



SARF045 Appendix A

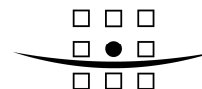
Literature Review of Evidence that Fish Farming Impacts on Tourism

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For: Scottish Aquaculture Research Forum

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1 INTRODUCTION

1.1 Context and Report Structure

The Scottish Aquaculture Research Forum (SARF) funded research to independently establish whether fish farming has an impact on tourism and define the scope and scale of such an impact in Scotland. This report forms the output of this research which was carried out by Royal Haskoning and Poseidon, with additional advice on landscape provided by Alison Grant, landscape architect.

The research was carried out in a phased approach:

Phase 1: A desk study was undertaken to review current evidence of fish farming and tourism interactions. Consideration was given to both positive and negative impacts and experience was drawn from Scottish, European and International examples.

This Appendix forms the output of Phase 1. It reviews current literature on interactions between aquaculture and tourism and set the background and context for Phase 2 of the research.

Phase 2: Using a case study approach, the impact of fish farming on tourism was assessed in three case study locations around Scotland; Oban & Mull, the Outer Hebrides and Shetland. Questionnaires were developed to target visitors / tourists, tourism-dependant businesses and aquaculture businesses for each case study location.

Phase 3: Phase 3 resents the final report and includes analysis of findings, implications for Scottish tourism and recommendations for further research.

This report is the output from Phase 1 and Appendix A to the final report. It is structured as follows:

1. **Introduction**
2. **Review of Scottish Tourism and Scottish Aquaculture Production**
Trends within Scottish tourism analysed regionally, focusing on pilot areas where possible. This is assessed against regional production of aquaculture using FRS production surveys and statistics to identify any correlations between aquaculture growth and tourism activity in pilot areas.
3. **Evidence of Interactions between Fish Farming and Tourism**
Examples of positive and negative impacts of fish farming on tourism is documented from Scottish, European and International experience.
4. **Landscape and Visual**
A summary of the list of criteria identified as being important in drawing up the case study locations and a brief landscape and visual assessment of the three case study locations is presented.
5. **Planning and Policy context**

1.2 Introduction

Aquaculture, tourism and recreation all require similar standards of water and environmental quality and good local infrastructure, so there is potential for conflicts of interest and competition to arise.

Aquaculture¹ is a very important industry for rural Scotland, in particular for the west coast and the islands where many communities depend on the employment and revenue it provides. Within Scotland aquaculture provided 1,500 full time equivalent jobs and Gross Value Added (GVA) of £395 million in 2007² to the Scottish economy. The vast majority of fish produced (95% by weight) consists of Atlantic salmon, followed by mussels, oysters, trout etc. Scotland is the second-biggest producer of farmed Atlantic salmon in Europe, producing approximately 135,000 tonnes annually.

Tourism provides close to 5% of Scottish GVA, with over £4 billion in domestic and international visitor spend in 2007. More than 200,000 people work in tourism related industries. The tourism sector is therefore more than 12 times larger than the aquaculture sector by GVA and over 130 times in employment terms.

Scottish tourism depends heavily on the country's landscape, with 90% of visitors considering scenery to be important in their choice of Scotland as a holiday destination, and the natural environment being important to 65% of visitors (VisitScotland, 2008).

There are 454 registered active finfish sites and 332 registered active shellfish sites in Scotland (Fisheries Research Services, 2008). The presence of fish farming production sites could influence tourists' decisions on where to visit, how long to visit and on whether to make a repeat visit. To date opinions on the potential impacts of aquaculture on tourism have at best been based on anecdotal evidence with no targeted research to inform the debate.

Salmon production sites consist of cages or pens in seawater near to shore, often within seawater lochs. Smolt (salmon fry) production is within cages in freshwater lochs or increasingly within land-based hatcheries. Trout production is mainly within freshwater ponds and raceways with only 10 out of 66 trout production sites in saltwater cages (FRS, 2007a).

Shellfish (predominantly mussel and some Pacific oyster) was being actively farmed at 332 sites in 2007. In Scotland mussel production is mainly based on rope culture where horizontal lines of barrels used as floats can be seen at the surface. The Shetland and Strathclyde regions host 78% of mussel production (FRS, 2007b).

The development of the aquaculture sector and moves towards fewer, but bigger fish farm sites are occurring at the same time as the ongoing development of Scottish tourism.

¹ Reference to "fish farming" and "aquaculture" within this proposal cover both finfish and shellfish farming

² Based on £380 million for Atlantic salmon, £10 million for other finfish species and £5 million for shellfish species (Scottish Government, 2008)

2 REVIEW OF SCOTTISH TOURISM AND AQUACULTURE

2.1 Scottish Tourism

2.1.1 Overview of Scottish Tourism

Tourism in Scotland provides direct employment for over 200,000 people and generates visitor spend of more than £4 billion a year (Scottish Government, 2008). It is therefore recognised as one of the largest business sectors within Scotland, representing close to 5% of total GVA in for Scotland. Many rural communities are dependant on the jobs and infrastructure it provides.

International Visitors

2001 to 2006 saw an increase international visitor numbers and visitor spend across the UK. In Scotland international visitor numbers increased by 72% and international visitor spend increased by 75%, while for the UK as a whole growth in international visitors and spend was only 43% and 29% respectively (VisitScotland, 2007a).

It should be noted that 2001 to 2003 saw limited growth in either the Scottish or UK markets. Factors influencing this stagnation included a down turn in global economic conditions (the dot com bust) and the 2001 World Trade Centre attacks. Tourism growth picked up again in 2004 and has seen strong growth in the 2004 to 2006 period.

As visitor numbers for the UK are growing faster than visitor spend it can be inferred that visitor spend per head is decreasing in the UK as a whole. In Scotland however visitor spending per international visitor has remained constant or has slightly increased. This data is presented in Table 2.1.

Table 2.1: International Tourism Volume and Value (VisitScotland, 2007a)

	2001	2002	2003	2004	2005	2006	2006 vs 2001
Scotland							
Trips (million)	1.59	1.58	1.57	1.88	2.39	2.73	+72%
Expenditure (£m [nominal])	757	806	837.3	993.8	1207.7	1439	+90%
Expenditure/visitor (£)	476	510	533	529	505	527	+11%
UK							
Trips (million)	22.84	24.18	24.72	27.76	29.97	32.71	+43%
Expenditure (£m [nominal])	11,306	11,737	11,855	13,047	14,122	15,889	+41%
Expenditure/visitor (£)	495	485	480	470	471	486	-2%

UK Visitors

There is limited time series data available for UK tourist numbers due to changes in survey methodology in 2005. However it would appear that between 2005 and 2006 the number of domestic tourists to Scotland decreased. The reasons for this decrease are thought to be:

- The strength of Sterling making holidays overseas more attractive to UK holidaymakers;
- An increase in the overseas choices available to tourists;
- A fall in disposable income due rises in interest rates and commodity prices; and
- The World Cup encouraging potential tourists to stay at home or travel to Germany to watch the matches.

The domestic tourism data available is presented in Table 2.2.

Table 2.2: Domestic Tourism indicators (VisitScotland, 2007a)

	2005	2006	% Change
Scotland			
Trips (million)	14.87	13.28	-11%
Expenditure (£m [nominal])	3006	2720	-10%
Expenditure/visitor (£)	202.15	204.82	+1%
UK			
Trips (million)	138.65	126.29	-9%
Expenditure (£m [nominal])	22667	20965	-8%
Expenditure/visitor (£)	163.48	166.01	+2%

It should be noted that the global economic outlook has changed significantly since 2006. Commodity prices have continued to increase especially food and oil which directly impacts on household expenditure, disposable income and makes flights and transport more expensive. Holidays are luxury rather than essential goods and would be expected to be hit first when household spending patterns change with a less buoyant economic outlook.

From 2007 to present (mid 2008) the US dollar weakened further against Sterling, and both Sterling and the US dollar weakened against the Euro. This makes UK and European holidays more expensive to American tourists, however UK holidays become cheaper for European tourists. This may have the effect of encouraging more tourists to visit UK destinations. UK tourists face an increase in the cost of European breaks making UK destinations more attractive.

Visitor Survey

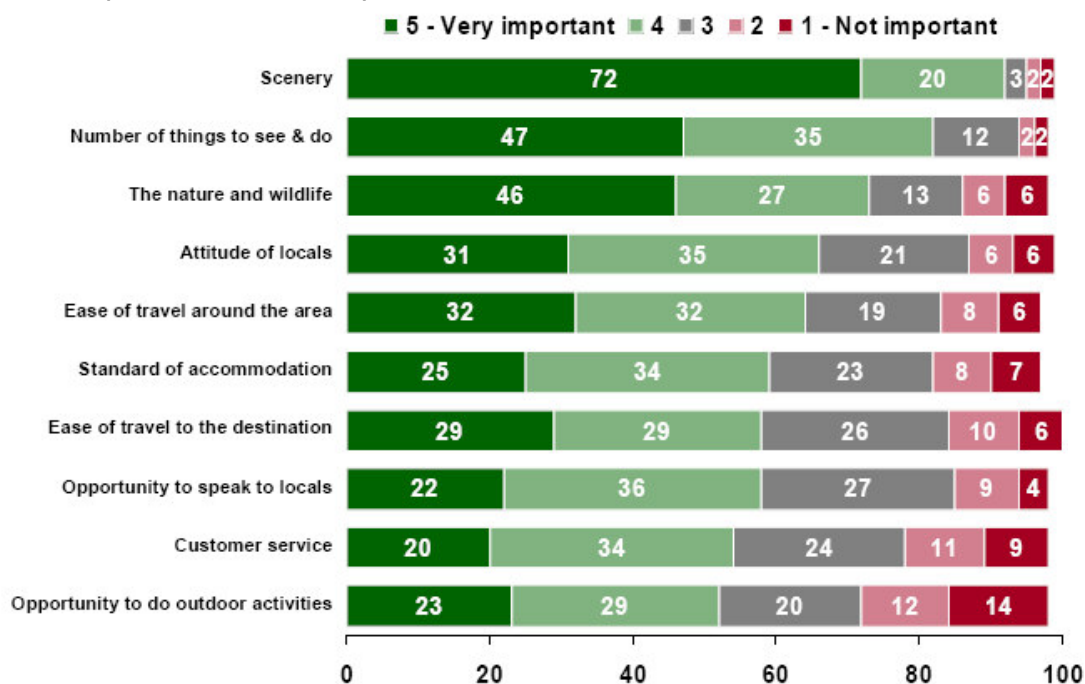
A Visitor Experience Study (previously called the Tourism Attitudes Survey) is carried out annually by VisitScotland (2007b). The *Visitor Experience Survey 2007* (Figure 2.1) found the main reasons for tourists choosing Scotland as a holiday destination were

- Scenery;
- Number of things to see and do;
- Nature and wildlife; and
- Attitude of locals.

Scenery was found to be the most important factor with 72% responding that it was “very important” to them choosing a Scottish holiday and a further 20% listing it as “important”. This study also discovered that 80% of respondents “feel Scotland protects and cares for its natural environment” and that 75% of visitors were interested in sampling local cuisines.

Ninety seven per cent of respondents to the 2007 survey were satisfied overall with their holiday in Scotland and none were dissatisfied. Furthermore, three quarters of visitors stated that they were “very likely” to recommend Scotland as a holiday destination.

Figure 2.1. Important Factors When Choosing Scotland as a Holiday Destination (VisitScotland 2007b)



Business Confidence and Employment

Independent research carried out by George Street Research for VisitScotland showed optimism among Scottish tourism businesses to be high in 2007, with a net positive shift in the industry’s general level of optimism compared with 2006. In May 2007 over 40% of businesses were found to be more optimistic in terms of the general business situation for both their sector and own business, compared to 2006 (VisitScotland, 2007a).

Official figures from the Office of National Statistics’ NOMIS database show an 8% increase in employment in tourism related³ sectors in Scotland between 2001 and 2005 (VisitScotland, 2007c) and a 4% increase from 2005 to 2006 (Table 2.3).

Table 2.4 presents tourism related employment in 2006 per full time and part time and compares against all employment in Scotland. In 2006 tourism related jobs accounted for 9% of all employment in Scotland.

³ Tourism-related employment refers to employment in industries, which depend on tourism to a greater or lesser extent.

