the 1860s, were pursuing a new non-consensual approach to fisheries management was that they were clearly under pressure to find alternative sources of evidence to support their inexpert views. In the 1860s and 70s that evidence consisted of little more than opinion and conjecture. Those who were charged with investigating and pronouncing upon the future of the fisheries for most of the nineteenth century were "politicians, not scientists".[198] Even Thomas Huxley, a member of the *Commission on the Sea Fisheries of the United Kingdom* which reported in 1866 and the most influential voice on sea fishing in the United Kingdom from the 1860s to the 1880s, was not a marine or fisheries specialist in the modern sense, but an old-fashioned generalist both by training, and inclination.[199] As late as 1878, the influential Commission on the Herring Fisheries in Scotland was headed by two gentlemen amateurs, Frank Buckland and Spencer Walpole. Buckland and Walpole were appointed on the basis that they were inspectors of the salmon fisheries for England and Wales, but neither had any formal scientific training.[200] At the time, of course, there *was* no such discipline as marine biology or fisheries science in the United Kingdom. Dedicated scientific work in these areas had begun in Russia in the 1850s and 60s, and was being undertaken by the United States Fish Commission in the 1870s.[201] But Britain had no academic specialist in such matters until the appointment of William McIntosh as Professor of Zoology at St. Andrews University in 1884.[202] Marine science and, in particular, the scientific study of fluctuations in the fisheries, only really became established in Britain with the foundation of the St. Andrews Fisheries Laboratory in 1884 (later, the Gatty Marine Laboratory) and the Marine Biological Association at Plymouth in the same year.[203]

Serious scientific study into the ecological impact of sea fishing in the United Kingdom really only began in response to concerns about the impact of industrial beam trawling on fish stocks, particularly those of plaice in the North Sea. As we have seen, a further commission of inquiry into the effects of beam trawling and

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[198] T.D. Smith, *Scaling Fisheries: The Science of Measuring the Effects of Fishing, 1855-1955* (Cambridge, 1994), 51.
[199] ODNB [http://www.oxforddnb.com/view/ article/14320?docPos=1, accessed on 03/06/2016].
[200] ODNB [http://www.oxforddnb.com/view/article/3857 and http://www.oxforddnb.com/view/article/36712?docPos=1, accessed on 03/06/2016].
[201] Smith, *Scaling Fisheries*, 35.
[202] ODNB [http://www.oxforddnb.com/view/article/34735, accessed on 03/06/2016].
[203] Scottish Oceans Institute, University of St. Andrews, *History of the Gatty Marine Laboratory* [http://soi.st-andrews.ac.uk/pageset.aspx?psr=438, accessed on 03/06/2016]; Smith, 56.

seining for herring was convened in 1882, and reported in 1885.[204] Despite the fact that this commission's report generally reinforced a non-interventionist approach, it did make a number of recommendations which led to localised restrictions on beam trawling in the short-term, and to the establishment of formal scientific investigations into resource depletion in the longer term.[205] As a result, by the turn of the twentieth century, "the 'overfishing problem' was widely accepted by many fisheries institutions refuting the claims of inexhaustibility of the seas".[206] A growing technical and scientific approach to the fisheries more generally stimulated the first large-scale studies of overfishing, overexploitation and unsustainability, most notably under the auspices of the International Council for the Exploration of the Sea (ICES).[207] Among many other measures, ICES formed its own overfishing committee, and appointed as its first chair Walter Garstang, who was instrumental in developing some of the key methodological approaches that we now take for granted in fisheries science.[208] As a result, he was confident enough by 1900 to state that "the bottom fisheries are not only exhaustible, but in rapid and continuous process of exhaustion; [and] the rate at which sea fishes multiply and grow...is exceeded by the rate of capture".[209]

Unfortunately, the pattern of governance and administration which was established in the late-1850s and 60s – of the subordination of evidence to the wider needs of administrators and policy makers – survived even the new scientific consensus relating to unsustainable fishing practices. Whereas, in the 1860s and 70s, FEK and wider public opinion had been largely overruled by commissioners and administrators in the interests of economic expansion, so those same commissioners and administrators chose carefully which scientific advice to heed, and which to ignore, from the 1880s onwards. Indeed, the repercussions of this early trend in fisheries management are still being felt today.[210]

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[204] *1885 Commission*.
[205] *1885 Commission*, xliii-xliv.
[206] D.R. Goethel, S.X. Cadrin and B.J. Rothschild, 'Reconsidering Historical Definitions of Overfishing and the Balance Between Sustainable Use and Overexploitation', *CM Documents – ICES* (2012), 6.
[207] H.A. Rozwadowski. *The Sea Knows no Boundaries: A Century of Marine Science Under ICES* (Washington, 2002), 9-41.
[208] *Ibid*.; J. Jakobsson, 'ICES and the Problem of Overfishing', *ICES Cooperative Research Report*, 260 (Stockholm 1999 Centenary Lectures) (2003), 20.
[209] W. Garstang, 'The Impoverishment of the Sea: a critical summary of the experimental and statistical evidence bearing upon the alleged depletion of the trawling grounds', *Journal of the Marine Biological Association of the United Kingdom*, 6:1 (1900), 8.
[210] Smith, *Scaling Fisheries*, 3, 336.

Chapter 4: Narratives of Change in Scotland's Inshore Fisheries, ca.1780-1880

4.1 Introduction

Chapters 1 and 2 demonstrate that, until at least the mid-nineteenth century, fishers were part of an ongoing dialogue with the authorities about the health of their industry, and about changes to its governance and administration, which was informed by their ecological knowledge and a traditional understanding of the fisheries in which they were engaged. Generally, there was a qualified acceptance of the weight of their evidence and, often, a convergence of interests between the majority of fishermen and those charged with governance and oversight. But in the middle decades of the nineteenth century, political and economic interests trumped those of long-term sustainability in inshore fisheries, and this relationship changed in some fundamental ways. Thereafter, the voices of fishermen became gradually subordinated, first, to those of high-ranking administrators and 'specialists' – naturalists and public servants who straddled the line between knowledge gathering and policy making – and then to the 'expert' knowledge of marine and fisheries scientists, whose work was (as, arguably, it remains) largely steered by the wider needs of political economy. The consequences of this shift in emphasis are still felt in today's global fisheries, and moves towards co-management and a greater regard for fishers' ecological knowledge (FEK) are a direct result of an acknowledged need to return to a more integrated approach to marine resource management.

One reason why this shift away from integration and consensus could be successfully brought about in the first place is that it has always been very difficult to disentangle the environmental or ecological knowledge of fishermen from their immediate economic or industrial interests. Where scientists have generally claimed to be disinterested in the pursuit of such knowledge, FEK has rarely been able to present itself in such an objective and, above all, empirically verifiable way.[1] Yet, as

[1] For discussions of the challenges of integrating FEK (sometimes referred to as local ecological knowledge, or LEK) and normative fisheries science, see, for example, A. Bundy, and A, Davis. 'Knowing in Context: An Exploration of the Interface of Marine Harvesters' Local Ecological Knowledge with Ecosystem Approaches to Management', *Marine Policy*, 38 (2013), 277-286; M.C. Ferreira Leite and M. Gasalla, 'A Method for Assessing

the evidence to the many nineteenth-century commissions of inquiry on seine netting appears to demonstrate, even when the self-interest of particular groups of fishermen is taken into account, it is certainly possible to gain a reasonably accurate overview of broad changes in the fisheries simply from the weight of their anecdotal evidence. In the Firths of the Forth and the Clyde, drift netters, who always constituted the great majority of herring fishermen, were convinced throughout the nineteenth century that seine netting (and especially ring-netting) was likely to damage the long-term viability of the fisheries. Notwithstanding shifts in official attitudes towards seine netting, those who were charged with overseeing those fisheries had to agree that something like the declines the drifters predicted did come about in specific localities and at particular times.[2] Of course, without the kind of empirically verifiable evidence which only scientific enquiry could provide, and which was not available at the time, the causes ascribed by the drifters for these local declines were difficult to verify, and were therefore too easily dismissed when they proved to be inconvenient.

Yet, well into the twentieth century, the use of the ring net to catch immature herring was given by its opponents as the primary reason for the decline of inshore fisheries all down the west coast of Scotland, and particularly (once again) in the Firth of Clyde. As one correspondent to the *Glasgow Herald* wrote in 1938:

> The method of fishing round our coasts...is by drift nets, which is a system entirely innocuous to young and immature herring, whereas ring-net fishing, as practised, sweeps in whole shoals, taking up mature and immature fish, the catch being picked over and the immature and unsaleable fish dumped in the sea.[3]

Despite the ascendency of modern fisheries science, and the development of a supposedly more objective knowledge base, the controversy over the use of the ring

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FEK/LEK as a Practical Tool for Ecosystem-based Fisheries Management: Seeking Consensus in Southeastern brazil', *Fisheries Research*, 145 (2013), 43-53; E.J. Hind, 'A Review of the Past, the Present, and the Future of Fishers' Knowledge Research: A Challenge to Established Fisheries Science', *ICES Journal of Marine Science*, 72:2 (2015), 341-58; P. Holm, 'Crossing the Border: On the Relationship Between Science and Fishermen's Knowledge in a Resource Management Context', *MAST*, 2:1 (2003), 5-49; M-J. Rochet *et al*., 'Ecosystem Trends: Evidence for Agreement Between Fishers' Perceptions and Scientific Knowledge', *ICES Journal of Marine Science*, 65:6 (2008), 1057-68. Of course, as was demonstrated in Chapter 3, while scientists may legitimately claim to be disinterested in their pursuit of knowledge about the fisheries, the selection of what science to include and what to ignore, and the actual use of scientific evidence in management decisions is certainly not. A recognition of this fact underpins most recent work which advocates bringing FEK back within a new co-management paradigm.

[2] See pp.113-4, above.

[3] *Glasgow Herald*, 11th January 1938, 10. See also, *Glasgow Herald*, 17th December 1937 and 25th January 1938.

net in Scotland's lucrative herring fisheries rumbled on until the eve of the second world war. To quote the *Herald* once again, the question of whether or not the ring net was instrumental in local declines of fish remained "one of the mysteries which the research work of the Fishery Board has not yet explained...The controversy is one not easy to settle".[4] Indeed, in many artisanal fisheries around the world, ring-netting is still the subject of considerable controversy, with opponents continuing to maintain that it is an overly destructive and unsustainable practice.[5] In other words, the question of whether or not Scottish herring drifters in the nineteenth and early-twentieth centuries were definitively right or wrong in their environmental assessment of the impact of seining has yet to be resolved. It could persuasively be argued, then, that the precautionary principle (acknowledged under the 1851 legislation, and withdrawn with its repeal in 1867) was the most appropriate approach to the problem.

What this episode in the history of Scotland's inshore fisheries seems to indicate is that, if one wishes to take the evidence of modern fishers (FEK) seriously in a policy and fisheries management context, one must first seek to gain an understanding of the *historical* evidence of fishers. It is yet another crucial area in the history of marine capture fisheries where shifting environmental baselines need to be addressed. As Ruth Thurstan and her co-authors noted in a recent chapter on the use of oral histories in fisheries research:

> In locations where scientific data on species abundance trends are limited or do not exist, oral histories may be the only way to source data on past species abundance or historical changes to marine communities.[6]

We might add that this applies as much to historical deficits in knowledge as it does to geographical deficits; and, indeed, Thurstan has taken this work forward

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[4] *Ibid*., 13th January 1938.

[5] See, for example, Alaska Board of Fisheries, 'Findings of the Alaska Board of Fisheries Ring Net Gear for King and Tanner Crab Southeast Alaska, 5th October 1986 [https://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/findings/ff86116x.pdf, accessed on 09/06/2016]; B. Fulanda *et al.*, 'The Structure and Evolution of the Coastal Migrant Fishery of Kenya', *Ocean and Coastal Management*, 52 (2009), 462-3; Global Greengrants Fund, 'Kenya: Local Fishermen Unite Against Environmentally Destructive Trawlers', 7th January 2007 [https://www.greengrants.org/2006/01/07/kenya-local-fishermen-unite-against-environmentally-destructive-trawlers/, accessed on 09/06/2016]; *The Times of India*, 'Fisherfolk Body Seeks Ban on Ring Net', 4th March 2013.

[6] R.H. Thurstan, S.M. Buckley and J.M. Pandolfini, 'Oral Histories: Informing Natural Resource Management Using Perceptions of the Past', in K. Schwerdtner Máñez and B. Poulsen (eds.), *Perspectives on Oceans Past: A Handbook of Marine Environmental History* (Dordrecht, 2016), 156.

elsewhere, specifically in relation to the 1866 *Commission on Sea Fisheries*.[7] What follows, in Section 4.3, is a further review of that evidence, specifically in relation to 'narratives of change' in Scotland's herring and demersal fisheries in the mid- to late-nineteenth century. But uniquely, this new review is undertaken within the context of a much wider investigation into those reported changes using data gathered by the Fishery Board between 1845 and 1886. By taking a mixed approach, and considering different types of evidence, it is possible, not only to identify fishers' perceptions of long-term changes in these fisheries, but also to establish whether those historical perceptions had the kind of empirical foundation that FEK is often accused of lacking. The analysis that follows demonstrate that it is, in fact, possible to verify Scottish fishers' historical FEK by placing it alongside the kinds of quantitative sources more commonly used by modern fisheries scientists. Following on from this exercise, which initially focuses, once again, on the long-exploited fisheries in the firths of the Clyde and the Forth, similar evidence is used to provide an overview of change in the rest of Scotland's inshore fisheries over the same period, including those of the Orkney and Shetland archipelagos. But before we move on to this broad environmental overview of Scotland's fisheries in the mid- to late-nineteenth century, Section 4.2 investigates another very detailed anecdotal source, and identifies significant narratives of change in the east coast fisheries from an even earlier date: the later-eighteenth century.

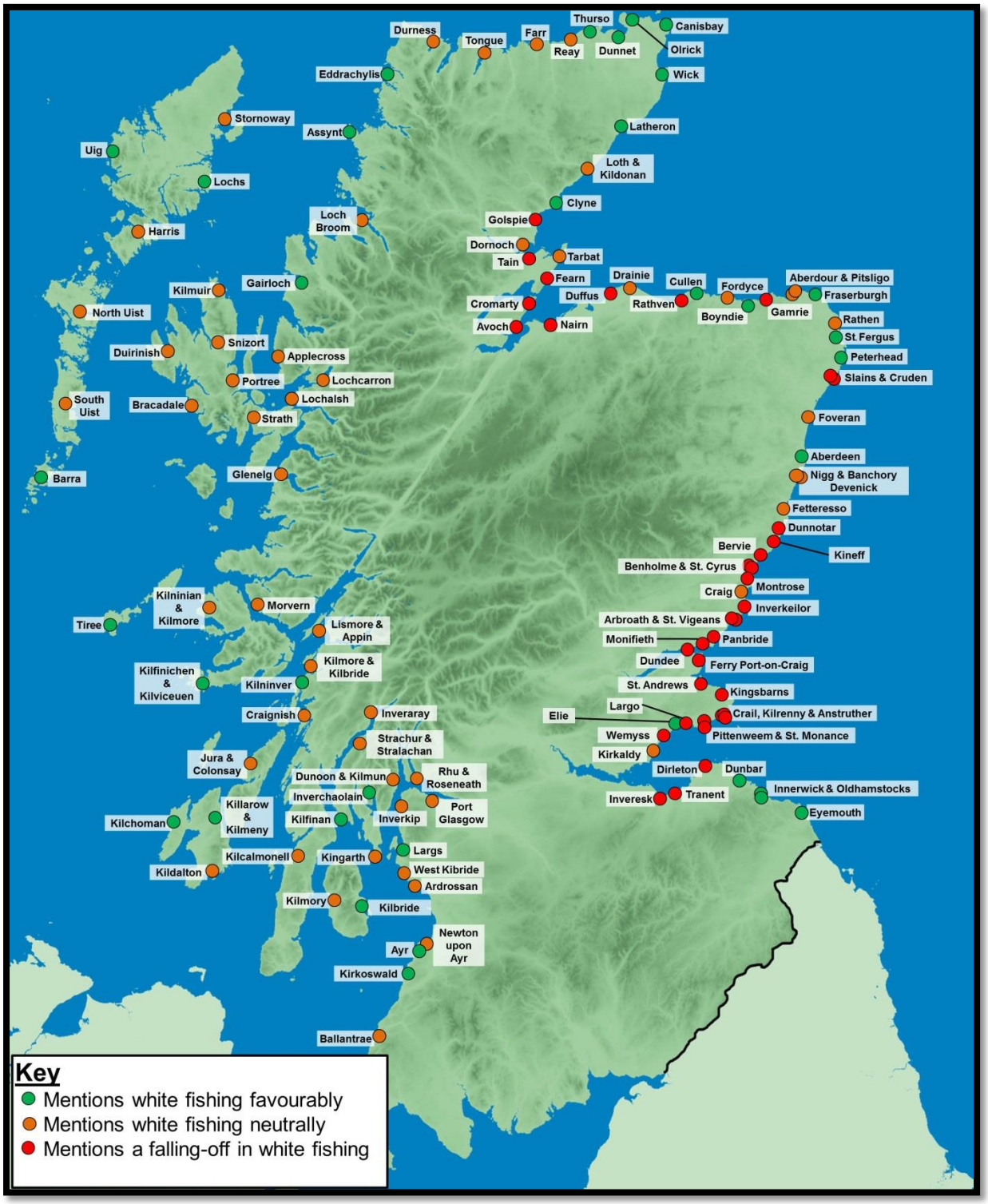
4.2 Early Narratives of Change in the Demersal Fisheries of Scotland's East Coast, ca.1770-1799

The Statistical Accounts of Scotland are parish-by-parish topographical and demographic accounts which were compiled, first in the 1790s (generally referred to as the *Old Statistical Account*), and again in the 1830s and 40s (the *New Statistical Account*).[8] These accounts were compiled by church ministers in each parish, who

[7] R.H. Thurstan, J.P. Hawkins and C.M. Roberts, 'Origins of the Bottom Trawling Controversy in the British Isles: 19th Century Witness Testimonies Reveal Evidence of Early Fishery Decline', *Fish and Fisheries*, 15:3 (2014), 506-22.

[8] *The Old Statistical Account* (hereafter, OSA) was originally published in twenty-one volumes as *The Statistical Account of Scotland drawn up from the Communications of the Ministers of the Different Parishes* (Edinburgh, 1791-99). *The New Statistical Account* (hereafter, NSA) ran to fifteen volumes, and was published as *The New Statistical Account of Scotland, by the Ministers of the Respective Parishes* (Edinburgh, 1834-45). However, both are currently available online by subscription at http://edina.ac.uk/stat-acc-scot/.

Figure 4.1: Accounts of the status of local (inshore) demersal fisheries in Scotland by parish, ca.1770-1795[9]



Source: *Old Statistical Account of Scotland*

[9] For the purposes of this discussion, where the spelling of parish names differs between the Statistical Accounts and modern usage, those favoured by incumbents in compiling the Statistical Accounts have been used.

combined detailed local knowledge with information gathered from other parishioners. They are a remarkably rich source of local, regional and national information, much loved by Scottish social historians. But, as the following discussion demonstrates, they can also be used to map changing environmental perceptions over time, particularly those relating to inshore sea fisheries. By looking at the evidence from all the maritime parishes in mainland Scotland and the Western Isles, it has been possible to create an overview of perceived changes in the local demersal fisheries at the end of the eighteenth, and the first decades of the nineteenth centuries.[10] The results are presented in Figures 4.1 and 4.2. The methodology used to illustrate these narratives of change is straightforward: for every parish where information about local sea fisheries was given, a basic 'traffic light' system demonstrates whether it was mentioned favourably or unfavourably in relation to its status in the past, or whether it was simply mentioned neutrally, without any qualitative judgement on its current state.

Figure 4.1 demonstrates some compelling results for the earlier period. In the 1790s, it is clear that there was a consistent perception of declines in local whitefish stocks down the whole of the east coast of Scotland; but the concentration of such apparent declines around the Moray Firth and the greater Firth of the Forth is of particular interest. There are good reasons why local stocks in semi-enclosed inshore waters are more vulnerable than those in the open seas. These range from complex environmental factors to the simple explanation that, in the early-modern period, most large conurbations (such as Glasgow, Edinburgh and Inverness) tended to develop at the upper ends of firths and estuaries, and fishing pressure was always historically highest close to these urban centres.[11] Nonetheless, these apparently straightforward explanations for perceived whitefish declines in the 1790s mask some notable complexities. The first of these is that, as a rather simplistic presentation of anecdotal sources, the 'traffic light' method hides significant differences in these accounts. When we look closer at the evidence, it becomes clear

[10] This discussion concentrates on accounts of the demersal, rather than the pelagic (herring) fisheries, simply because of the difficulties inherent in attributing specific causes to fluctuations of these migratory fish. It omits evidence from the Orkney and Shetland Isles for the following reasons: in the Orkneys, even by the later period, fishing was reported to be a purely subsistence activity, and few, if any, of the reports note the state of the fisheries relative to the recent or distant past. In Shetland, on the other hand, commercial whitefish were traditionally targeted a considerable distance from land, and cannot therefore be described as the product of inshore fisheries.

[11] J.F. Caddy, 'Toward a Comparative Evaluation of Human Impacts on Fishery Ecosystems of Enclosed and Semi-Enclosed Seas', *Reviews in Fisheries Science*, 1:1 (1993), 58.

that a more subtle pattern of perceived change was being reported by parish ministers.

For example, around the Moray Firth declines in demersal fish abundance were reported to be less catastrophic, and more specific, the further away from the upper firth one travelled. So, the ministers of Golspie on the north side of Dornoch Firth, and Duffus, on the outer edge of the Moray Firth, reported specifically that haddock (*Melanogrammus aeglefinus*) were much less abundant than they had been in the past, but neither reported that other target whitefish species were more scarce. In fact the minister of Duffus stated that, while "[haddock] are at present in smaller numbers, and in deep water farther out from land...[t]here is [otherwise] a good white fishing here".[12] In Avoch and Cromarty, however, both of which are parishes at the upper limit of the firth, reports of whitefish decline were much more general, and far more serious. In both places, the fishermen were, "within these last 16 or 20 years," forced to travel to the outer firth, and even further, in order to catch demersal fish, necessitating the adoption of larger boats.[13] It was once again the scarcity specifically of haddock, rather than demersal fish more generally, which was reported in the parishes of Rathven, Slains and Cruden, all of which were parishes which faced the open sea.[14] However, at Gamrie, another 'open' coastal parish, the minister did note that, "[o]f late years, the fishing has been so remarkably poor...that there has hardly been fish to supply the markets at home".[15]

Moving south, towards the greater Firth of Forth, from accounts of scarcity at Dunnotar in Kincardineshire (now, Aberdeenshire) right through to those at Dirleton in East Lothian, there was a consistent message of general declines in all valuable or commercial species of whitefish. At Tranent, "[f]ew or no white fish have been taken off the coast for several years," and at Inverkeillor, "[t]he white fishing continued much the same, till the year 1786, from which period, both the great and the small fish have been very scarce".[16] At Kilrenny, on the East Neuk of Fife, the minister gave a detailed (though still anecdotal) account of the changes in the white fisheries within his experience. Born and bred in the parish, he wrote that:

[12] OSA, Vol. 8, 391.
[13] *Ibid*., Vol.15, 614; Vol.12, 248-9.
[14] *Ibid*., Vol.13, 400-3; Vol.5, 277-8; Vol.5, 433.
[15] *Ibid*., Vol.1, 471.
[16] *Ibid*., Vol10, 87; Vol.3, 282.

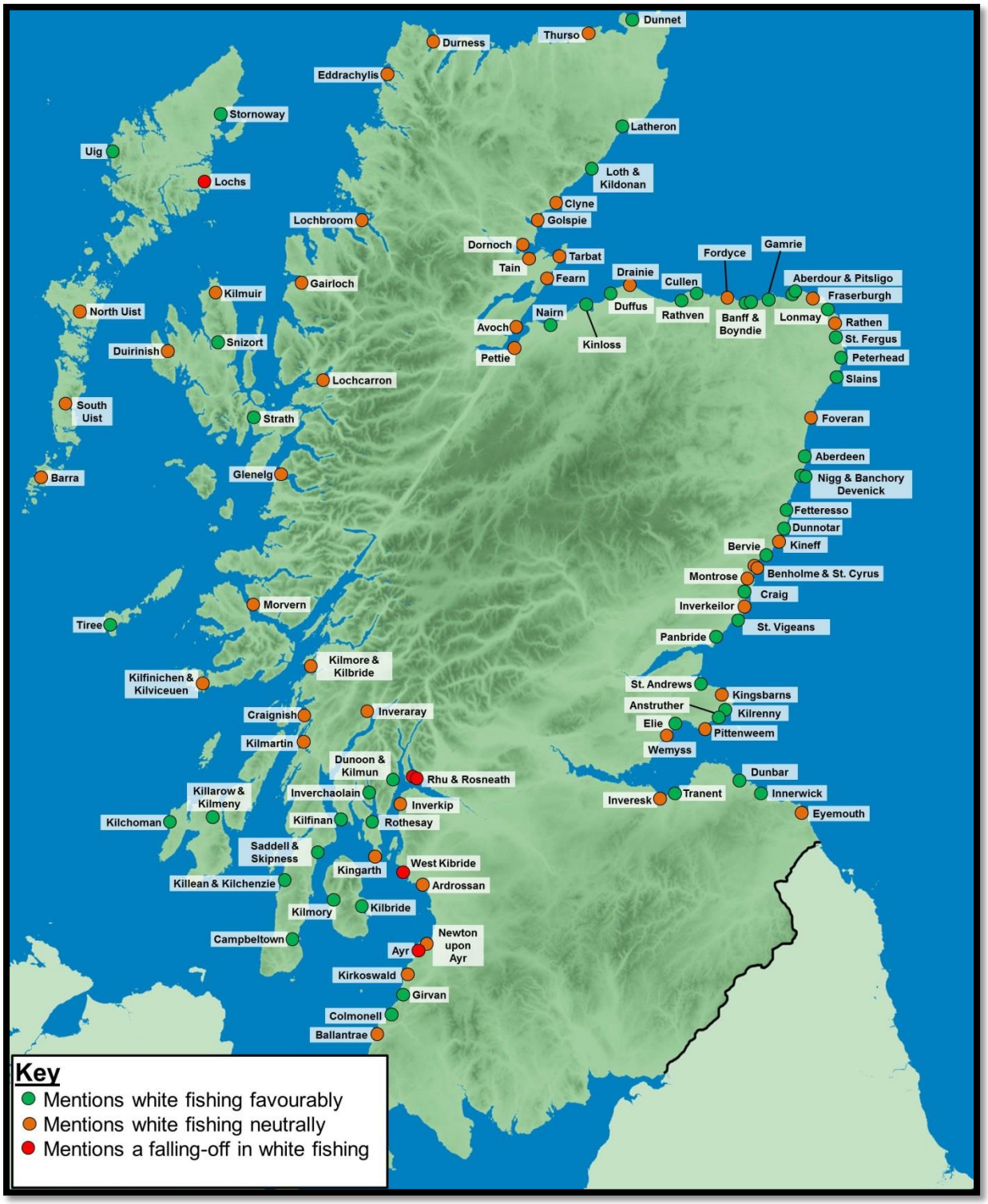
> within his remembrance, vast quantities of large cod, ling, haddocks, herrings, holibut, turbot, and mackarel, have been caught here; but the fisheries are now miserably decayed. He can remember, when he was a young man, that he numbered no less than 50 large fishing boats, that required 6 men each, belonging to the town of Cellardykes, all employed in the herring fishery in the summer season...He has seen 10 or 12 large boats come into the harbour in one day, swiming [*sic*] to the brim with large cod, besides 30, 40, or 50, strung upon a rope fastened to the stern, which they took in tow; and, what will hardly be credited, many a large cod's head lying for dung on the land.[17]

"So strong is the contrast between that time and this," he concluded, "that not only few or no fish are caught, but, to the amazement of everybody, the haddocks seem to have deserted this coast; and for two years past it has become a rarity to see one".[18]

Few of these observations gave a precise (or even a vague) date for the beginnings of these declines, but those that did tended to fit them within a relatively broad time-frame. In Tain, for example, the minister suggested that scarcity had been felt progressively over a 20 to 30 year period, whereas in St. Monance, the disappearance of haddock was dated to only four to five years before the parish account was written.[19] Overall, it is very difficult to put a precise time-frame on these observations, partly because the accounts themselves were written at different times (between 1791 and 1799), but mainly because they were not written to a systematic template. Most of those who noted such declines did so "for some years past," or "of late years": occasionally, a specific date was given, for example, 1782 at Nairn and 1786 at Inverkeillor, although no explanation for such a precise observation was offered in either case.[20] One suspects that these discrepancies are, in part, due to the familiarity (or lack of it) of the minister and his informants with the long-term situation in the parish. As the example of the minister at Kilrenny suggests, some incumbents had lived in the parish for most or all of their lives; but in many cases, they must have been of recent origin. The lack of a systematic structure for gathering the information in these accounts is one of their great drawbacks, as it is for most

[17] *Ibid*., Vol.1, 410.
[18] *Ibid*.
[19] *Ibid*., Vol.3, 390.
[20] *Ibid*., Vol.12, 388; Vol.1, 410.

Figure 4.2: Accounts of the status of local (inshore) demersal fisheries in Scotland by parish, ca.1820-1840



Source: *New Statistical Account of Scotland*

anecdotal evidence relating to the history of the fisheries.[21] Nonetheless, the overall picture presented in Figure 4.1 does suggest that significant whitefish declines were felt in a large number of east coast parishes, mostly concentrated around the Moray Firth and the greater Firth of Forth, and that they began to be registered somewhere between one and three decades before the publication of the *Old Statistical Account* in 1799.

Given the weight and consistency of the evidence in these early accounts of stock declines, it is intriguing to find that, when we repeat this exercise using the evidence from the *New Statistical Account*, no such narratives of change were by then evident (see Figure 4.2). Clearly, between the 1790s and the 1830s and 40s, something significant had happened, either in the fisheries themselves, or in relation to fishers' perceptions of them, so that, except in a handful of scattered parishes in the Firth of Clyde and on the Isle of Lewis, fish stocks were reported to be as healthy as they had been in living memory around the entire coast of Scotland, and, in many cases (especially on the east coast) they were said to have been even healthier. This raises some very important questions about the usefulness of anecdotal evidence relating to the fisheries when it is unsupported by other, less subjective data; and also about how it can and should be used within the context of environmental history or marine historical ecology. It is certainly possible to speculate about the reasons for the discrepancy between the evidence presented in the 1790s and that given the 1830s and 40s. For example, the apparent declines of demersal abundance in the later-eighteenth century could have had something to do with the availability of pelagic food fish, in particular, shifts in the migratory patterns of the large shoals of herring on which Scotland's fishing prosperity was founded. But, while there were reports of serious declines in stocks of herring in the Firth of Forth and the Neuk of Fife in the *Old Statistical Account*, such declines were not universally reported further north.[22] At Nairn and Cromarty, for example, they were said to be less abundant than previously, but at Avoch, in the uppermost part of the Moray Firth, they were reportedly still abundant and this fishery was said to be healthy.[23]

Even if we were to accept that the reported declines in demersal fisheries were related to the regional scarcity of herring it is, of course, just as difficult, in the absence of other 'hard' evidence, to attribute these underlying fluctuations of pelagic

[21] Thurstan *et al*., 'Oral Histories', 165-7.
[22] T.C. Smout and M. Stewart, *The Firth of Forth: An Environmental History* (Edinburgh, 2012), 40-41.
[23] OSA, Vol.15, 614.

fish to any particular cause or set of causes. The fact that, by the time of the later accounts, both the demersal and the herring fisheries appear to have recovered complicates the picture still further. If, for example, we were to explore the thesis that fishing pressure might have impacted on stocks in the earlier period, then we would have to take account of the later reports of recovery, and might justifiably conclude that, on this evidence, fishing pressure was not a significant factor in such fluctuations in the eighteenth century. Yet, even here, given the non-standard nature of the evidence, the picture is far from straightforward. During the period in the eighteenth century when declines were being reported on the east coast, most fishermen from small fishing settlements were only able to pursue demersal fish a relatively short distance from the shore. In his report on the white fisheries in Scotland, in 1786, Mr. Mactavish reported that, between Dornoch and Elgin, none of the men travelled further than two leagues, or seven miles, from home.[24] From Elgin southwards he reported that, even those fishermen who travelled as far as the Caithness and Sutherland coasts for herring, only fished for demersal fish (and, in particular, haddock) from "smaller boats" in the summer.[25] At Avoch, in the earlier statistical account, the boats were described as "small," and the fishermen as "timid," so they would not venture far out into the firth to catch fish when declines became apparent. At Crail the white fishing boats were again described as "small"; and at Inveresk, on the south coast of the Firth of Forth, it was also stated that the fishermen "do not venture into deep water".[26] It is true that, from some of the more populous and long-standing fishing settlements (such as those on the East Neuk of Fife, and at Peterhead in Aberdeenshire) fishermen ventured much further out to sea in pursuit of demersal fish as early as the 1780s and 90s. But, generally, it appears that they stayed within a few leagues, and probably within sight, of land.[27]

By the time the *New Statistical Account* was compiled, however, it seems that most fishermen on the east coast had learned the lesson which had only just dawned on the fishermen of Cromarty forty years previously, that there was a "[clear] necessity [for] larger boats, and [for] going out some considerable distance" to catch demersal fish.[28] At Drainie, Cullen, Fordyce, Bervie, Craig, Kilrenny, Inveresk, and

[24] National Records of Scotland, Edinburgh, GD9/3: 'Extracts from Mr. Mactavish's Report to the Board of Trustees 1786: N.E. Coast White Fisheries', 145.
[25] *Ibid*., 146.
[26] OSA, Vol.15, 614; Vol.9, 445-6; Vol.16, 18.
[27] *Ibid*., Vol.13, 403; Vol.16, 549.
[28] *Ibid*., Vol.1, 248.