Table 2.3. Tourism related employment in Scotland (VisitScotland, 2007c)

Industry	2005	2006	% Change
Hotels	48,100	50,100	+4%
Camping sites etc	5,500	5,200	-4%
Restaurants	54,000	57,200	+6%
Bars	40,400	40,800	+1%
Activities of travel agencies etc	8,500	8,600	+1%
Library, archives, museums etc	10,500	12,400	+17%
Sporting activities	29,000	29,400	+1%
Other recreational activities	13,500	14,500	+7%
Total	209,700	218,200	+4%

Table 2.4 Employment in Scotland (VisitScotland, 2007c)

	Full Time	Part Time	Total
Tourism-related Employment	103,600	114,600	218,200
All Employment in Scotland	1,608,400	762,200	2,370,600
Tourism-related as % of All Employment in Scotland	6%	15%	9%

Value of Key Visitor Groups

There are a wide range of recreational activities that rely on water. This includes scuba diving, angling, yachting, jet-skiing, kayaking, rafting and windsurfing, as well as activities that abstract and discharge water. Although those taking part in many of these activities are not charged for water use, they can have an impact on the economy through spending (SEPA, 2005).

Anglers

The revenue generated from angling provides an important source of income, particularly in rural areas. Visiting anglers contribute significantly to the income of many hotels, guest houses and other businesses throughout Scotland and they also provide a source of tourist income in the early and late months of the year. Fishing tackle shops, ghillies, water bailiffs and numerous other people depend directly or indirectly on angling.

A study carried out for Scottish Executive (Radford et al., 2004) estimated the economic contribution of game and coarse angling to Scotland. As part of this an angler database was set up to show the number of anglers targeting specific species across seven regions in Scotland (Table 2.5). Within this study the Argyll and Bute area, including Mull and Oban, falls into the Highland region.

Table 2.5: Angler days per region (Radford et al., 2004)

	Salmon & Sea Trout	Brown Trout	Rainbow Trout	Coarse Fish	Regional Total
Dumfries & Galloway	48,245	28,195	17,337	23,926	117,703
The Borders	43,000	17,884	10,942	315	72,141
Highland	190,589	78,576	26,702	10,915	306,782
North East Scotland	190,853	54,715	108,894	11,402	365,864
Central Scotland	61,646	134,391	231,615	45,581	473,233
Outer Hebrides	10,715	12,606	<100	<100	23,321
Orkney & Shetland	<100	27,000	<100	<100	27,000
Scotland Total	545,048	353,367	395,490	92,139	1,386,043

Across Scotland, in terms of angler effort, salmon and sea trout angling is the most important type of angling.

Radford et al. (2004) also estimated total angler expenditure by using the fisheries database to scale angler daily expenditure estimates. From Table 2.6 below, it is estimated that anglers spend a total of £113million on angling in Scotland, with salmon and sea trout anglers accounting for over 65% (£73m) of this total.

Table 2.6: Angler expenditure per region (£'000s) (Radford et al., 2004)

	Salmon & Sea Trout	Brown Trout	Rainbow Trout	Coarse Fish	Regional Total
Dumfries & Galloway	£2,962	£1,186	£1,206	£1,397	£6,751
The Borders	£6,669	£672	£607	£16	£7,964
Highland	£35,408	£5,088	£1,752	£715	£42,963
North East Scotland	£24,344	£1,589	£4,910	£824	£31,667
Central Scotland	£3,386	£5,234	£10,963	£1,930	£21,513
Outer Hebrides	£719	£458	<£1	<£1	£1,177
Orkney & Shetland	<£1	£511	<£1		£511
Scotland Total	£73,488	£14,739	£19,438	£4,882	£112,547

Boat based water sports

Boating activities including power boating, sailing, canoeing etc also contribute significantly to the tourist economy in Scotland, with over 230,000 people participating in such sports each year (RYA, 2008). The marine industry benefits from this, with approximately 300 boatyards and specialist marine companies employing several thousand people in Scotland. Last year, the industry reported revenues of £98.9 million and recent reports indicate that the economic contribution to the whole of Scotland could be in the region of £270 million per annum (RYA, 2008).

2.1.2 Tourism within Case Study Locations

Shetland

The Shetland Isles are located 145 km north of mainland Scotland and comprises more than 100 islands, 15 of which are inhabited by the 22,000 resident population. The economy is dominated by fisheries, fish processing and aquaculture, oil and gas related activities, public administration and services and tourism.

Table 2.7 below shows the absolute and relative size of Shetlands key sectors in 2006. Note that the fisheries sector includes landings by fishing boats and fish processing and that tourism includes business visitors. Visitors numbers to Shetland in 2006 broken down into various categories along with visitor spend are shown in Table 2.8 below.

Table 2.7 Size of Key Economic Sectors in Shetland in 2006 (Shetland in Statistics 2007)

	Absolute (£ million)	Proportion
Oil Operations	70.0	13.7%
Fisheries	225.7	44.1%
Agriculture	16.7	3.3%
Knitwear	3.0	0.6%
Tourism	12.0	2.3%
Governance	184.9	36.1%
Total	512.3	100.0%

Table 2.8: Visitors to Shetland in 2006 (Shetland Visitor Survey 2005/2006)

	Numbers	Proportion	Spend	Proportion
Holiday	24,744	23.7%	7.3	44.3%
Business	22,099	21.2%	5.4	32.8%
Visiting Friends or Relatives	13,081	12.5%	2.6	15.8%
Cruise Passengers and Crew	43,035	41.3%	1	6.1%
Yacht	1,292	1.2%	0.163	1.0%
Total	104,251	100.0%	16.463	100.0%

The number of visitors to Shetland arriving by cruise ship has seen a marked increase over recent years, although all visitor numbers have increased. This has resulted in a falling spend per visitor as cruise visitors tend to spend fewer nights on the islands.

Most visitors to Shetland (1 in 3 of all visitors and 1 in 2 of Scottish visitors) are either on a business trip or visiting friends or relatives. Of those on holiday, the main reason for choosing Shetland was its bird populations, wildlife and flora followed by its remoteness, peacefulness and scenery. The most common activities are bird watching, walking, and sight-seeing (Shetland Visitor Survey 2005/2006).

The five most visited tourist attractions in the Shetland in 2006 are shown in Table 2.9 below.

Table 2.9. Most visited attractions in the Shetland Isles (Visitor Attraction Monitor, 2006)

Attraction	2006 Visitors
RSPB Shetland (Sumburgh Head Reserve), Virkie	30,000 (estimate)
Bonhoga Gallery, Weisdale	17,675
Jarlshof, Sumburgh	15,589
Shetland Jewellery, Weisdale	8,436
Hoswick Visitor Centre, Sandwick	8,264

Outer Hebrides

The population of the Outer Hebrides in 2006 was 26,400 of which 15,500 were of working age (Nomis, 2008). The Outer Hebrides is heavily reliant on primary industries and the public sector in terms of income. Fisheries, aquaculture, agriculture are all important economic sectors for the area.

The tourism sector in the Outer Hebrides is of significant importance to the local economy, contributing around 15.6% to the Gross Regional Domestic Product (GRDP) of the Outer Hebrides. Tourism accounts for 9% of all jobs in the area (on a par with the industry in Scotland as a whole) and many self-employed posts. An estimated 1,000 FTEs are supported by tourism in the Outer Hebrides, including direct employees, self-employed, indirect and induced (Snedden Economics, 2007).

In 2002 179,696 people visited the Outer Hebrides, of which 12% were business visitors. Leisure visitors accounted for 131,631 visitors (88%), either being on holiday, arriving by yacht, or visiting family and friends. The main motivation given for leisure trips to the Outer Hebrides were connected to the natural environment (44%) and the cultural environment (6%). Aspects of the natural environment considered important to visitors included: the peacefulness of the islands, the scenery, wilderness qualities, the sea, and the wildlife. In addition Gaelic and the crofting way of life were cited as cultural reasons.

Expenditure by leisure visitors in 2000 was £28,416,681 (HIE, 2001). Visitors and visitor spend on the islands has been growing and the tourist season is expanding from primarily the summer months to run between March and October (Comhairle nan Eilean Siar, 2002). Visitor numbers to the Outer Hebrides (including people on holiday, visiting friends and relatives (VFR) and business visitors) has been estimated to have increased by 8.9% since 2002, with an overall 27% increase in tourism expenditure (Snedden Economics, 2007). Table 2.10 provides a comparison between the total volume and value of tourism in the Outer Hebrides in 2002 and 2006.

Table 2.10. Growth in volume and value of tourism in the Outer Hebrides 2002-2006 (Snedden Economics, 2007).

	2002	2006	% Increase
Total Volume of Tourism	179,696	195,766	8.9%
Total Value of Tourism	39,300,000	49,906,657	27.0%

Stornoway is the most popular entry point to the Outer Hebrides, accounting for 55% of arrivals from the mainland during 2006. The five most visited tourist attractions in the Outer Hebrides in 2006 are shown in Table 2.11 below.

Table 2.11 Most visited attractions in the Outer Hebrides (2006 Visitor Attraction Monitor)

Attraction	2006 Visitors
Taigh Chearsabhaigh Museum Arts Centre, North Uist	31,188
Calanais Visitor Centre, Calanais	19,584
Gearrannan Blackhouse Village, Carlway	11,600
Black House Arnol, Bragar	10,697
Morven Gallery, Borve	9,000

Oban & Mull

Oban and Mull are both within the Argyll and the Islands Enterprise area. This area is geographically diverse, covers 715,615 hectares and accounts for approximately 20% of the Scottish coastline. It includes both the Kintyre peninsula and the islands of Mull, Jura, Islay, and Arran as well as a further 23 inhabited islands.

Tourism is becoming an increasingly important economic sector in the area and is a popular tourist destination for both UK and international visitors. Visitors during the summer support many of the businesses which serve the residents throughout the year and the local community benefits greatly from the frequency of ferry sailings to the islands.

The Argyll and the Islands Enterprise recorded 334,000 tourist trips to the Oban, Mull and Lorn area in 1999, with a total expenditure by tourists of £102.3 million. It is estimated that approximately 600,000 people visit the Isle of Mull each year (Pettigrew, 2001). The flow of visitors is seasonal with over 71% visiting between May and September, peaking in July and August.

The Mull and Oban area is popular with bird and wildlife watchers, geologists, botanists, divers and sea anglers. Local attractions and popular recreational activities include:

- **Scuba diving:** The waters around Mull and Oban form one of the UK's leading diving destinations, encompassing the Sound of Mull, Sound of Kerrera, Firth of Lorne and Loch Linnhe. A number of dive charters based in Lochaline, Oban and Tobermory operate throughout this area.
- **Angling:** The popularity of sea angling in the area has increased over the last few years. Most of the fish species targeted can be caught from shore, although there are a few where a boat is essential. As such, several charter boats offer fishing trips over wrecks, in open water and over deep rocks and caves
- **Eco tours** that operate in the area offer full and part-day wildlife and whale-watching trips with the hope of viewing many species of seabirds, seals, porpoises, dolphins and whales. Operators that specialise in eco tours include Sea Life Surveys and Hebridean Adventure (based on Mull) and Sea.fari Adventures, Argyll Charters and Sealife Adventures (based at Oban).
- **Walking and Cycling:** There are numerous walking and cycling routes and paths throughout the area, including guided tours of the scenery and wildlife.
- **Yachting:** Boating and sailing activities are popular in the area. Oban Marina provides 94 pontoon berths and 33 swinging moorings and Dunstaffnage Marina provides 150 berths. There are marinas with recreational berths available at Tobermory and Craignure on the Isle of Mull and at Lochaline on Morvern.

2.2 Scottish Aquaculture Production

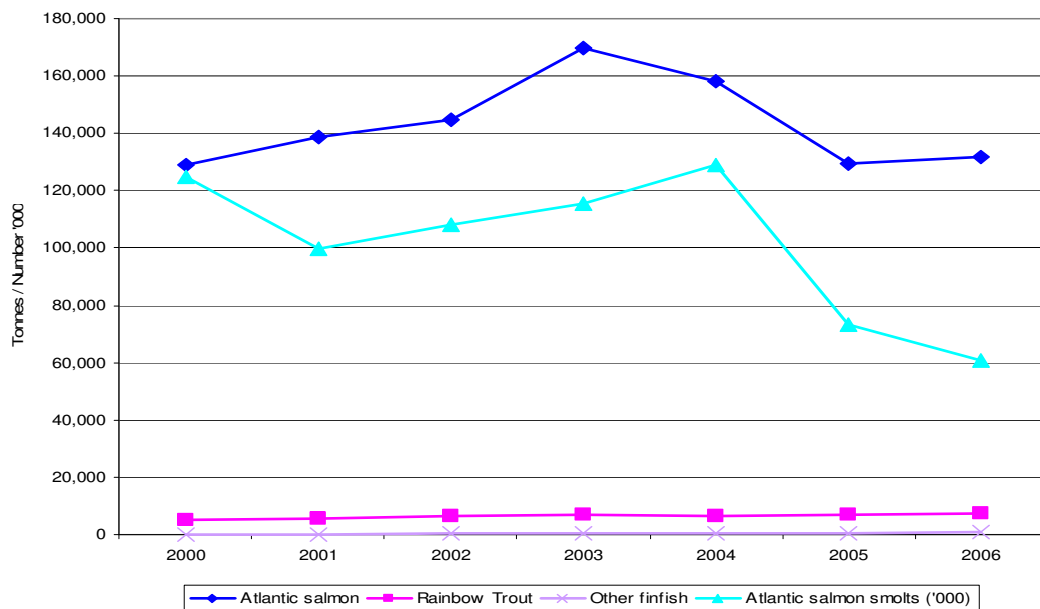
2.2.1 Overview of Scottish Aquaculture

Finfish

The Scottish Fish Farm Production Survey provides figure for the aquaculture industry's production and employment in the given year and provides previous years figures as a comparison. In 2006 (latest data available) six species of fish were cultivated in Scottish waters:

- Atlantic salmon *Salmo salar*
- Rainbow trout *Oncorhynchus mykiss*
- Arctic charr *Salvelinus alpinus*
- Brown trout *Salmo trutta*
- Cod *Gadus morhua*
- Halibut *Hippoglossus hippoglossus*

Figure 2.2 Scottish finfish aquaculture production by species 2000 – 2006 (FRS, 2006)



Between 1986 and 2006 the production of Atlantic salmon has increased from 10,337 tonnes to 131,847 tonnes. This represents an annual growth rate of 14.34% over the period. Between 1993 and 2006 the production of rainbow trout has increased from 4,023 tonnes to 7,492 tonnes, an annual growth rate of 5.23%.

Figure 2.2 presents the finfish aquaculture production in Scotland from 2000 to 2006. There was a large increase in salmon production across 2002 to 2003, followed by a gradual decrease from 2003 to 2005; resulting in 2% overall growth in salmon production from 2000 to 2006.

Growth in the sector has not seen corresponding increase in sites indicating that existing sites have been expanded to accommodate the increased production. The number of companies involved in aquaculture in Scotland has also declined over the period. Whilst production of fish, especially salmon, has vastly increased in recent years, there has not

been an equivalent increase in employment, and as such production per employee has also increased. Overall increases in production has been achieved through fewer companies owning multiple and larger sites and increasing efficiency through economies of scale.

Shellfish

In 2007 five species of shellfish were cultivated in Scottish waters:

- Common mussel *Mytilus edulis*
- Pacific oyster *Crassostrea gigas*
- Native oyster *Ostrea edulis*
- Queen scallop *Chlamys opercularis*
- King scallop *Pecten maximus*

Production was dominated by mussel and Pacific oyster with smaller quantities of queen scallop, native oyster and king scallop also produced. Scottish production of shellfish in 2007 is summarised by region in Figure 2.3. Trends in shellfish production since 1998 are shown in Figure 2.4.

Figure 2.3. Scottish shellfish production by region, 2007 (FRS, 2007)

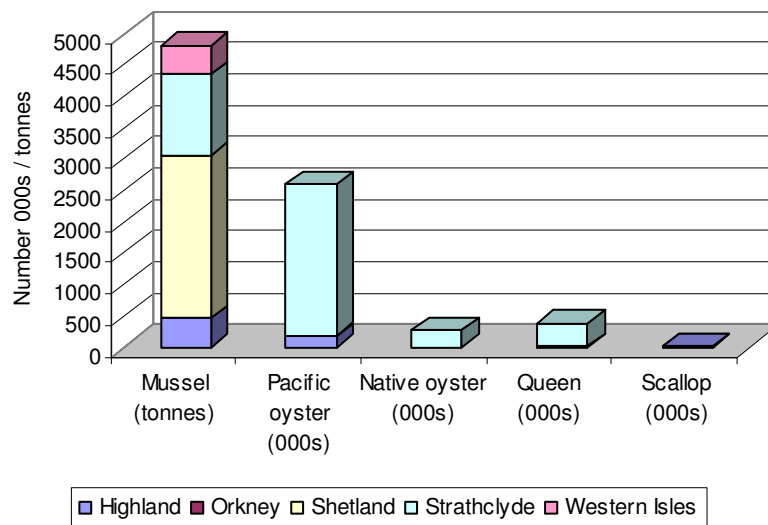
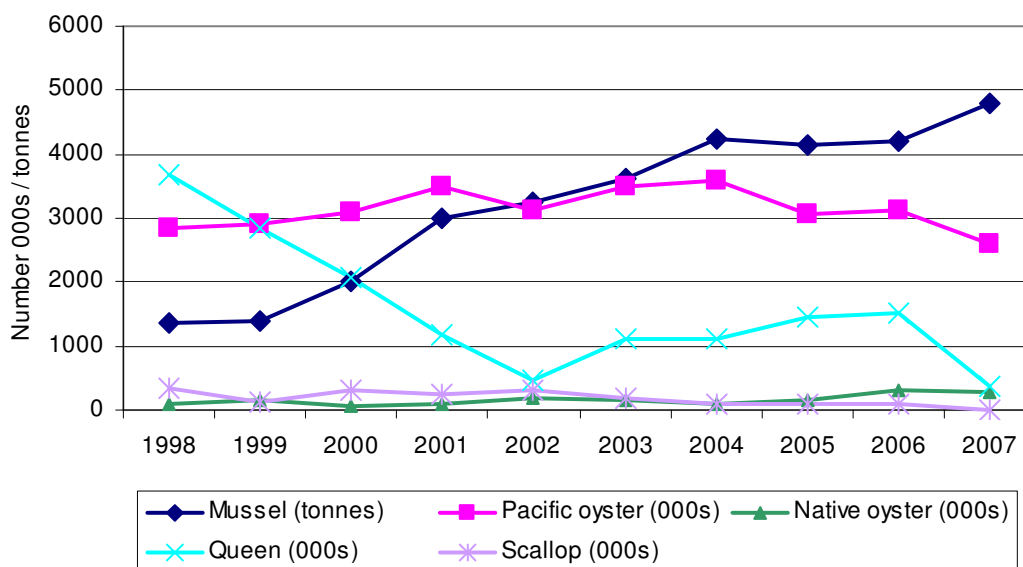


Figure 2.4 Table production by shellfish species 1998-2007 (FRS, 2007).



Mussels clearly dominate shellfish production in Scotland, with the majority (54%) being grown in Shetland, followed by 27% from the Strathclyde area. Mussel production has grown steadily from 1999 to 2004, after which it plateaus until 2006 and then significantly increases from 2006 to 2007.

Production of Pacific oyster has remained fairly stable from 1998 to 2007. 93% of Pacific oysters were produced in the Strathclyde area in 2007.

Queen scallops have significantly decreased in production from 1998 to 2002, followed by a slight rise across 2002 to 2006 and a decrease in 2007 when production dropped to the lowest levels recorded.

2.2.2 Aquaculture Production within Case Study Locations

Shetland

Aquaculture lease sites in Shetland are shown in Figure 2.5. Shetland aquaculture production is dominated by salmon and mussels. However, the industry has experienced significant developments over the last few years, with companies diversifying into new species such as cod, halibut and haddock.

Shetland produced 2,605 tonnes of mussels in 2007 worth an estimated £2.33 million, equating to 54% of Scottish production (FRS, 2007).

Annual production of salmon (including grilse, pre salmon and adult salmon) totalled 39,278 tonnes in 2006, equating to 30% of Scotland's production, and is projected to be 44,458 tonnes for 2007 (FRS, 2006). Adult salmon made up 49% of the production in 2006. The growth in salmon production from 2000 to 2006 is shown in Figure 2.6 and the trends in employment (full time and part time) related to salmon production are shown in Figure 2.7.

Figure 2.5. Active aquaculture sites (FRS, 2006 & 2007)

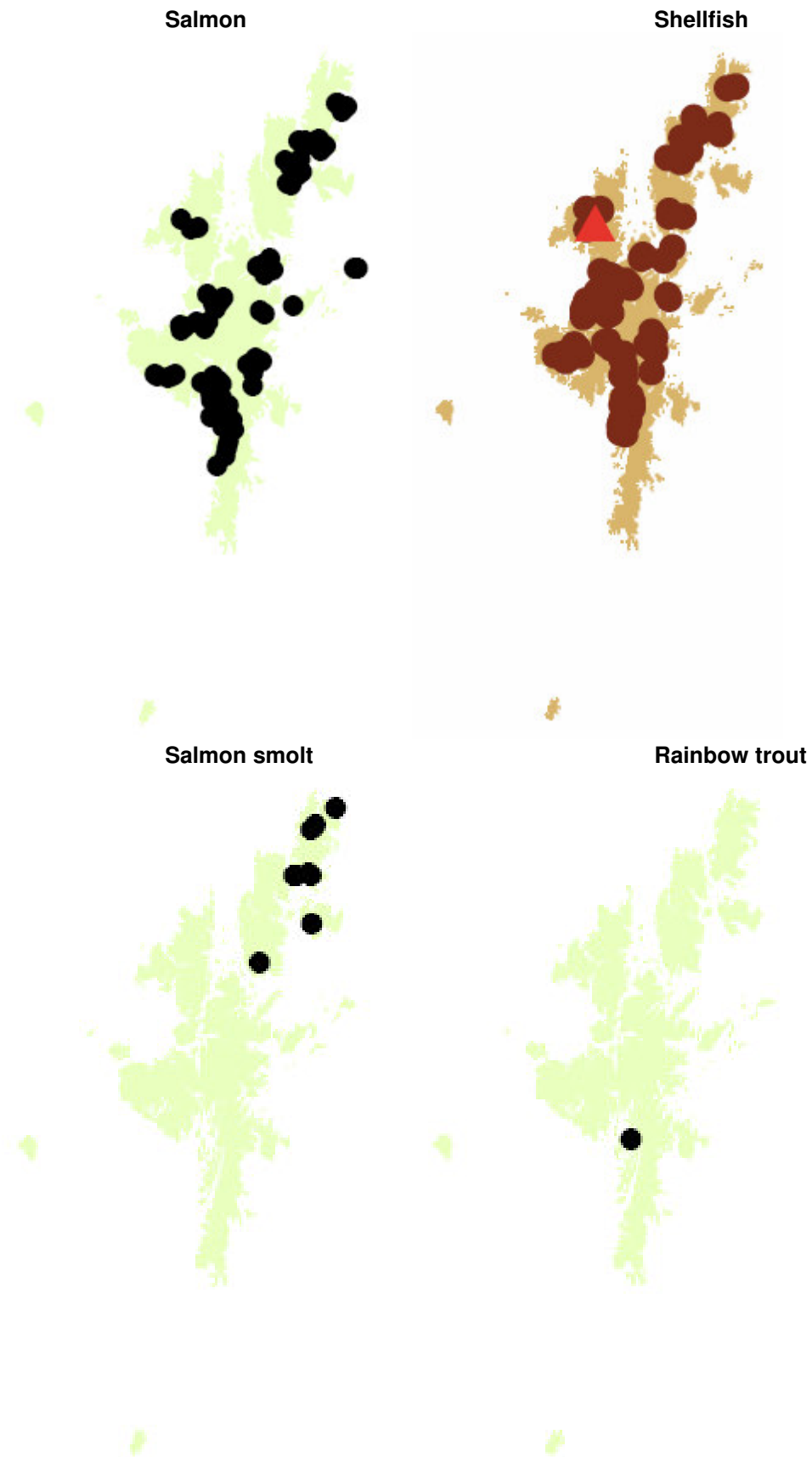


Figure 2.6. Annual Production of salmon (including grilse, pre salmon and adult salmon) in Shetland (FRS, 2006)