Tranent, it was specifically reported in the 1830s and 40s that demersal boats were now of two sizes, smaller boats for summer fishing and much larger boats for the winter, and that the larger boats were routinely fishing between 30 and 50 miles offshore.[29] The argument that the earlier narratives of decline had disappeared by the 1830s and 40s because fishermen were, by then, exploiting more distant fishing grounds gains added weight when we consider the evidence given to the 1866 *Commission on Sea Fisheries*. As the next section clearly demonstrates, declines in the available stocks of whitefish were, by this point, being complained of more generally, and in some areas of Scotland (including parts of the east coast and the greater Firth of Forth) they were reaching critical levels. But the response of fishermen to these dramatic changes in the 1850s was clear: in all cases, they reported having to fish further and further offshore. At Anstruther, Alex Welch reported that "[t]he boats go further to sea"; at Broughty Ferry, David Cobb said the same thing, and added that they had to have "[l]arger and finer boats" in order to do so.[30] The same story was repeated many times, from as far south as Dunbar to as far north as Wick.[31]

In conclusion, it is clear from the anecdotal evidence of the *Old* and *New Statistical Accounts* that there was a perception of decline in the availability of commercial whitefish in some of the local fisheries on the east coast of Scotland as early as the 1770s and 80s, but also that these declines were no longer being felt by the 1830s and 40s. From the point of view of the environmental history of Scotland's fisheries, this is clearly important evidence. The discrepancy may have been down to the recovery of targeted stocks in the intervening fifty or so years, or it may have been a question of changing perceptions among fishermen, perhaps due to the fact that, in the later period, much longer journeys out to sea were by then commonplace. If the latter explanation is at all accurate, then it would seem to be a classic demonstration of shifting environmental baselines in action. But the evidence is far from conclusive. Without further corroboration, any conclusions based on the anecdotal evidence of fishermen must remain pure speculation. As a result there is no clear way of knowing how accurate these early fishers' perceptions of their fisheries (their 'narratives of change', based on FEK) actually were, beyond

[29] NSA, Vol.13, 156; Vol.13, 338; Vol.13, 190; Vol.11, 16; Vol.11, 255; Vol.9, 979-80; Vol.1289, 30; Vol.2, 279.
[30] *Report of the Commissioners Appointed to Inquire into the Sea Fisheries of the United Kingdom* (London, 1866), (hereafter, *1866 Commission*), 632, 637.
[31] *Ibid*., 614, 667.

concluding that the weight of evidence suggests that local scarcity was certainly felt in some areas on the east coast in the final decades of the eighteenth century. When we move into the nineteenth century, however, we are fortunate that the records are much more complete and, as a result, it is possible to test fishermen's 'narratives of change' (and their FEK) against quantitative sources of evidence. The results, explored in the next section, are revealing.

4.3 Testing Fishers' 'Narratives of Change' in the Mid-West and Southeast of Scotland, 1845-1886[32]

In a 2013, Ruth Thurstan, Julie Hawkins and Callum Roberts claimed that "[b]ottom trawling...spread around the British Isles from the 1820s, yet the collection of national fisheries statistics did not begin until 1886". As a result, they concluded that:

> analysis of the impacts of trawling on fish stocks and habitats during this early period is difficult, yet without this information, we risk underestimating the extent of changes that have occurred as a result of trawling activities.[33]

In order to compensate for what they viewed as a lack of statistical evidence prior to 1886, the authors analysed the evidence of fishermen to the two major parliamentary commissions which were appointed to inquire into the state of Britain's sea fisheries, in 1863 and 1884, which were used extensively in Chapter 3.[34] They concluded that, as early as the publication of the first report in 1866, fishermen had begun to bemoan the depletion of inshore stocks of demersal, or whitefish, while, by the time of the emergence of the second report in 1885, there was a broad consensus that bottom trawling was largely to blame for that depletion.[35]

That article was the latest in a series of important contributions by the same authors to the debate concerning the historical impact of industrial fishing in Britain's coastal waters which, taken together, have had the effect of stimulating a lively

[32] The discussion in this section comprises an edited version of a published article which was based entirely on my doctoral research: P. Jones, A. Cathcart and D.C. Speirs, 'Early Evidence of the Impact of Preindustrial Fishing on Fish Stocks from the Mid-west and Southeast Coastal Fisheries of Scotland in the 19th Century', *ICES Journal of Marine Science*, 73:5 (2016), 1404-14.
[33] Thurstan *et al.*, 'Origins of the Bottom Trawling Controversy', 506.
[34] *1866 Commission*; *Report of the Commissioners Appointed to Inquire and Report upon...Trawl Net and Beam Trawl Fishing* (London, 1885) (hereafter, *1885 Commission*).
[35] Thurstan *et al.*, 'Origins of the Bottom Trawling Controversy', 509.

exchange of views. In 2010, Thurstan, Roberts and Brockington used a 'landings per unit of [fishing] power' (LPUP) model to demonstrate that "the availability of bottom-living fish for the [England and Wales trawling] fleet fell by 94% from 1889 to 2007".[36] Also in 2010, they turned their attention specifically to the Firth of Clyde, where they again used landings information to suggest that, by then, the Firth was in a state of "ecological meltdown," and that "many once abundant species [of fish] are now ecologically extinct".[37] This claim was contested by Mike Heath and Douglas Speirs, who analysed the findings of research vessels to demonstrate that, in fact, the "biomass of the six main commercial species in the late 2000s was approximately double that prior to...the 1960s," when a long-standing ban on trawling in the Clyde was lifted.[38] Nonetheless, though they differ considerably from Thurstan and Roberts in their methodology and conclusions, Heath and Speirs found that the composition of the demersal fish community in the Clyde has changed dramatically, so that by the beginning of the twenty-first century it consisted almost entirely of undersized whiting (previously, a relatively insignificant species).[39]

This section covers some of the same ground as Thurstan, Hawkins and Roberts by looking again at the anecdotal evidence of fishermen, alongside landings statistics from the nineteenth century, to estimate the impact of historic fisheries development on stocks in the coastal fisheries of mid-west and southeast Scotland (the greater firths of the Forth and the Clyde). On the whole, it accepts their assertion that commercially-exploited whitefish stocks appear to have been in decline in some areas by the 1860s, but it questions the view that it was bottom trawling that was solely, or even primarily, to blame for this decline in Scotland. It also takes issue with the statement that "the collection of national fisheries statistics did not begin until 1886": in fact, the Fishery Board published a range of statistics in its annual reports from its inception in 1809.[40] Most of these, it should be acknowledged, relate to the fisheries in Scotland, for which there is complete geographical coverage; but it is also likely that Thurstan, Hawkins and Roberts meant to signify that *total* landings were

[36] R.H. Thurstan, S. Brockington and C.M. Roberts, 'The Effects of 118 Years of Industrial Fishing on U.K. Bottom Trawl Fisheries', *Nature Communications*, 1 (2010), DOI: 10.1038/ncomms1013, 4.
[37] R.H. Thurstan and C.M. Roberts, 'Ecological Meltdown in the Firth of Clyde, Scotland: Two Centuries of Change in a Coastal Marine Ecosystem' *PLoS One*, 5:7 (2010), e11767. doi:10.1371/journal.pone.0011767, 10.
[38] M.R. Heath and D.C. Speirs, 'Changes in Species Diversity and Size Composition in the Firth of Clyde Demersal Fish Community (1927-2009)', *Proceedings of the Royal Society B*, 279 (2012), doi:10.1098/rspb.2011.1015, 551.
[39] Heath and Speirs, 'Changes in Species Diversity', 543.
[40] These are held, along with the rest of the Fishery Board's archive, at the National Records of Scotland (hereafter NRS) in Edinburgh (overall catalogue reference AF).

not recorded until the 1880s, and this is certainly the case (although it is important to note that they actually began in 1884, not 1886 as stated in their article). Prior to this, only landings of fish intended for cure (that is, to be salted and stored in barrels for later consumption) were recorded by the Fishery Board's officers at each fishing station: cured herring landings were recorded from 1809 onwards, and cured 'whitefish' landings (which, in practice, meant the commercially important demersal species of cod, ling and hake) were recorded from 1821.

The aim of the following discussion is to demonstrate that, with careful handling, not only can these extensive statistics be used to push back our understanding of the scale of change in Scottish fisheries over the nineteenth century, but that when placed alongside other Fishery Board statistics they can even allow us to offer a rudimentary calculation of changes in the abundance of Scottish fish stocks for the period between 1845 to 1886.[41] For herring, this is achieved by dividing landings (hundredweight) by the total area (square yards) of drift net used to catch them. For commercial whitefish (mostly cod and ling), landings (hundredweight) have been divided by the total length (yards) of handlines and longlines used in the fishery. Assuming that discarding was negligible and that the total yardage of nets and lines represent a rough measure of effort, these ratios then give estimates of catch per unit effort (CPUE, analogous to Thurstan, Hawkins and Roberts' LPUE). The standard approximation of catch being proportional to the product of effort and stock size implies that the rough estimates of CPUE are plausible indices of stock abundance.[42] Datasets based on the Fishery Board's historical statistics are not unproblematic. Some (for example, those which include herring net yardages and the total length of whitefish handlines and longlines) rely on extrapolated estimates. Nonetheless, it is possible to demonstrate that, contrary to the current academic consensus, there is sufficient data to provide viable estimates of herring and whitefish landings from 1809 and 1821 respectively (for Scotland, at least), as well as estimates of changes in CPUE from around the middle of the nineteenth century; models which, as we shall see, chime remarkably well with the direct evidence of fishermen to the national commissions of inquiry, and which

[41] The end-point of 1886 for these, and other, calculations in this chapter is far from arbitrary. On the one hand, it allows for the inclusion of a three year overlap into the period when the Fishery Board collected both cured, and fresh, landings data (1884-6). On the other, to have extended the discussion beyond 1886 would have risked compromising the conclusions drawn in this chapter, as it would have taken us well into the new age of motor power for both fishing vessels and gear.

[42] For an excellent introduction to fisheries modelling, see M. Haddon, *Modelling and Quantitative Methods in Fisheries* (Boca Raton, FL, 2001).

challenge the existing view of the impact of commercial fishing around Scotland's shores before the twentieth century.

4.3.1 The Development of Scotland's Commercial Fisheries, 1809-1886[43]

There already exists an extensive, though far from complete, literature relating to the early development of Scotland's commercial fisheries.[44] For example, despite the fact that exports of cured Scottish herring had been growing steadily from as early as the mid-fifteenth century under the control of the Royal Burghs, it is known that serious political efforts were made to develop fisheries, particularly around the Outer Hebrides, on a much larger scale from the seventeenth century onwards.[45] Until the later eighteenth century, these efforts took the form of a series of joint stock companies intended to encourage investment in both the local and the national infrastructure for catching, curing and exporting herring to lucrative markets in Ireland, the West Indies and the Continent.[46] Despite the best efforts of the protagonists, and an enthusiastic public debate surrounding the potential national benefits of Scotland's herring fisheries, these companies are generally held to have failed. The reasons for this are manifold, but they can broadly be summarised as a failure to take account of the local social and economic conditions faced by the majority of Scottish fishermen, and an overzealous adherence to a centralized model represented by the extremely successful Dutch buss fishery of the preceding two centuries.[47] In the eighteenth century, the focus of protagonists' attention shifted towards the payment of cash bounties to encourage so-called 'adventurer merchants' to invest in these large-scale fishing vessels. From 1750 onwards, bounties were payable according to the tonnage of the vessels engaged in the herring fishery, and

[43] A much more thorough discussion of early attempts to stimulate Scotland's fisheries is provided in Section 3.2, above.

[44] See, for example, J.R. Coull, *The Sea Fisheries of Scotland: A Historical Geography* (Edinburgh, 1996); J.R. Coull, A. Fenton and K. Veitch (eds.), *Scottish Life and Society: Boats, Fishing and the Sea* (A Compendium of Scottish Ethnology, Vol. 4, Edinburgh, 2008); J. Dunlop, *The British Fisheries Society, 1786-1893* (Glasgow, 1978); J.R. Elder, *The Royal Fishery Companies of the Seventeenth Century* (Glasgow, 1912); M. Gray, *The Fishing Industries of Scotland, 1790-1914: A Study in Regional Adaptation* (Oxford, 1978); R. Harris, 'Scotland's Herring Fisheries and the Prosperity of the Nation, c.1660-1760', *The Scottish Historical Review*, 79:1 (2000), 39-60; M. Rorke, 'The Scottish Herring Trade, 1470-1600', *The Scottish Historical Review*, 84:2 (2005), 149-65.

[45] M. Rorke, 'The Scottish Herring Trade', 153. See also Chapter 3, Section 3.2, above

[46] R. Harris, 'Scotland's Herring Fisheries and the Prosperity of the Nation', 39-60; J.R. Elder, *The Royal Fishery Companies*, 54, 97-8; J. Dunlop, *The British Fisheries Society*, 7-15. On joint stock companies see W.R. Scott, *The Constitution and finance of English, Scottish and Irish Joint-Stock Companies to 1720: Volume I, The General Development of the Joint-Stock System to 1720* (Cambridge, 1912).

[47] Harris, 'Scotland's Herring Fisheries', 44, 57.

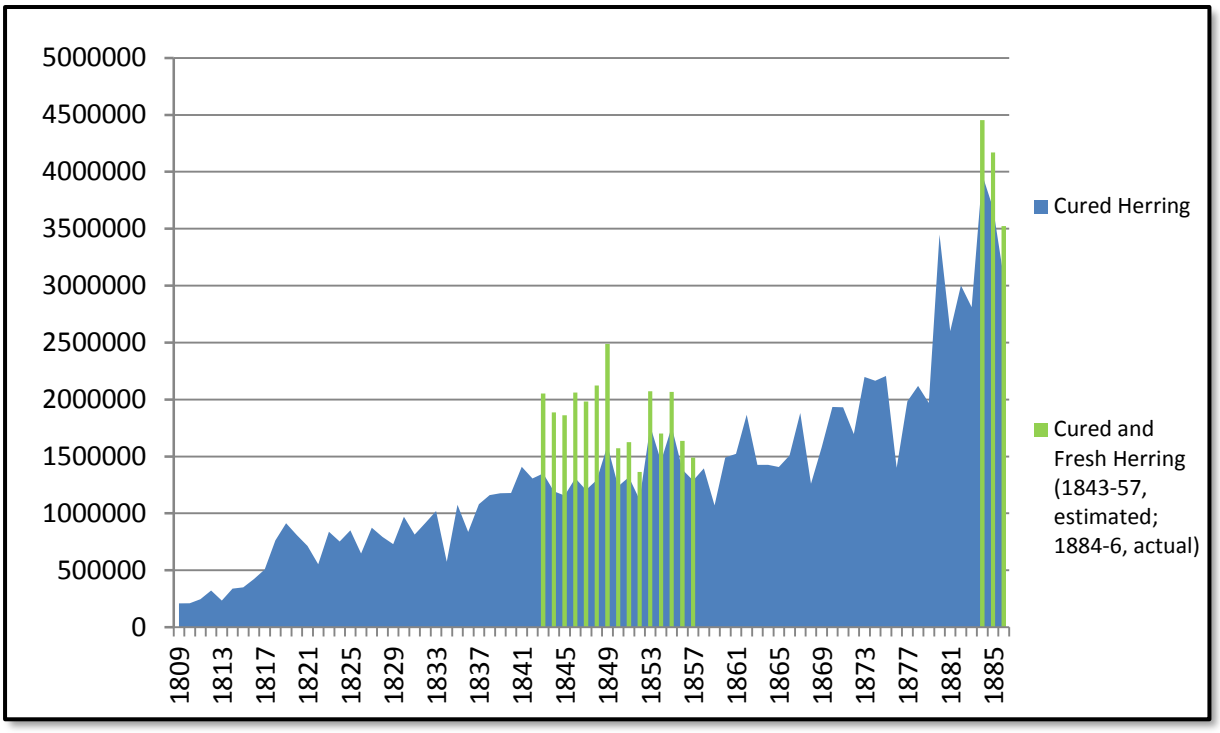
they took no account of the quantity of herring caught, something which caused great controversy at the time as it appeared to reward large-scale investment rather than actual fishing effort.[48]

By the beginning of the nineteenth century, there was a hard won recognition that the best way forward for Scotland's fisheries was no longer investment in large capital projects, such as herring busses or the development of new fishing settlements, but the encouragement of existing small-scale boat fishing which had always provided its backbone.[49] As a result, bounty payments which had been payable to the owners of busses were gradually phased out and replaced by a barrel bounty on cured fish that reached a minimum standardized quality for export, and which was payable to all fishermen regardless of the size and scale of their fishing operation. The barrel bounty had been established as early as 1785 but it gained renewed momentum with the creation of the Fishery Board in 1809. In 1815, the export bounty on cured herring was also scrapped in favour of an enhanced bounty of four shillings per barrel on approved cured landings, and in an attempt to develop other fisheries this was extended to cured whitefish in 1820. In James Coull's words, the generous barrel bounty, payable to all, had the effect of "pump-priming...a substantial boat fishery' in the first third of the nineteenth century".[50] It is certainly true that the number of Scottish boats engaged in all fisheries (excluding the few remaining herring busses) rose from around 8,300 in 1825 (when systematic records began) to well over 10,000 in 1840, while the number of men and boys manning those boats rose by almost a quarter over the same period.[51]

From the early-nineteenth century, then, the Fishery Board's efforts to develop Scotland's home-grown fisheries appear to have been a success, and this is borne out by their own statistics for landings of herring from 1809 and whitefish from 1821. Figures 4.3 and 4.4 represent, not only the actual landings of shore-cured fish, but also estimates made by local Fishery Board officers for landings of fish sent fresh to market for the period 1843-57. They also include the actual total landings for the period 1884-6 for comparison, and the relationship between estimated total landings

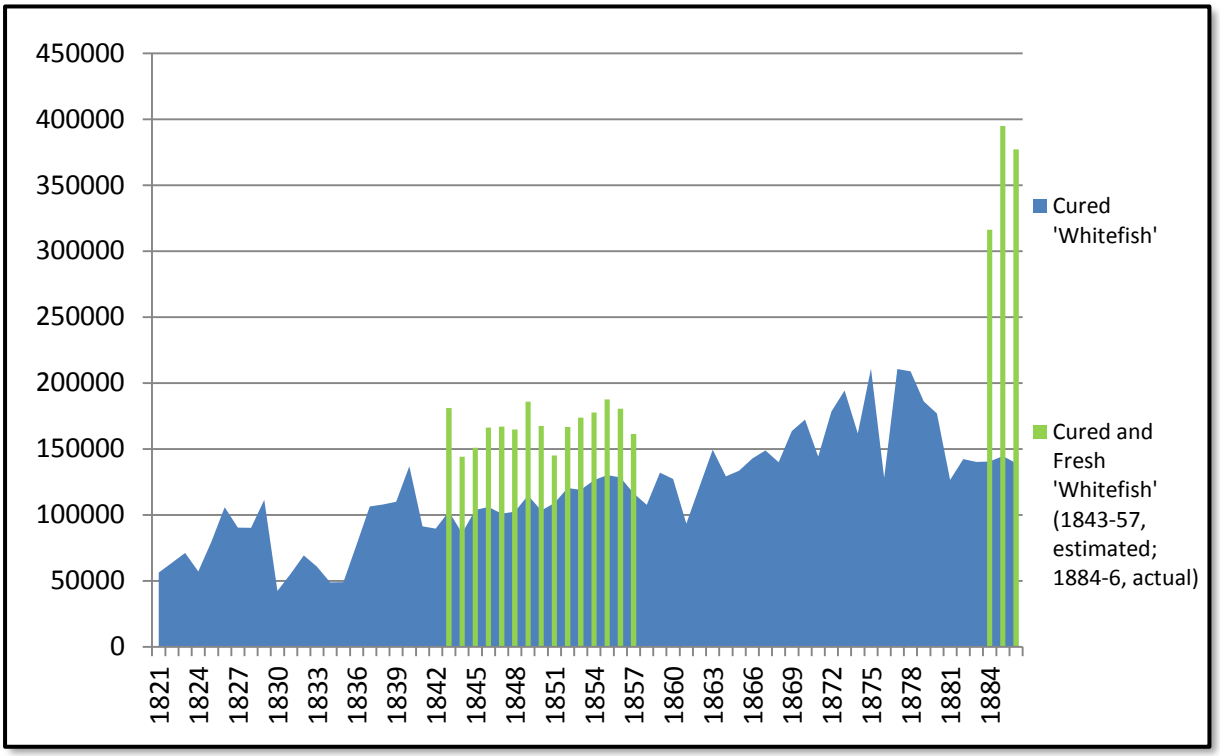
[48] J. Leazer, 'A Case for Subsidies? Adam Smith and the Eighteenth Century Scottish Herring Fishery', *The Historian*, 75:1 (2013), 66-7. See also Chapter 3, Subsection 3.2.1, above.
[49] J.R. Coull, 'Fishery Development in Scotland in the Eighteenth Century', *Scottish Economic and Social History*, 21:1 (2001), 18-19.
[50] Coull, *The Sea Fisheries of Scotland*, 106.
[51] TNA, AF82/1 & 2: *Commission for the Herring Fishery, Annual Reports* (hereafter, *Fishery Board Annual Reports*), 1825-40.

Figure 4.3: Herring landings at all Scottish ports (cwt.), 1809-86



Source: *Fishery Board Annual Reports*, 1809-86 (NRS AF82/1-4, 6-10)

Figure 4.4: Whitefish landings at all Scottish ports (cwt.), 1821-86



Source: *Fishery Board Annual Reports*, 1821-86 (NRS AF82/1-4, 6-10)

and cured landings in the earlier period, and actual total landings and cured landings between 1884-6, appears to be sufficiently similar to be useful for indicating trends. Figure 4.3 clearly demonstrates what we already know about the rise of the herring fishery in and beyond the nineteenth century.[52] Estimated and actual total landings for 1843-57 and 1884-6 also bear out the supposition that it was cured herring (mostly for export) which dominated landings, even beyond the development of significant markets for fresh fish. In terms of whitefish, however, it is clear from Figure 4.4 that the market for fresh fish grew substantially in the latter part of the century, and it appears to have significantly impacted on the amount of whitefish available for cure somewhere around 1880. This shifting balance between cured and fresh whitefish is unsurprising given the improvements which were made to rail and steamship communications from the middle of the century onwards, particularly those to the increasingly productive fisheries of the east and northeast of Scotland.[53] These improvements helped both to serve, and to develop, new markets for fresh whitefish which had previously been inaccessible to most of Scotland's coastal fisheries before the mid- to late-nineteenth century.

With the debate over free trade gaining vigour in the later-eighteenth century, the generous bounties which were paid to fishermen for cured fish inevitably drew their critics. As early as the 1770s, Adam Smith had mounted a concerted attack on the buss bounty system, by then only 20 years old, for compromising the potential success of the small boat fisheries and distorting the market.[54] By the 1820s, the barrel bounty was also under fire for interfering with the market and subsidising inefficient fishing practices, and in response to this chorus of disapproval all bounties for cured herring and whitefish were finally scrapped in 1830.[55] According to the Fishery Board, this had a significant impact on the whitefish fisheries on the west coast of Scotland, which went into immediate decline.[56] It is likely that this accounts

[52] See especially Coull, *Sea Fisheries of Scotland*, Chapters 7 and 8; Gray, *The Fishing Industries of Scotland*, Chapters IV and VIII.

[53] This expected rise in the movement of fresh fish by rail is borne out by two sets of printed figures for the North British Railway, which began in the 1840s as a service between Edinburgh and Berwick-upon-Tweed but which was amalgamated with other railway companies to serve the whole of the north coast of Scotland and northern England by the end of the century. The first shows that in 1862, the company carried 12,292 imperial tons of fish annually; but by 1889, this had risen to 23,144 tons. *1866 Commission*, 10; *Statistical Tables and Memorandum relating to the Sea Fisheries of the United Kingdom, Including Return of the Quantity of Fish Conveyed Inland by Railway (House of Commons Returns)* (1890), 36. See also J.M. Knauss, 'The Growth of British Fisheries During the Industrial Revolution', *Ocean Development and International Law*, 36:1 (2007), 2.

[54] Leazer, 'A Case for Subsidies?', 54, 66-7. See also pp.96-7, above.

[55] Coull, *Sea Fisheries of Scotland*, 109.

[56] *Fishery Board Annual Report*, 1831, 4.

for the dip in cured whitefish landings visible in Figure 4.4 above, but it is also obvious that for Scotland overall this reversal in fortunes was short-lived, because by 1837 landings had bounced back stronger than ever. In terms of the herring fishery, the scrapping of the barrel bounty appears to have had little or no effect on landings and the overall picture is one of steady growth for all of Scotland's fisheries across the whole of the nineteenth century. This brief analysis of overall landings is generally consistent with what we already know about the growth of Scottish fisheries from the existing literature. What it does not tell us is how that growth varied from region to region, and the impact of considerable early growth on the short-term prospects of local fisheries, and on their stocks of fish. These are questions which will be addressed in this and the following sections.

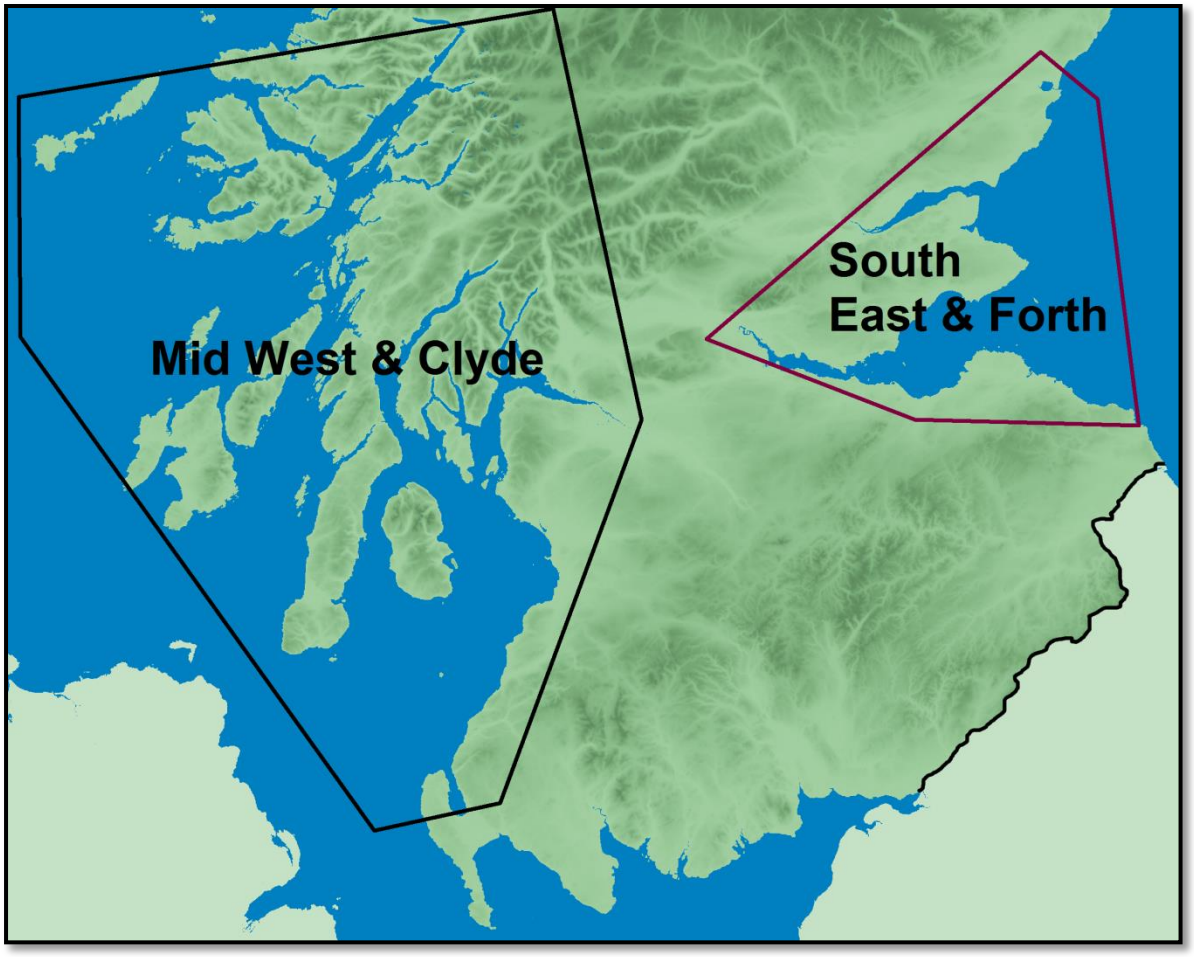
4.3.2 Fluctuations in the Regional Fisheries of Mid-West and Southeast Scotland, 1809-86

The great advantage of the Fishery Board statistics is that they were collected and presented by fishing 'station': that is, the largest fishing port in each relatively small coastal area. On the one hand, this means that the Board's officers were, by-and-large, very familiar with the fishing in their own locality; on the other, it enables us to analyse the statistics on a regional basis, rather than simply at a national level. Surprisingly little research has been done at the level of Scotland's regional fisheries (or, indeed, on most of the regional fisheries of the United Kingdom), especially given their uneven growth during this period. A debt is owed to the work of James Coull and Malcolm Gray in detailing the broad trends in fisheries development over the nineteenth century, particularly on the east coast of Scotland, but we still lack a deep understanding of the quantitative and qualitative growth or demise of specific fisheries in particular localities. The following analysis aims to address this gap in our knowledge with particular reference to the fisheries of the mid-west of Scotland, including the Firth of Clyde (Figure 4.5, bounded by black line), and the southeast of Scotland, including and immediately surrounding the Firth of Forth (Figure 4.5, bounded by maroon line).

The precise geographical delimitation of these two regions is determined by the Fishery Board's own administrative boundaries.[57] On the southeast coast,

[57] The fisheries stations covered by the two regions are as follows :

Figure 4.5: The coastal fisheries of central Scotland



Source: NASA SRTM image, and U.S. Geological Survey's GTOPO30 data series

landings from Montrose and Eyemouth were, at times, included in the overall figures for either Leith or Anstruther. In the mid-west, landings from the outer-Argyll and Inner Hebridean fisheries were similarly included in the figures for the Clyde ports of Campbeltown, Inveraray or Rothesay. The Board's reasons for including the statistics of what might be described as 'outlying' fisheries in the landings of stations within the two firths was far from arbitrary. On the one hand, it reflected the realities of manning and maintaining expensive fisheries stations. Over the nineteenth century, and in particular between 1830 and 1850, smaller fisheries stations around

Southeast and Forth: Anstruther, Burntisland, Eyemouth, Leith and Montrose
Mid-West and Clyde: Ayr, Ballantrae, Campbeltown, Fort William, Glasgow, Greenock, Inveraray, Islay, Lochgilphead, Rothesay and Stranraer

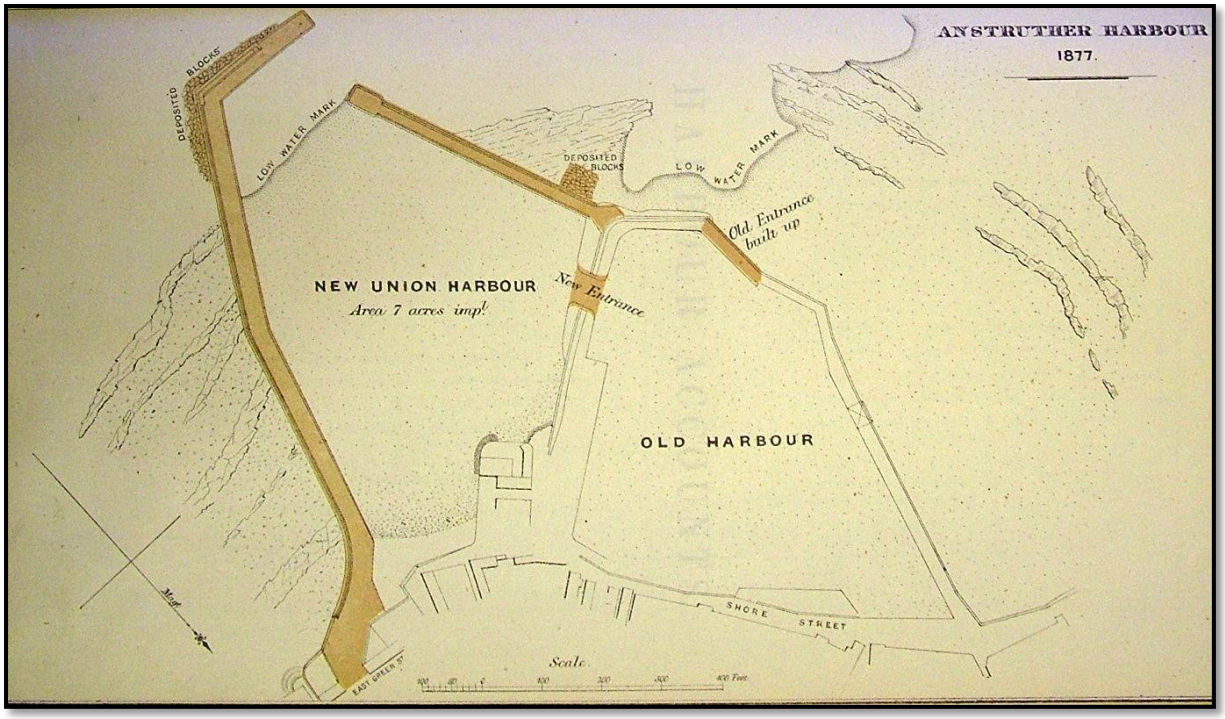
Not all of these stations were operational throughout the entire period. For example, as mentioned above, at various times the stations at Eyemouth, Montrose, Fort William and Islay were merged with larger stations nearby. For details of the fishing stations contained in all the regions investigated in this chapter, see Appendix, below.

the Scottish coast were amalgamated with larger ones in order to save costs.[58] In addition, it also reflected the practicalities of fishing in these two regions over time. On the west coast, for example, the major ports of the Clyde had always maintained strong links with the fisheries on the other side of the Kintyre peninsula. Campbeltown and Greenock had been at the forefront of the herring buss fishery which sailed annually to the north-west Highlands from the mid-eighteenth century onwards.[59] The opening of the Crinan Canal in 1801, and its improvement as a navigable channel in the 1830s, had the dual effect of making the coastal waters of the outer-Argyll peninsula and the Inner Hebrides an even more viable destination for the western Clyde fishing fleet, and of making the markets and ports of the Clyde far more accessible to the local fishermen of these outlying fisheries.[60] On the east coast, the ports of Leith and Anstruther dominated the greater-Forth region throughout the nineteenth century, the former being Edinburgh's hub for all coastal commerce and the latter being the largest port in the long-established fishing nucleus of the Neuk of Fife. Anstruther's importance as a centre for the surrounding fisheries increased considerably with the building of the Union Harbour in the 1860s and 1870s at a total cost of £55,000 (Figure 4.6).[61]

It is generally acknowledged that the coastal seas around the central belt saw the earliest development of commercial fishing in Scotland, which is understandable given that they offered relatively sheltered waters for safe fishing, were close to the main urban centres, and had well-developed communications for conveying fish to market.[62] One by-product of this early development, though, is that by the beginning of the period these coastal waters had been subject to relatively intensive fishing for many decades, and, in some places, centuries. As a result, one might expect to see some evidence of the impact of these activities in the development of the commercial fisheries in the nineteenth century; and, in fact, this is precisely what the Fishery Board statistics seem to tell us. Nonetheless, the picture is complex and requires careful examination in order to understand precisely what was happening in these regions during this period.

[58] For example, Loch Gilphead was combined with Inveraray in 1836; Islay was combined with Campbeltown, and Barra with Stornoway, in 1837; and Burntisland was combined with Leith in 1845. NRS AF82/2 (1836, 1837, 1845).
[59] S.L. MacDonald, 'Trade and Economic Development in Eighteenth-Century Campbeltown' (unpublished PhD thesis, University of Edinburgh, 1982), 116-139; Coull, 'Fishery Development in Scotland', 11.
[60] NSA, Vol. 7 (South Knapdale), 266-7, 269.
[61] Coull, *Sea Fisheries of Scotland*, 267.
[62] *Ibid*., 55-63, 84-6; Rorke, 'The Scottish Herring Trade', 150.

Figure 4.6: Anstruther Union harbour, 1877

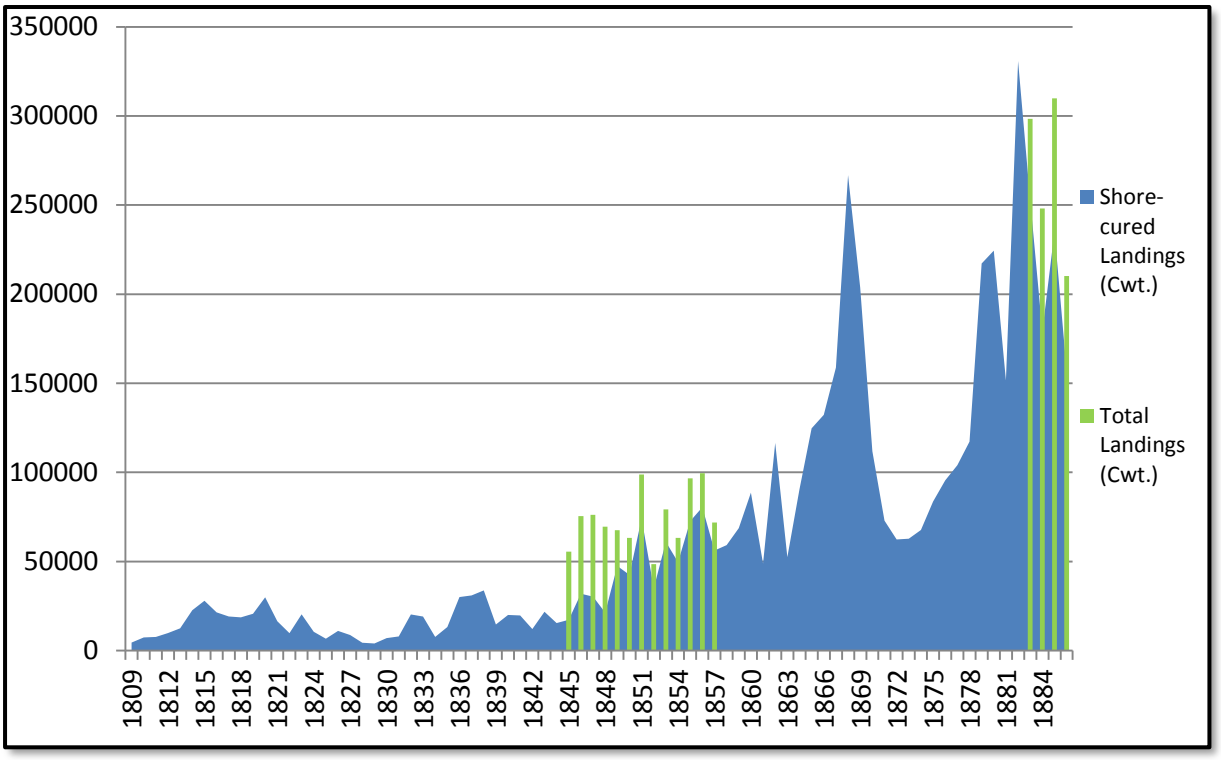


Source: *Fishery Board Annual Report*, 1877 (NRS AF82/4)

In terms of the landings of fish, Figures 4.7 and 4.8 demonstrate that the herring fisheries in the mid-west and southeast fared quite differently across the nineteenth century.[63] In the mid-west, the picture is one of substantial if erratic increases in landings, particularly from around the middle of the century, whereas the southeast tended to see a decrease in landings of cured fish after 1860 and a flattening out of herring catches overall. This is consistent with written accounts given in the Fishery Board's annual reports, and it is notable that drift-net fishermen often put this difference down to the use of two contentious deviations from the customary gear for catching herring: the 'ring' or 'circle-net' in the Clyde, and the small-meshed seine net for catching sprats in the Forth. As we saw in Chapter Three, the Fishery Board took an active role in policing the situation, but ring-netting was considered by drift netters, not only to be overly efficient, sweeping up whole shoals of herring to the detriment of fishermen as a whole, but to be highly destructive to the long-term

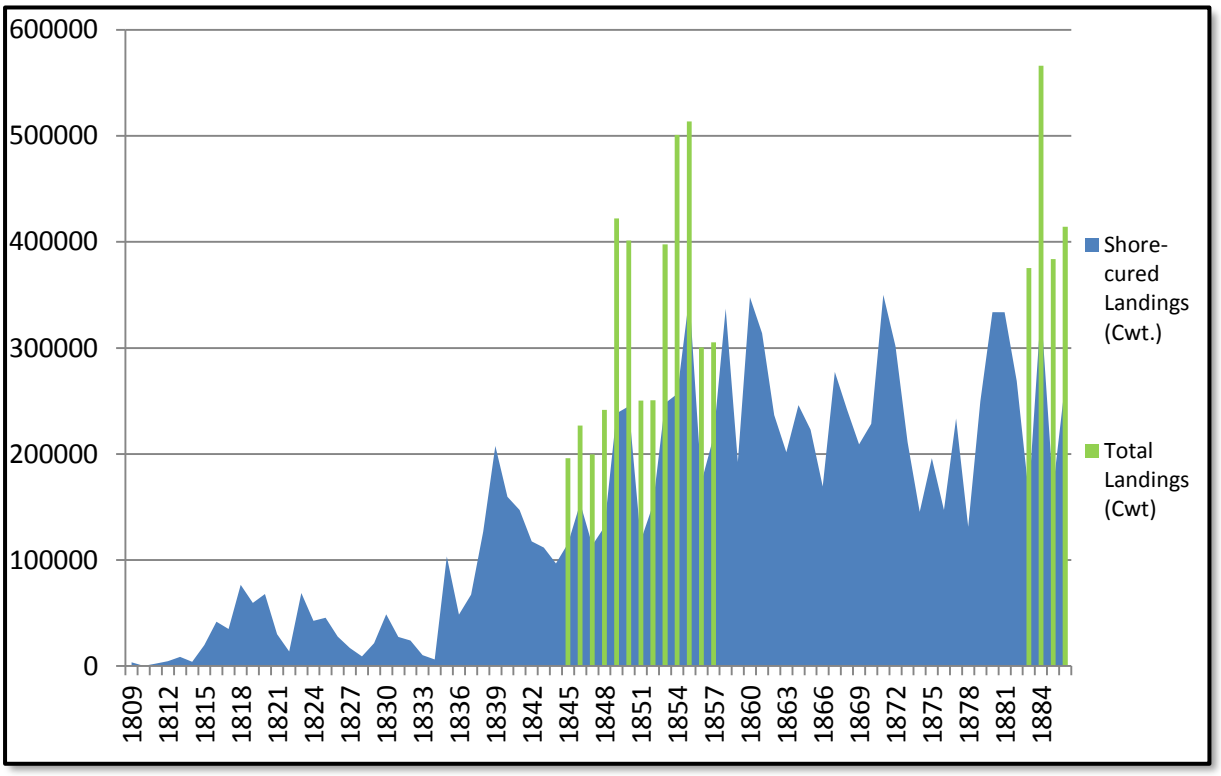
[63] The figures represented in Figures 4.7 and 4.8 are for shore-cured herring only. Figures were also given for 'vessel-cured' fish, which were fish cured on large buss-like vessels in distant fisheries and landed in the Firths of Clyde and Forth. These have been ignored as they were clearly not caught locally. In addition, as for Tables 1 and 2, the green bars represent estimated total landings (that is, cured plus fresh fish) for the earlier period, and actual total landings for the period between 1884 and 1886.

Figure 4.7: Herring landings in the mid-west of Scotland (cwt.), 1809-86



Source: *Fishery Board Annual Reports*, 1809-86 (NRS AF82/1-4, 6-10)

Figure 4.8: Herring landings in southeast of Scotland (cwt.), 1809-86



Source: *Fishery Board Annual Reports*, 1809-86 (NRS AF82/1-4, 6-10)

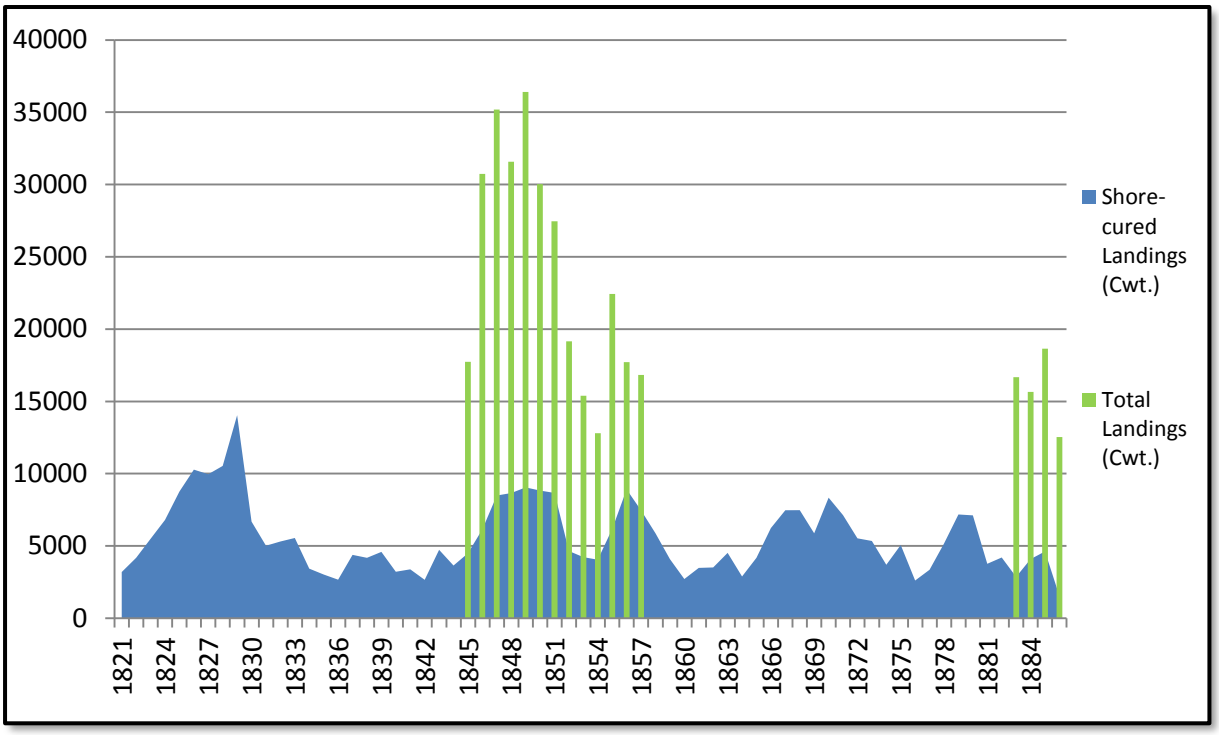
prospects of the fishery.[64] In the event, it may not be a complete coincidence that the repeal of the ban on ring netting in 1867 was the beginning of a short-lived boom, and then collapse, in cured herring landings in the mid-western region, which is clearly visible in Figure 4.7. In the Greater Forth, as we saw in the last chapter, the small-meshed sprat net was blamed for the local collapse of herring catches and for jeopardizing the regional fishery in the long-run. In both cases, the quantitative evidence bears out the anecdotal accounts of fishermen, that there were significant local – and, for certain periods in the century, even regional – fluctuations in the two fisheries which may have been connected to the development, restriction and, later, the derestriction of the use of these contentious fishing methods. Although it is difficult to establish a firm causal connection, it is notable that these two types of customarily problematic gear were blamed by contemporaries for having a similar effects on herring stocks in the two firths. Whether either gear-type had a direct causal impact on the fortunes of fishermen in either place remains to be proven: it is notoriously difficult to create such linkages with migratory pelagic fish such as herring.

When we look at the landings of whitefish, the picture is once again quite different in the two regions (Figures 4.9 and 4.10). This time, despite a highly uneven pattern of development, both shore-cured and fresh whitefish landings in the mid-west appear to demonstrate a long-term decline over the nineteenth century, whereas in the southeast the proportion of whitefish caught and cured declined significantly towards the end of the period in favour of fish caught fresh for market, landings of which rose to unprecedented levels. Again, there are a number of reasons why this should be the case. On the one hand, there is considerable evidence that, as the fisheries developed across the nineteenth century, the Forth ports of Leith and Anstruther became increasingly important as major landing stations for fish caught from other well-established fisheries on the east coast, particularly those on the Neuk of Fife, even as their own fisheries were declining.[65] Thus, although they are necessarily included by the Fishery Board as greater Forth fishing stations, landings from far beyond the Forth itself almost certainly have the

[64] *Report of the Royal Commission on the Operation of the Acts Relating to Trawling for Herring on the Coasts of Scotland* (Edinburgh, 1863) (hereafter *1863 Commission*), 11-12.

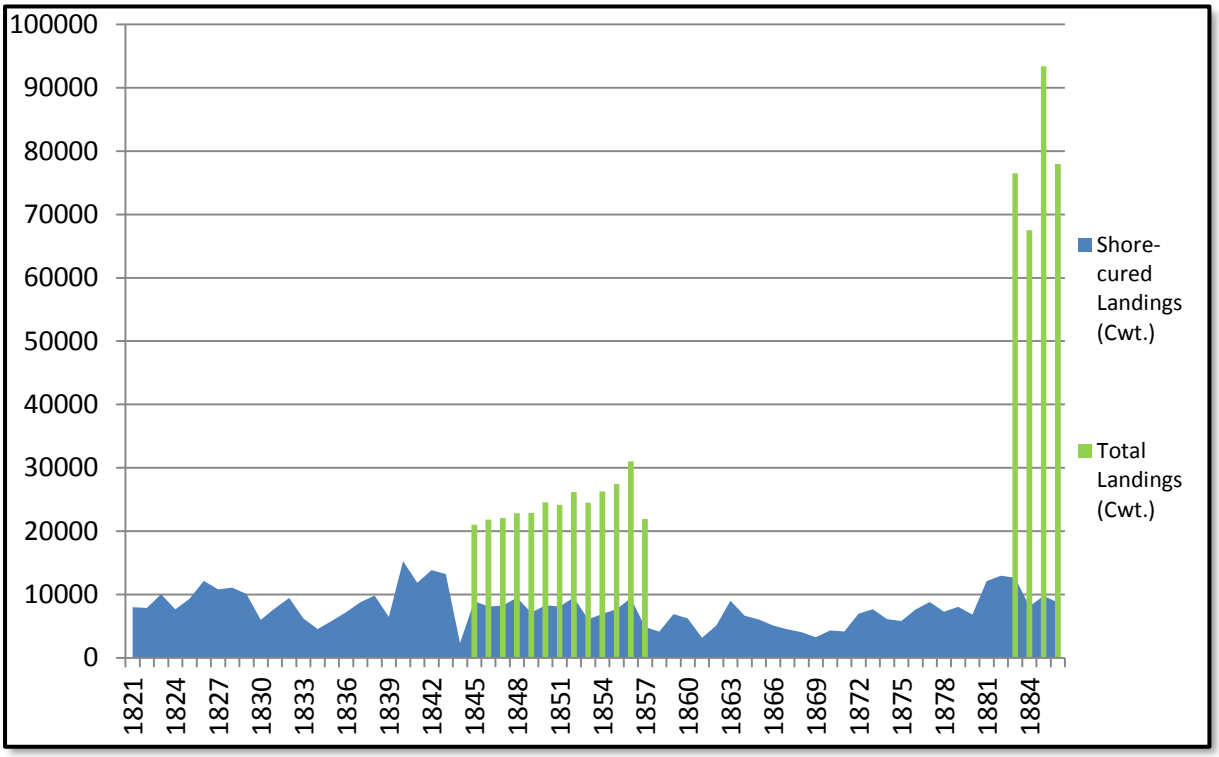
[65] As we have seen, a deep-water harbour at Anstruther was completed in 1877 at a total cost of over £80,000, despite the fact that its local herring fishery by this time had almost entirely disappeared. Gray, *The Fishing Industries of Scotland*, 75, 78-9; Coull, *Sea Fisheries of Scotland*, 137-8. See also p.160, above, for the increasing importance of Anstruther as ports for east-coast fish.

Figure 4.9: Whitefish landings in the mid-west of Scotland (cwt.), 1821-86



Source: *Fishery Board Annual Reports*, 1821-86 (NRS AF82/1-4, 6-10)

Figure 4.10: Whitefish landings in the southeast of Scotland (cwt.), 1821-86



Source: *Fishery Board Annual Reports*, 1821-86 (NRS AF82/1-4, 6-10)

effect of skewing the figures. On the other hand, slowly declining whitefish landings in the mid-west may demonstrate a shift of emphasis as the herring fishery,

particularly in lower Loch Fyne, Kilbrannan Sound and on the Ballantrae Banks, became increasingly important after the 1860s. However, the raw data can only give a rough outline of the progress of the fisheries during this period. Beneath these raw data lies a much more profound story of change, and in order to uncover that it is important to dig much deeper into the Fishery Board statistics.

4.3.3 Short- and Medium-term Impacts of Demersal Fishery Growth in the Mid-West and Southeast of Scotland, 1845-1886

In evidence to the 1866 *Commission on Sea Fisheries*, Robert Smith of Dunbar was adamant that the supply of cod thereabouts was "diminishing greatly," so that:

> I remember one winter season 15 years ago when we got eight or 10 score on our small hooks, and now we will not get five in the winter season on all the length of lines we have, and yet we are going 20 miles distance from here after them.[66]

Smith was not alone in this belief. Almost unanimously, fisherman, fish curers and merchants from both the mid-west and the Greater Forth regions bemoaned a recent decline in stocks of whitefish, and fishermen in the southeast stated again and again that they had to go much further out to sea to catch them. As Thurstan *et al.* point out in their recent paper, many of the witnesses to the *1866 Commission* blamed beam-trawling for the recent demise of whitefish stocks.[67] But in these two regions of Scotland they were by no means unanimous in this, and their evidence demonstrates that it was not beam-trawling alone which concerned them. In the Clyde, in particular, they felt that not only did the ring-net damage the prospects of herring fishermen, but it was even more destructive to the whitefish fisheries than the beam-trawl.[68] William McCullogh, a Glasgow fish-curer, considered that "we have never seen the quantity of white fish come into the market since [ring-net] trawling was allowed," and others, such as fisherman Robert McLean of Largs, and Patrick Forbes, proprietor of Inveraray, blamed herring ring nets for destroying the spawn of white fish.[69] In the southeast, reasons given for the apparent decline in whitefish ranged from moss

[66] *1866 Commission,* 614.
[67] Thurstan *et al.*, 'Origins of the Bottom Trawling Controversy', 518-9.
[68] See Chapter 3, Subsections 3.3.1 and 3.3.2, above.
[69] *1866 Commission*, 1107, 1121, 1154.

being washed into the Firth of Forth from cleared land upstream, to the persistent bad weather over several seasons, and the destruction of small fish by sprat fishermen, and also for bait; though there is no doubt that a higher proportion of southeast fishermen blamed the beam-trawl as well.[70]

Up to now, it has been all-but impossible to corroborate these early reports of whitefish demise; which is, perhaps, why historians and fisheries scientists have generally overlooked the evidence of the *1866 Commission* (Thurstan *et al.* excepted). On their own, anecdotal accounts such as these are questionable, particularly when they come from a body such as coastal fishermen whose livelihood has always been precarious and who, as a result, have traditionally been quick to defend their interests from what they consider to be outside interference and unfair practices.[71] As the authors of the 1866 Report rather archly put it:

> fishermen as a class are, exceedingly unobservant of anything about fish which is not absolutely forced upon them by their daily avocations; and they are, consequently, not only prone to adopt every belief, however ill-founded, which seems to tell in their own favour, but they are disposed to depreciate the present in comparison with the past.[72]

In the event, though, it seems that the commissioners were wrong to dismiss the concerns of local fishermen in 1866 quite so readily.

By placing landings figures alongside other statistics gathered by the Fishery Board, it is possible for the first time to suggest a rough, though viable, model of catch per unit effort (CPUE) for Scotland's fisheries for the second half of the nineteenth century. From 1845, the Board's local officers estimated the total quantity and financial value of all herring nets and whitefish handlines and longlines used by boat fishermen within their catchment area. From 1857, they stopped estimating the total quantity, but continued to record the likely financial value of nets and lines. In order to arrive at a relatively consistent estimate of the quantity of nets and lines used from 1858 to 1886, the mean value per square yard of net, and per yard of handline and longline, has been calculated for the earlier period (between 1845 and 1857) for each region, and this has then been applied to the estimated total value of

[70] *1866 Commission*, 601, 605, 624.
[71] Thurstan *et al.*, 'Oral Histories', 165-7.
[72] *1866 Commission*, xvii-xviii.

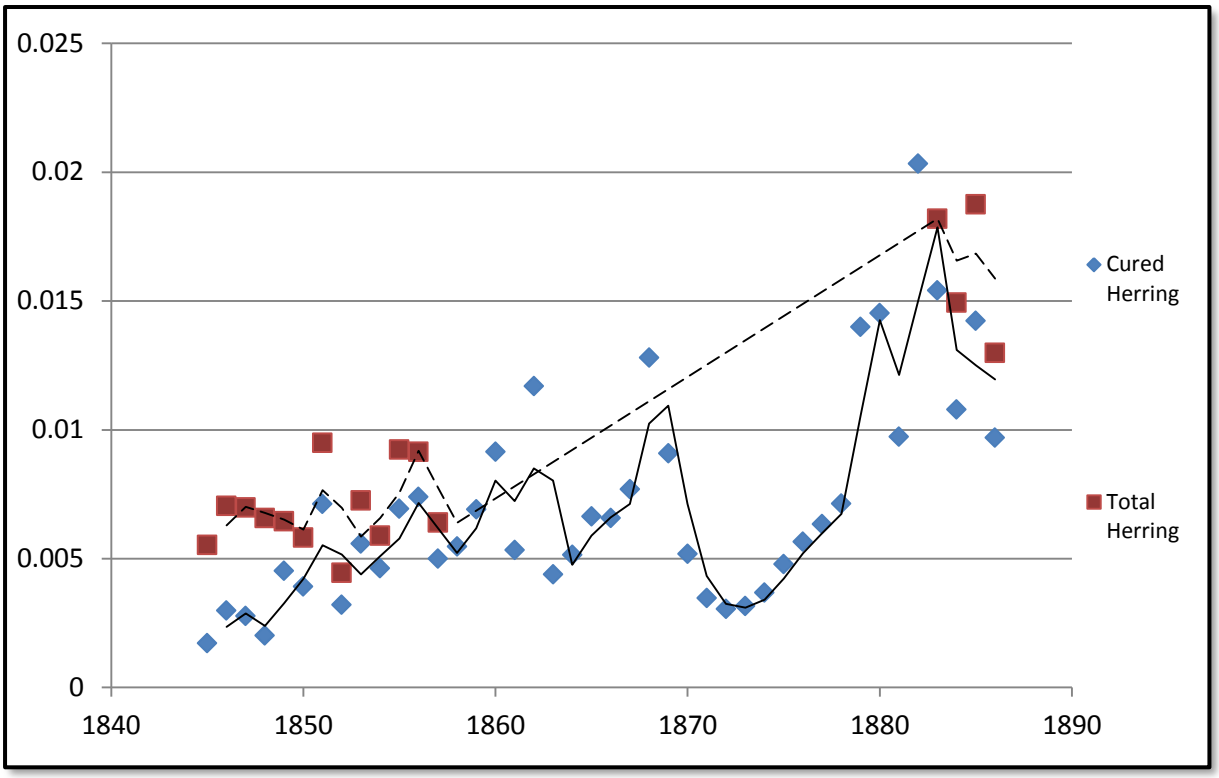
nets and lines given by fisheries officers from 1858 onwards. For the mid-western region, the mean value per square yard of herring net was estimated at 0.00403 of a pound sterling between 1845 and 1857 (for the southeast, it was 0.00425), and the mean value per yard of handline and longline was 0.0017 (0.0023 for the southeast). These values were then used to provide estimated CPUE values for the fisheries in both regions by dividing landings (converted for comparability to hundredweight, or cwt., which was the standard measure of weight for whitefish) by estimated total quantities of herring nets and whitefish lines. As was noted above, these extrapolations are clearly not unproblematic. But for the purposes of estimating CPUE it is important to note that the yardages of nets and lines calculated on the basis of the mean values for the period 1845 to 1857 are, in all likelihood, *under*estimations of the actual quantities of nets and lines used by fishermen after 1858. This is because, as mass-produced cotton yarn increasingly took over from hemp and linen as the material of choice for both nets and lines, the basic cost of materials would certainly have been driven down.[73] In other words, although it must be acknowledged that the calculations behind the following illustrations are subject to uncertain margins of error, those margins are, if anything, likely to *over* rather than underestimate stock levels in the later period as reflected in changing CPUE.

What is immediately obvious from Figures 4.11 and 4.12 is that the different trajectories of CPUE for herring in the mid-west and southeast of Scotland are, if anything, even more dramatic than those for raw landings. Despite a significant dip in productivity in the 1870s, the picture for the mid-west fishermen was of considerable increases in CPUE across the second half of the century as a whole. Again, this is consistent with accounts given in the Fishery Board annual reports, which detail both the sudden dropping-off of herring in Loch Fyne in the 1860s and 1870s (along with the grumblings of many local fishermen, who continued to blame the recently legalised ring nets for this demise) and the unprecedented catches which were once again being made by the early-1880s.[74] It is also consistent with the evidence given

[73] *Report on Trawling for Herring on the Coasts of Scotland* (1863), p.11; E.W.H. Holdsworth, *Deep-Sea Fishing and Fishing Boats* (London, 1874), 6-7. For a broad overview of the declining cost of raw cotton in the second half of the nineteenth century, see G. Wright, 'Cotton Competition and the Post-Bellum Recovery of the American South', *The Journal of Economic History*, 34:3 (1974), 611.

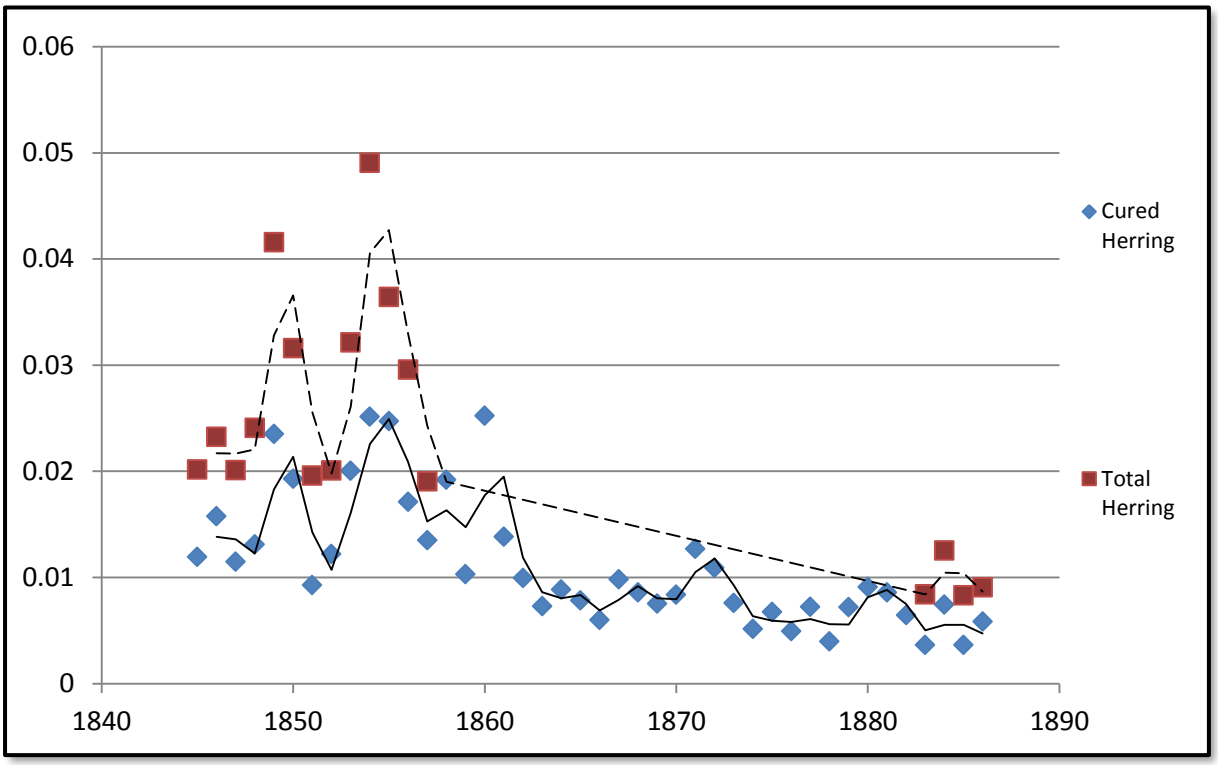
[74] *Fishery Board Annual Report*, 1875, 3; *Fishery Board Annual Report* (1882), xxix.

Figure 4.11: Herring fishing CPUE in the mid-west of Scotland (cwt. / sq. yd. net), 1845-86



Source: *Fishery Board Annual Reports*, 1845-86 (NRS AF82/2-4, 6-10)

Figure 4.12: Herring fishing CPUE in the southeast of Scotland (cwt. / sq. yd. net), 1845-86



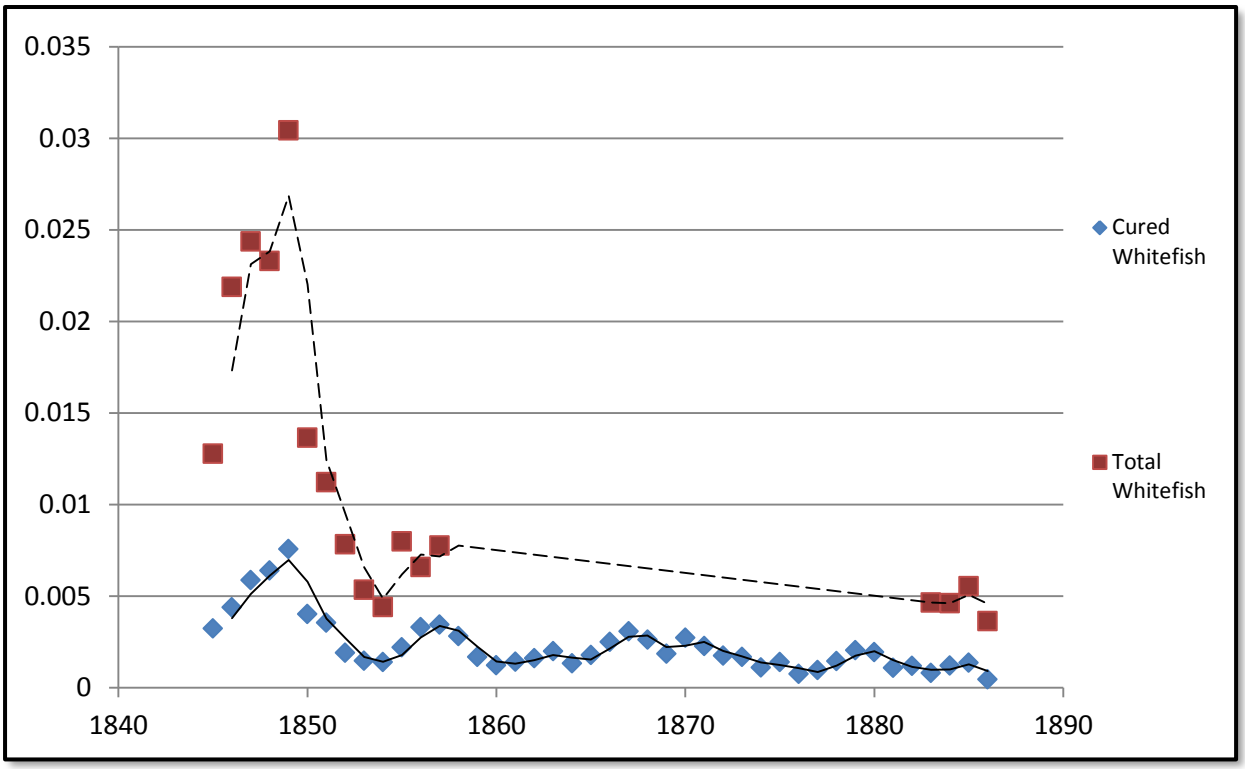
Source: *Fishery Board Annual Reports*, 1845-86 (NRS AF82/2-4, 6-10)

by fishermen to the 1866 Commission, who, despite the impression that the whitefish were becoming more scarce, consistently spoke of improvements in the herring fishing in lower Loch Fyne and the Kilbrannan Sound.[75] In contrast, the southeastern fishermen spoke of the herring in very similar terms to the whitefish, in that they consistently bemoaned the demise of both. William Bisset spoke for many when he said that "the number of boats engaged in fishing [for herring] is increasing, but the number of fish to each boat has not been as good as it was some years back; taking the average of six years back, there has been a falling off".[76] This is graphically illustrated by Figure 4.12, above, which shows a rather erratic picture of CPUE up to 1860, and a consistent falling off from then onwards, precisely the time identified by Bisset as the start of the decline.