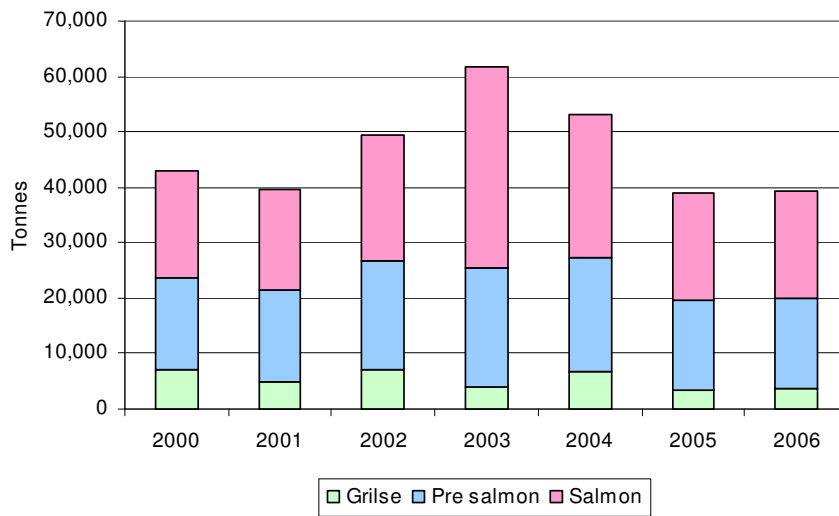
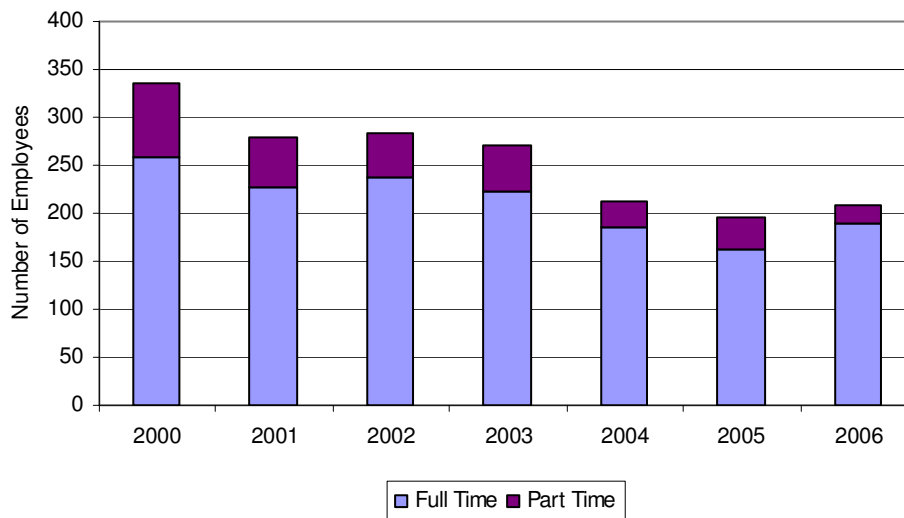


Figure 2.7. Full time and part time employment in salmon production in Shetland (FRS, 2006)



Outer Hebrides

Aquaculture lease sites in Outer Hebrides are shown in Figure 2.8. Outer Hebrides aquaculture production is dominated by salmon and mussels, although Pacific oyster is also farmed.

Annual production of salmon (including grilse, pre salmon and adult salmon) totalled 23,166 tonnes in 2006, equating to 18% of Scotland's production, and is projected to be 25,266 tonnes for 2007 (FRS, 2006). Adult salmon made up 75% of the production in 2006. The growth in salmon production from 2000 to 2006 is shown in Figure 2.9 and the trends in employment (full time and part time) related to salmon production are shown in Figure 2.10.

The Outer Hebrides produced 459 tonnes of mussels in 2007 worth an estimated £400,000, equating to 9% of Scottish production (FRS, 2007).

Figure 2.9. Annual Production of salmon (including grilse, pre salmon and adult salmon) in Outer Hebrides (FRS, 2006)

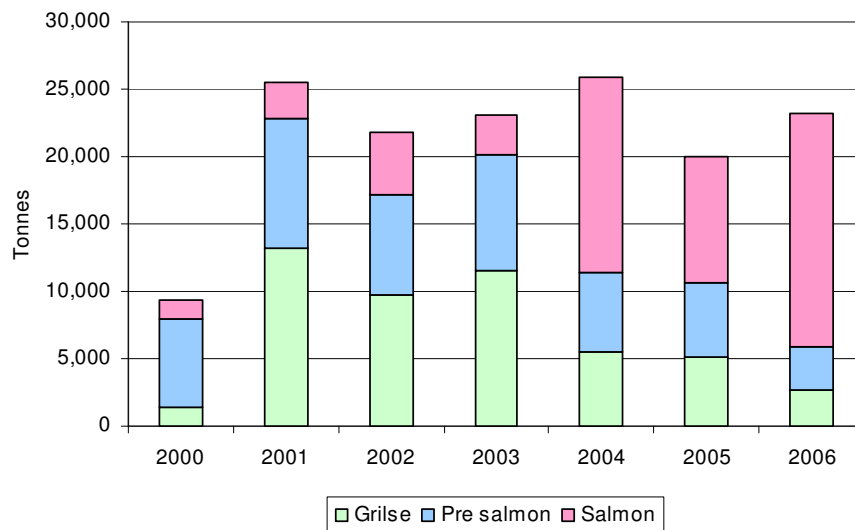


Figure 2.10. Full time and part time employment in salmon production in Outer Hebrides (FRS, 2006)

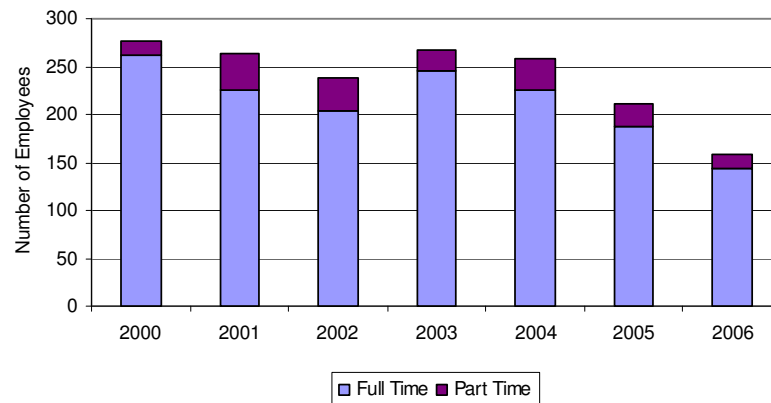
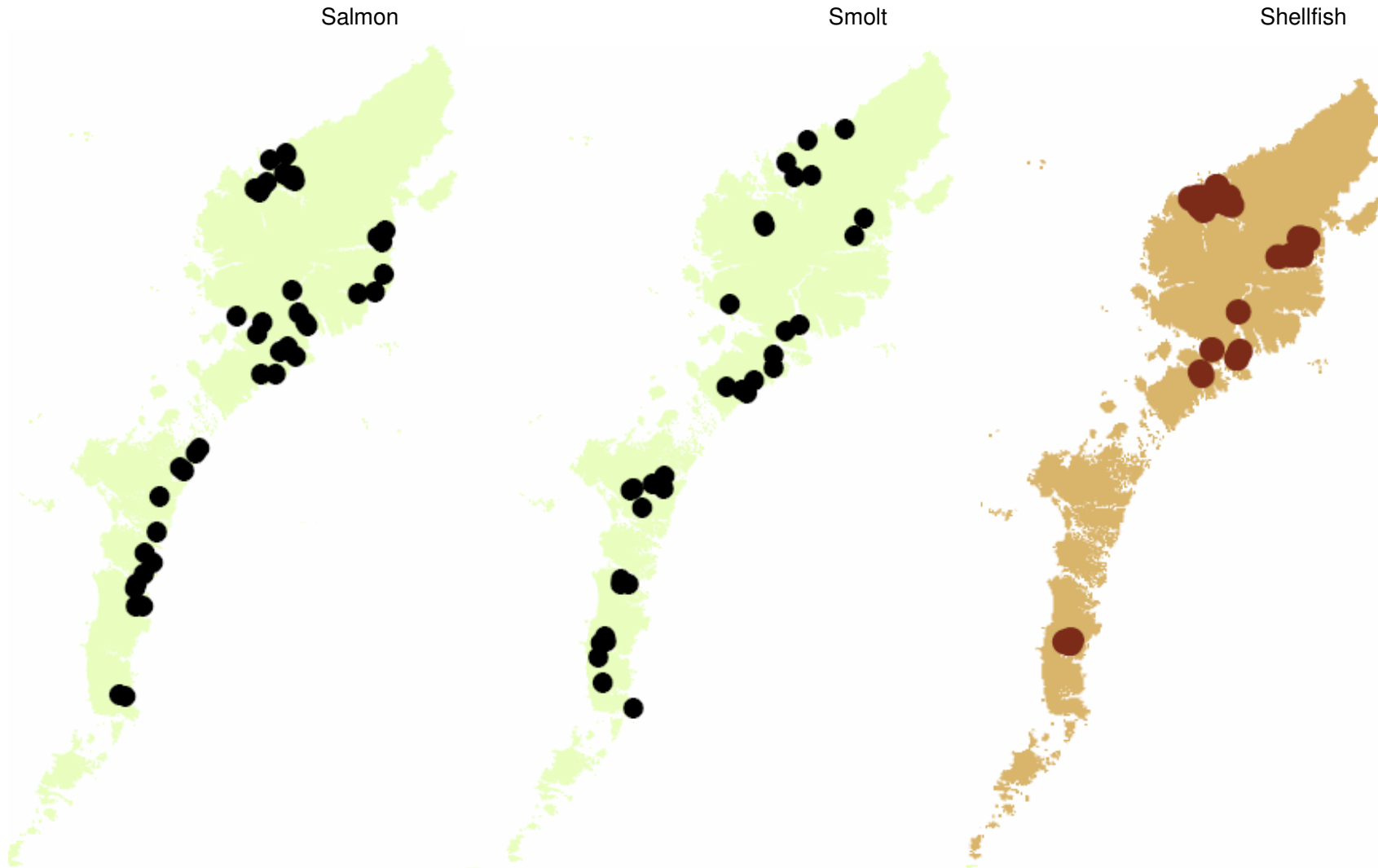


Figure 2.8. Active aquaculture sites (FRS, 2006 & 2007)



Oban and Mull

Aquaculture lease sites in the Oban and Mull area are shown in Figure 2.11. In Fisheries Research Services Annual Production Surveys, the Oban and Mull area falls under the 'South West' region for finfish statistics and the 'Strathclyde' region for shellfish statistics. Aquaculture production in this region is dominated by salmon and mussels, although Pacific oyster is also farmed.

Annual production of salmon (including grilse, pre salmon and adult salmon) totalled 25,460 tonnes in 2006, equating to 19% of Scotland's production, and is projected to be 34,505 tonnes for 2007 (FRS, 2006). Adult salmon made up 59% of the production in 2006. The growth in salmon production from 2000 to 2006 is shown in Figure 2.12 and the trends in employment (full time and part time) related to salmon production are shown in Figure 2.13.

The Strathclyde region produces 27% of farmed mussels in Scotland and dominates the other shellfish species with 93% Pacific oyster, 100% native oyster and 98% Queen scallop table production in Scotland. There are also two several orders for scallop fisheries in the Strathclyde region (FRS, 2007).