In terms of whitefish, CPUE for the two regions is much more consistent (Figures 4.13 and 4.14). In fact, given the apparently different fates of whitefish *landings* in the mid-west and southeast over this period illustrated in Figures 4.9 and 4.10 above, the much closer correspondence of CPUE is important in that it goes some way towards explaining the eyewitness accounts of southeastern fishermen to the 1866 Committee. If we were to look at the findings for raw landings alone, we would have to note the apparent discrepancy between what is indicated by the Fishery Board's figures (that landings increased considerably in the southeast towards the end of our period) and what the fishermen themselves clearly felt was the case in 1866 (that the fish had become scarcer and harder to catch). What Figure 4.14 demonstrates is that, despite overall increases in landings of whitefish in the 1880s (and despite the complications of fish being landed in the Forth ports from other areas), CPUE in the southeast region never returned to the levels it reached in the late-1840s and early-1850s. Nonetheless, despite the overall decline in CPUE from the apparent highs of these years, Figure 4.14 does indicate that it increased from its lowest point by some margin towards the end of our period. Once again, it is possible to account for this anomaly by pointing to the fact that by the early-1880s, when the Fishery Board first began recording actual total landings, Leith and Anstruther were clearly taking in large amounts of whitefish from elsewhere on the east coast. These landings were being caught, not by small boat fishermen using hand and longlines, but by large steam-driven beam-trawlers fishing far out at sea.

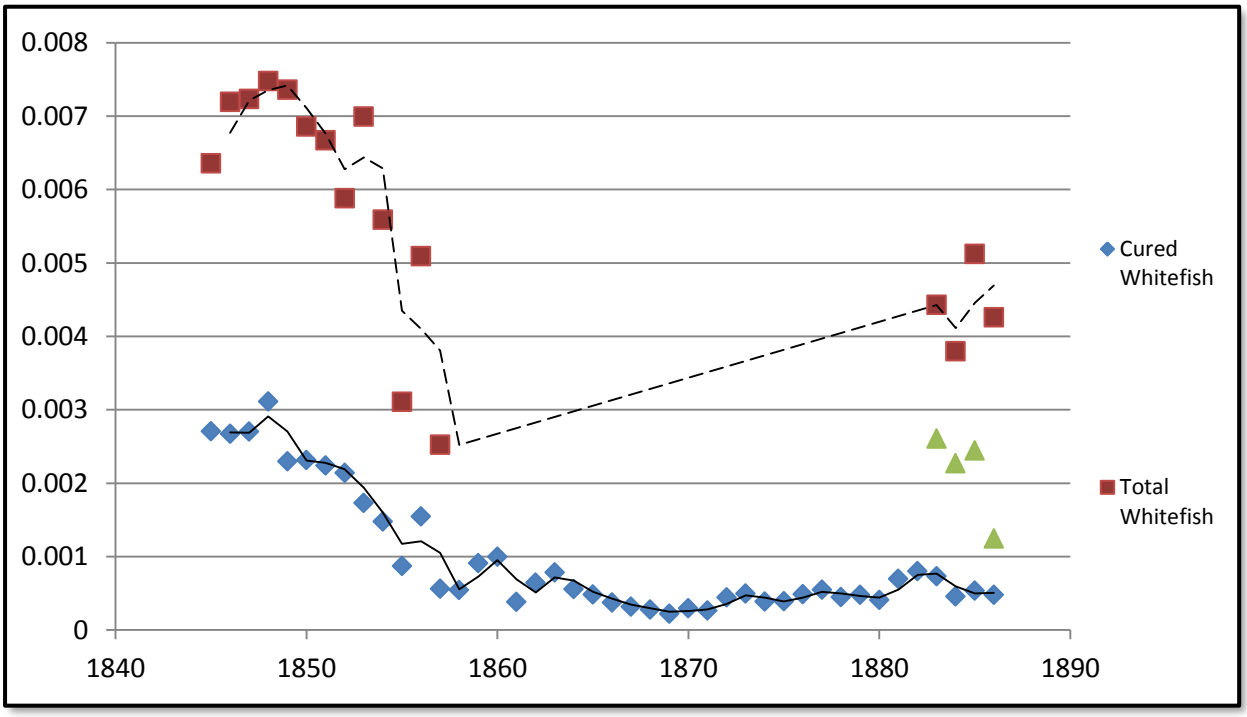
[75] *1866 Commission,* 750, 751-53.
[76] *1866 Commission,* 602.

Figure 4.13: Whitefish fishing CPUE in the mid-west of Scotland (cwt. / yd. line), 1845-86



Source: *Fishery Board Annual Reports*, 1845-86 (NRS AF82/2-4, 6-10)

Figure 4.14: Whitefish fishing CPUE in the southeast of Scotland (cwt. / yd. line), 1845-86



Source: *Fishery Board Annual Reports*, 1845-86 (NRS AF82/2-4, 6-10)

According to the 1885 Commissioners' *Report on Trawl Net and Beam Trawl Fishing*, these two ports had a total of 20 steam trawlers registered to them by 1885 out of only 35 such trawlers along the whole of the east coast of Scotland; and these trawlers, though operating out of the Forth ports, were fishing from 40 to 50 miles offshore.[77] In other words, even though these large steam vessels formed only a fraction of the total number of boats operating from the Greater Forth ports (1,540 in 1885), they must have accounted for a greatly disproportionate quantity of whitefish landings; whitefish that cannot be disaggregated from the total landings for the southeast region and which, importantly, were caught, not by handlines, but by trawl nets, and which therefore do not appear in the estimated quantities of whitefish fishing gear recorded by the Board. In other words, without the landings from these steam-trawlers the CPUE figures for the Greater Forth region for actual whitefish landings in the 1880s look very different indeed (the southeast region's whitefish CPUE, with Anstruther's data removed, is represented by the green triangles in Figure 4.14). However, having reintroduced the subject of beam-trawling to the discussion it is now time to look in more detail at the possible causes for the trends illustrated above.

4.3.4 Consequences of Declining CPUE in the Mid-West and Southeast of Scotland, 1845-1886

Despite the evidence of many fishermen to the 1866 Commission (and the implied conclusions of Thurstan, Hawkins and Roberts) it is actually very difficult to ascertain how far beam-trawling was a significant factor in the fisheries in any Scottish waters for most of the nineteenth century.[78] Malcolm Gray suggested only that "[o]ne or two of the east coast settlements...[equipped] their sailing boats for some seasonal trawling activities" before the 1880s, and James Coull stated just as equivocally that "there was some trawling off the coasts of southern Scotland from the 1860s".[79] There is, however, direct evidence from contemporary sources that by the late-1850s beam-trawling by sail had taken hold in certain areas around the Firth of Forth. For example, in 1860, as a result of the fact that "[i]t has been the practice, for several

[77] *Report on Trawl Net and Beam Trawl Fishing* (1885), xi.
[78] Thurstan *et al.*, 'Origins of the Bottom Trawling Controversy', 521.
[79] Gray, *The Fishing Industries of Scotland*, 167; Coull, 'Chapter 13: White Fishing', in Coull *et al.* (eds.), *Boats, Fishing and the Sea*, p.264.

years past, of a few fishermen...to Trawl for White-fish on the valuable Herring Fishery Ground near Pittenweem," an Act was passed outlawing the use of "Trawl, Drag, or Beam Nets...opposite the parishes of Kilrenny, Anstruther Easter, Anstruther Wester, Pittenweem, and St. Monance, and from one to four miles to seaward".[80] In the mid-west, there is no evidence that it was a widespread practice for most of the century, but there does seem to have been some small-scale beam-trawling by fishing smacks in the Clyde from relatively early on, particularly around the Campbeltown area.[81]

By the time of the 1866 Commission this activity seems to have declined in importance, so that William Gallacher, a Greenock fish curer, gave evidence that "[t]here are not two [beam] trawlers in Campbeltown...now where there used to be eight or nine".[82] By the time evidence was gathered for the second Report in 1885, beam trawling on the west coast was so negligible that the commissioners did not deem it necessary to visit any ports or fishing stations on that side of Scotland at all; and this impression was strengthened by written submissions from those based in the mid-west and Firth of Clyde region.[83] In addition, in 1872 the Fishery Board reported that:

> disagreements have been rife between the Line and Net Fishermen and the Beam Trawlers...not so much from the objection to the Beam Trawl Net upon allegation of its being destructive to the fishing grounds...but because this Net with its heavy beam comes in contact with and injures the Lines and Nets of the Line and Net Fishermen.[84]

In other words, the evidence of the Board's enquiries, as well as the anecdotal evidence to the various commissions on sea fisheries, suggest that while there was a growing body of opinion among pockets of Scottish fishermen that early beam-trawling was not good for the fisheries, this was far from universal, and their objections to it stemmed at least as much from a fear of damage to their gear.

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[80] *Fishery Board Annual Report*, 1860, 4.
[81] NRS, AF7/9: 'Scottish Fishery Board Inquiry, 1856', unpublished, 429-30.
[82] *1866 Commission*, 1103. Thurstan, Roberts and Hawkins, in their 2013 piece on trawling, suggest that beam-trawling in the Clyde began as early as the 1820s, citing as their source the 1866 Report and Minutes of Evidence (Thurstan *et al.*, 'Origins of the Bottom Trawling Controversy', Figure 1, 3). I can find no such evidence in that report, which leads me to wonder if they are confusing the frequent references to 'trawling' for herring (using seine nets) with beam-trawling.
[83] *Report on Trawl Net and Beam Trawl Fishing* (1885), 349, 439, 446.
[84] *Fishery Board Annual Report*, 1872, 5.

On the other hand, we do know that by the early-1880s beam-trawling by steamers was gathering considerable pace along the east coast of Scotland, and there is no doubt at all that this was blamed for falling catches of both herring and whitefish by many, if not most, non-trawling fishermen, not least in the southeast region. It was, after all, the explicit reason for the establishment of a second national inquiry into sea fishing less than twenty years after the first. Unlike the first report, evidence from the east coast to the 1885 Commission unanimously and overwhelmingly linked diminishing supplies of fish to beam-trawling, and ultimately led to new powers for the Fishery Board to ban trawling in local inshore areas – which is, in fact, what happened in the Firth of Forth in 1885 and in the Clyde in 1892.[85]

In 1882, the Fishery Board reported that "[b]eam trawling by steamers, which has been more recently adopted, has greatly increased within the last two or three years," and that "[t]he number of steam trawlers employed in Scotland varies; but the average may be stated as about twenty-five".[86] As we have seen, these were concentrated on the east coast, and they operated mostly out of Aberdeen. By the time of the publication of the 1885 Report there were 45 trawlers registered on the east coast of Scotland, operating out of Leith as well as Aberdeen.[87] For the purposes of this discussion, it is important to note that these were all steam trawlers, and that no sailing trawlers were by now registered on the east coast of Scotland at all.[88] According to the Fishery Board's annual reports, the following numbers of beam-trawlers were registered in the Firth of Clyde and the Greater Forth region from 1883 (when systematic records began) to 1886 (Table 4.1). Apart from at Aberdeen,

Table 4.1: Number of beam trawlers registered in the mid-west and eastern regions, 1883-86

	1883	**1884**	**1885**	**1886**
Clyde	***9***	***15***	***60***	***75***
Greater Forth	***22***	***29***	***30***	***23***

Source: *Fishery Board Annual Reports*, 1883-86 (NRS AF82/7-10)

[85] Coull, 'The Trawling Controversy', 111.
[86] *Fishery Board Annual Report*, 1882, xxxix.
[87] *Report on Trawl Net and Beam Trawl Fishing* (1885), xi. Beam trawlers were registered across the Greater Clyde region, at Eyemouth (1), Leith (22), Anstruther (2) and Montrose (5), as well as at Aberdeen (15).
[88] *Report on Trawl Net and Beam Trawl Fishing* (1885), xi.

none was registered outside these regions. The number of beam-trawlers operating in the Clyde at the beginning of this period was small, but it soon increased, so that by 1886 more than three times the number of beam-trawlers were registered in the Clyde than in the Forth (no doubt largely accounted for by the early ban on trawling in the Forth). But when we look at the average tonnage of beam-trawlers in both Firths it becomes clear that the Clyde trawlers were much smaller than those in the Forth (Table 4.2). This strongly suggests that, whereas the Forth trawlers were fishing far out at sea (as they would have had to, given the 1885 ban on trawling within the Firth), the Clyde vessels were fishing much closer inshore, almost certainly within the Firth itself. As a result, from the mid-1880s it is possible that landings from

Table 4.2: Average tonnage of beam trawlers registered in the mid-west and eastern regions, 1883-86

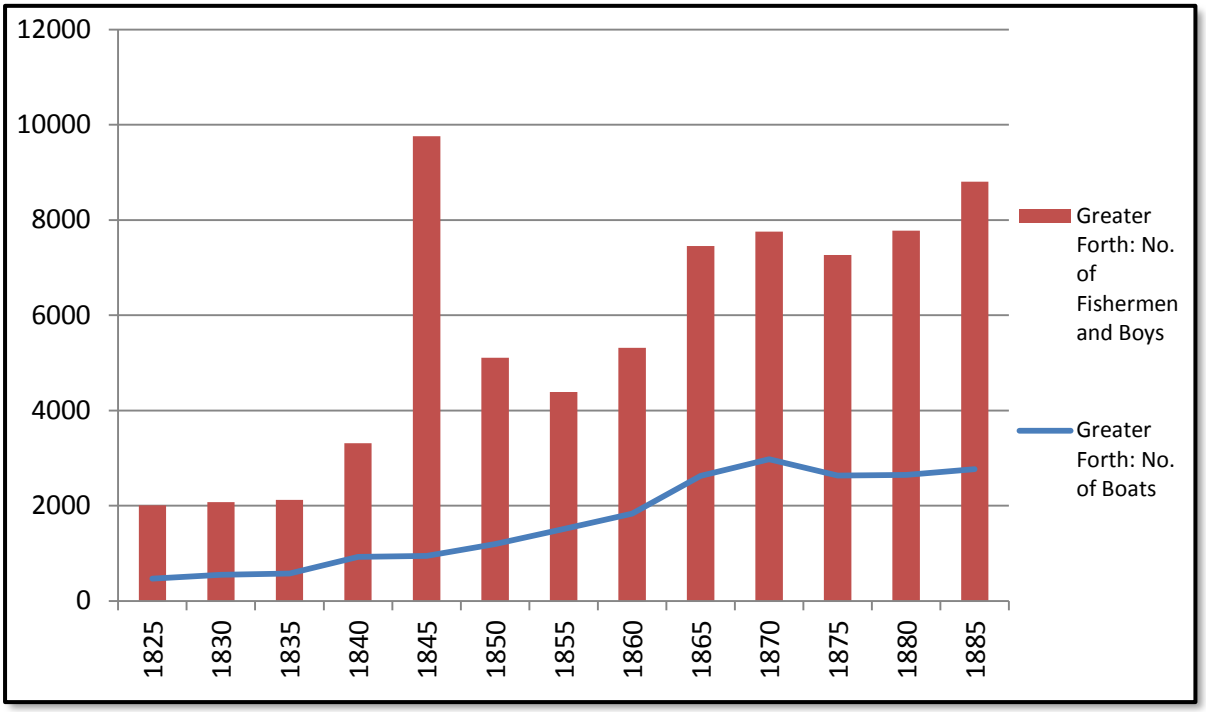
	1883	**1884**	**1885**	**1886**
Clyde	***8***	***10.4***	***7.25***	***8.07***
Greater Forth	***34.27***	***29.93***	***33.23***	***54.96***

Source: *Fishery Board Annual Reports*, 1883-86 (NRS AF82/7-10)

beam-trawlers in the Clyde will once again have had the effect of artificially inflating the whitefish CPUE findings in Figure 4.13 above. Yet, it is also obvious that CPUE continued on a long-term downward trend. The only conclusion to be drawn from this is that whitefish CPUE in the mid-west region for the final years covered here would have been even worse without the artificial effect of including trawled landings from the Clyde.

Overall, then, the evidence seems to suggest that beam-trawling had, at best, a negligible impact on CPUE and landings in the mid-west of Scotland for the majority of our period, and virtually none (except in the contested area around Pittenweem) in the southeast region until the 1870s and 1880s. Yet, the figures presented here and the evidence given by fishermen to the 1866 Commission are absolutely consistent, and there seems little doubt that whitefish CPUE declined significantly in both regions from around 1850 onwards. This, of course, raises the question: what was the cause of this apparent decline in whitefish stocks in the mid-west and southeast of Scotland? The most plausible answer is overfishing in its most

Figure 4.15: Number of fishing boats, fishermen and boys in the southeast of Scotland (5-year intervals), 1825-85



Source: *Fishery Board Annual Reports*, 1825-86 (NRS AF82/1-4, 6-10)

basic form: the overexploitation of finite marine resources at an unsustainable rate. Figure 4.15 vividly illustrates the increase in the number of boats and manpower engaged in fishing in the southeast region from 1825 to 1885, and in particular in the years between 1840 and 1845, just a decade or so before the beginnings of the decline in CPUE for both herring and whitefish.[89] It seems very likely that it was a straightforward increase in traditional fishing power from the beginning of the nineteenth century, brought to bear on what were already long-exploited commercial fish stocks, which was at the heart of the apparent demise in the number of whitefish available to fishermen in both regions from the 1840s onwards.

The situation with regard to herring landings and productivity is more problematic. It has long been acknowledged that herring abundance is affected by a multitude of environmental factors, so teasing out the precise impact of human-related activity, in particular intensive fishing, on herring stocks in any particular area

[89] The picture in the mid-western region is much more complicated, showing fluctuations in the numbers of men and boats throughout the period from 1825 to 1885. However, we have already seen that, while whitefish landings and productivity declined from around the mid-century, the herring fishery moved in the opposite direction. Given that the Fishery Board did not differentiate between boats and men engaged in the herring fishery and those fishing for whitefish (and indeed, many if not most boats would have been engaged in both fisheries at different times of the year) it is impossible to infer from these figures alone anything unique relating to the impact of increased fishing effort in the whitefish fishery.

is a very complex task.[90] Given their migratory nature, there may be a case for suggesting that the collapse of herring stocks in the southeast region during our period was due to the intensification of local fishing activity over many decades (and even centuries) alongside the huge growth of the east coast herring industry as a whole.[91] This was certainly the opinion of John Cleghorn, who is widely acknowledged to have coined the phrase 'overfishing' to describe the process of unsustainable fishing practices for herring in precisely this region of Scotland.[92] The majority of herring fishermen in both regions blamed the illegal or unchecked use of the seine net, as we saw in Chapter 3, and there is some anecdotal evidence that in upper Loch Fyne and the upper Firth of Forth there was significant local depletion of herring stocks from relatively early in our period.[93] But because of the manner in which landings information was gathered for both regions, and because of the natural fluctuations of pelagic fish stocks such as herring over time, it would be unwise to draw too many conclusions about the state of herring stocks overall (particularly given the very different experiences of the two regions) from this evidence alone. On the other hand, when it comes to the decline of whitefish in the second half of the nineteenth century we are on much firmer ground. From the Fishery Board's own statistics there appears to have been a significant decline in overall stocks of commercial whitefish in both regions from the middle of the nineteenth century onwards, measured by substantial increases in the amount of fishing effort required to catch them. It is unlikely that in either region beam-trawling was primarily the cause of this decline; far more likely is that the simple increase in fishing effort, measured by the number of boats and fishermen, and the quantities of handlines, longlines and hooks employed by them, was enough to provide a tipping point in these vulnerable and long-exploited whitefish communities.

[90] See, for example, A.J. Southward, G.T. Boalch and L. Maddock, 'Fluctuations in the Herring and Pilchard Fisheries of Devon and Cornwall Linked to Change in Climate Since the 16th Century', *Journal of the Marine Biological Association of the United Kingdom*, 68:3 (1988), 423-5; and, more recently, B. Poulson, *Dutch Herring: An environmental history, c.1600-1860* (Amsterdam, 2008), 240-1.

[91] Coull, *Sea Fisheries of Scotland*, 115-7.

[92] D.R. Goethel, S.X. Cadrin and B.J. Rothschild, 'Reconsidering Historical Definitions of Overfishing and the Balance Between Sustainable Use and Overexploitation', *CM Documents – ICES* (2012), 5-8. From his statistical studies, Cleghorn believed vehemently that stocks of herring in the Forth had been overfished to the point of extinction, and he told the Commissioners this in 1866 in no uncertain terms. *1866 Commission*, 693-4. See also J. Cleghorn, 'On the Causes of the Fluctuations in the Herring Fishery', *Journal of the Statistical Society of London*, 18:3 (1855), 240-2.

[93] See Chapter 3, Subsections 3.3.1 and 3.3.2, above.

4.4 The North-Western and Eastern Fisheries: A Mixed Picture

One of the advantages of using this kind of analysis to investigate the historic fisheries in the central belt of Scotland is that these areas share many characteristics with more obviously defined semi-enclosed seas.[94] In particular, large areas of these two regions are "restricted from the open oceanic conditions by land...[producing] an environment and ecosystem which is different from adjacent coastal waters," and as a result they will undoubtedly experience "a limited degree of exchange...with the oceanic environment, and a high degree of input of materials and influences from adjacent land masses".[95] In addition, just as the Mediterranean, Baltic and Black Seas were the cradles of European civilization, so the Firths of Clyde and Forth and their adjacent coastal waters were the cradles of modern Scottish civilization, and (like their Continental counterparts) they therefore experienced "moderate levels of anthropogenic influences for a long time, with impacts of industrial-scale fisheries [as] a recent addition".[96]

It became evident in Section 4.3, above, that these anthropogenic influences, in the shape of traditional fishing methods, intensified to such an extent during the first half of the nineteenth century that they appear to have impacted significantly on the stocks of whitefish available to fishermen. There is also the possibility that, as semi-enclosed and partially estuarine seas, these regions were particularly ill-equipped to recover from the intensification of this fishing activity. As Caddy noted in 1993, the physical characteristics of such seas "lead to a limited capacity of the environments and resources...to absorb the impacts of human activities".[97] In other words, it is quite possible that in the regions of the mid-west and southeast of Scotland overexploited commercial fish stocks found it difficult to recover, either through species adaptation or by recruitment from migratory populations in the open ocean. Hence, it is possible to produce a compelling narrative of the relatively

[94] For a comprehensive discussion of the various competing definitions of 'enclosed' and 'semi-enclosed' seas, see T. Healy and K. Harada, 'Definition and Physical Characteristics of the World's Enclosed Coastal Seas', *Marine Pollution Bulletin*, 3 (1991), 639-44.
[95] Caddy, 'Toward a Comparative Evaluation', 58.
[96] Healy and Harada, 'Definition and Physical Characteristics' , 640; J.F. Caddy, 'Marine Catchment Basin Effects Versus Impacts of Fisheries on Semi-Enclosed Seas', *Journal of Marine Science*, 57 (2000), 628.
[97] Caddy, 'Toward a Comparative Evaluation', 58.

dramatic impact of traditional fishing activity on commercial whitefish stocks in both regions after the 1830s and 40s.

The narrative for many other inshore fisheries in Scotland during the nineteenth century, on the other hand, is far less straightforward. In part, this is due to geographical and environmental complexity. From the eighteenth century onwards, Scotland's expanding coastal fisheries spanned the full range of habitats and locations, from the sea lochs and sheltered waters of the west, to broad swathes of open sea on the east. The impact of this geographical complexity was not confined to diversity in coastal habitats and the accessibility of fishing grounds. Despite improvements to the Highland road network (thanks, in large part, to the impetus provided, first by General Wade's military roads in the eighteenth century, and later by Thomas Telford's parliamentary roads in the 1820s), the population of much of western and northern Scotland remained sparse and isolated from the major urban and commercial centres – as, indeed, it does today.[98] Similarly, although the east coast was relatively well served by railway communications by the 1860s (followed by the northeast coast in the 1870s) even now there exist only three branch lines connecting west and northwest Scotland to the rest of the United Kingdom (providing services to Oban and Ballachulish, Mallaig, and the Kyle of Lochalsh), and another to Thurso on the western side of the far north coast.[99] What is more, none of these lines serves the rest of the coastal population of the west, only meeting the sea at the port of termination. In other words, the geography and relative isolation of much of northern and western Scotland was a significant factor in the uneven development of Scotland's fisheries during the period of greatest expansion after 1809. This was explicitly acknowledge by Malcolm Gray as long ago as 1978. "Not all the features of the west coast favour the fisherman," he wrote:

> The Lochs and inlets cut deep into a mountain mass, and the population is squeezed on to narrow coastal ledges...Thus, north of Kintyre local markets are limited and connection with more distant markets is difficult.[100]

But it was not these structural factors alone which impacted on the development of the fisheries in the northwest, particularly in the first third of the

[98] For an overview of the impact of road building in the Highlands before the twentieth century, see J.P. Day, *Public Administration in the Highlands and Islands of Scotland* (London, 1918), 313-332.
[99] See: [http://www.railbrit.co.uk/_maps/index.htm, accessed on 22/07/2014].
[100] Gray, *The Fishing Industries of Scotland*, 4.

nineteenth century. At least as important by this time was the fact that the lucrative but capricious herring shoals appear to have dwindled significantly along much of the northwest coastline, including around much of the Inner and Outer Hebrides. Whereas in the 1790s contemporaries complained that a lack of sufficient infrastructure was inhibiting locals from fully exploiting the great annual bounty of the herring harvest, by the 1840s precisely the opposite was the case, and it was widely noted that although investment in the west coast herring trade had been considerable it had largely been in vain because there were now few herring to be had.[101] As a result of these environmental and structural obstacles, at least in part, it was the east coast – far more exposed to the fluctuating moods of the North Sea, but also far better connected to local and distant markets and with more consistent migrations of herring after 1800 – which expanded most successfully throughout the whole of the nineteenth century.[102]

As was noted in Chapter Three, the northwest coast from Skye to Lochinver, including the Long Island, was the main focus of attention for adventurers during concerted attempts to develop Scotland's herring fisheries in the seventeenth and eighteenth centuries. Brand new fishing settlements were built at Lochbay and Ullapool in the 1790s, and many other facilities such as curing and processing stations were established from Dunvegan and Portree on Skye, to Lochinver and Stornoway in the north.[103] But for the reasons noted above these attempts to develop the northwest as a centre for commercial fishing activity largely ended in failure.[104] The buss fishery – that is, the annual migration of large fishing and processing vessels from the Clyde ports – was longer-lived in northwest Scotland between 1750 and 1830, but even this proved a temporary and only partially-successful experiment, largely kept alive by the payment of tonnage bounties to substantial merchant-adventurers.[105] In the end, it was the last of the British Fisheries Society's settlements which really set the standard for the huge commercial expansion to

[101] J. Anderson, *An Account of the Present State of the Hebrides and Western Coasts of Scotland* (Edinburgh, 1785), 11-12; *First Report from the Select Committee on Emigration, Scotland* (1841), 'Minutes of Evidence', 5-6. See also Chapter 3, Subsection 3.2.1, above).

[102] This is a narrative which is well known in the historiography, but for an excellent overview, see Gray, *The Fishing Industries of Scotland*, Chapters II, III and V.

[103] Dunlop, *The British Fisheries Society*, 1, 29, 88-9. Tobermory, on the Inner Hebridean island of Mull, was also developed by the British Fisheries Society, but quickly foundered as a fishing centre and instead became a west coast centre for merchant shipping. *Ibid*., 86.

[104] Coull, *The Sea Fisheries of Scotland*, 38.

[105] See above, Part 1.2.1. See also Coull, 'Fishery Development in Scotland', 18-19; Leazer, 'A Case for Subsidies?', 66-7.

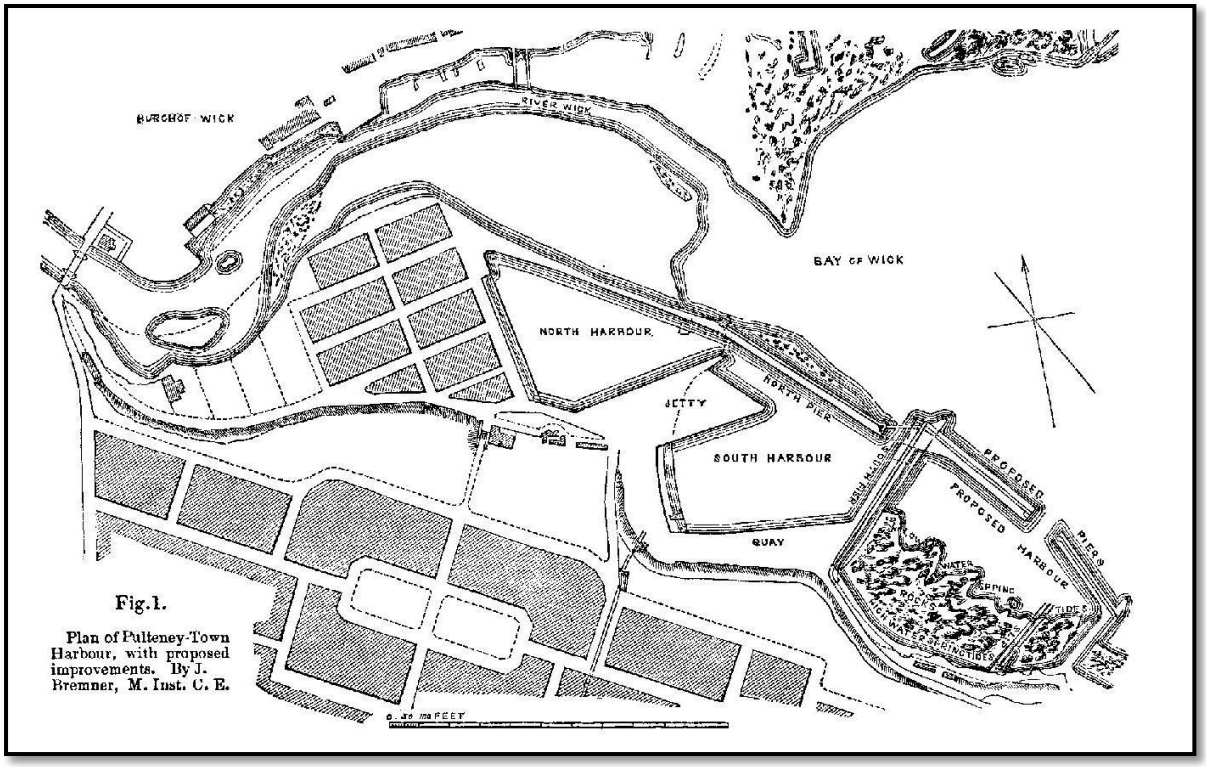
come. As Jean Dunlop pointed out, "[w]hile the Society's settlements on the west coast were 'vibrating between life and death'" at the beginning of the nineteenth century, "a new venture was undertaken in Caithness which from the first was a great success".[106] This "new venture" was the settlement of Pulteneytown, the new fishing centre for Wick, its larger neighbour across the estuary.

By the start of the nineteenth century there were already the beginnings of a highly successful herring fishery on the Caithness coast. According to Gray, it began somewhat by chance with the arrival of fish merchants from the Firth of Forth who were initially intent on buying up whitefish, perhaps because of the decline of stocks on their own doorstep.[107] As a result, the conditions developed for a ready market in herring, too, and by the 1790s Caithness fishermen were landing over 10,000 barrels of herring annually from upwards of 200 boats. By the second decade of the new century, more than 1,000 boats were engaged in the annual herring fishery off the Caithness coast, "a greater concentrated fishery than any that had been known in Scotland," and the pattern (for the herring fishery, at least) was set for the next fifty years.[108] Caithness's success gives us an insight, not only into the entrepreneurial spirit of the fishermen and merchants of that place, but also into another major obstacle faced by potential commercial fishing centres around Scotland, particularly those on the east coast. As the scale of the fisheries expanded, particularly in pursuit of herring, one inevitable consequence was a corresponding increase in the size and number of fishing boats. Until the late-eighteenth century, fishermen on the northwest and east coasts relied on the natural topography of the coastline to launch and recover their boats, and to transfer landings of fish. In the northwest, this meant finding safe anchorage and sheltered bays in the sea lochs and natural coves, of which there were many. On the east, the tradition had long been to establish small fishing villages close to shingle beaches, such as those at Cairnbulg (Aberdeenshire) and Sandend (Banffshire), or to build houses on "small fragments of raised beaches" on cliff coasts, such as at Pennan (Aberdeenshire) and Crovie (Banffshire).[109]

The great expansion of the industry on the east coast in the early-nineteenth century inevitably stimulated demands for more, bigger and better fishing ports and harbours. The main obstacle to the development of these dedicated fishing centres

[106] Dunlop, *The British Fisheries Society*, 154.
[107] Gray, *The Fishing Industries of Scotland*, 29. See also the discussion on early declines in whitefish in Section 4.2, above.
[108] *Ibid*., 29, 33.
[109] Coull, *The Sea Fisheries of Scotland*, 37.

Figure 4.16: Pulteneytown harbour in 1844 (showing proposed improvements)



Source: J. Bremner, 'An Account of the Town and Harbour at Pulteney-Town (Wick, Caithness), from their origin in 1803 to the year 1844', *Minutes of the Proceedings of the Institute of Civil Engineers*, 3 (1844)

was finance. According to Coull, "[u]ntil the twentieth century, the capital for fishing harbours came mainly from coastal burghs or their harbour authorities," and finding or justifying the high cost of building or upgrading harbours from civic funds was always a difficult task.[110] As a result, "there was a definite tendency for [fishing] activity to concentrate at relatively few ports".[111] But, as he points out, Wick was a special case, financed as it was in its early stages by the British Fisheries Society.

Having invested relatively early on in a large modern port, along with curing and processing facilities, the Society ensured that Wick (through Pulteneytown Harbour) would become what was described in 1844 as "the largest fishing-port of its kind in Great Britain" (Figure 4.16).[112] The case of Wick and the Pulteneytown settlement once again emphasises that the development of Scotland's commercial fisheries in the nineteenth century was dependent on a range of geographical, environmental and structural factors. As we have seen, the east coast had

[110] J.R. Coull, 'The Role of the Fishery Board in the Development of Scottish Fishing Harbours, c.1809-1939', *Scottish Economic and Social History*, 15:1 (1995), 30.
[111] *Ibid*., 28.
[112] J. Bremner, 'An Account of the Town and Harbour at Pulteney-Town (Wick, Caithness), from their origin in 1803 to the year 1844', *Minutes of the Proceedings of the Institute of Civil Engineers*, 3 (1844), 118.

reasonable inland communications and a long unbroken inshore coastline to exploit by the turn of the century, but it lacked natural harbours and shelters. The west coast, on the other hand, had plentiful inlets and sheltered sea lochs, but it was extremely difficult to access by land, and the population was sparse and highly dispersed. The success of Wick and Pulteneytown Harbour as an early centre for the herring fishery led to investment in other east coast ports and harbours, most notably in the older fishing regions of Banffshire and Aberdeenshire.[113] Development on the west coast, on the other hand, was relatively moribund except for the valuable Loch Fyne herring fishery in the Clyde, and it remained so for much of the century.

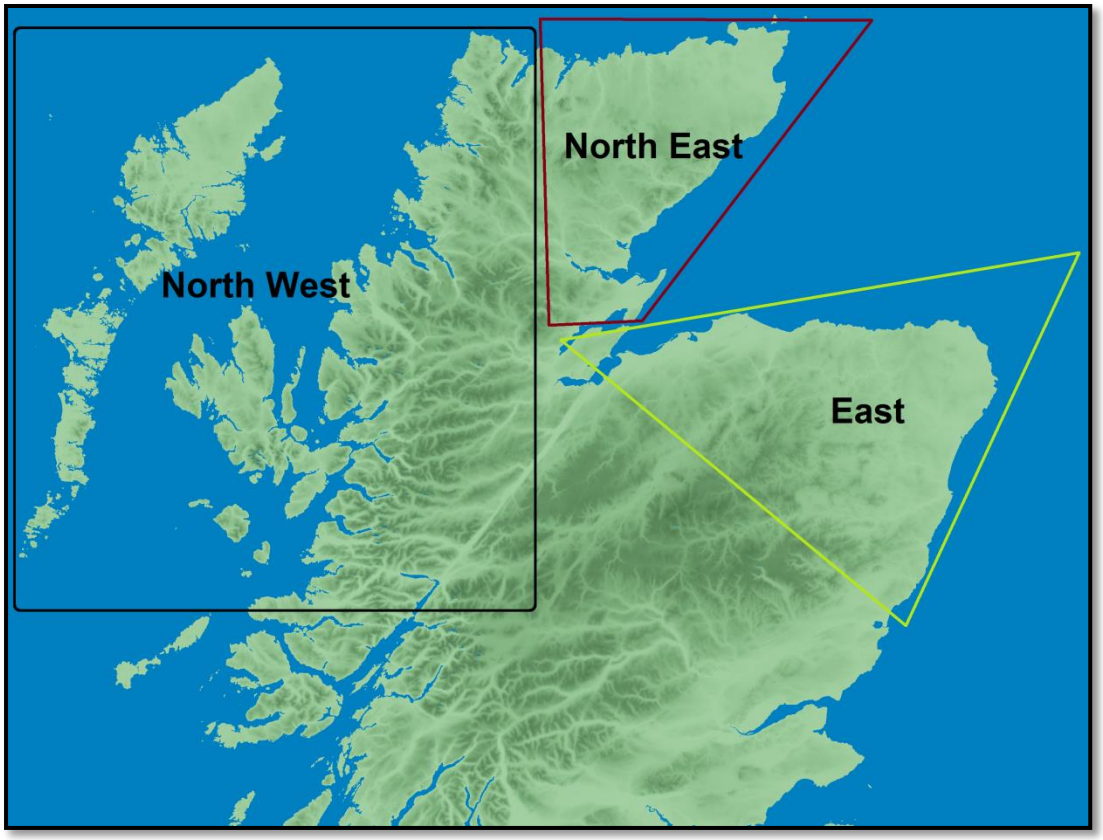
This broad-brush narrative of an east-west split in the development of Scotland's inshore fisheries is instructive, but what is less clear is quite how the uneven development of these fisheries was reflected in overall landings, and how it affected fishery resources. Using a similar methodology to that applied to the mid-west and southeast of Scotland in Section 4.3 above, the following discussion provides a region-by-region (and, at times, a fisheries station-by-fisheries station) account of those landings for the period between 1809 and 1886, and it also provides some initial suggestions as to the possible impact (or otherwise) of fisheries exploitation on commercial stocks in each locality.

4.4.1 The Herring Fisheries of the Northwest, Northeast and Eastern Coasts of Scotland

It has long been recognised that the fisheries on the east and west coasts of Scotland fared very differently throughout the nineteenth century. There is no doubt that speculators on the west coast – and, in particular, the northwest coast – faced formidable environmental and logistical obstacles to the development of modern commercial fisheries. But they also faced considerable cultural and social barriers, too. Malcolm Gray suggested almost sixty years ago that the peasant-fisherman of the western Highlands "might be amphibious – most were to some degree – but he never liked to set more than one foot off the soil and that only for short periods".[114] In

[113] J.R. Coull, 'The Scottish Herring Fishery 1800-1914: Development and Intensification of a Pattern of Resource Use', *Scottish Geographical Magazine*, 102:1 (1986), 12.
[114] M. Gray, *The Highland Economy, 1750-1850* (Edinburgh, 1957), 107.

Figure 4.17: The coastal fisheries of northwest, northeast and eastern Scotland



Source: NASA SRTM image, and U.S. Geological Survey's GTOPO30 data series

this, he echoed contemporaries who were familiar with the Highlands, such as Alexander MacClean of Coll. MacLean warned the British Fisheries Society that Argyll lacked "any distinct body of men who live solely by the fishing," because they regarded it as a "mere temporary object or casualty [*sic*]".[115] Yet, on closer inspection, the evidence suggests very clearly that specialisation in either occupation was less a matter of choice for the northwest Highlander than it was a simple necessity.

The pattern of landholding in the Highlands and Islands, and the nature of social relations between landholders, their deputies and tenants, meant that it was impossible for most small peasant-fishermen, either to obtain access to enough productive land to feed themselves and their families, or to afford the means for fishing on a full-time basis. As a result, and not unlike the situation which was described by contemporaries in Shetland (see Section 4.5, below), a culture of dependency was fostered whereby landlords provided boats and gear for fishing, but

[115] NRS British Fishery Society Papers, GD9/3, 1787, 89-90, cited in R.A.A. McGeachy, *Argyll 1730-1850* (Edinburgh, 2005), 169.

in doing so imposed many highly prejudicial conditions on crofter-fishermen. As early as 1785, Anderson described the situation for the Hebridean islanders in stark terms. "This extreme dependence of the people of all these coasts upon the land," he wrote:

> has suggested the idea to the possessors of it in some places near the sea-shore, of making the poor people pursue the fishing for the profit of the superiors only. With this view, their superiors furnish to their immediate dependents, boats, and the necessary apparatus for fishing, for which they charge whatever rates they think proper to impose: they also lay in oatmeal, and other necessaries, which they give out to their dependents in small portions as it is wanted, at what prices they please to exact. To obtain payment for these articles, they take the people bound to go out a-fishing as often as possible, and (in some cases upon oath) not to sell to any other person, any part of the fish they shall catch, but to bring them all to their superior, who agrees to take the whole at certain stipulated prices, of his own making also.[116]

By the time Anderson was writing his account, commentators were already blaming the degraded Highland clan system for the plight of poor crofters, and they reserved much of their scorn for the role of the tacksman. Tacksmen were the administrative representatives of the lairds on their estates, an intermediary between landowner and crofter or farmer. Originally, they would have been close to both parties, a close family member of the laird and known locally by the whole of the clan. Samuel Johnson described their *historic* role in 1775 as holding "a middle station, by which the highest and lowest were connected".[117] But by the time he was writing this, he (like many others) was convinced that tacksmen had strayed from their original purpose, and he went on to describe them as usurpers, men who bought their position for the sole purpose of enriching themselves:

> I have found in the hither parts of *Scotland*, men not defective in judgement or general experience, who consider the Tacksmen as a useless burden of the ground, as a drone who lives upon the product of an estate, without the right of

[116] Anderson, *Present State of the Hebrides*, 21.
[117] S. Johnson, *Journey to the Western Islands of Scotland* (London, 1775), 196.

> property, or the merit of labour, and who impoverishes at once the landlord and the tenant.[118]

On the coasts of the Western Isles, John Buchanan observed that "[t]he natural resource of the maritime and hardy inhabitants...is fishing: an occupation to which they are...addicted"; but he went on to note that "the lairds and tacksmen...will not suffer them to settle even in huts on the sea-shore, unless they become, in fact, their predial slaves, by taking a piece of cold waste land".[119] By this means, the poor inhabitants of much of the western Highlands and Islands were disabled from becoming either sufficiently productive farmers or full-time fishermen, and were therefore condemned to combine the two occupations for what was barely a subsistence living under what many contemporaries viewed as intolerable conditions.

If the situation was bad by the end of the eighteenth century for many northwestern crofters, it was set to get much worse in the nineteenth century. As the inland clearances gathered pace, "a settlement pattern that had always been mainly coastal was rendered more emphatically so," as crofters were expelled to the margins of estates and islands.[120] Pressure on already overstretched arable land increased, so that many newcomers were forced to seek alternative employment wherever they could. The collapse of the kelp trade in the 1820s was a further burden locally on coastal crofters, and "[i]t was in this situation that fishing for many provided the necessary work to allow household budgets to get to a position of balance".[121] The problem was that the existing social structure and the remoteness of these settlements mitigated against the development of a stable and widespread commercial fishery, so that "the fishery never could be carried on by men so circumstanced; and being unable to purchase boats and other apparatus for the fishery, they are obliged to rely upon the *soil*, as the surest means of finding subsistence".[122]

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[118] *Ibid*., 198. The scorn of contemporaries for the tacksmen has been challenged by modern commentators, however, who argue that it was actually reflective of a misplaced anger at often reluctant clan servants, loyal men who had been reduced by commercialising chieftans-cum-landlords to the status of 'improving' stewards. See, for example, T.M. Devine, *Clanship to Crofters' War: The Social Transformation of the Scottish Highlands* (Manchester, 1994), 41; J. Hunter, *The Making of the Crofting Community* (3rd edition, Edinburgh 2010), 46.

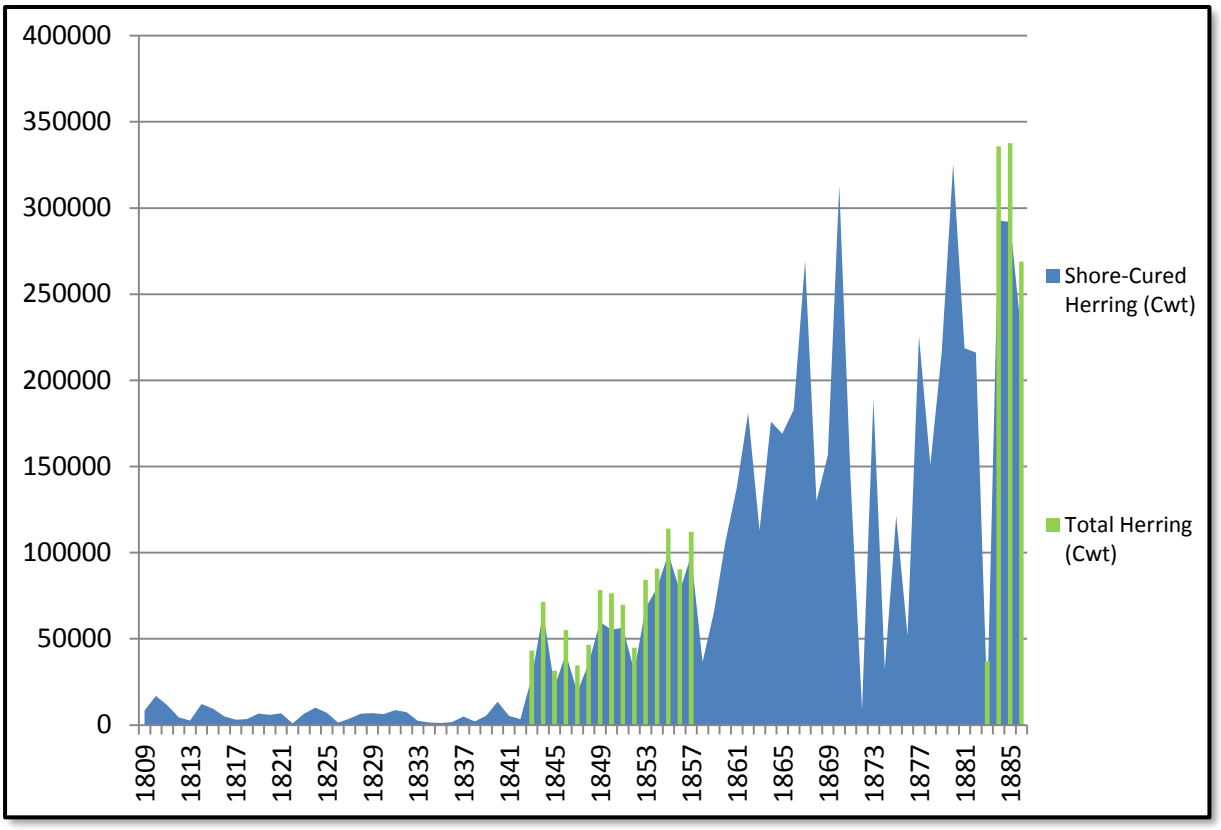
[119] J.L. Buchanan, *Travels in the Western Hebrides from 1782 to 1790* (London, 1793), 230.

[120] Coull, 'Crofter-Fishermen', 312-13. See also P. Jones and S.A. King, 'Voices from the Far North: Pauper Letters and the Provision of Welfare in Sutherland, 1845-1900', *Journal of British Studies*, 55:1 (2016), 80-82, 91.

[121] Coull, 'Crofter Fishermen', 313.

[122] Anderson, *Present State of the Hebrides*, 20.

Figure 4.18: Herring landings in the northwest of Scotland (cwt.), 1809-86



Source: *Fishery Board Annual Reports*, 1821-86 (NRS AF82/1-4, 6-10)

The final, and perhaps the most important, barrier to the development of a mature commercial fishery in the north-west of Scotland at the beginning of the nineteenth century was, as has already been noted, the capriciousness of the most important commercial fish of all: the migratory herring. Notwithstanding considerable investment by the British Fisheries Society at the end of the eighteenth century, landings of herring in the north-west were poor throughout most of the first half of the nineteenth (Figure 4.18). This was confirmed in the annual reports of the Fishery Board, so that as early as 1813 it was reported that "the total Quantity of Herrings caught is less [than previous years], owing to a very considerable failure having taken place in the west Highland or Loch Fishery".[123] From the 1820s onwards, it was regularly noted that "the Fish appear...to have foresaken their usual haunts, more especially in the north-west Highlands," and that, in the same region, "the Fishing...[is] still far short of what it once was".[124] From the raw figures, it is clear that the herring fishery began to improve from the early-1840s in this region and, though

[123] NRS AF82/1 (1813).
[124] NRS AF82/1 (1822, 1824).

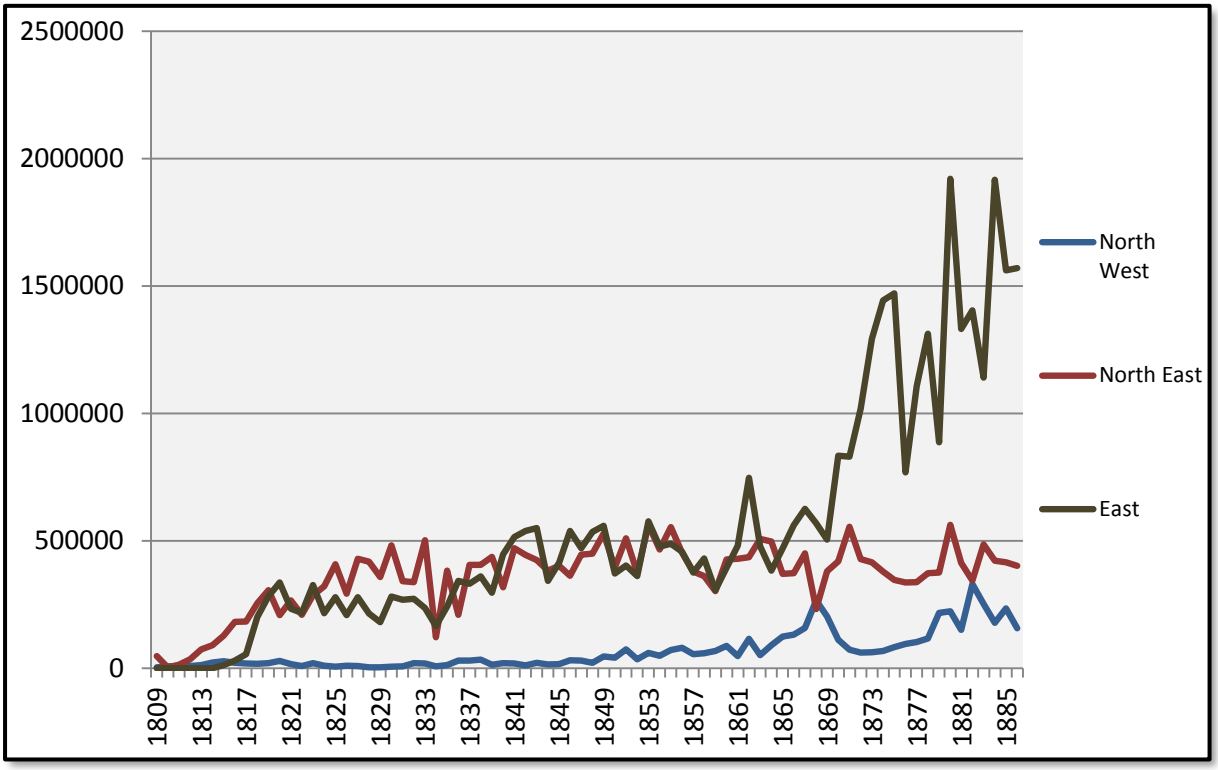
erratic, it increased significantly from the late-1850s through to the end of our period. In fact, the trajectory of the north-west herring fishery is remarkably similar to that of the Clyde and mid-west noted in Figure 4.7 above, suggesting, perhaps, that the herring in these two regions were either derived from the same populations or, if they constituted different populations, that environmental influences on migration patterns affected both in similar ways.[125] Indeed, when we compare the two figures, it is also obvious that, in terms of the raw quantities of herring landed, catches in the two regions were broadly analogous. The most notable difference, of course, is that the herring fishery in the mid-west was almost entirely centred on a narrow strip of the Firth of Clyde, in the sheltered waters from the Kilbrannan Sound to the top of Loch Fyne.[126] In the northwest, on the other hand, herring was caught piecemeal across this sizeable region, in sea lochs and sheltered waters, wherever they appeared.

Concentrating on raw landings offers us a ready opportunity to compare the trajectory of the northwest fishery with that of two remaining regions, the east and northeast east of Scotland. Figure 4.19 demonstrates graphically that, in terms of the raw landings of cured herring, the northwest lagged behind the eastern fisheries by a considerable margin for the whole of the nineteenth century. The reasons for this discrepancy have already been explored at some length, but they can be summarised as a combination of environmental, logistical and socio-economic disadvantages in the northwest. On the one hand, we know that the herring themselves were erratic, visiting the coastline and sea lochs of the west periodically, then deserting them again without notice. On the other, many if not most crofter-fishermen in the northwest remained under what contemporaries viewed as a state of semi-feudal bondage, so that they had neither the means nor the incentive to invest in fishing as a full-time occupation. Finally, the topography of the west Highlands and Islands, combined with these other factors, meant that investment in the infrastructure which would be required to develop the fisheries as a serious commercial proposition was largely lacking throughout the century. As Murdo MacKenzie, proprietor of Dundonnell in Wester Ross, noted in 1841:

[125] The modelling and identification of distinct herring populations is notoriously contentious, but Cushing suggested in an influential article in 1967 that two distinct populations of spring-spawning herring could be identified in the waters off the north-west and west of Scotland; one adjacent to the Outer Hebrides, and another adjacent to the Inner Hebrides. D.H. Cushing, 'The Grouping of Herring Populations', *Journal of the Marine Biological Association of the United Kingdom*, 47 (1967), 196.

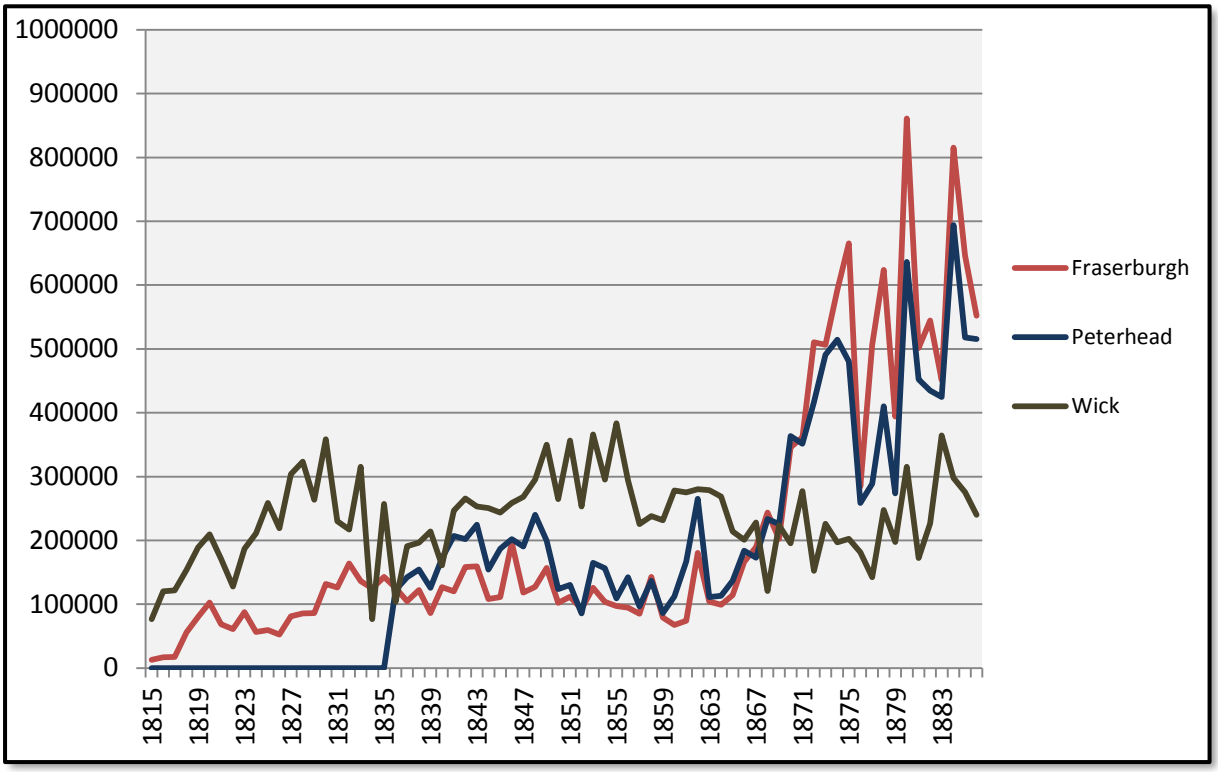
[126] NRS AF82/2 (1846); NRS AF82/3 (1852, 1859); *1866 Commission*, 1104; Gray, *Highland Economy*, pp119-20.

Figure 4.19: Cured herring landings in the northwest, northeast and east of Scotland (Cwt.), 1809-86



Source: *Fishery Board Annual Reports*, 1809-86 (NRS AF82/1-4, 6-10)

Figure 4.20: Cured herring landings at selected east-coast ports (cwt.), 1815-86



Source: *Fishery Board Annual Reports*, 1815-86 (NRS AF82/1-4, 6-10)

> The principal encouragement is to open the markets by roads and by steam navigation...That would be an immense benefit to that part of the country; it would give a great stimulus to industry, and afford a market for fish and other articles; but steamers do not visit all parts of the coast; they call at certain parts only, and unless there were roads in those parts people could not carry their fish there.[127]

These were disadvantages which either did not apply, or had been largely overcome, on the east coast as a whole by the second decade of the nineteenth century.

The British Fisheries Society settlement at Pultneytown (Wick) is an excellent example of how the northeast coast fisheries managed to prosper while the northwest remained largely stagnant; but it is not the only one. In many ways, as the century progressed Pultneytown became a victim of its own success, in the sense that the capacity of the harbour and curing facilities had already been reached by the 1830s in this relatively small and (by east coast standards) remote settlement. As Coull has pointed out, "[a]lthough the British Fisheries Society did undertake a major programme of harbour building at Wick [in the 1840s]...this was to prove an expensive failure".[128] He went on to add that "[h]arbour improvement was far more successful at Peterhead and Fraserburgh, and from the 1860s development at the Aberdeenshire ports outpaced that of Caithness".[129] This is graphically illustrated in Figure 4.20, which shows the gradual weakening of Wick's status as the predominant herring port on the east coast from 1870 onwards. By this point, when much larger decked boats began to dominate the industry, Wick's limited capacity really began to tell and the Aberdeenshire ports overtook it comfortably in terms of landings.[130] Once again, the main reason for this shift from the remote northeast to the more accessible mid-eastern region was in large part a logistical one. Aberdeenshire was not only much closer to the lucrative southern markets of Scotland and beyond; being more populous and with a much longer tradition of fishing for commercial markets it was also much better connected. It is important to add that this shift of emphasis from Wick to Aberdeenshire in the middle of the nineteenth century really marks the end of the long term project to repopulate and revitalise the Highlands through the medium of the herring trade. From the middle of the eighteenth century (and particularly after

[127] *Second Report from the Select Committee on Emigration* (1841), 'Minutes of Evidence', 25.
[128] Coull, *Sea Fisheries of Scotland*, 116.
[129] *Ibid*.
[130] Gray, *The Fishing Industries of Scotland*, 83-4.

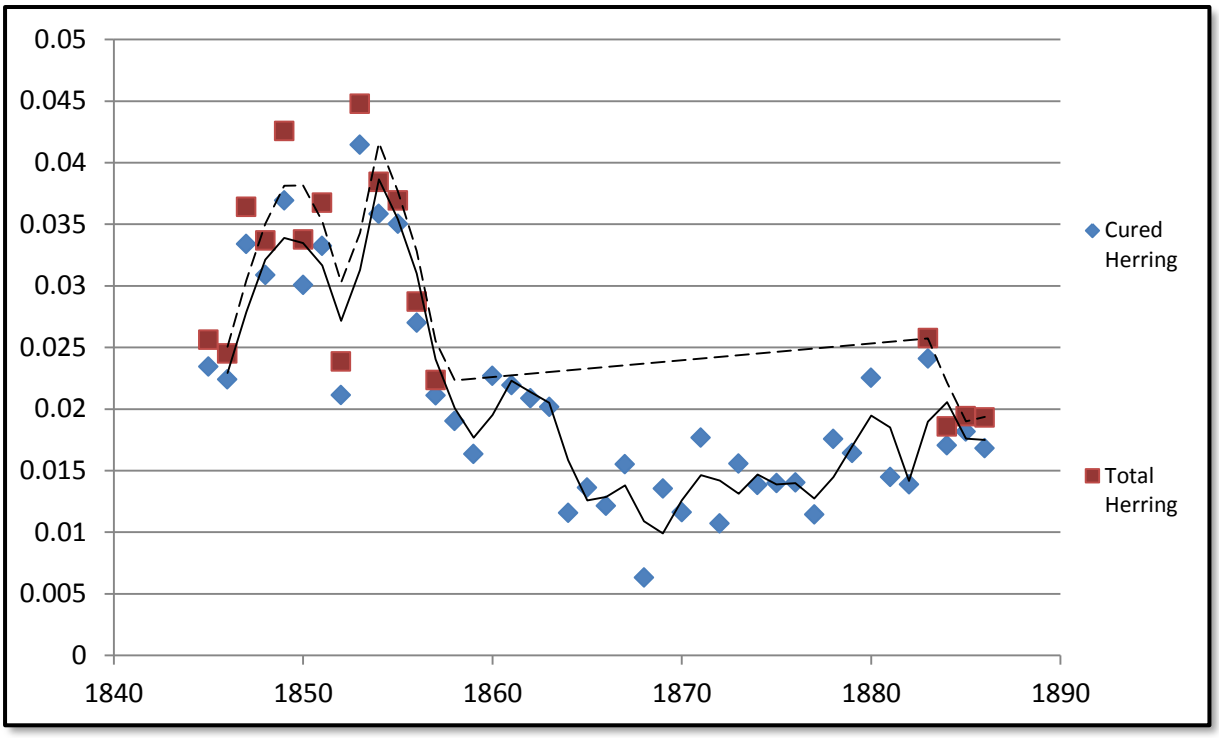
the Jacobite Rebellion in 1745), attempts to stimulate the northern fisheries were consciously framed as a means by which Highland populations could be brought under the 'civilising' influence of commerce, and as the effects of clan breakdown and early clearances took hold towards the end of the century they were increasingly viewed as a means of retaining and employing demoralised Highlanders.[131] But the interventionist dream of an organised and productive West Highland fishery to rival that of the Dutch was finally dashed by the commercial realities of trying to compete with better placed neighbours to the south and east.

From an ecological or environmental point of view, this discussion of the different trajectories of the northwest and eastern herring fisheries in Scotland is of genuine interest when it comes to interpreting the possible impact of fishing activity on the stocks of this most lucrative fish. Figures 4.21, 4.22 and 4.23 are the result of a similar catch per unit effort (CPUE) exercise as that employed in Part 3.2 for the mid-western and southeastern fisheries. The results, though far from conclusive, appear to demonstrate that all down the east coast herring were becoming harder to catch after the 1850s. This is broadly consistent with what was described for the southeastern region (Figure 4.12 above), and it may indicate that intensive fishing activity had had a significant impact on herring stocks in all the coastal fisheries on the east side of Scotland. It is true that the decline in CPUE for the mid-east and northeast regions was not as marked as that for the southeast, but this is understandable given that most of the landings for the latter were taken in the restricted 'semi-inland sea' of the Greater Forth, whereas for the rest of the east coast, boats were able to range much further afield to compensate for falling catches in their own localities. In fact, this is something which was explicitly acknowledged by Aberdeenshire fishermen in evidence to the 1866 Commission. Alexander Lepper, of Stonehaven, was quite clear that the herring "do not come as close inshore as they did in former times," and he specifically attributed this to "such a large number of boats at work now".[132] Alex Jamieson of Peterhead was even more emphatic, stating that "I think the decrease would appear to be...in consequence of over-fishing,"

[131] Harris, 'Scotland's Herring Fisheries', 55-6. See also pp.97-8, 179-80, above. The most coherent, and influential, plea for the establishment of dedicated fishing towns in the Highlands of Scotland is that of John Knox, the Scottish-born bookseller, whose *Discourse on the Expediency of Establishing Fishing Stations or Small Towns in the Highlands of Scotland and the Hebride Islands* (London, 1786) was widely read and often cited by the founders of the British Fisheries Society.

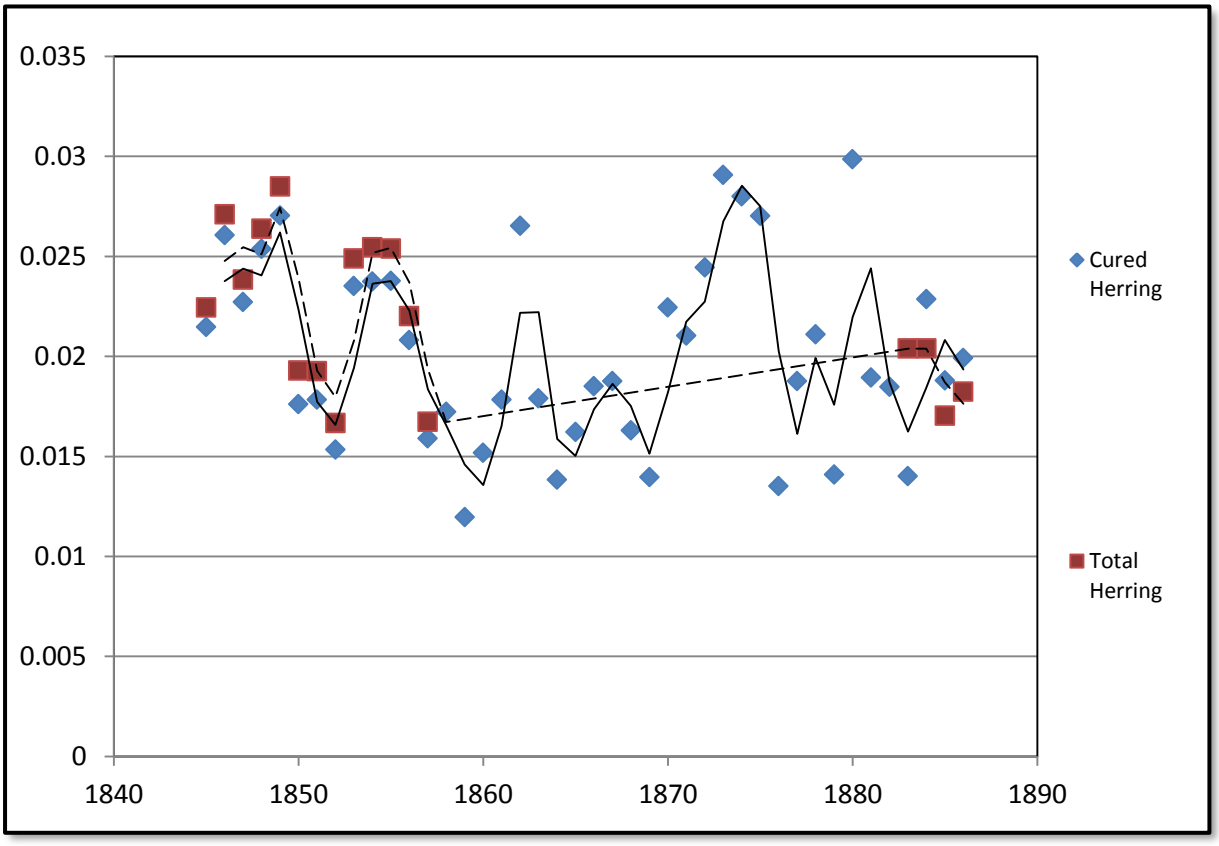
[132] *1866 Commission*, 640.