Figure 2.12. Annual Production of salmon (including grilse, pre salmon and adult salmon) in South West Scotland (FRS, 2006)



Figure 2.13. Full time and part time employment in salmon production in South West Scotland (FRS, 2006)

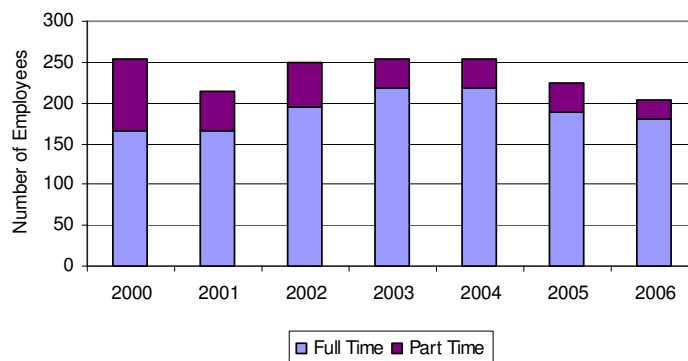
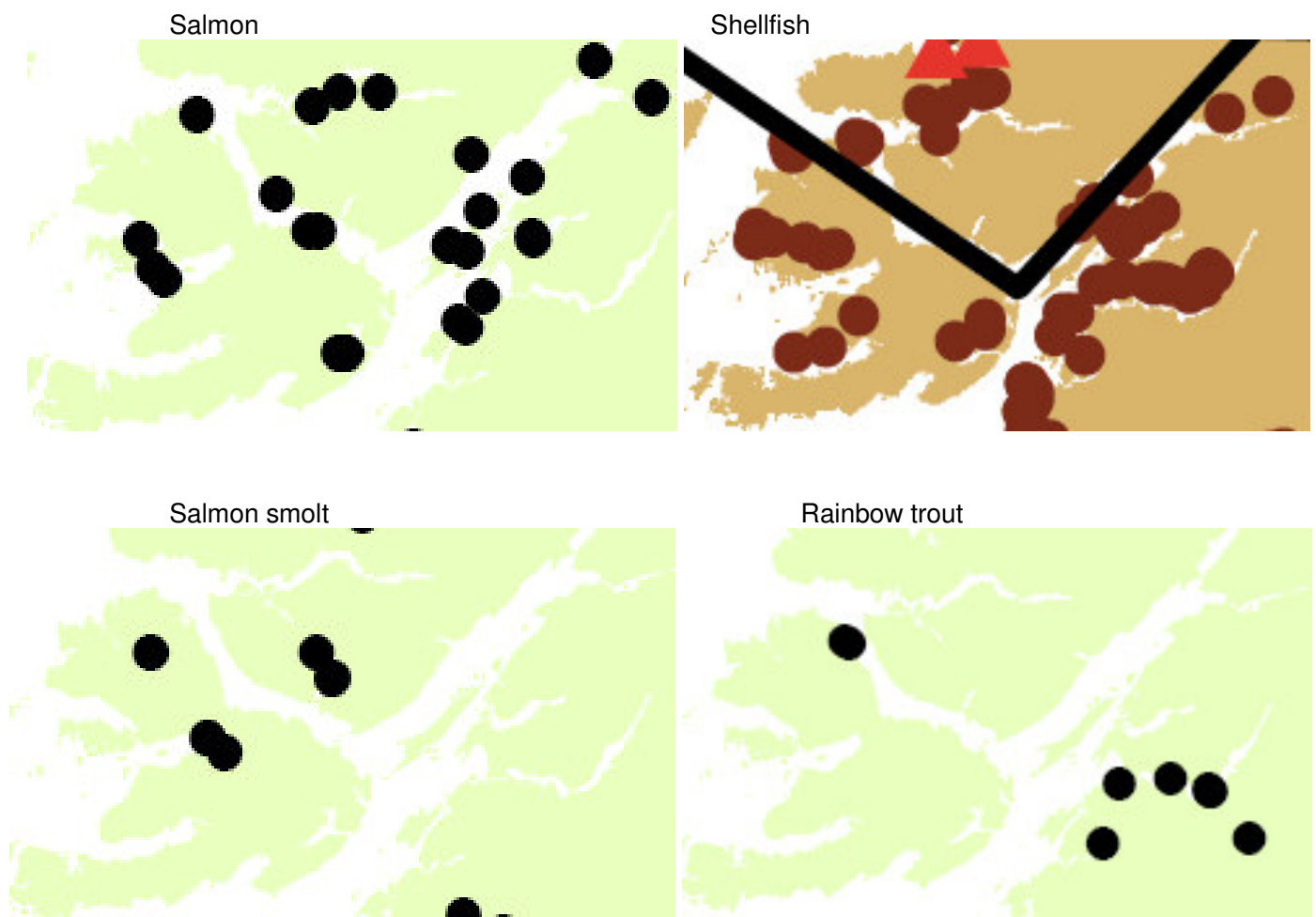


Figure 2.11 Active aquaculture sites (FRS, 2006 & 2007)



2.3 Correlation between Scottish Tourism and Aquaculture

Tourism and aquaculture data which is available is collected on a national level with limited breakdown of data by area. The spatial element to the data is too coarse to allow any meaningful statistical analysis of interactions between the two. Furthermore it is obvious that a number of other factors are having a significant effect on tourism, primarily global economic conditions such as currency rates and commodity prices. Any impact on tourism by aquaculture cannot be isolated from other variables such as currency exchange rates that are expected to be more influential.

However it is clear that scenery and the environment are a major influence on tourists' decisions to holiday in Scotland. As such it could be argued that aquaculture sites reduce the quality of the landscape environment. Additionally a significant number of visitors to Scotland participate in activities that are dependent on a healthy and natural aquatic environment such as angling, boating and diving. Over the longer term, if the tourists' perception of pristine environment is reduced they may choose not to return and Scotland's international reputation for high environmental quality would be negatively affected.

Island communities in Scotland tend to have higher economic activity and lower unemployment rates than the mainland. Aquaculture forms a significant sector in the economies of all the pilot areas. Due to the limited size of the island communities involved there may be limited scope for further diversification or expansion within these economies.

It should be noted that the factor limiting the development of tourism in the pilot areas, especially the Outer Hebrides and Shetland, may be the supply of suitable accommodation and tourism services rather than the potential demand of tourists to visit. During high season (July-August) in 2006 occupancy rates for caravans and self catering accommodation in the Outer Hebrides was above 90%. Hotel occupancy was between 70% and 80% (VisitScotland, Outer Hebrides Accommodation Occupancy Survey). Due to the very small supply of additional labour available in both areas, opportunities to expand the supply of tourist accommodation and services may be limited.

No clear quantitative or empirical evidence of the impact of aquaculture on tourism in Scotland has been identified. However it is clear that both are important economic sectors in Scotland and are the focus of ongoing private and public sector efforts to increase their value in Scottish coastal areas. It is therefore important that any correlations (positive or negative) should therefore be understood and if possible quantified in order to inform more sustainable rural development.

3 EVIDENCE OF INTERACTIONS BETWEEN FISH FARMING AND TOURISM

3.1 Introduction

There are a number of studies suggesting that aquaculture and tourism may compete for some of the same resources. Fish farming and tourism both place certain demands on the coastal environment with a range of potential interactions. This section of the report is structured as follows:

- Competition for space (land & sea);
- Navigational conflicts between fish farms and tourism;
- Visual Impact of fish farms on tourism;
- Tourist perception of the environmental impact of fish farms;
- Aquaculture as a tourist attraction;
- Tourism as a consumer of aquaculture products; and
- Conflict between fish farms and other recreational groups

The visual impact of fish farms is considered a key topic and is addressed further in Section 4.

Many coastal zone activities relating to public or national resources are regulated and may require a license. The extent of licensing required in different countries will affect how easy it is for an industry to develop and become profitable. Regulation may therefore influence the extent to which aquaculture and tourism can effectively co-exist and develop in an area in relation to the above interactions.

In some countries, user conflicts are a result of poorly defined rights over resources, where it may be unclear who owns the space and what uses they are entitled to exercise. As a result of this it can be difficult for individuals to enforce and protect their rights. To reduce the conflict between aquaculture and tourism groups in an area it is important to develop a clear policy for the rights of use across the competing users. (Holland & Brown, 1998).

Evidence shows that conflicts have arisen in many countries and that there is often no straightforward solution to resolve the matter (Deniz, 2001). However, careful planning and control strategies, such as conflict resolution management, can be implemented to prevent conflicts from arising and minimise them if they occur.

3.2 Competition for space (land & sea)

Site selection is a key factor in any aquaculture operation affecting success, sustainability and environmental effects.

3.2.1 International

Like elsewhere in the world, tourism has been found to contribute substantially to the economy in Mediterranean countries. Marine aquaculture is being practised in coastal Mediterranean waters but has difficulty in finding locations to compete successfully or co-exist with tourism. The exploitation of the coastal land for tourism development has resulted in high land prices which have become prohibiting for other forms of development, including aquaculture which is considered a relatively new economic

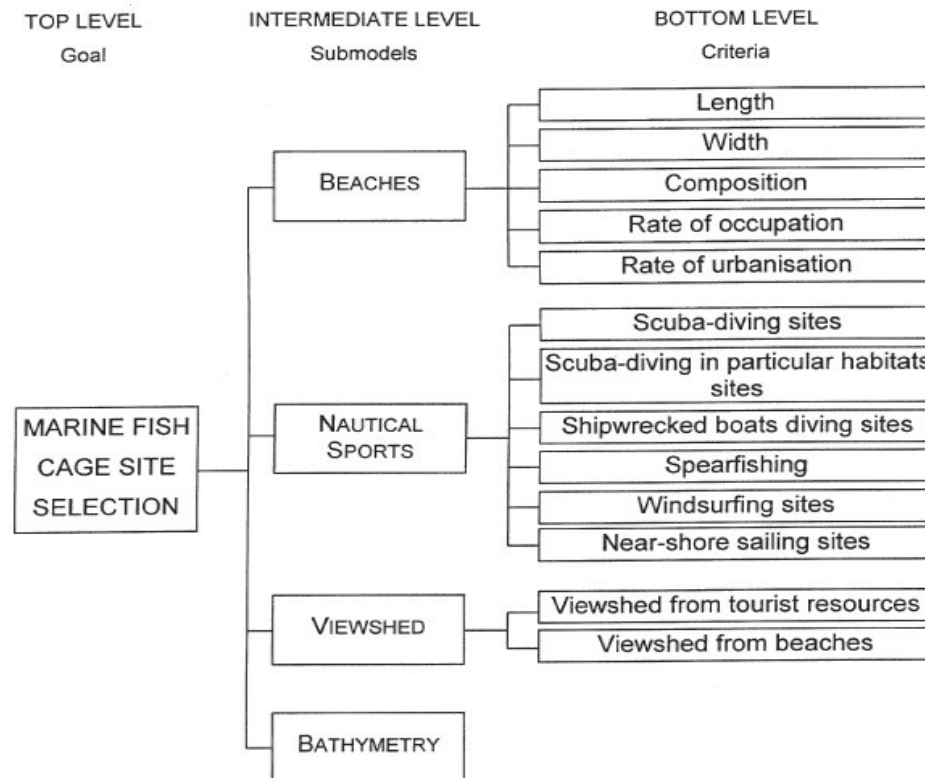
activity in the area (Stephanou 1996). There is often a lack of political support for aquaculture in the Mediterranean and so it is not promoted in terms of national or regional policies. Where legal framework does exist for Integrated Coastal Zone Management, aquaculture is rarely supported as a positive element of local development, despite creating permanent employment, generating fresh produce, and being a potential source of tourism activity (de Monbrison 2004).

The local authority of the Murcia region of Spain made an effort to promote regional planning for aquaculture development. All relevant sectors, including tourism groups, were invited to map areas that each sector considered to be suitable for aquaculture development. However there was no correlation between the maps produced by different groups which led to the termination of the project for 2 years, after which it was decided with political support that the fish farms should be located offshore (de Monbrison 2004).

A more positive outcome resulted from a study of tourism and aquaculture in Tenerife by Pérez *et al.* (2003) which recognized the clear hierarchy between tourism and other sectors. It developed a model for selecting the best sites for marine fish-cage aquaculture within the tourist industry in Tenerife. The model was built based on hierarchical structures supported by a set of criteria.

Figure 3.1 presents the suitability analysis for marine fish cage site selection in Tenerife as a hierarchical structure. The top or first level in the hierarchy represents the ultimate goal of the multicriteria decision-making analysis process. The intermediate or second hierarchy level lists the relevant evaluation criteria that were compared pairwise to assess their relative weights. The lowest level in the hierarchy contains the evaluation objects; these are all the criteria identified as influencing the goal of the study.

Figure 3.1. Conceptual structure of the suitability analysis for integration of marine fish cages within the tourism industry in Tenerife (Pérez *et al.* 2003)



56% of the coastline of Tenerife was identified as being suitable, with 46% being very suitable, suggesting that marine cage aquaculture could be developed in coexistence with the well-established tourism industry. However, it is important to have knowledge of the potential future developments on the island if aquaculture is to be developed without directly competing for the same coastal space and resources as the tourism industry.

Once the potential for developing marine aquaculture in Tenerife had been determined, further studies were recommended to investigate site selection in terms of water quality requirements (such as temperature, suspended solids, sewage discharges), marine environment (such as waves, currents, bathymetry), infrastructure to support the industry (such as roads, airports, ports), and other uses of the coastal space, such as fisheries (Pérez *et al.* 2003). This approach primarily assesses compatibility with tourism before considering the location based on physical and environmental conditions required for aquaculture production. The approach is appropriate given the clear dominance of tourism to the island over a relatively undeveloped aquaculture sector. For Scotland no such forward planning has been evident, creating a complex mosaic of coastal users that are already present and making demands for space. Such spatial planning is however sensible for the future development of the coastal area, as exemplified by British Columbia below.

The provincial government in British Columbia, Canada, undertook a series of coastal resources interest studies to identify areas along the coast with high or low potential for salmon farming, along with possible resource conflicts. User groups and resource agencies mapped the major uses along the coast. Draft maps of finfish aquaculture opportunities were then prepared and presented at public open houses, followed by the

publication of final opportunity maps (Ackerfors & Rosenthal 1996, cited in Holland & Brown 1998). This resource was utilised by the provincial Government when considering applications for aquaculture, allowing the potential user conflicts at the proposed sites to be identified and minimised.

In Norway there is increasing pressure for activities in the coastal zone to give larger profits, in correspondence with strong international economic competition, as well as national competition between different activities. This requires that the management of the coastal zone allocates rights to resources to the most valuable sector and therefore influences how aquaculture and tourism compete for space. Aquaculture is a significant economic sector for Norway, but its spatial development is partially controlled by the state through the issuing of production licenses by region, encouraging distribution that considers the needs of each region and the capacity of the receiving environment.

Some states have been more specific in their marine planning, explicitly recognising the interactions between tourism and aquaculture. The Ministry of Reconstruction in Turkey recently developed a coastal zone master plan, however this did not consider the aquaculture industry. It is thought that conflicts with aquaculture could be resolved through the production of Marine Spatial Planning for aquaculture development in suitable areas, with guidelines regarding separation distances. Deniz (2001) recommends the following criteria and minimum distances between various types of aquaculture installation and tourism development. These distances are dependent on topography, concealment and screening and have been developed for Turkey:

- Shellfish aquaculture should be at least 1 km from tourist hotels and holiday homes;
- Cage aquaculture, hatchery and tank farms should be at least 1 km from tourist centres;
- In scenic areas, cage aquaculture, hatchery and tank farms should be kept at distances of 0.5 km, 0.75 km and 1 km respectively;
- Hatcheries, ponds and tank farms should be screened from view with trees and shrubs;
- Cage and raft culture should be restricted in heavily used recreational waters as a safety precaution but should be permitted in waters with light, irregular traffic;
- Fish farm operators should be encouraged to clearly mark the boundaries of farm sites;
- Hatcheries should have their intakes and outfalls clearly buoyed;
- Tourists should not be permitted within farm and hatchery areas; and
- Tourism development should be subject to the same controls relating to pollution of the sea as other industries.

3.2.2 Scotland

Recent research for SARF by Hambrey Consulting (2005) studied site optimization of aquaculture operations in relation to economic, social and environmental parameters.

Key siting criteria for aquaculture developers were found to be primarily influenced by economic considerations, including infrastructure and availability of skilled/motivated staff. In addition to economic considerations, social and environmental criteria were also developed and summarized below:

Infrastructure and costs

- Existing (own) farms
- Farm services and supplies
- Roads
- Piers
- Access to markets, processing and distribution facilities
- Labour force
- Housing
- Finance

Physical environment

- Location relative to other farm companies
- Water depth
- Shelter
- Water current
- High water quality
- Low toxin incidence (toxic plankton)

Biological environment

- Biosecurity
- Low fouling
- High food concentration (shellfish)
- Minimal threat from predators (mainly seals, eiders, golden eye and shooter ducks)

Socio-economic

- Employment; demography
- Job quality/satisfaction
- Job safety
- Wage rates
- Employment sustainability/ stability
- Training and skills development
- Overall value added and multipliers
- Community strengthening
- Level of existing development

Impacts on environment and other users/interests

- Location relative to designated areas
- Integrity of wild salmon and sea trout populations (disease, genetics)
- Shooting, scaring, disturbance of predators (mainly seals, eider, golden eye and scooter ducks)
- Introduction of alien species
- Integrity of designated sites and other sites of particular interest or value
- Impact on water quality
- Impact on landscape
- Other users (e.g. Fishermen, boat owners; fish farmers, shell-fish farmers; undersea cables)
- Shipping and recreation

Marine spatial planning is becoming a more established and effective tool, utilized by the Scottish Government and Local Authorities to manage the development and use of the marine and coastal areas of Scotland.

The Shetland Sustainable Marine Environment Initiative (SSMEI) pilot published a consultation paper on the draft Shetland Marine Spatial Plan in February 2008. This includes intensity maps of present marine users and activities, as well as providing guidance to the placement of future marine developments. The following activities were mapped within the Marine Spatial Plan:

- Commercial fishing: important whitefish grounds
- Commercial fishing: important shellfish grounds
- Aquaculture: use intensity of fin fish farming (Figure 3.2)
- Aquaculture: use intensity of shellfish farming (Figure 3.3)
- Shore access
- Recreation and tourism at sea (Figure 3.4)
- Coastal archaeology
- Dredging and disposal of dredged material

Figure 3.2 Aquaculture: use intensity of fin fish farming (Shetland SSEMI, 2008)

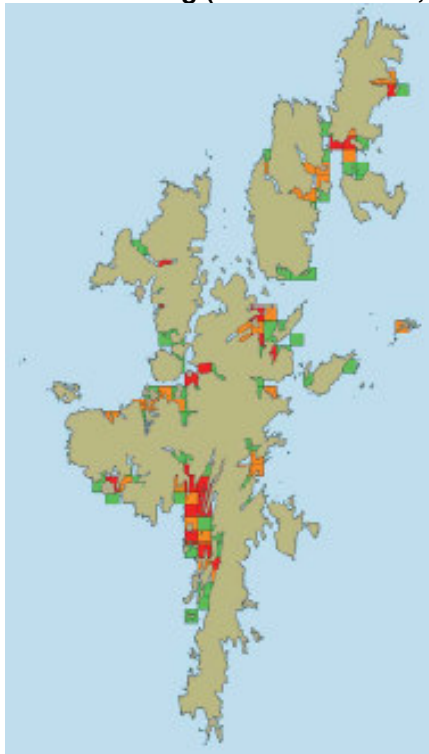


Figure 3.3 Aquaculture: use intensity of shellfish farming (Shetland SSEMI, 2008)

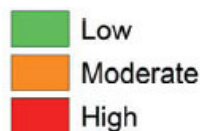
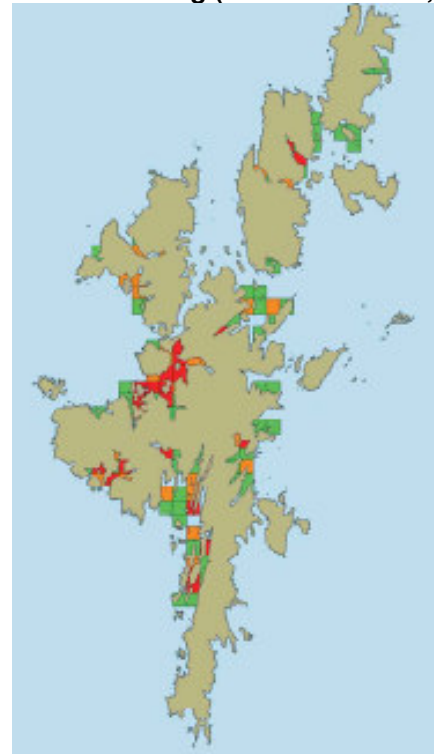
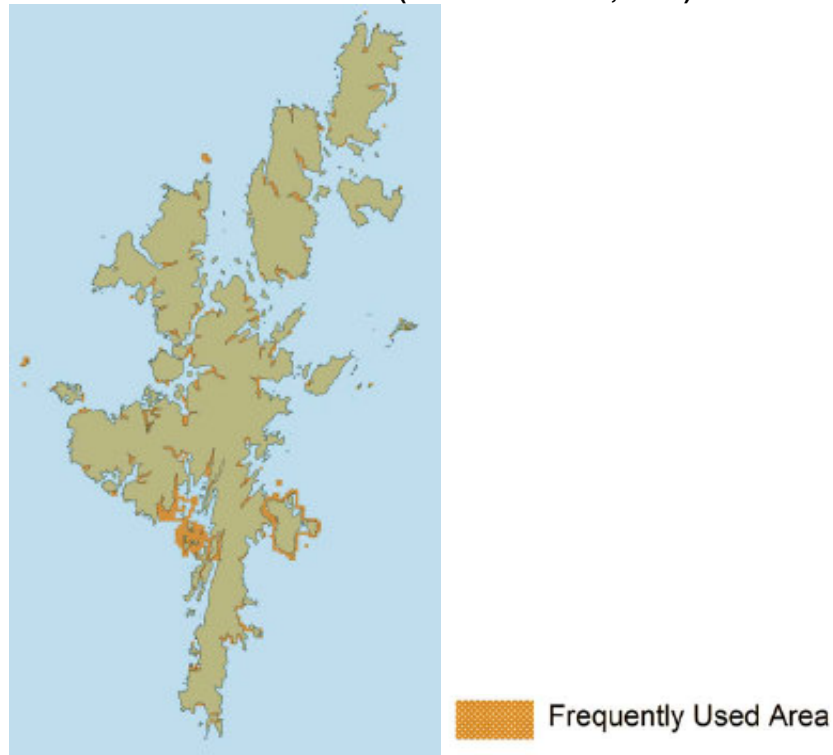


Figure 3.4 Recreation and tourism at sea (Shetland SSEMI, 2008)



Conflicts for space between fish farms and associated infrastructure and other activities can also occur on land. Fish farms may impact on public roads, particularly those used as scenic tourist routes as well as major routes to ferry terminals. Advice documents (Scottish Executive, 1999) and local plans (The Highland Council, 1999) highlight the need to avoid these areas where possible or avoid transportation during peak times and/or rush hour.

The Scottish Executive Advice Note on marine fish farming and the environment provides indicative separation distances for marine cage fish farms (Table 3.1).

Table 3.1 Indicative separation distances for marine cage fish farms (Scottish Executive, 1999)

Feature	Distance to finfish farm	Qualifications
Finfish farms	8 km	Closer siting may be possible between small-scale farms, and in large loch systems or open water
Shellfish farms	3 km	as above
Public viewpoints, tourist centres and popular tourist routes	1.5 km	Screening by buildings, landform or woodlands may permit closer siting.
Houses (other than those related to the development)	0.8 km	Attitudes of residents should be taken into account; closer siting may be acceptable in some areas.
Vulnerable wildlife	0.8 km	Assuming adequate anti-predator measures
Anchorage/approaches	0.5 km	Subject to the assessment of the DETR Marine Division
Fishing grounds/netting stations	0.5 km	Assuming specific productive areas in frequent use

3.3 Navigational conflicts between fish farms and tourism

The conflict between aquaculture and tourism can be magnified by competition for navigational area and associated facilities. Some resource users may consider that aquaculture interferes with efficient navigational systems (Borel 1997, cited in Holland & Brown 1998).

3.3.1 International

International evidence of navigational conflict with aquaculture is documented by Stephanou (1996) in Cyprus, where leisure boat traffic is intense in coastal areas that are also abundant fish farms. This can lead to conflict and so, to minimize the hazards to both farms and boats, the Ports Authority requires good demarcation of the cage farms, including the use of effective lights and radar reflectors. Farm positions are also marked on Admiralty charts.

In the cases where tourism and aquaculture are using the same infrastructure facilities, priority is given to fishing boats, including boats servicing the fish farms. New marinas in Cyprus designed mainly for nautical tourism, promoted by the government, are expected to also be used by cage farms (Stephanou 1996).

3.3.2 Scotland

Fish farm operators in Scotland are responsible for ensuring all existing fish farms are adequately marked with navigational markers and buoys under regulation enforced by the Maritime and Coastguard Agency (MCA). The Northern Lighthouse Board provides advice on navigation issues and navigational markings. These markers are intended to ensure all vessels are fully aware of and can avoid aquaculture areas.

Furthermore, the Scottish Government and Local Authorities must formally consult RYA Scotland on any proposals in Scottish coastal waters which might affect navigation or safety, including fish farms and moorings.