Figure 4.21: Herring fishing CPUE in the northeast of Scotland (cwt. / sq. yd. net), 1845-86



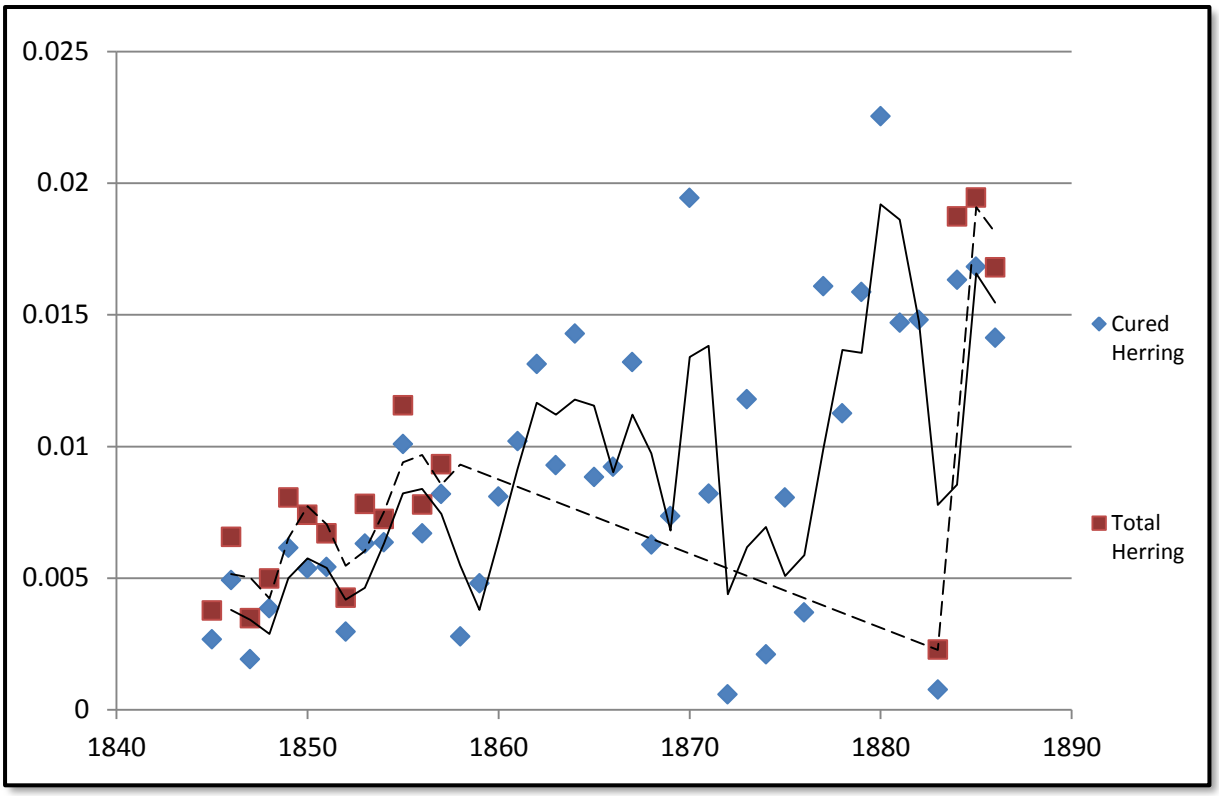
Source: *Fishery Board Annual Reports*, 1845-86 (NRS AF82/2-4, 6-10)

Figure 4.22: Herring fishing CPUE in the east of Scotland (cwt. / sq. yd. net), 1845-86



Source: *Fishery Board Annual Reports*, 1845-86 (NRS AF82/2-4, 6-10)

Figure 4.23: Herring fishing CPUE in the northwest of Scotland (cwt. / sq. yd. net), 1845-86



Source: *Fishery Board Annual Reports, 1845-86 (NRS AF82/2-4, 6-10)*

adding that "[t]he ground has been over-fished as it were".[133]

In the northwest, on the other hand, where fishing activity was, for the reasons outlined in this section, much less intensive across the whole of the nineteenth century, CPUE actually appears to have increased throughout the period (notwithstanding some very rapid and profound fluctuations from the 1860s onwards; see Figure 4.23). It is, perhaps, important that opinions as to the state of the herring fishery in the northwest were divided in 1866, depending on where the commissioners took their evidence from. It was strongly suggested that the Minch fishery, in the sound separating Lewis and Harris from Skye and the northwest Highlands (by far the largest centre for herring fishing in the northwest throughout the nineteenth century) was more productive than ever by this time. But fishermen from Skye itself, and even from the Inner Hebrides, complained that the herring had long since departed their waters, and they laid the blame squarely on the Stornoway fishermen for decimating migrating stocks before they had a chance to catch them.[134] Perhaps the most perceptive observation, given the apparently erratic nature of

[133] *1866 Commission*, 648.
[134] *1866 Commission*, 717-8, 740, 744.

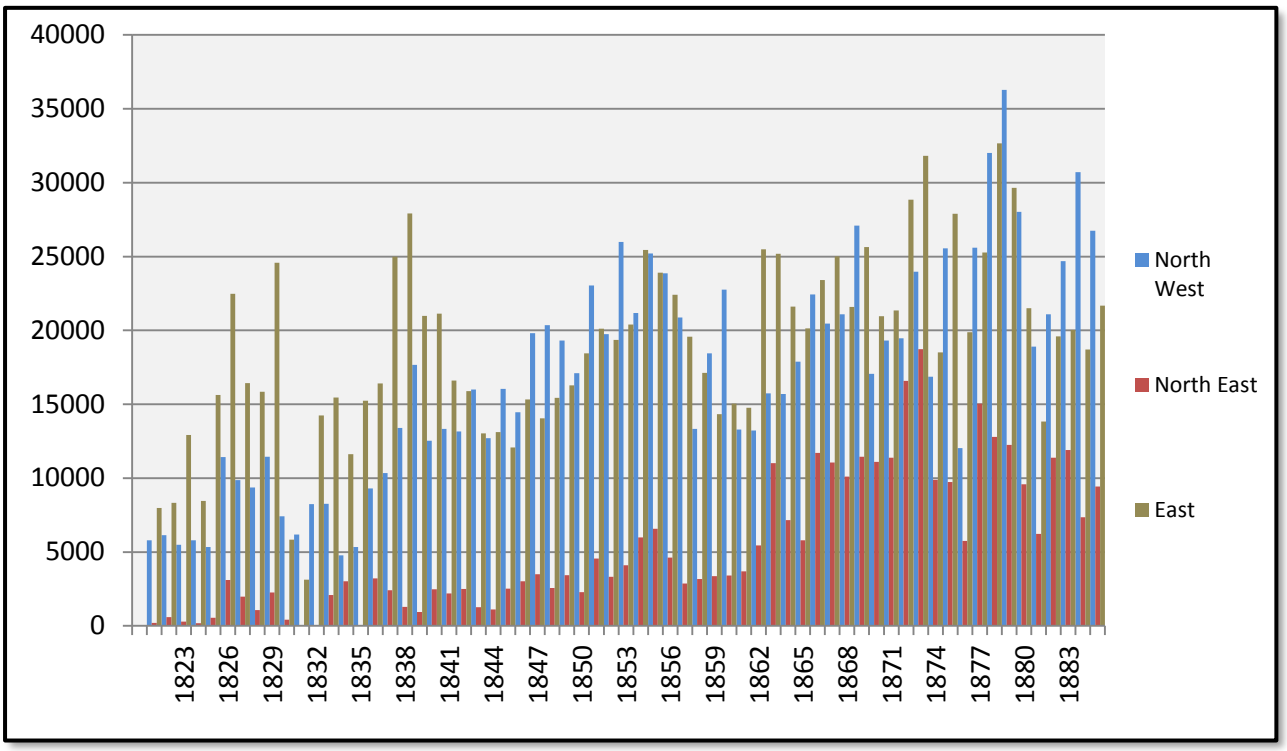
herring fishing in the northwest, was from Alexander Mackinnon, Lord Macdonald's agent on Skye, who stated that there was, overall, neither an increase nor a decrease in the herring, but that it was subject to great seasonal and annual fluctuations.[135] Despite the compelling evidence, both from fishermen and the Fishery Board data, it is important once again to acknowledge that attributing significant shifts in the availability of migratory herring directly to anthropogenic factors such as intensive fishing is highly problematic. As suggestive as these findings are, once again we are on much firmer ground when considering the situation with regard to demersal, or whitefish.

4.4.2 The Whitefish Fisheries of the Northwest, Northeast and Eastern Coasts of Scotland

With the sole exception of Shetland[136], the main commercial driver in the expansion of Scotland's regional fisheries from the early-modern period was the highly lucrative international market for cured herring. Whitefish were, to all intents and purposes, of secondary interest and they were viewed, more often than not, an inferior commercial product.[137] Nonetheless, they were always an important source of subsistence and local income, and by the middle years of the nineteenth century they were, in some places, commercially significant in their own right.[138] Towards the end of the century new markets for fresh and, to a lesser extent, lightly cured whitefish (which, in practice, meant predominantly cod, ling and hake) developed thanks once again to the increased carrying capacity of improved roads, rail networks and steamer packets.[139] There was, of course, the additional stimulus between 1821 and 1830 of barrel bounties which were payable on acceptably cured barrels of whitefish, mainly cod, and it is clear from the figures below that the withdrawal of this bounty

[135] *1866 Commission*, 742.
[136] See Section 4.5, below.
[137] Coull, *The Sea Fisheries of Scotland*, 3.
[138] The most obvious example of this is the development of the Aberdeenshire smoked haddock industry which developed significantly between 1800 and 1830 and expanded south to Fife in the 1820s. Gray, The Fishing Industries of Scotland, 42-4.
[139] Coull, *Sea Fisheries of Scotland*, 96-7. For the reasons already discussed, the expansion of markets for fresh whitefish were only really felt on the east and southwest coasts, which far outstripped the northwest in terms of whitefish landings from the 1870s onwards. This was highlighted as late as 1884, when it was noted that "white fish from the north and west of Lewis cannot be despatched fresh to market," and that improved railway communication 'is the principal requirement of the fishing population on the western coast'. *Report from the Commission of Inquiry into the Condition of the Crofters and Cottars in the Highlands and Islands* (1884), 64, 63.

Figure 4.24: Cured whitefish landings in the northwest, northeast and eastern regions (cwt.), 1821-86



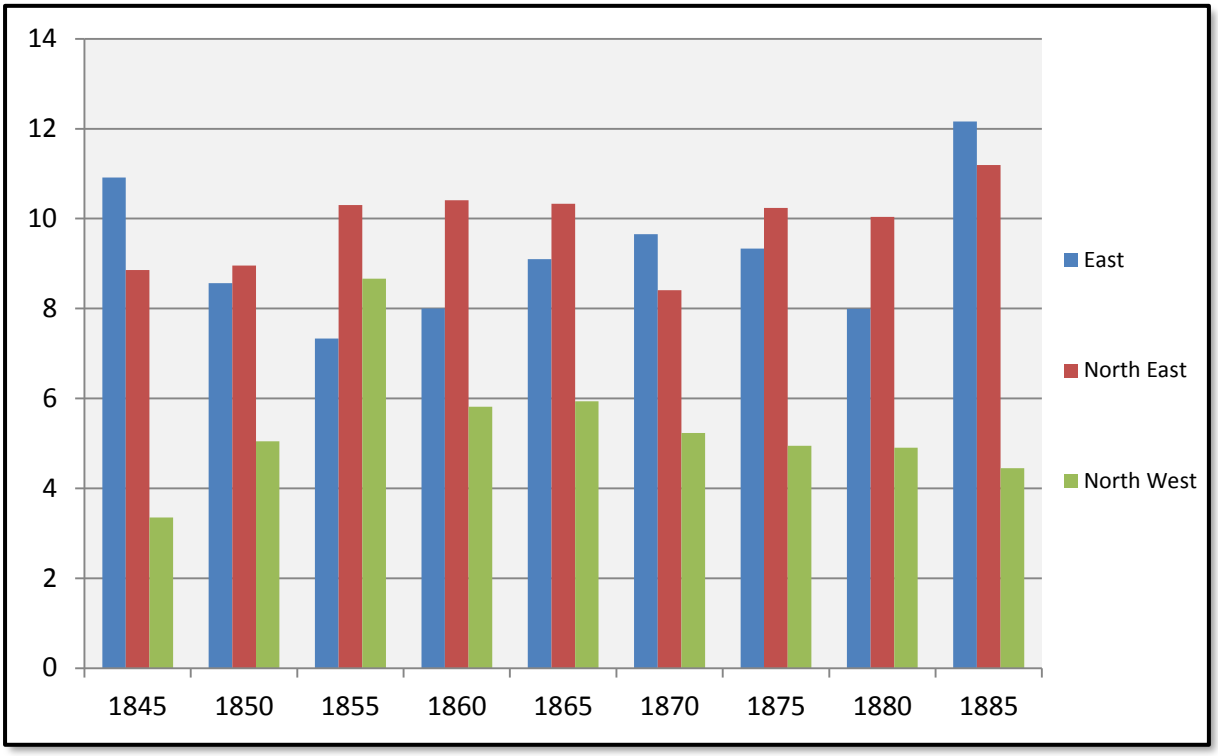
Source: *Fishery Board Annual Reports*, 1821-86 (NRS AF82/1-4, 6-10)

affected the regions under scrutiny here just as it did the mid-west and southeast.[140] Figure 4.24 gives a comparative view of the landings of cured whitefish, and it is clear that all three regions suffered a short-lived dip in landings of fish for cure in 1830 and 1831. Other than this, the most striking thing about this figure is that, notwithstanding the comparatively underdeveloped state of the herring fishery in the northwest, cured whitefish catches were relatively robust in relation to the other two regions, especially from the 1840s onwards. Overall, of course, whitefish landings for much of the century were small when compared to those of herring on mainland Scotland and in the Western Isles, and except for the growing, mostly east-coast, market for smoked haddock, whitefish did not become a staple in the diet of most non-maritime Scots until the 1870s and 1880s.[141]

Very little has been written about the regional whitefish industry in nineteenth-century Scotland with the exceptions, once again, of the Shetland 'haaf' and cod fisheries, and the east coast trade in smoked haddock; but it does seem to be the

[140] See pp.157-8, above.
[141] Coull, *Sea Fisheries of Scotland*, 96.

Figure 4.25: Average tonnage of boats in the east, northeast and northwest regions (five year intervals), 1845-1886



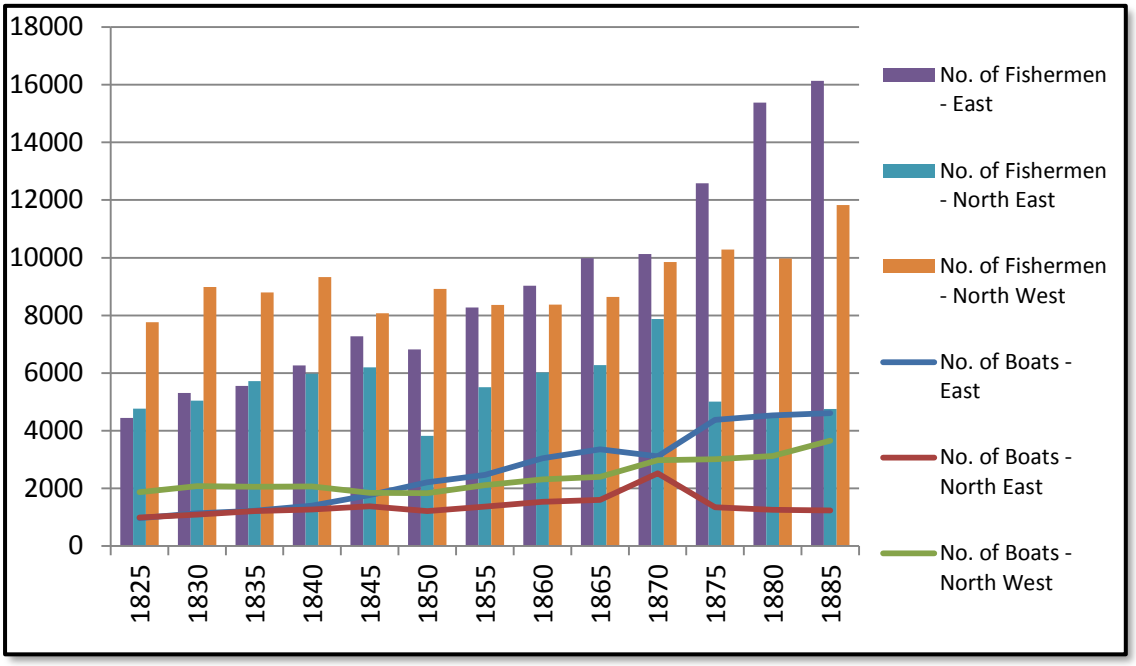
Source: *Fishery Board Annual Reports*, 1845-85 (NRS AF82/2-4, 6-9)

case that the steady growth of both east and west coast landings of whitefish was above all an extension of traditional, small-scale fishing. Coull makes the point that Lewis, Barra and Islay on the west coast, and Fife and Eyemouth on the east, were well-known launching points for larger boats fishing for cod and ling in deeper water; but, crucially, he is also very clear that "the greater developments in Scotland in the 19th century were actually the inshore fisheries".[142] This is certainly reflected in the Fishery Board's statistics on the number and tonnage of boats, and the number of boys and men employed in all fisheries from 1821. Figure 4.25 demonstrates that the average tonnage of boats overall remained reasonably constant from 1845 (when tonnage was first recorded) to the end of our period, and that in none of these regions did it climb much above 10 tons per boat until the 1880s.[143] Perhaps more significant, though, is the fact that in the northwest of Scotland boats were generally much smaller in size than in either the east or the northeast, and towards the end of

[142] *Ibid*.

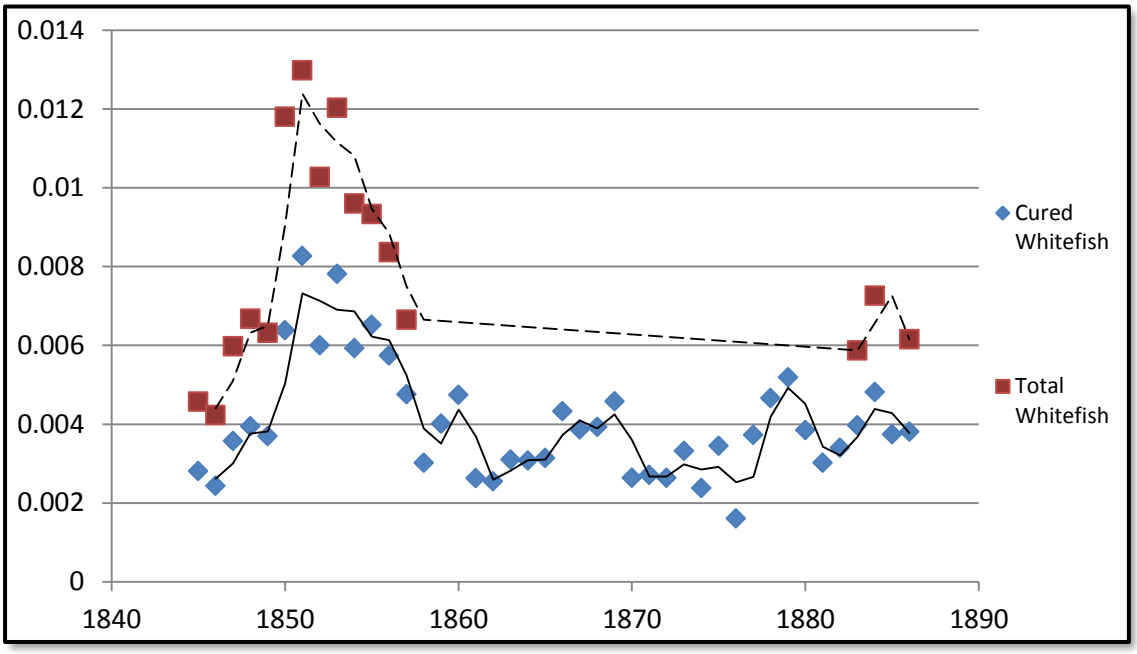
[143] Half-decked boats, which were already making inroads on the east coast of Scotland in the 1860s, were at least twice this size in terms of tonnage, and were often much larger. *1866 Commission*, 749.

Figure 4.26: Number of boats, men and boys employed in the east, northeast and northwest regions (five year intervals), 1825-1885



Source: *Fishery Board Annual Reports*, 1845-85 (NRS AF82/1-4, 6-9)

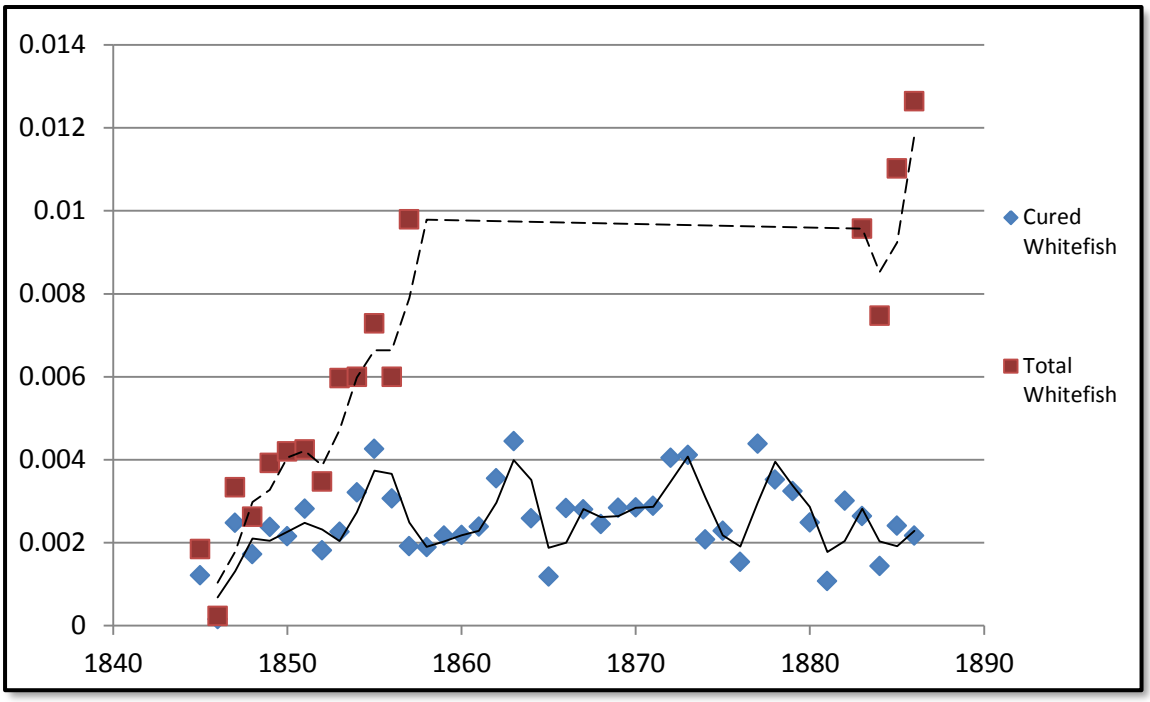
Figure 4.27: Whitefish fishing CPUE in the northwest of Scotland (cwt. / sq. yd. net), 1845-86*



Source: *Fishery Board Annual Reports*, 1845-86 (NRS AF82/2-4, 6-10)

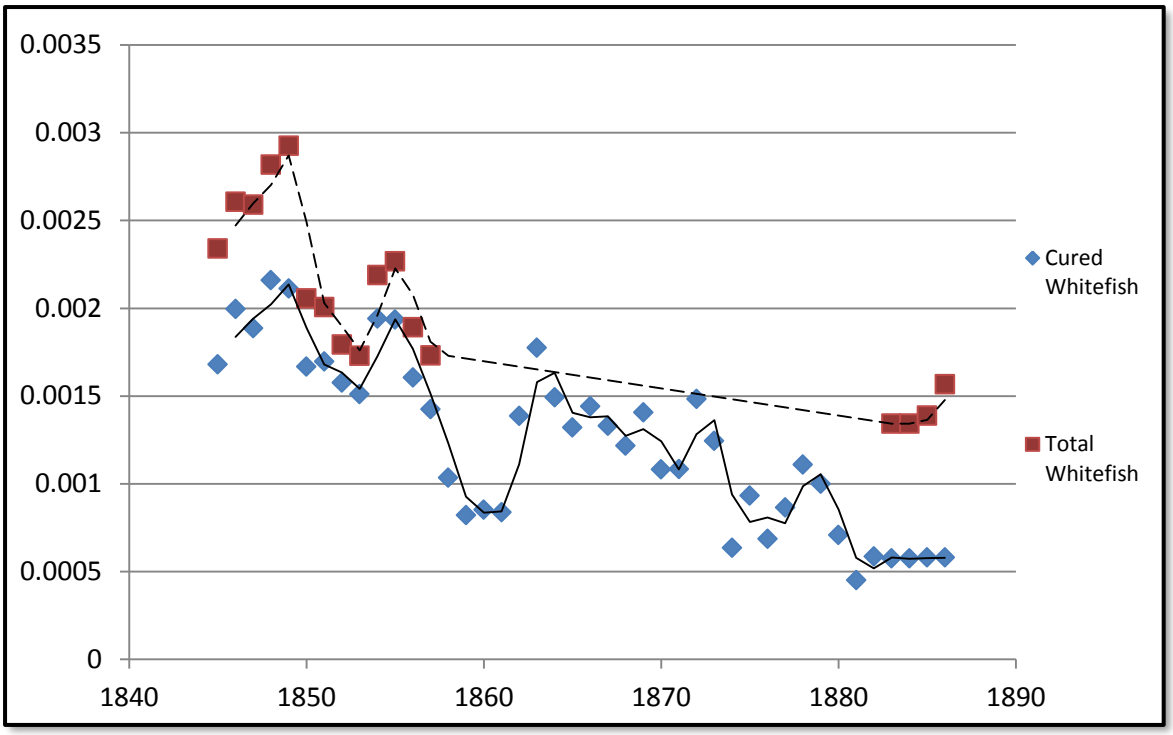
* Fresh whitefish fishing CPUE has been omitted for the year 1885 in this figure as a result of an apparent anomaly in the collection of data. In 1883, landings of fresh cod in Stornoway amounted to 4,211 Cwt., in 1884 this figure was 4,510 Cwt., and in 1886 it was 5,273 Cwt. However, in 1885, the figure recorded was 31,099 Cwt. It could be that this was a transcription error or misprint in the Fishery Board's Annual Report, but it seems very unlikely that this amount of cod was actually caught by Stornoway's small boat fishermen in that year. See *Fishery Board Annual Report*, 1885, 22.

Figure 4.28: Whitefish fishing CPUE in the northeast of Scotland (cwt. / sq. yd. net), 1845-86



Source: *Fishery Board Annual Reports*, 1845-86 (NRS AF82/2-4, 6-10)

Figure 4.29: Whitefish fishing CPUE in the east of Scotland (cwt. / sq. yd. net), 1845-86



Source: *Fishery Board Annual Reports*, 1845-86 (NRS AF82/2-4, 6-10)

the period they actually appear to have been diminishing in size.[144] In addition, the number of boats, men and boys employed in the northwest fisheries remained broadly constant, whereas those on the east coast rose sharply over the century, which again appears to confirm that the fishermen on the west coast were generally fishing on a smaller scale, consistent with their dual role as crofter-fishermen (Figure 4.26).

The value of this mixed approach to the environmental history of the fisheries is once again brought into relief when we look at the amount of effort that was required to catch whitefish in these very different regions. The trends that emerge are remarkably similar to those uncovered for the mid-west and southeast of Scotland in Part 3.2 above. Figures 4.27 and 4.29 once again demonstrate that whitefish CPUE for the northwest and eastern regions of Scotland rose to a high point in the 1840s, and then more or less declined from around the middle of the century, failing to recover significantly thereafter. The only anomaly in this narrative of declining coastal whitefish is in the northeastern region (Figure 4.28), which seems to have experienced an increase in CPUE across the whole period. In each case, this is consistent with what is known from the historiography of the fisheries in these regions. Parts of the northwest and the east coast of Scotland were fished relatively intensively throughout the nineteenth century, though in quite different ways. As Figure 4.27 demonstrates, and as is corroborated from contemporary accounts, parts of the northwest Highlands and the Outer Hebrides were fished consistently over time by many small boat fishermen on a part-time basis. The fact that "every farm and hamlet have their boats," that "the season is divided between fishing, farming and kelping," but that "the people are not acquainted with the deep sea fishing," inevitably meant that there had long been significant pressure on local inshore waters, just as there had in the relatively circumscribed coastal areas of the mid-west.[145]

It appears that this consistent pressure reached a critical point in the local fisheries of both of these regions at about the same time, the mid- to late-1840s, and that stocks of whitefish available to small boat fishermen diminished accordingly. On

[144] The exception to this trend is during the mid-1850s, when average boat size in the northwest jumped by around two tons. This temporary increase was almost certainly caused in large part by the short-lived mid-century exploration of the deep water cod fisheries off the coast of Iceland and in the Davis Straight between Greenland and Baffin Island. Deep water smacks set out for these fisheries from Lerwick in Shetland, but also from Stornoway, and in 1850 it was reported that most of the cod caught on these expeditions was landed at Lewis. *Fishery Board Annual Report*, 1850, 3.

[145] *The New Statistical Account of Scotland*, Vol.14 (Stornoway), 132-3.

the east coast, however, the trajectory of the fisheries was clearly quite different. The number of boats and men increased over time, boats were consistently larger than their northwest counterparts, and we know that many more of the east coast fishermen pursued their trade exclusively. As a result, fishermen were also more experienced, and far better prepared to fish further offshore as inshore stocks became scarce. In 1866, Alexander Lepper of Stonehaven, whose we heard from earlier, was quite explicit about this, stating that the haddock "do not come as close inshore as they did 40 years back," but that "we can get great numbers 30 miles off".[146] Robert Bruce of Buchanhaven agreed that haddock and other whitefish could only be found "further out to sea now...there are plenty in the deep water...[f]rom 12 to 15 miles off".[147]

In the northeast, however, we know that the development of the fisheries followed a quite different course. Figure 4.28 indicates that for most of the nineteenth century, cod, ling and hake were of relatively little importance to the fishermen of this region. This was confirmed by the evidence given to the 1866 Commission: Malcolm Geddes, fish curer at Wick, stated that "[t]he cod and ling fishery is not practised here locally; it never has been to any great extent," and he blamed this on the fact that the railways had not reached the region by then.[148] The Fishery Board concurred with his conclusions about the lack of a northwest whitefishing industry, but suggested that it was down to the inadequacies of Pulteneytown harbour, which again puts us in mind of the relative decline of Wick as a fishing station when compared to Peterhead and Fraserburgh in the south.[149] It is difficult to establish which of these structural factors was primarily to blame: most likely, the two were causally linked and the resolution of one would have resulted in the other being seriously addressed. Overall, though, the net result of this lack of a whitefish industry in the northeast region was that cod, ling and hake were fished relatively lightly for the majority of the period, resulting in the preservation of accessible stocks. Francis Sinclair of Wick noted in1866 that "[t]he haddock fishery has diminished, but the cod fishery has been rather better for the last few years," and he went on to state that they could be got "[a]ll over the coast".[150] Malcolm Geddes was convinced that "[a] good deal of cod might be got here if we

[146] *1866 Commission*, 641.
[147] *Ibid*., 655.
[148] *Ibid*., 671. See also the evidence of Francis Sinclair of Wick, in *Ibid*., 674.
[149] *Fishery Board Annual Report*, 1869, 5; see pp.189-90, above.
[150] *1866 Commission*, 674.

had access to the markets".[151] This is a very different narrative to any other we find, in relation to whitefish, around the coasts of mainland Scotland and the Western Isles in the nineteenth century. In the northeast alone, structural and demographic factors conspired to check the 'natural' increase in traditional inshore hook-and-line fishing for cod, ling and hake between 1840 and 1870 with the result that fish stocks appear to have remained stable and CPUE actually increased.

4.5 Orkney and Shetland: The Island Fisheries

It is very difficult to offer even a conjectural environmental analysis of the development of fisheries in the Northern Isles over the nineteenth century to rival that for the other regions, above. This is partly because of their geographical isolation, and partly because of the historical trajectory of the Orkney and Shetland fisheries. However, it is possible – and, indeed, necessary – to take account of them in relation to the environmental history of Scotland's inshore fisheries in the nineteenth century overall. The Orkney and Shetland Islands are of particular interest because, despite their relative proximity and many shared social, historical and topographical features, the development of the fisheries on these two archipelagos in the eighteenth and nineteenth centuries could hardly have been more different. Though always central to island life, fishing in the Orkneys rarely fulfilled more than a subsistence function during this period, a means by which hard-pressed crofters and cottagers could supplement the produce of the soil.[152] Here, it was small whitefish, mostly coalfish (more commonly known as pollack or saithe (*Pollachius pollachius*)) which were the main target.[153] The coalfish was caught close to the shore, or from the shore itself, at various stages in its development, and it fulfilled many uses in the household economy from fresh food and a much needed source of oil (extracted from the fish's liver), to essential wind-dried winter protein. Dogfish (most likely the small spotted dogfish, *Scyliorhinus canicula*, or the greater spotted dogfish, *Scyliorhinus stellaris*) were also caught, both for food (although its flesh was often considered to be inferior to that of the coalfish, and was therefore viewed as only fit for the poor) and for oil,

[151] *Ibid.*, 671.
[152] Coull, 'Crofter-Fishing', in Coull *et al.* (eds.), *Boats, Fishing and the Sea*, 311-12.
[153] A. Fenton, *The Northern Isles: Orkney and Shetland* (Edinburgh, 1978), 529-30.

which had a variety of uses around the home and which was also sold to neighbouring parishes.[154]

Despite the fact that "every household, whether tenant or cottar, had a share in a fishing boat," Fenton tells us that Orkney communities generally comprised "small farmers who fished for home supplies, not for any commercial reason, and if they were not farming or fishing they might be acting as shoemaker, tailor, smith or carpenter".[155] In essence, the story of the Orkney islanders during this period is a classical one of a mixed economy of generalists who saw themselves primarily as farmers, but who were able to take advantage of (or, perhaps, were forced to fall back on) the bounty of the sea in order to supplement meagre harvests and a deficiency of animal protein in their diet. There were exceptions: a few full-time crews fished for cod from Stromness or for dogfish off the south coast of Mainland, and across the islands there were those who specialised in the lucrative lobster fishing for the distant city markets further south.[156] But overall, Gray noted that the Orkneys were "strangely lacking in any determined fishing tradition" for most of the eighteenth and nineteenth centuries.[157]

In Shetland, on the other hand, an almost unique trajectory of fisheries development, first exploited by foreign merchants and then by local landowners, meant that the whitefish industry here was of unrivalled importance to the local economy by the beginning of the eighteenth century.[158] Crofter-fishermen had been engaged in a summer 'haaf' (or deep-sea) fishery since the sixteenth century, and for more than a hundred years the impetus for this commercial activity came from merchants from northern Germany with whom the Shetland fishermen 'trucked' (or exchanged) their fish for commodities or foreign coin.[159] Indeed, according to one early historian, even as late as 1806, "Dutch and Danish coins were more common in Lerwick than British money".[160] In the early eighteenth century, though, the trade was largely taken over by a new breed of merchant lairds, landowners from the islands themselves who stepped into the gap left by retreating Continental merchants put off by (among other things) a new tax on salt (essential in large quantities for curing the

[154] *Ibid*., 530.
[155] *Ibid*.
[156] Gray, *Fishing Industries of Scotland*, 124.
[157] *Ibid*.
[158] Coull, 'Crofter-Fishing', 308; H.D. Smith, *Shetland Life and Trade, 1550-1914* (Edinburgh, 1984), 46-52.
[159] *Ibid*.; J.R. Tudor, *The Orkneys and Shetland; Their past and present state* (London, 1883), 129-30.
[160] Tudor, *The Orkneys and Shetland*, 130.

Figure 4.30: A Shetland sixareen being used to ferry ponies at Uyeasound, Unst, ca.1905

Source: Shetland Museum and Archives Collection

fish).[161] These home-grown adventurers were far better placed to exploit, not only the bounty of the seas on their own shores, but also the population of crofters and cottagers who lived on their land. Despite working from relatively small boats (the traditional 'fourareen' manned by four men and, later, the slightly larger six-man 'sixareen', Figure 4.30, above), which were almost always powered by oars rather than by sail, the haaf fishery was prosecuted up to 30 miles off the coast, along the edge of the continental shelf. The main target of the haaf was ling, which was salted or cured and sent in large numbers to the Continent, and was caught by means of long lines up to 4,000 fathoms (7,300 metres) in length, and carrying as many as 1,200 hooks.[162]

It has long been noted, just as it was in the Highlands and the Western Isles, that the situation of Shetland's crofter-fishermen was, until the end of the nineteenth century, "little better than serfdom":

[161] Fenton, *The Northern Isles*, 571; Smith, *Shetland Life*, 61-3.
[162] Coull, 'Crofter Fishing', 308; Gray, *Fishing Industries of Scotland*, 129.

> a Shetlander could only fish for his laird or his laird's tacksman; had to procure every article he was in need of from the shop of the laird or tacksman; and was expected to dispose of every article of farm produce and every beast he had for sale at the same place.[163]

Moreover, after the retreat of German merchants, "[the lairds] alone were able to accumulate capital and to perform the functions that required capital," and as a result only they were in a position to finance boats big enough for an offshore fishery, which they then effectively leased to the fishermen, engaging them in a never-ending cycle of debt.[164] Finally, they maintained their grip on the lucrative fishery in a way that only all-powerful landlords in an isolated landscape could: many required their tenants to engage in the fishery, and to sell their catch to the laird or his tacksman on favourable terms, as a fundamental condition of tenancy for the occupation of a croft or cottage.[165]

Unsurprisingly, the nature of the Shetland haaf fishery has historically attracted strong views. As early as 1806, a commentator complained that:

> the poor vassals (in defiance of laws still kept in bondage) are compelled to slave and hazard their lives in the capture, to deliver fish for their lords, for a trifling sum, who sell them to adventurers from different parts at a high price.[166]

Even the Revd. Mr. Menzies, Minister of Lerwick, noted that "they must fish for their masters, who either give them a fee entirely inadequate for their labour...or take their fish at a lower price than others would give".[167] Recent historians have sought to mitigate this pessimistic narrative, situating the haaf fishery within a more nuanced understanding of the difficult economic conditions faced, both by inhabitants, and landlords, on these remote islands. Gray argues that the lairds had no choice but to step in when the German traders left at the end of the seventeenth century in order to provide islanders with a much-needed market for their fish; and Coull suggests that the situation of the Shetlanders differed from that of the crofter-fishermen in the

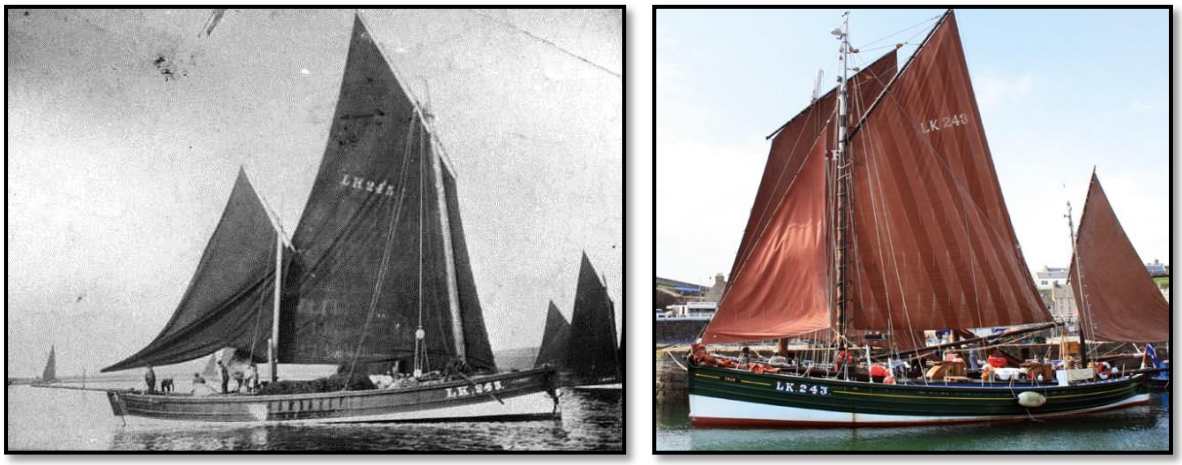
[163] Tudor, *Orkneys and Shetland*, 131.
[164] Gray, *Fishing Industries of Scotland*, 131-3.
[165] *Ibid*.
[166] Unnamed traveller, cited in P. Neill, *A Tour Through Some of the Islands of Orkney and Shetland* (Edinburgh, 1806), 96.
[167] *Ibid*., 96-7.

remote western Highlands only in terms of the scale of the enterprise.[168] Nonetheless, while accepting that the geography and economy of the Shetlands may have necessitated some direct intervention in the fisheries by the landlords, both finally agree that the haaf fishermen were "compulsory suppliers of fish to the curer-landlords," and that they were "effectively bound in a state of debt-bondage".[169]

Despite the huge economic and practical significance of the haaf fishery (and its wide coverage in the literature) it is important to note that this was only part of the total fishing story in Shetland, particularly in the nineteenth century. In fact, a number of factors combined to weaken the grip of the merchant landlords on the fishing population from around 1830. While the haaf remained important right through to the last decades of the century, it came under serious challenge from what would come to be known as Shetland's 'free' fisheries. By 1883, for example, John Tudor was able to write that "[a]t the present day very few of the proprietors engage in fish-curing on their own account...and the tenants are said no longer to be compelled to fish for their landlord's nominee".[170] One of the main reasons for this shift was the rise of an alternative to the haaf system, which involved fishing for cod, often in distant fisheries around the Faroe Islands or Greenland, using larger vessels (fishing smacks) under sail. The initial impetus for this new fishery was the bounty which became payable on cured landings of cod, ling and hake after 1820, and which once again attracted merchant capital to the islands.[171] As a result, an annual fishery developed from March to August, prosecuted by boats of up to 30 tons, often decked, and crewed by up to fourteen men, such as the *Swan*, shown in Figure 4.31. According to Gray, the fishermen were free to engage each season with whichever merchant they chose, and "such were the catches made at the cod fishing that the men would make more out of it than they could from the sixareen fishing".[172] In fact, so great were its attractions that, despite the continuing social and economic influence of local landlords over the islander's lives, by the middle of the century up to one third of the Islands' fishermen were engaged in the new cod fishery.[173]

[168] Gray, *Fishing Industries of Scotland*, 131; Coull, 'Crofter-Fishermen', 310.
[169] Gray, *Fishing Industries of Scotland*, 132; Coull, *Sea Fisheries of Scotland*, 92.
[170] Tudor, *The Orkneys and Shetland*, 131.
[171] Coull, 'Crofter-Fishermen', 310; Gray, *Fishing Industries of Scotland*, 136. For details of the whitefish bounty, see p.155, above.
[172] Gray, *Fishing Industries of Scotland*, 136-7.
[173] Coull, 'Crofter-Fishermen', 311.

Figure 4.31: The smack-rigged Fifie, 'Swan', in the early-1900s and, fully restored, in the 1990s



Source: Shetland Museum and Archives Collection, 00028; the Swan Trust, Scottish Charity No. SCO17598

The missing piece in this historical fishing jigsaw of Shetland well into the nineteenth century is often seen as a viable herring fishery. It had long been a cause for complaint for those who sought to promote and develop the valuable herring industry in Scotland that, despite their proximity to the most valuable North Sea herring grounds, Shetlanders seemed incapable of making the most of this natural harvest. As early as 1633, Captain Smith was sent to Shetland specifically to observe the operations of the Dutch buss fleet, reporting back that it consisted of 1,500 boats, each of 80 tons burden, and that it was accompanied by a fleet of around 20 armed ships for protection.[174] A hundred and seventy years later, in 1806, Patrick Neill complained that, "[although] the Shetlanders are best situated for carrying out this fishery" from Scottish territory, "owing to poverty, the tenants or fishers are quite unable to engage in it".[175]

More recently, historians have suggested that the reasons behind the Shetlanders' neglect of the herring were not quite as straightforward as a simple lack of resources. Such was the controlling interest of merchant landlords in eighteenth-century Shetland that they actively discouraged the fishing of herring for anything more than minimal household or subsistence use because it would have interfered with the haaf. As early as 1727, landlords were shaping the haaf to suit their own interests, so that on Northmaven:

[174] Cited in Neill, *A Tour Through Some of the Islands*, 216.
[175] *Ibid*., 217

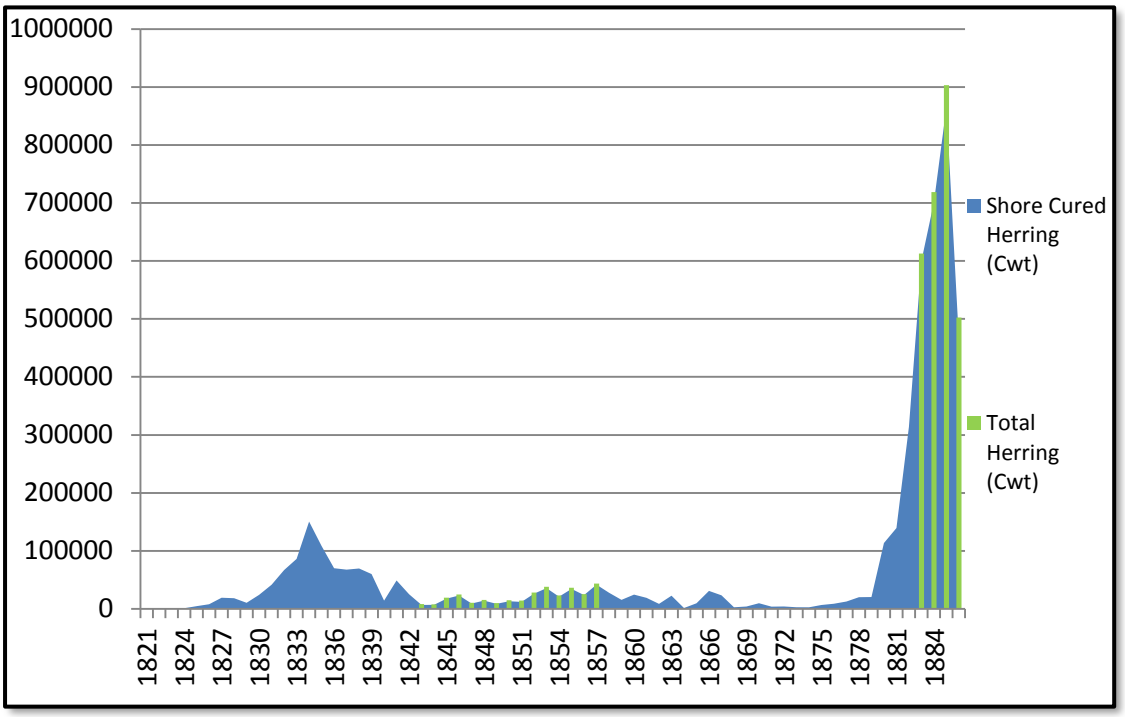
> for Encureging the white fishers, there shall not one barrel of herring be taken from any man within the said paroch that is not a white fisher...[and] ther shall not a herring be received from any fisher in Northmaven befor the last of Jully so, as every man may have equall chance for the herring and no disturbance made in the White Fishing.[176]

In other words, because of the peculiarities of the Haaf system in Shetland, the normal order of things which prevailed in the rest of Scotland was turned on its head, and an apparently boundless herring fishery was sacrificed to the needs of a limited white fishery. In addition, we have already seen that, until well into the nineteenth century, poor Shetland fishermen were almost entirely dependent on the capital of merchant landlords to provide them with boats and gear for the haaf. These boats, the fourareen and the sixareen, were singularly unsuited to anything but the most modest herring fishing "because of their small size and relatively low-loading capacity".[177] As a result of these physical and structural obstacles, the herring fishery in Shetland simply could not gain a foothold until fishermen could escape a degree of control from their overbearing landlords. Eventually, this began to happen with the return of merchant capital and the development of the 'free' fishery in the 1830s, a phenomenon which also saw the growing use of masted (and sometimes double-masted) fishing smacks, boats which were also ideal for a large-scale herring fishery.

Accordingly, the herring industry in Shetland began to grow at about the same time as the development of the large-boat cod fishery. Figure 4.32 graphically illustrates this, but it also demonstrates very clearly that the herring boom of the 1830s was actually very short lived. Thereafter, until a dramatic rise in the 1880s annual herring landings never regained anything like their mid-1830s peak of 150,000 cwt.[178] The reasons for this short-lived boom are complex and, on the face

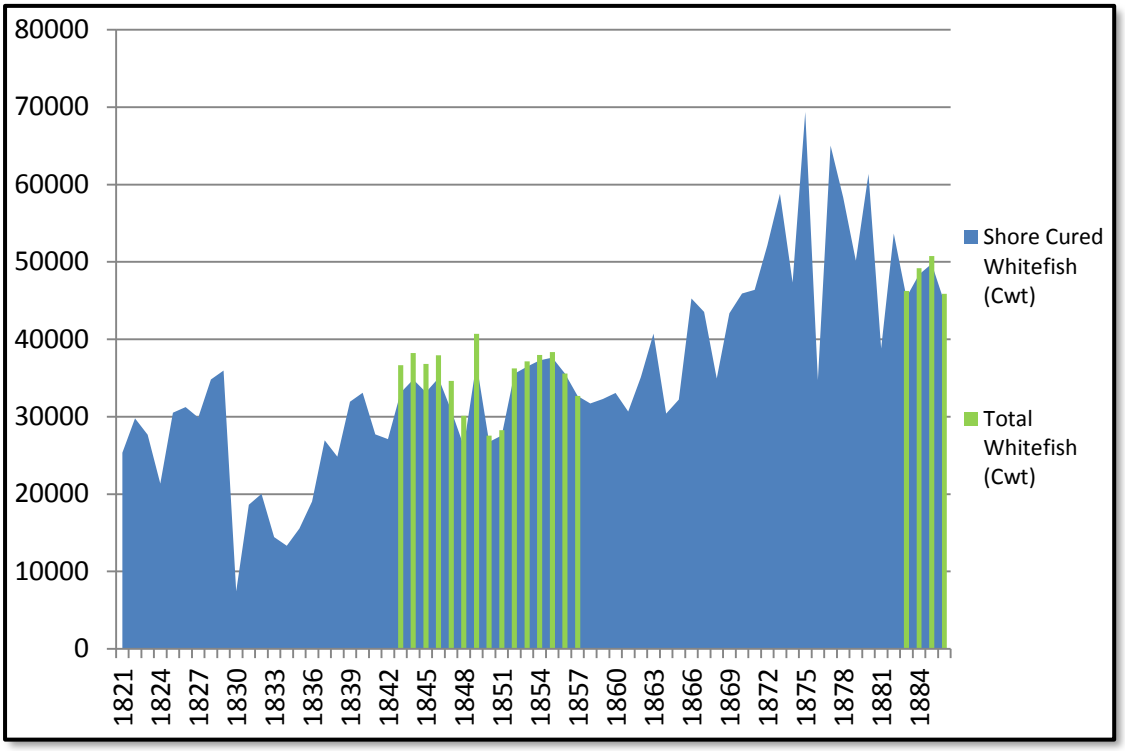
[176] Unnamed contemporary cited in Fenton, *The Northern Isles*, 571.
[177] *Ibid*., 583.
[178] The rise of the Shetland herring fishery in the 1880s coincided with a decline in traditional fishing methods related to the haaf, and also the breakdown of the old economic relationship between crofter-fishermen and merchant-landlords, and thus points very firmly forward towards the twentieth century rather than back into the nineteenth. It has been the subject of much academic attention already, and would require far more space to do it justice than it would be expedient to give it here. As a result, the reader is referred to the following sources for a broad historical overview: J.R. Coull, 'Shetland's Herring Fishery: Economic Boom a Century Ago', *Shetland Life*, 33 (1983), 26-29; J.R. Coull, 'The Engagement System During the Shetland Herring Boom, 1880-1914', *Scottish Economic and Social History*, 7:1 (1987), 55-65; J.R. Coull, 'The Boom in the Herring Fishery in the Shetland Isles, 1880-1914', *Northern Scotland*, 8 (1988), 25-38; Fenton, *The Northern Isles*, 611-15; Gray, *Fishing Industries of Scotland*, 200-209.

Figure 4.32: Herring landings in Shetland (cwt.), 1821-86



Source: *Fishery Board Annual Reports*, 1821-86 (NRS AF82/1-4, 6-10)

Figure 4.33: Whitefish landings in Shetland (cwt.), 1821-86



Source: *Fishery Board Annual Reports*, 1821-86 (NRS AF82/1-4, 6-10)

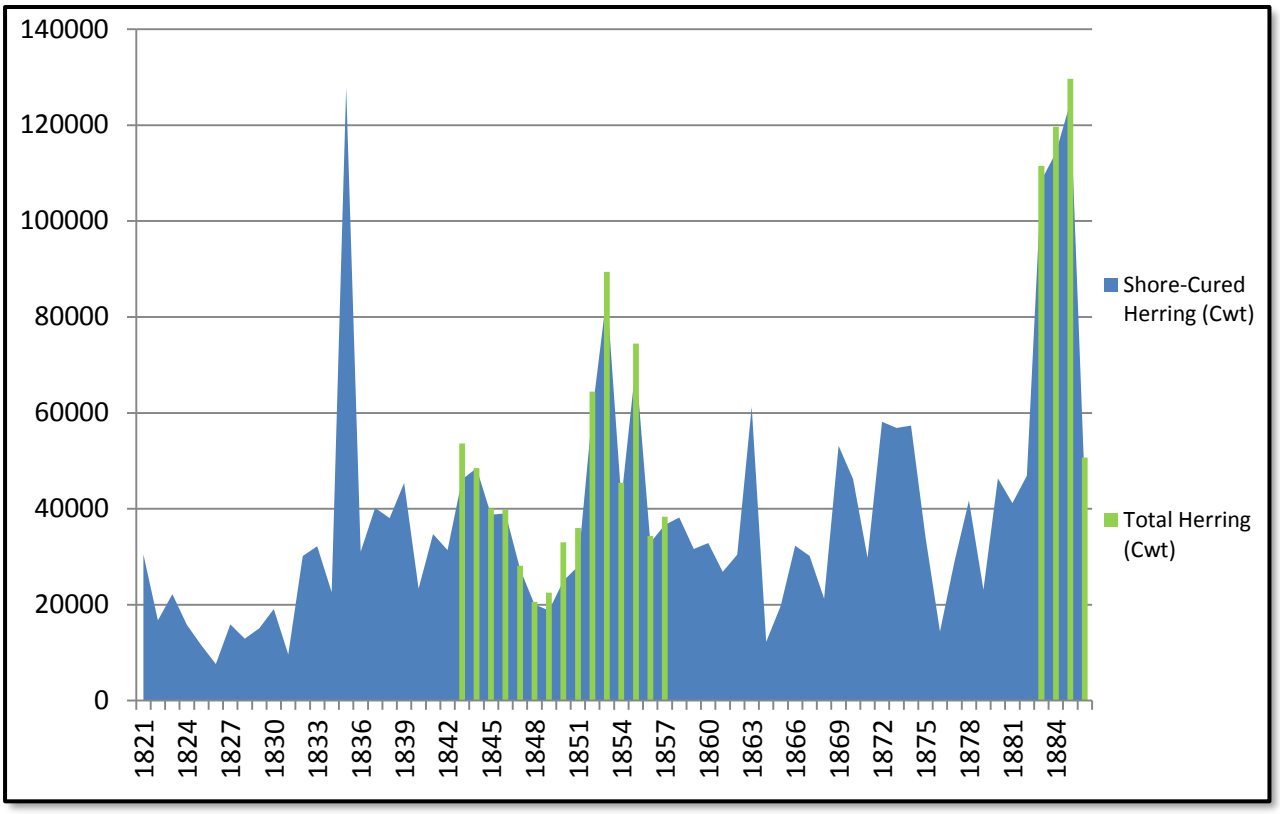
of it, perplexing. As Fenton points out, the cod and herring seasons were actually complementary, with the former ending in July and the latter beginning in August, so

there was no reason why herring and cod could not both be fished from Shetland.[179] Robert Gear, in a recent reassessment, rather blandly puts the failure of the mid-century herring fishery down to "[a] terrible storm in 1840, herring failures, sub-standard curing" on Shetland, and the loss of the lucrative West Indian market.[180] But if we compare herring landings with those of whitefish (Figure 4.33), an interesting pattern seems to emerge. It appears that the herring boom of the 1830s coincided almost exactly with a relatively dramatic decline in the landings of whitefish.[181] When whitefish landings began to increase again, in 1836, herring landings decreased; and it is significant that when they finally regained their pre-1830 levels, by 1839, herring landings dropped off completely. One possibility is that the crofter-fishermen of Shetland were either unable or unwilling to take part in two major fisheries in the Spring and Summer months. The haaf fishery, which they had followed for upwards of a century, was problematic, but it had a number of advantages beyond tradition and established practice. Perhaps most significantly, with its brief season from May to July it enabled the Shetlanders to continue for the rest of the year with what they viewed as their main, and most important, occupation: farming.[182] Certainly, it was a fishery which they were, in part, compelled to follow; but it was also a temporary occupation which guaranteed an income of sorts, and which therefore enabled them to occupy and farm a croft which in itself was inadequate to provide completely for their needs. On the other hand, had they taken whole-heartedly to the herring fishery as well as the haaf, they would perhaps have jeopardised their position as small farmers, coming as it did during harvest-time, the most agriculturally labour-intensive period of the year.

Although far from proven, this hypothesis is further strengthened when we look at similar evidence from Orkney. As we have seen, commercial fishing here was neither as well organised nor as economically important at it was on Shetland. Nonetheless, there was an increase in fishing activity for both herring and whitefish in the early decades of the nineteenth century. Most historians put this down to the

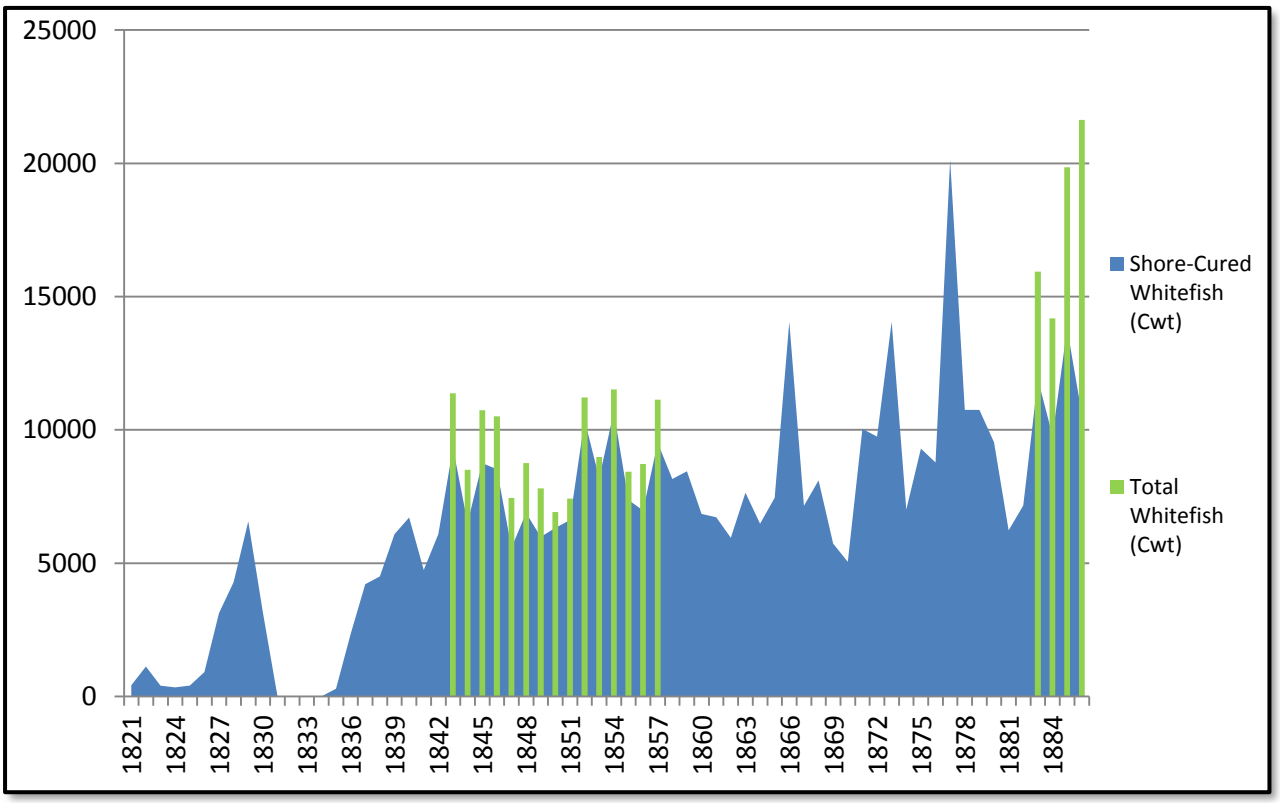
[179] Fenton, *The Northern Isles*, 604.
[180] R.W. Gear, 'Re-assessing Shetland's Herring Industry Before the 1870s', *Journal of the North Atlantic*, 4 (2013), 65.
[181] As we saw in Part 1.2.1 above, this short-lived decline was partly triggered by the final withdrawal of bounties for cured fish and it was mirrored across Scotland as a whole (see Figure 2 above).
[182] As Gray points out of crofter-fishermen on the west Coast, 'small-boat fishing...was in the hands of people whose main interest was in the working of the land'. Gray, *Fishing Industries of Scotland*, 101.

Figure 4.34: Herring landings in Orkney (cwt.), 1821-86



Source: *Fishery Board Annual Reports*, 1821-86 (NRS AF82/1-4, 6-10)

Figure 4.35: Whitefish landings in Orkney (cwt.), 1821-86



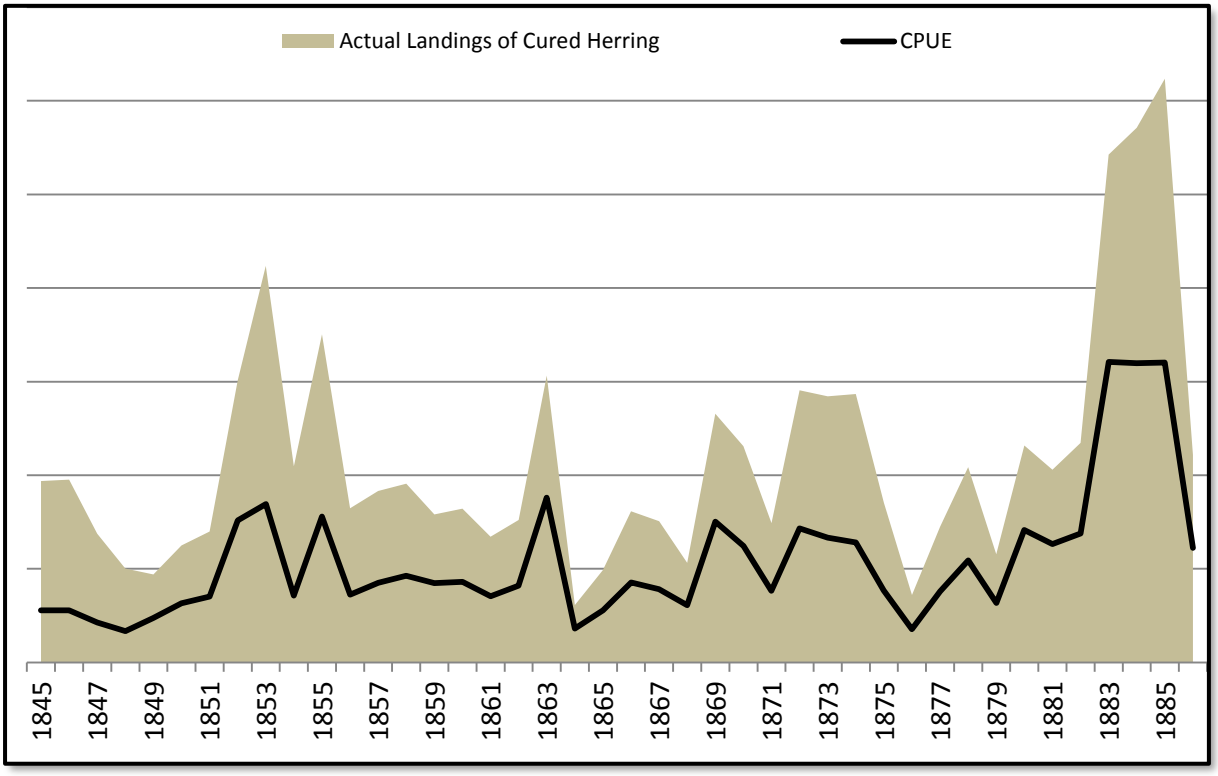
Source: *Fishery Board Annual Reports*, 1821-86 (NRS AF82/1-4, 6-10)

decline of the lucrative kelp industry, which had been the main landlord-sponsored commercial activity on the islands since the early-eighteenth century.[183] By the 1830s, though, the kelp industry was on the decline and, as Gray points out, it had been surpassed by fishing as "the part-time activity and source of monetary gain of the farmers" on Orkney.[184] Figures 4.34 and 4.35 show the relative importance to Orcadians of herring and whitefish landings, and while landings of whitefish remained very limited throughout the century, the herring industry saw more success from the early-1830s onwards. For the purposes of this discussion, though, it is intriguing to note that the beginnings of this boom broadly coincide, as they did in Shetland, with a decline in whitefish landings following the withdrawal of the bounty on cured fish in 1830. Once again, this might suggest that part of the initial stimulation for the herring fishery came from Orcadian crofter-fishermen who had begun to take advantage of the nascent whitefish fishery in the later-1820s, but who were left with an earnings deficit when it collapsed in 1830. Clearly, the situation continued to be very different in the two archipelagos for the remainder of the nineteenth century. In particular, although it quickly recovered after 1835, the whitefish fishery in Orkney never achieved anything like the numerical or financial importance of that in Shetland, and consequently it never posed a similar threat to the development of the herring industry, which continued erratically thereafter. Nonetheless, a comparison of the trajectory of cured whitefish and herring landings does suggest that there was at least a partial connection between the collapse of investment in whitefish and the take-off (temporary in Shetland) of the fishery for herring in these remote islands.