Hambrey Consulting (2005) studied the main issues that led to the rejection of 36 fish farm applications from 1999 to 2004 (under all regulatory regimes, not just EIA regulations). 19% of the fish farm applications were rejected due to navigational concerns.

As part of the Atlantic Coast (Wester Ross) Project, a Tourism and Recreation study considered the potential conflicts between marine users. The issues raised included a limited number of sheltered areas for anchorage of recreational boats since many natural anchorages were also viewed and utilised as prime sites for fish farms e.g. Tanera Mor.

3.4 Tourist perception of the visual impact of fish farms

A number of studies have been carried out to explore the visual impact of fish farms in relation to their siting and setting. This is expected to be a key issue in terms of the potential impact of aquaculture on tourism and is explored further in Section 4 of this report. This section will focus on tourist's perception of fish farms in relation to their visual impact.

Conflict between aquaculture and neighbouring users of the resources is often caused by concerns that the development of aquaculture leads to an impact on the landscape character or a loss of visual amenity. This can be a result of building construction, above ground fish tanks, exposed plumbing, raft or rack structures, pontoons or floats, machinery, fencing and power lines (Mather 1993, cited in Holland & Brown 1998).

3.4.1 International

International evidence is documented in Turkey where tourism is generally associated with hotels and second home areas. To be successful these require surroundings that are aesthetically pleasing and peaceful. Conflicts with aquaculture are often associated with the infrastructure that is located close to tourism areas (Deniz and Kilic, 1998, cited in Deniz, 2001). Ponds, tanks, cages, waste-processing plants, store sheds and construction materials are believed to have a deleterious effect upon the environmental quality of the hotels and second home areas.

The degree to which the planning system defines and enforces the rights to more abstract economic values such as visual amenity for those who benefit from the scenery of an area is complicated. It is difficult for aquaculture operators to prove that their activities will not adversely affect existing environmental amenities. Aspects such as the number of fish pens or cages that affect the visual amenity of an area must be considered, but these are difficult to quantify as they depend on many different factors as well as individual opinion.

In Australia there has been particular conflict and defining the value of environmental amenities remains a difficult and largely subjective issue. Recreational and environmental uses of Australia's coastal zone are part of the national culture and their amenity values can be correspondingly high (Holland & Brown 1998).

A formal cost-benefit analysis to inform decision making in the siting of aquaculture is therefore generally absent as it would require quantification of these intangible environmental qualities and would result in comparison with tangible socio-economic benefits of aquaculture derived through very different valuation techniques.

3.4.2 Scotland

A recently published report by Caledonian University *et al* for the Scottish Government (2008) investigated the economic impacts of wind farms on Scottish tourism. The research team surveyed 380 visitors and tourists at four areas throughout Scotland; Stirlingshire & Perthshire, Dumfries & Galloway, Caithness & Sutherland and the Scottish Borders. 86% of respondents had made a trip to Scotland before and 80% indicated that they would definitely return to Scotland at some point in the future.

Respondents were asked to rate the effect the following structures in the landscape have as strongly positive, slightly positive, no impact, slightly negative or strongly negative effect on them:

- Pylons
- Wind farms
- Mobile phone masts

- Ski facilities
- Planted forestry / felling
- Telephone wires / poles
- Hydro-electric dams
- Power station
- **Fish farms**
- Quarries
- Uplands trails / tracks

The responses to fish farms are presented in Figure 3.5. 22% of respondents had some level of positive opinion towards fish farms, while 11% indicated some level of negative response, with only 3% being strongly negative. The full results from this question of the survey are presented in Table 3.2.

Figure 3.5. Opinion of Fish Farm Structures in the Landscape

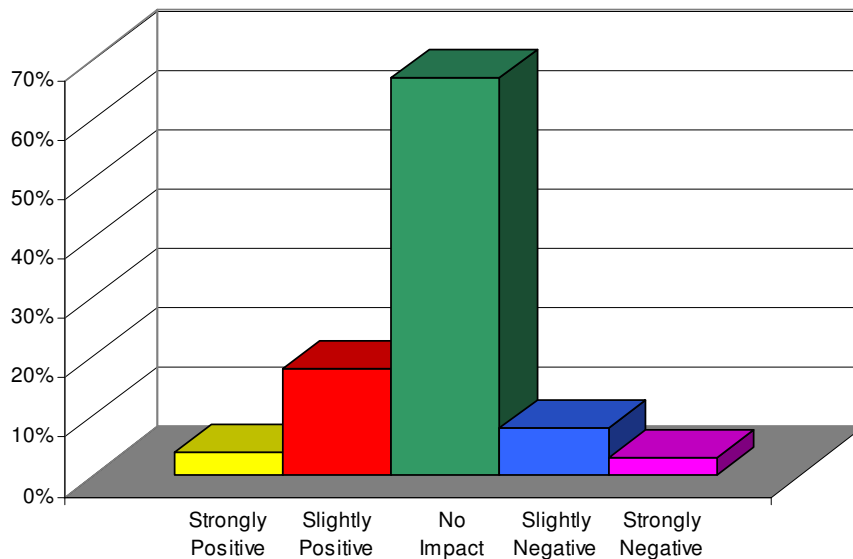


Table 3.2 Opinion of Structures in the Landscape (Scottish Government, 2008)

	Strongly Positive	Slightly Positive	No impact	Slightly Negative	Strongly Negative	+ve rank	-ve rank
Pylons	2%	5%	44%	32%	17%	10	1
Wind farms	14%	25%	36%	15%	10%	3	4
Mobile Telephone Masts	1%	3%	59%	27%	9%	11	2
Ski Facilities	3%	16%	73%	6%	2%	6	9
Planted Forestry/Felling	15%	31%	36%	15%	3%	2	7
Telephone Wires/Poles	2%	8%	69%	17%	3%	9	6
Hydro-electric Dams	10%	18%	66%	5%	2%	4	10
Power Station	4%	7%	63%	20%	6%	8	3
Fish Farms	4%	18%	67%	8%	3%	5	8
Quarries	3%	10%	64%	16%	7%	7	5
Uplands Trails/Tracks	23%	32%	41%	3%	1%	1	11

In terms of positive attitudes, fish farms were ranked fifth highest with 22% of respondents rating it as having a strongly or slightly positive effect. If taken along with 'no impact' responses, 89% of respondents believe that fish farms have a positive or neutral impact on the landscape.

The level of negative response (11%) towards fish farms was behind only ski facilities (8%), hydro-electric dams (7%) and uplands trails / tracks (4%).

3.5 Tourist perception of the environmental impact of fish farms

The perception of an area by tourists may depend on their initial expectations. Where a place has been marketed as a busy, thriving coastal community with the associated commercial activities such as aquaculture, the tourists are likely to be content with the sight of fish farms. Tourists seeking tranquillity in an unspoilt location may find fish farms to be more of an impact. Therefore appropriate marketing may play a part in this aspect of competition between tourism and aquaculture (Mikkelsen 2003).

Conversely, tourism developments may impact on existing and potential aquaculture through the discharge of sewage to the sea and by general disturbance. Recreational

activities may also interfere with aquaculture through noise, disturbance, and accidental collision with sea-based installations (Deniz, 2001).

3.5.1 International

Public perception of fish production often presents a different image from one country to another. The growth of coastal marine aquaculture in Europe is sometimes perceived to be of the newcomer disrupting the long-established balance between existing users (Aquamedi, 2002).

In some countries aquaculture appears as a secure strategy to control product quality and sustainability, while in France and Italy it is generally the view that food fish must be wild. In general marine aquaculture suffers from a bad image in the public with various recriminations such as chemical pollution. A fish farm on the northern coast of France (St Brieuc) was closed due to public pressure and negative image reasons. It was accused of producing algal blooms in summer. However, after closing the farm, ongoing monitoring showed that this farm produced significantly less nitrates and phosphates than the local pork production that was found to be the major cause of the blooms (de Monbrison 2004).

In Ayia Napa, Cyprus in 1990-91 a bloom of *Cladophora patentiramea*, an alien species from the indopacific caused nuisance to tourists. Effluents from a land based marine fish farm were blamed as the cause. The public reaction was organized mainly by the hoteliers, land developers and the nearby communities whose main concern was the effect that *Cladophora* could have on the tourist industry. An in-depth study of the phenomenon by the local and foreign experts proved that tourism development projects and intensive agriculture contributed 300% more nitrates to the sea enrichment than the fish farm. The scientific rationale was not accepted by the hoteliers and local communities, who demanded the farm be closed. This led to the government reconsidering its policy for land based marine aquaculture. Only hatcheries are now allowed on the coast, with fish farming being undertaken in offshore cages. During this period the *Cladophora* died off, while the farm was still in operation, in 1991. The *Cladophora* growth was attributed to a coincidence of favourable environmental parameters, like a series of years of warm, calm winters, high water temperatures and a favourable nutrient environment (Stephanou 1996).

Recent updates to aquaculture development plans in New Zealand came under criticism from tourism parties when the plans were to include the Bay of Islands area, which is one of New Zealand's premier marine tourism places. Rack culture of oysters was found to be of particular concern. Furthermore, negative views of aquaculture were fuelled by past management practises and the perceived abandonment of farms, particularly following a pollution event of uncertain origin that had severely affected the operations of farms in an inlet near a major yacht marina and historic sites (Rennie, 2008). However, a Congress on Marine Tourism (CMT) in New Zealand, which was being held at a similar time, held a session on the growing research on seafood tourism. Discussions included the development of an aquaculture tourism trail by the New Zealand Marine Farmers Association. It is believed by Rennie (2008) that there is potential to diversify local economies and promote heritage-based tourism through the development of culinary tourism experiences and that Scotland is well placed to achieve this.

3.5.2 Scotland

A recent survey of public attitudes in Scotland has suggested that people are relatively unconcerned about the environmental impact of fish farming, with only 28% of respondents claiming to feel worried about the issue (Hinds *et al.*, 2002, cited in Whitmarsh & Wattage 2006). The same survey showed that, while a majority (60%) believed that the seawater off Scottish beaches could be classed as either 'poor quality' or 'grossly polluted', only 1% believed that fish farms were the main source of seawater pollution and 4% believed fish farms to be a contributory source. However, there are signs of negative media coverage of intensive aquaculture (Asche *et al.*, 2001; Burbridge *et al.*, 2001, cited in Whitmarsh & Wattage 2006), and this may have impinged to some degree on the attitude of the general public towards fish farming in the area.

Tourist groups with a particular interest in the environmental impact of fish farms are scuba divers and sport anglers. These groups are an important part of the tourism industry and may be easily discouraged from visiting an area perceived to have a negative impact from aquaculture.

The British Sub Aqua Club has expressed concern about the levels of excess food and faeces which are discharged into the sea from fish farms without prior treatment (Rogerson 2004).

The World Wildlife Fund (WWF) reported sea lice from salmon farms in Western Scotland are strongly linked as the source of lice in wild salmon. Dr Rebecca Boyd of WWF's Joint Marine Program, stated. "The Scottish Executive and industry need to take prompt action to preserve Scotland's wild salmon and sea trout, and the angling and tourism industries that depend upon them." (SOS, 2004b)

The Scottish Anglers National Association Ltd reported salmon escaping from fish farms put Scotland's wild salmon stocks in danger from competition and possible interbreeding with larger and fatter farmed fish (Wallace, 2007).

The debate over the impact of aquaculture on wild salmon fisheries continues with the two camps both presenting contrary evidence on the extent and significance of environmental impacts, in particular sea lice. While fish farmers and sports fishermen continue to be in conflict on many issues, there are some positive developments, such as the success of Area Management Agreements (AMAs), that show consensus can be achieved locally.

3.6 Aquaculture as a tourist attraction

3.6.1 International

There is an international trend for increasing nature based tourism (Mikkelsen 2003). This can include fish farm integration with recreational activities or farm tours with possible product tasting (Aquamedia, 2002).

In Canada tourism operators in shellfish farming areas such as Baynes Sound, Cortes Island, Okeover Inlet, Barkley Sound and Clayoquot Sound of British Columbia have a

strong interest in extending their tourist season by linking with shellfish farm activities. Many established tourism related businesses can gain by having an added activity in their community - accommodation, eco-tourism guides, restaurants and transportation providers can all benefit. An example of this is the annual Comox Valley Shellfish Festival, the Cortes Island Oyster Festival, the Ladysmith Oyster Festival and the Clayoquot Oyster Growers Festival, held every year in British Columbia. As well as celebrating area seafood through the participation of local chefs, these festivals include literature, wine, music, and storytelling (BCSGA, 2007).