The Fishery Board's landings figures seem to confirm in a broad-brush way what we already know about the development of the whitefish and herring fisheries in Shetland and Orkney for much of the nineteenth century. By comparing catch per unit of effort (CPUE) figures with the raw data, an even clearer picture emerges. What is most notable for both herring (Figures 4.36 and 4.37) and whitefish (Figures 4.38 and 4.39) is that, in the broadest sense, CPUE tends to follow a very similar trajectory to the actual landings of fish over time.[185] This suggests that the

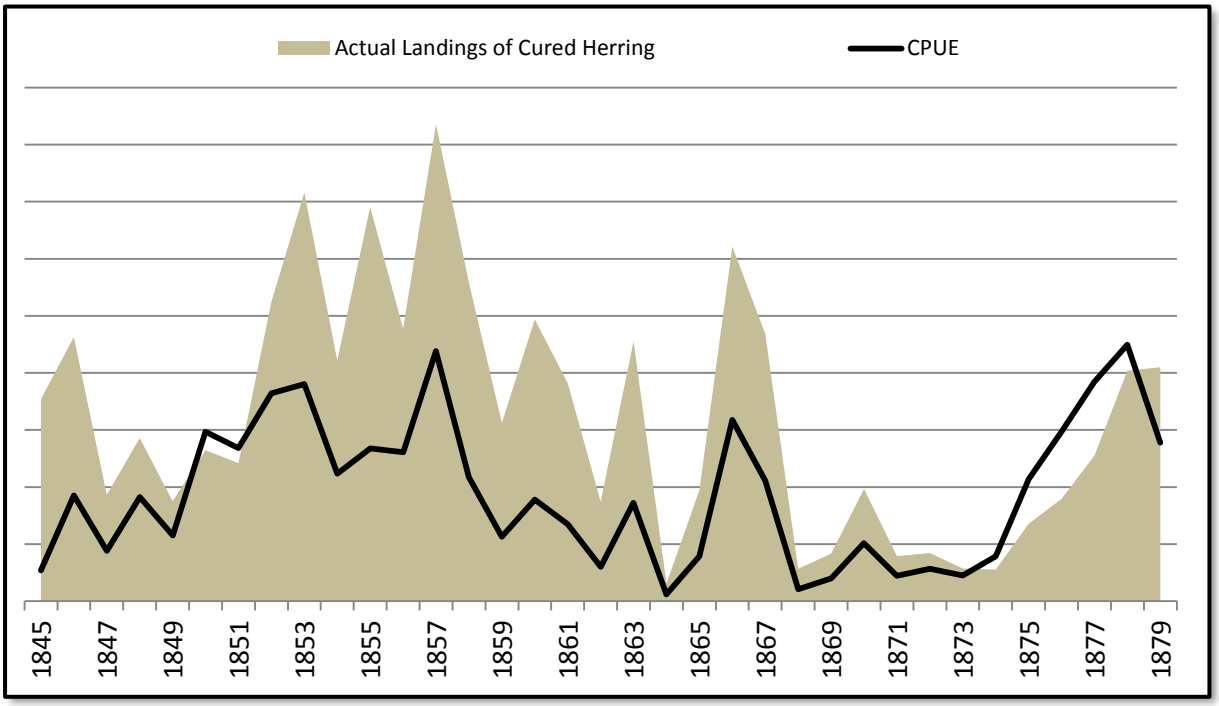
[183] Fenton, *The Northern Isles*, 58.
[184] Gray, *Fishing Industries of Scotland*, 126.
[185] A number of things need to be clarified in relation to Figures 4.34 to 4.37. First, they do not include the y-axis lables as they are intended to illustrate trends rather than actual values. However, it should be noted that the y-axis starts at zero in each case. Second, for clarity of illustration these figures are based solely on the landings of cured herring and whitefish. As Figures 4.32 to 4.35 above demonstrate, this is of little consequence in relation to total landings on Shetland and Orkney, as the proportion of fish that was caught to be sold fresh to market was always relatively insignificant. Thirdly, it must also be noted that in Figure 3.35

Figure 4.36: Comparative trajectory of cured herring landings and herring fishing CPUE in Orkney, 1845-86



Source: *Fishery Board Annual Reports*, 1845-86 (NRS AF82/2-4, 6-10)

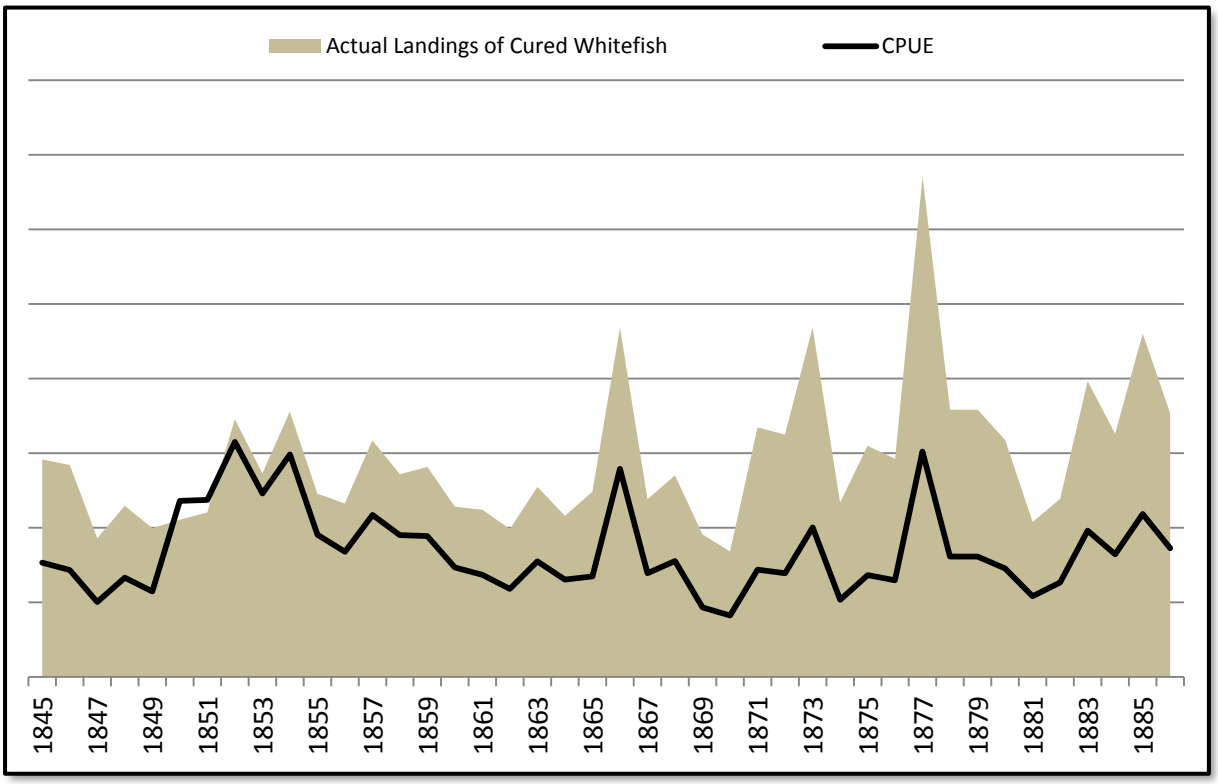
Figure 4.37: Comparative trajectory of cured herring landings and herring fishing CPUE in Shetland, 1845-79



landings and CPUE for herring on Shetland are only given for the period between 1845 and 1879. This is because the dramatic increase of landings after the latter date (see Figure 4.32) serves to obscure the similar trajectories of landings and CPUE overall.

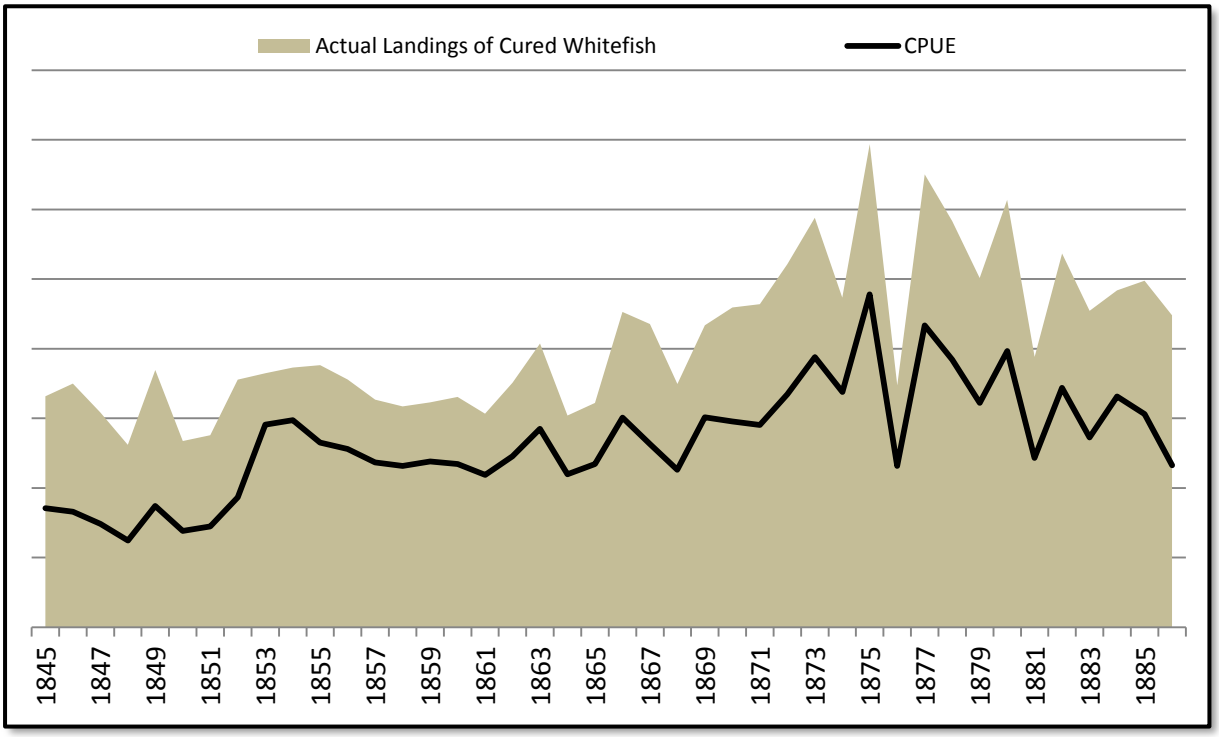
Source: *Fishery Board Annual Reports*, 1845-86 (NRS AF82/2-4, 6-10)

Figure 4.38: Comparative trajectory of cured whitefish landings and whitefish fishing CPUE in Orkney, 1845-86



Source: *Fishery Board Annual Reports*, 1845-86 (NRS AF82/2-4, 6-10)

Figure 4.39: Comparative trajectory of cured whitefish landings and whitefish fishing CPUE in Shetland, 1845-86



Source: *Fishery Board Annual Reports*, 1845-86 (NRS AF82/2-4, 6-10)

intensification of fishing effort represented by increased landings was also followed by improvements in productivity; but also that the reverse is true, decreases in landings were followed very quickly by decreases in productivity. Knowing what we do about the fisheries of the Northern Isles in this period, it is unlikely that this has much to do with the actual availability of fish stocks. On the one hand, as we have seen, herring fishing around both islands, and whitefish fishing around Orkney, remained largely underexploited by the islanders themselves until the 1880s. On the other, the only intensively exploited fisheries – the Shetland haaf and, later, the cod fisheries – had been prosecuted many miles offshore since at least the early eighteenth century. Indeed, from the 1830s these offshore efforts were regularly supplemented by catches from the biggest merchant-financed vessels which left Shetland to venture to other, more productive whitefish grounds, first around the Faroe Islands, and then in the waters around Greenland and the Davis Strait.[186]

The most likely explanation for what seems to be a mirroring effect between landings of fish and the degree of fishing effort required to catch them is that the majority of crofter-fishermen on the two archipelagos increased their productivity in response to external stimuli such as rising returns for fish, increased demand or basic economic need. In other words, as part-time fishermen, preoccupied to a greater or lesser extent with other activities (in particular, farming the croft), it may well be that they could only be induced to increase fishing productivity (by fishing longer hours, or more often during the season) when the economic benefits of doing so proved irresistible or when necessity demanded it, such as at times of crop failure or other unavoidable hardship. This pattern of behaviour would certainly be consistent with what anthropologists and others have tended to universalise as the 'risk averse' nature of peasants and peasant economies. In particular, it would fit very well with the idea that crofters were acutely aware in their own lives of the concept of "decreasing marginal utility," whereby a willingness to engage in a particular economic activity (in this case, 'extra' fishing, over and above the economically, socially or culturally dictated minimum) was intimately tied to their perception of the relative rewards.[187] As we saw above, Gray suggested that the peasant-fisherman of the West Highlands "might be amphibious...but he never liked to set more than one

[186] Gray, *The Fishing Industries of Scotland*, 137-8.
[187] For a more thorough discussion on 'risk aversion' in peasant economies, see J. Henrich and R. McElreath, 'Are Peasants Risk-Averse Decision Makers?', *Current Anthropology*, 43:1 (2002), 172-81.

foot off the soil and that only for short periods".[188] In fact, this might be a much more accurate description of the crofter-fishermen of Orkney and Shetland.

4.6 Conclusion

This broad overview of the trajectory of Scotland's fisheries in the later-eighteenth and nineteenth centuries tells us a great deal about change in pre-industrial fisheries over time. In the first place, it became clear in Section 4.2 that it is possible to gain valuable insights into the state of historic fisheries even where technical or statistical data is absent. The anecdotal accounts of the ministers who compiled the first *Statistical Account of Scotland* in the 1790s clearly demonstrate a widespread perception among fishermen on the east coast that target whitefish species (in particular, cod, ling, hake and haddock) had been on the decline for some years, and even decades, before its publication. This is clearly very important, and is the earliest evidence of widespread declines in any of Scotland's fisheries. But without the corroboration of other forms of evidence, such as systematic landings and effort information, it is very difficult to estimate just how significant these declines were, let alone to offer any meaningful conjecture as to the causes of these declines. This was emphasised still further when we looked at the evidence of the second *Statistical Account*, compiled only 30 to 40 years after the first. By then, perceptions of the east coast white fisheries were very different, and the narratives given were of healthy, and even increasing, stock levels.

Fortunately, with the establishment of the Commission for the Herring Fishery in 1809, systematic records relating to catch and effort began to be compiled and reported on an annual basis. By placing the information contained in these technical records alongside the anecdotal evidence of fishermen submitted to a range of major commissions on the fisheries, it has been possible to make a number of important conclusions about the state of Scotland's fisheries, and the status of its fishermen, in the nineteenth century. The first is that there appears, once again, to have been a significant decline in target stocks of whitefish (in particular, cod, ling and hake) in many regions of Scotland, around the middle of the nineteenth century. These declines in inshore stocks were consistently reported by fishermen from the mid-west, the southeast, the east coast and the northwest coast. Crucially, the evidence

[188] M. Gray, *The Highland Economy, 1750-1850* (Edinburgh, 1957), 107; see p.183, above.

of fishermen was matched almost exactly by the Fishery Board data, which demonstrated that catch per unit effort declined at precisely the time, and in precisely those regions, where it was reported by fishers themselves. This triangulation of different kinds of evidence was also very useful for the herring fisheries where, once again, the evidence of fishermen (either of declines, or increases, in herring availability) mirrored closely the Fishery Board data. Overall, it appears that fishermen's evidence – their ecological knowledge, or FEK – was extremely accurate in assessing broad changes in the status of Scotland's inshore fisheries.

When we looked at the causes of these regional declines, it was hard not to conclude that it was the long-term increase in traditional inshore fishing effort which was, in large part, to blame. In all the areas affected, fishermen had demonstrably increased their fishing effort (in terms of the quantity of hooks and lines, and the sizes of the boats) over the previous decades and, in some cases, even centuries, before they reported those declines. In none of the regions was there a significant regime shift in the fisheries, such as, for example, the widespread adoption of beam trawling. This conclusion clearly presents a challenge to students of modern commercial fisheries. As Bolster and his co-authors recently noted in relation to the Nova Scotian Shelf fisheries in the mid-nineteenth century, "[n]either historians nor biologists believed that primitive hook-and-line technology could affect the legendary abundance of species like cod".[189] Yet, as they demonstrate, not only could these "primitive" technologies affect that abundance, they undoubtedly did, and profoundly so. The evidence presented in this chapter indicates that something similar occurred in many of Scotland's inshore fisheries at about the same time. Intriguingly, despite Bolster's claim that conclusions such as these may come as a surprise to modern scholars, it was something which was remarked upon at the time by the Fishery Board itself. In its annual report for 1850, the commissioners wrote that:

> By the statements of Fishermen generally, it appears that the Boats are almost everywhere obliged to go further from land then formerly before they find [cod]; and hence it is assumed either that the Fish have changed their runs on account

[189] W.J. Bolster, K.E. Alexander and W.B. Leavenworth, 'The Historical Abundance of Cod on the Nova Scotian Shelf', in J.B.C Jackson, K.E. Alexander and E. Sala (eds.), *Shifting Baselines: The Past and the Future of Ocean Fisheries* (2012), 95.

> of the Fishing that has been carried on, or that the Fishing grounds near the shore have been over-fished.[190]

Finally, even in those areas of Scotland where the evidence points to relatively healthy fisheries, such as the northeast mainland and the archipelagos of Orkney and Shetland, by placing these very different forms of evidence alongside each other it has been possible to offer a much more nuanced insight into the state of the fisheries, and into the behaviour and motivations of fishermen and their communities in the nineteenth century. Overall, this chapter demonstrates the value of taking a mixed approach to the environmental history of the fisheries. By integrating standard and non-standard evidence, and engaging with analytical tools from far outside the discipline of history (such as CPUE and FEK), it has been possible to create a synthetic analysis which, arguably, is much greater than the sum of its parts.

[190] *Fishery Board Annual Report*, 1850, 3.

Chapter 5: Conclusion

The research that underpins this thesis is founded on the premise that the roots of the current crisis in global marine capture fisheries reach far back into history, but that very little work has so far been done to uncover the long term trends (social, economic, industrial and environmental) which have led us to the situation we now face. This is despite the fact that, in the modern literature, that situation is almost universally acknowledged to be the result of the long-term overexploitation of marine resources and inadequate or inappropriate fisheries management in the past.[1] This thesis therefore represents the first in-depth study of interactions between fishermen, fisheries managers and fishery resources in the British Isles in the *longue durée*. The work presented above shares important DNA with a number of current research strands relating to the history of global fisheries. In particular, it is heavily informed by recent methodological approaches in the disciplines of marine environmental history and marine historical ecology.[2] However, it differs from much of that work in a number of important ways. Firstly, it synthesises many of these approaches in order to make a coherent case for certain trends in the historic fisheries of the British Isles across a period of five hundred years and more. Secondly, by taking a long view of the fisheries it has been possible to demonstrate that many technological and resource-management trends which, up to now, have been viewed as being of relatively recent origin, actually have very deep roots. Thirdly, it demonstrates that the collective response of fishing communities – and, indeed, many of those charged with oversight of local fisheries – to new technologies or added pressure on fishery resources was relatively consistent across geographical and temporal boundaries for most of the period under study. Finally, it suggests strongly, and for the first time, that a broad consensus between fishermen and those in positions of authority, based on a generally cautious approach to the local exploitation of inshore fisheries resources, was finally broken in Britain and Ireland sometime in middle of the nineteenth century.

[1] See *fn.*1, above.

[2] Including, but not restricted to, the work of: W. Jeffrey Bolster, Poul Holm, Brian MacKenzie, Daniel Pauly, Bo Poulsen and Ruth Thurstan. See Bibliography for details.

Chapter 2 presented compelling evidence that beam trawling, the most controversial and, arguably, the most destructive conventional commercial fishing practice, spread from the estuaries of the Thames and the Medway in the fourteenth century and gained a significant foothold right around the southeastern coast of England over the next two hundred years or so. Even though there is some indication that beam trawling was being practiced in the early Dutch Republic, this is the first substantial evidence of its widespread use anywhere in Europe before the eighteenth century, at the earliest.[3] By the early seventeenth century, trawling was already being practiced some distance off the coast of East Sussex and Kent, perhaps as far as ten leagues, or thirty miles. By this early date it was already widely considered to be extremely problematic, and was blamed for falling catches of commercial demersal and groundfish destined for the London market. The main concern of fishermen and the authorities at this stage was the capture of small and immature fish, either as a result of the use of small-meshed nets, or because of the 'bagging' effect of the beam trawl's cod end. Indeed, beam trawling was considered to be so potentially destructive to local commercial stocks in this period that it led to a number of proclamations, prohibitions and prosecutions and, in 1635, to the first and only nationwide ban on the practice in British history.

In the event, this ban proved ineffective. Within a hundred years bottom trawling had spread right along the south coast of England, and had also taken hold in some key inshore fisheries on the south and east coasts of Ireland, where it was once again implicated in falling catches of demersal and ground fish. On this evidence, the history of the spread and impact of beam trawling in nearshore waters in the North East Atlantic clearly needs to be reconsidered; but so, too, does the history of relatively large-scale commercial beam trawling in order to take account of the opening up of the Nymph Bank in the mid-eighteenth century, which lies between eleven and thirty leagues (35 to 90 miles) off the coast of southern Ireland. Here, it was reported that large numbers of English and, possibly, continental European boats were routinely using trawl gear with beams up to thirty feet in length. By this time, or shortly after, it is clear that beam trawling was common practice right around the English coast and off the coast of Ireland, from Port Ryan in the north to Cork in the south. As was the case on the Nymph Bank, trawlers were routinely travelling

[3] S.J. de Groot, 'The Impact of Bottom Trawling on Benthic Fauna of the North Sea', *Ocean Management*, 9 (1984), 178-9.

long distances to exploit the most productive areas for fishing, and English trawlers were common off the coast of Ireland, Wales and the Isle of Man. This places the beginnings of beam trawling on a national scale in British waters at least a hundred years before most historians have conventionally dated it; and, of course, it also has significant implications for the historical impact of trawling on the benthos and, potentially, on long-term stocks of commercial fish.[4]

Two further issues arose from the long history of beam trawling which was revealed in Chapter Two. The first is that some of the very earliest archival evidence from Britain demonstrates a relatively advanced understanding of the potential impact of overly destructive fishing methods *per se*. In particular, growth overfishing – in this case, the taking of large numbers of immature or juvenile fish with small-meshed nets, and the use of weirs or static nets to capture whole shoals of fish of passage – was something which was complained of, and legislated against, from as early as the thirteenth century. Secondly, it is clear from the evidence relating to bottom trawling and growth overfishing more generally that the main source of this understanding of the interplay between fishing effort and long-term resource availability was fishermen themselves. It was fishermen who alerted the authorities at times of excessive pressure on inshore stocks, and it was they who complained of particularly destructive fishing practices. Moreover, evidence stretching from the thirteenth until at least the early years of the nineteenth centuries indicates very strongly that those local and national bodies which were charged with overseeing the fisheries were, on the whole, prepared to trust the judgement of the majority of fishermen in this regard, and, more often than not, were willing to act to address their concerns. This is a theme which was expanded on in Chapter 3, in relation to the lucrative herring fisheries in the firths of Forth and Clyde, in Scotland.

The majority of herring fishermen complained bitterly when, in the 1830s and 40s, a minority adopted the seine net in order to encircle whole shoals of herring in Loch Fyne, and to catch large numbers of young herring as a by-product of fishing for sprats in the upper Firth of Forth. Initially, the complainants were strongly supported by all the respected authorities including the Fishery Board, which was charged with oversight and keeping good order in these fisheries. Despite only a rudimentary understanding at the time of the technical evidence relating to the

[4] See, for example, R. Robertson, *Trawling: The Rise and Fall of the British Trawl Fishery* (Exeter, 1996), 22-33.

impact of specific fishing practices, seining for herring was outlawed in 1851 explicitly as a conservation measure, and severe penalties were imposed for offenders. This approach was an example of what we would now describe as the 'precautionary principle' in action, whereby risks to future fish stocks are minimised by limiting potentially destructive fishing practices wherever gaps in the knowledge base exist. It was also an approach which was entirely in keeping with centuries of good governance in inshore fisheries, as demonstrated elsewhere in Chapter 3 and in Chapter 2. Yet, soon after the enactment of this prohibition those who had supported the suppression of seining for herring began to retreat from this position and to voice disquiet about the imposition of any further restrictive measures on herring fishermen. By the mid-1860s drift netters (still by far the largest body of herring fishermen in Scotland) were virtually alone in voicing their disquiet about the practice, and in 1867 all restrictions on seining for herring were repealed. Despite claims by the Fishery Board that the drifters' objections had virtually ceased by the 1870s, the controversy over the use of the seine net to catch herring continued, particularly in the Clyde and on the west coast of Scotland, for another sixty years.

What became clear towards the end of Chapter 3 is that the progress of the seine-net controversy in Scotland is indicative of a fundamental shift in official attitudes towards the administration of the sea fisheries of Great Britain and Ireland overall in the middle years of the nineteenth century. The repeal of restrictive legislation on seine netting for herring was followed only a year later by the passing of the 1868 Sea Fisheries Act, which overturned more than fifty protective acts of Parliament relating to sea fisheries spanning several centuries. In Ireland, a similar measure sweeping away decades, and even centuries, of local protection for inshore fisheries was enacted even earlier, in 1843.[5] This abandonment of the precautionary principle marked a clean break with traditions of qualified cooperation and a general accord between legislators, administrators and fishermen reaching back to the earliest Plantagenet legislation against fixed nets and weirs. No longer could fishers rely on being heard when it came to important matters of management and resource conservation. Instead, their hard-won practical experience – and, it should be noted, the natural desire of small fishermen to protect their livelihood in the long term – was shunned in favour of the needs of political economy which, in practice, meant

[5] *An Act to regulate the Irish Fisheries* (5 & 6 Vict. C. 106), 10th August, 1842.

productivity in the fisheries at almost any cost. What is particularly important about the discussion in Chapter 3 is the speed with which the Fishery Board, with Bouverie Primrose at its helm, shifted from a position of committed support for protection in the herring fisheries, to advocating its complete withdrawal. Within two years of the first protective Act, Primrose was actively looking for a compromise which would allow him to withdraw his support with dignity. This rapid *volte face* presaged a profound shift in the relationship between administrators, resource users and largely unqualified 'experts' in the fishing industry.

The discussion in Chapter 3 demonstrates, for the first time, that in the 1850s and 60s, the place of fishermen as experts in local fisheries management was arbitrarily usurped by persons of influence in positions of power, largely on the grounds of political economy. Some of these new 'experts' had the veneer of learning as 'gentlemen amateurs', but none were truly technical or scientific specialists. Later, towards the end of the nineteenth century, policy makers and administrators co-opted influential scientists to add substance to their claims about the inexhaustible state of marine fisheries. Eventually, in the early decades of the twentieth century, an uneasy compromise was reached between fisheries scientists, whose aim was the long-term sustainability of commercial stocks, and policy makers, who continued to press for evidence to support the unqualified expansion of capture fisheries. The long term implications of this shift in the relationship between managers and fishermen are profound. Fishermen remained largely absent from discussions about the governance of their industry until the 1980s and 90s, when the sudden and unpredicted collapse of some of the most important North Atlantic fisheries threw aside the veil of 'inexhaustibility' and forced policy makers to consider alternative approaches.

In Chapter 4, the historical context for this unhappy situation was extended beyond the narrow confines of the firths of the Clyde and the Forth, and the restricted ground of the herring fisheries. In the first section, further evidence was presented to illustrate that, just as with the long history of beam trawling and the short controversy over the use of the seine net, the combined weight of anecdotal and non-traditional evidence from fishermen can be extremely useful in pointing to changes in the historical ecology of nearshore fisheries over time, especially in the absence of data-driven evidence. Between the 1770s and the 1790s, those with access to detailed local knowledge were unequivocal that stocks of some

commercially important demersal fish had declined markedly in particular localities on the east coast of Scotland. In particular, they pointed to rapid and, in some cases, marked declines in and around the Moray Firth and the Firth of Forth. At this point, observers were unwilling or unable to ascribe a particular cause or causes to these declines; but the evidence collected for the *First Statistical Account of Scotland* is difficult to ignore. Nonetheless, in the absence of 'hard' corroborative data, this evidence remains circumstantial and its interpretation is far from straightforward. For example, by the time the *Second Statistical Account* was compiled fifty years later, reports of scarcity on the east coast were completely absent. On the one hand, it may be that perceived declines in inshore stocks of demersal fish in the eighteenth century were the result of environmental factors, and that they had recovered naturally in the intervening years. On the other, it could be a classic case of the shifting baseline syndrome in action. If, for example, fishermen were routinely using larger boats and fishing further out to sea in the later period, as the evidence seems to suggest ("fishing down the deep," as it is described in modern terms[6]) then it is entirely possible that they had simply lost all collective memory of a time when viable catches could be made closer inshore. Without further corroboration, however, it is impossible to account precisely for the reasons behind those 'narratives of change' in the earlier period, or for their absence by the 1830s and 40s.

The lack of 'hard' evidence, in the shape of reliable catch data, is clearly a major obstacle to our understanding of fluctuations in fisheries before the modern period. As a result, even though some small-scale and local studies have been completed into the impact of historical fishing effort on available stocks of commercial fish across the globe, only a few have gone beyond this, taking in entire fisheries or the whole picture on a national scale.[7] As Bolster *et al*., noted in 2012:

> Few reliable catch statistics existed prior to 1900. Any that could be reconstructed from historical documents would lend an especially valuable perspective to the changing nature of fished stocks.[8]

[6] T. Morato, R. Watson, T.J. Pitcher and D. Pauly, 'Fishing Down the Deep', *Fish and Fisheries*, 7:1 (2006), 24-34.
[7] The main exception to this rule is Poulsen's comprehensive investigation into the long term fluctuations of North Sea herring, in B. Poulsen, *Dutch Herring: An Environmental History, c.1600-1860* (Amsterdam, 2008), Chapter 8, 130-59.
[8] W.J. Bolster, K.E. Alexander and W.B. Leavenworth, 'The Historical Abundance of Cod on the Nova Scotian Shelf', in J.B.C Jackson, K.E. Alexander and E. Sala (eds.), *Shifting Baselines: The Past and the Future of Ocean Fisheries* (2012), 82-3.

Fortunately, when we move into the period of oversight by the Fishery Board for Scotland after 1809, such statistics become readily available. From that date onwards, the Board routinely collected comprehensive data relating to landings of herring, and from 1821 it did the same for commercial whitefish. The Board also collected a whole range of subsidiary data relating to boats, manpower, and even fishing power for Scotland's coastal fisheries from the mid-1840s onwards. Using these extremely rich datasets, it has been possible to reconstruct the historical ecology of those fisheries for the whole country on a region-by-region basis for the period between 1845 and 1886. The results, which form the foundation of the discussion in Chapter 4, are both remarkable and very sobering. On the basis of catch per unit effort (CPUE) estimates, whereby the estimated and actual reported landings of fish were divided by the estimated power used to catch it, it appears that fishing pressure over decades, and even centuries, had taken a heavy toll in many inshore fisheries around the coast of Scotland. In particular, in the intensively fished firths of the Forth and the Clyde whitefish CPUE appears to have peaked around 1850 and declined significantly thereafter. Moreover, this is a pattern which was repeated, to a greater or lesser extent, along the eastern and northwestern coasts, including the Hebrides. Only on the northeastern coast of Scotland was this pattern not repeated. Here, it appears that whitefish CPUE flattened out after the mid-1850s, and may even have increased towards the end of the century.

This tendency, for available inshore whitefish (demersal) stocks to decline around Scotland's coastline in the middle of the nineteenth century and to remain suppressed thereafter, was noted by contemporaries. In particular, fishermen themselves remarked upon it time and again to a range of national commissions of inquiry. Even the Fishery Board was unable to ignore it, reporting early on that "by the statements of Fishermen generally, it appears that [they] are almost everywhere obliged to go further from land" to catch cod.[9] But this is the first time that fishermen's anecdotal accounts of fluctuations in the fisheries (their 'narratives of change') have been corroborated using 'hard' statistical evidence for any period before the twentieth century.[10] Using a similar methodology, Scottish fishers'

[9] *Fishery Board Annual Report*, 1850, 3. See p.216, above.

[10] The use of the anecdotal evidence of fishermen to fill gaps in the 'hard' evidence, in relation to historic stock abundance, is growing, but never before has this kind of qualitative evidence been tested against data as

impressions of the state of the herring fisheries were also tested against the Fishery Board data and, although the picture is inevitably more variable for the migratory and capricious herring, it has once again been possible to validate their impressions of the overall state of these fisheries. The evidence presented in Chapter 4 therefore represents a clear historical vindication of the value of fishers' ecological knowledge (FEK) in assessing long-term trends in the health of fisheries.

The findings relating to the decline of some key inshore demersal fish stocks in the 1850s and 60s are particularly important when placed in their full historical context. For they happened at a time when Scotland's fishers were still reliant on 'preindustrial' technology: that is, they occurred in the age of sail, and before the adoption of motorised gear. It is true that some packet ships were powered by steam from the 1830s onwards, and that, by the mid-1850s, they were even used to transport fish from the fishing grounds to distant markets.[11] But until the 1870s, at the earliest, Scottish demersal fishermen continued to rely on the age-old technology of hooks and lines. Moreover, unlike the rest of Britain and Ireland, beam trawling by sail (which was widely blamed for perceived declines in whitefish elsewhere from the 1860s onwards) was virtually unknown in Scotland until the 1870s. Although there is every reason to be cautious about the precise interplay between environmental and anthropogenic influences on stock fluctuations before the modern era, the evidence presented in Chapter 4 appears to demonstrate that, while the new era of industrial fishing (beginning around 1880) undoubtedly saw the greatest gains in terms of raw landings – unsustainable gains which would eventually lead to the collapse of many of Scotland's fisheries a century later – pressure on whitefish from the intensification of 'traditional' fishing techniques had already reached unsustainable levels in some places by the 1850s.

Overall, the present study demonstrates that, while it is true that our understanding of the impact of preindustrial fishing on vulnerable marine habitats has grown considerably over the last twenty years, and while we have a reasonable grasp of the long-term causes of recent failures in marine resource management,

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robust as that of the Fishery Board data. See, for example, D. Al-Abdulrazzak *et al*., 'Gaining Perspectives on What We've Lost: The Reliability of Encoded Anecdotes in Historical Ecology', *PLoS One*, 7:8 (2012), e43386; R.H. Thurstan *et al*., 'Origins of the Bottom Trawling Controversy in the British Isles: 19th Century Witness Testimonies Reveal Evidence of Early Fishery Declines', *Fish and Fisheries*, (2013), doi: 10.1111/faf.12034.

[11] 'Scottish Fishery Board Inquiry, 1856', unpublished, National Archives of Scotland, AF7/9, 34, 469-70.

there is still much work to be done. What Daniel Pauly described as the shifting baseline syndrome in fisheries science in 1995 is a stubborn adversary, and it requires many more local and regional studies, founded wherever possible on hard data as well as historical anecdote, to demonstrate that the roots of the current crisis in global marine fisheries reach back much further than has previously been recognised. This study represents another milestone in this process of understanding, and it is to be hoped that it may even provide a template for further integrated research into the social, economic and environmental history of the fisheries of the North Atlantic.

Appendix: *Scottish Fishery Board Stations Grouped by Region*

MID-WEST AND CLYDE REGION

- Ayr
- Ballantrae
- Campbeltown
- Fort William
- Glasgow
- Greenock
- Inveraray
- Islay
- Lochgilphead
- Rothesay
- Dumfries
- Stranraer
- Tobermory

EAST REGION

- Aberdeen
- Banff
- Buckie
- Cromarty
- Findhorn
- Fraserburgh
- Peterhead
- Port Gordon
- Portsoy
- Stonehaven

GREATER FORTH REGION

- Anstruther
- Burntisland
- Eyemouth
- Leith
- Montrose

NORTHEAST REGION

- Helmsdale
- Lybster
- Thurso
- Tongue
- Wick
- Caithness (Other)

NORTHWEST REGION

- Barra
- Dunvegan
- Loch Broom
- Loch Carron
- Loch Shildag
- Stornoway

ORKNEY

- North Orkney
- South Orkney

SHETLAND

- Lerwick
- Uist
- Walls

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