In the state of Maine both aquaculture and tourism sectors have grown steadily over the last 25 years indicating that aquaculture and tourism can and do coexist. Sea kayaking and boat tour companies use Maine's aquatic farms as an attraction. Recreational fishing guides bring clients to fish around the farms because they act as artificial reefs attracting game fish to feed around the underwater structures the farms create. For similar reasons birdwatchers visit aquatic farms to view the many different birds attracted to the farms. Tourists can sample the aquaculture products at the annual salmon and oyster festivals. Furthermore, thousands of trout are raised yearly on the local farms and are then released into contained ponds to support recreational fishing (Maine Aquaculture Association, undated).

Other examples of aquaculture coexisting with tourism include (Aquamedia, 2002):

- In Italy the practise of Valliculture, where a variety of marine fish are held in coastal lagoons at low density has been integrated successfully with tourism and recreational activities, such as Duck hunting.
- Aquaculture has been used for the integration and reclamation of low quality agricultural land into pleasant holiday properties, surrounding freshwater pond farming, in the Dombes area of France.
- Some farms have developed small lakes or river areas, for recreational fisheries such as trout fly fishing. An example of this includes angling 'tours' around the water courses of Jutland, Denmark. This region contains 75 'Put and Take' lakes as well as an abundance of river fishing areas.

Marine aquaculture in Cyprus has resulted in occasional non-organised tourist attraction. One of the distinct environmental effects of the fish farm operation is the increase of fish population below the cages and around them. In Cyprus fish, such as mullet and occasionally Bluefin Tuna, are attracted by fish food remnants and fish excreta. The fish aggregation draws both commercial and recreational fishermen in the area of fish farms. This activity can result in conflict between the aquaculture operators and tourists. No recreational fishing is allowed within a distance of 350 m from the floating installations of cage farms and a specific provision is included in the relevant licences issued by the Department of Fisheries, however fishing does sometimes occur. The tourists also cause controversy by travelling to the cages by speed boats, which can distress the fish and effect farm productivity (Stephanou 1996).

The town of Coromandell, to the south of Auckland, was one of the first sites for green mussel farming in New Zealand and also has a long history of rack oyster farming. The farm has a mussel barge tourist charter that takes people fishing and visits mussel farms. It also has an oyster shop which forms one of three seafood stops on a tourist route that also takes in macadamia nuts, chocolate, a winery and an ostrich farm (Rennie, 2008).

3.6.2 Scotland

A number of fish farms in Scotland have developed an as a tourist attraction for sport anglers due to high densities of fish and by being set in pleasant country areas.

The Moffat fish farm, Dumfries & Galloway shown in Figure 3.6 is set in a scenic location and provides sport anglers with a loch stocked with large Rainbow trout and Brown trout, as well as a loch stocked with carp, roach, rudd, bream and tench.

Figure 3.6 Moffat fish farm, Dumfries & Galloway



A fish farm in the Beecraigs Country Park, West Lothian encourages sport angling and also has an area of the farm open for visitors to feed the fish. (Undiscovered Scotland 2008).

Fish farm shops and restaurants can also become an attraction by developing a reputation for high quality products. An example of this is the Loch Fyne Oyster farm, discussed in section 3.7.2.

3.7 Tourism as a consumer of aquaculture products

3.7.1 International

As mentioned previously aquaculture products can be a tourist attraction. Also, the viability of fish farms can be increased by the demand from tourists for local seafood. With this in mind, the Cypriot government promotes marine aquaculture acknowledging its potential in increasing the good quality fresh fish required for its local population and the tourist trade. The bulk of the fish produced by marine aquaculture is consumed locally and tourism presents a main outlet for aquaculture products in Cyprus. Each tourist was estimated to consume at least 1.5 kg of fish (Stephanou, 1995, cited in Stephanou 1996), out of which a large part came from aquaculture. Seabream and seabass are served extensively in the local taverns frequented by tourists. The Cyprus Tourism Organization promotes the consumption of farmed fish through leaflets and other publications.

3.7.2 Scotland

Research has shown that *“Eating locally distinctive food, experiencing new and exciting flavours and having easy access to a choice of catering are all essential components of a memorable tourism experience”* (Food Tourism Scotland, 2008).

Scotland is known for its production of high quality smoked salmon and mussels. There are a number of instances where aquaculture is in partnership with food companies selling high quality seafood products to the tourism industry.

The Loch Fyne Oyster farm in Scotland provides an example of tourist consumption of aquaculture products. The farm has developed a fine dining image due to the high quality local produce and high environmental standards in their culturing and fishing methods. The farm also acts as a tourist attraction with a number of restaurants and shops, with a good reputation world wide.

Tobermory Fish Company, on the Isle of Mull, sells locally farmed mussels and trout as well as salmon and scallops in various forms.

3.8 Conflict between fish farms and other recreational groups

Conflicts with other recreational interests arise from yachts and pleasure boats, windsurfers, divers, snorkellers, swimmers and sports fishermen. These activities require good water quality for bathing water safety as well as large areas of uncluttered water surface. The effects of aquaculture can be deleterious to these by increasing turbidity through over-feeding and poor waste management (Deniz, 2001).

3.8.1 International

Sport anglers can be in conflict with aquaculture due to close competition for resources. Evidence of this is reported by Save Our Sea Trout Group who state that the world famous sport fishery for sea trout (and, to a lesser extent, the wild salmon) of western Ireland are now in a state of near total collapse due to high levels of sea lice originating from fish farms. The organisation suggests this has significant impact on employment, tourist numbers and the quality of life of many local people (SOS 2004a).

3.8.2 Scotland

As mentioned previously, some fishermen in Scotland fear negative effects on wild fish stocks due to negative environmental impacts from fish farms on wild fish stocks, including organic waste and sea lice.

Scuba divers may have a negative perception of fish farms due to having a particular interest in the environmental quality around some farm areas. In 2006 divers who have been visiting the wreck of the Port Napier in Loch Alsh, Scotland, reported that water quality and marine life on the wreck seems to have declined in the last 20 years since installation of a nearby fish farm in 1987 (Highland Council 2006).

At the same fish farm in Loch Alsh, wildlife watching operators were concerned about the level of predator control practiced by aquaculture managers. Species such as seals may be viewed as persistent pests by the aquaculture industry, although they may also be regarded as an indicator of good environmental quality by others, who have actively engaged in recording and reporting programmes with SMRU and others.

4 VISUAL IMPACTS AND SITING OF AQUACULTURE

4.1 Introduction

This section of the report provides:

- A summary of the list of criteria identified as being important in drawing up the case study locations;
- A brief landscape and visual assessment of the three case study locations; and
- A summary of planning context.

4.2 Case Study Locations: Landscape Criteria

A decision matrix was developed to inform the choice of case study locations (see Section 3.1 Table 3.1 of the main report). The following landscape criteria helped inform this process.

4.2.1 Viewpoint elevation

One of the most important factors in terms of potential visibility of an aquaculture structure is level of viewpoint. High level viewpoints, from elevated roads and footpaths, for example, look down upon cages, so they are more readily visible against a simple backdrop of open water. Fin fish farm cages tend to be less visible from low level viewpoints, for example from roads which run around the edge of the coast, or from the sea, as they are frequently back-dropped against the dark rocky shoreline or varied texture and colour of vegetation and woodland, or may well be located in shadow.

Recommendation: The selected case study locations should include stretches of high level road, mountain passes and low level coastal routes as well as coastal footpaths.

4.2.2 Variations in scale and distance

As noted in Hill *et al*, 'in contrast to landscape, a large water surface...offers few clues to help us gauge how far away a particular point in the water lies. Distances are particularly difficult to judge when looking out to sea.' In contrast, narrower stretches of water may make it easier to assess size, particularly if there is frequent boat traffic or on shore development of a known size. Hill *et al* also point out that 'on indented coasts with bays and islands it may be easier to judge distance and size, but only if the adjoining land offers clear clues as to scale.'

Recommendation: The selected case study locations should include viewpoints where coastal views extend out to a wide expanse of open sea, narrow straights or enclosed sea lochs, where views are likely to be drawn along the length of the coast, and more indented, small scale coastlines with promontories and islands.

4.2.3 The developed and undeveloped coast

The degree of development is used as a defining characteristic in coastal planning. Scottish Government policy on coastal planning is set out in National Planning Policy Guideline 13 'Coastal Planning', which encourages planning authorities to identify

stretches of coast as 'developed, undeveloped or isolated and set out the policies which should apply to these areas'⁴.

Aquaculture tends to be located on the developed and undeveloped coastlines, but is less likely to be encountered on the 'isolated'⁵ coasts, where national planning policy has tended to discourage development. Therefore it is important that the case study locations include generous stretches of coastline which can be defined as 'developed' or 'undeveloped' coast as per the NPPG13 definitions. This variety of coastline also creates opportunities for varied visitor experience, from visiting towns and villages to walking or kayaking in more remote areas.

Recommendation: The selected case study locations should include 'developed' and 'undeveloped' coastlines as well as 'isolated' coast, as defined in NPPG 13: Coastal Planning. This diversity of coastlines also offers a variety of landscape which had potential for different visitor experiences.

4.2.4 Recognised scenic value

Some landscapes are recognised as having scenic quality and have been designated either nationally or locally to reflect scenic or landscape quality. These are landscapes which are valued because of their natural beauty, and are therefore likely to have qualities recognised as being attractive to visitors.

Recommendation: At least one case study location should include a National Scenic Area (NSA), the national designation for landscapes of 'unsurpassed scenic quality'.

4.2.5 Study limitations

It was not possible within the limitations of this study to compare all aquaculture leases in Scotland with the list of landscape criteria identified above. Instead, large case study locations were identified where it was known that the seascape/landscape character included all the landscape criteria.

In addition, a desk study identified that aquaculture leases were located where they were likely to juxtapose with the criteria set out above within all case study locations. However, no site visits were undertaken to confirm that leases had been taken up and were active, or that leases were visible from publicly accessible viewpoints, and not obscured by local screening. In addition, the visitor questionnaire does not aim to establish whether visitors had encountered any or all of the variety of different landscape experiences possible in each case study area, it simply aims to establish whether or not visitors were aware of any fish farms during their visit.

4.2.6 The juxtaposition of landscape criteria and aquaculture in case study locations

In each case study location, a desk assessment of the relationship between the four landscape criteria used to help identify the case study locations and the distribution of aquaculture leases was carried out. Examples of sites where the landscape criteria can be found juxtaposed with the aquaculture leases is presented in the accompanying tables.

⁴ Scottish Executive, 'NPPG 13: Coastal Planning', 1997, Paragraph 14

⁵ Scottish Executive, 'NPPG 13: Coastal Planning', 1997, Paragraph 24

Isle of Mull: Landscape/seascape criteria

Landscape/Seascape Criteria	Examples where the criteria juxtapose with aquaculture leases
Viewpoint elevation	High-level viewpoints overlooking aquaculture leases: <ul style="list-style-type: none"> - B8035 looking north to Ulva - A484 south along the Sound of Mull Low level viewpoints overlooking aquaculture leases: <ul style="list-style-type: none"> - A849 along Loch Scridai and Loch Spelve
Variations in scale and distance	Expansive scale: <ul style="list-style-type: none"> - Lighthouse at Rubha nan Gall (north of Tobermory) - Overlooking Ulva from B8035, which also shows small scale islands in an expansive setting Straights and enclosed sea lochs: <ul style="list-style-type: none"> - Loch Spelve - Sound of Mull Indented coastlines with islands: <ul style="list-style-type: none"> - Loch Tuath
Developed and undeveloped coast	Developed coast <ul style="list-style-type: none"> - Tobermory, also a visitor attraction Undeveloped coast <ul style="list-style-type: none"> - Loch Tuath - Loch Scridai
Recognised scenic value	Loch na Keal NSA

Outer Hebrides: Landscape/seascape criteria

Landscape/Seascape Criteria	Examples where the criteria juxtapose with aquaculture leases
Viewpoint elevation	High-level viewpoints overlooking aquaculture leases: <ul style="list-style-type: none"> - A859 looking along West Loch Tarbert Low level viewpoints overlooking aquaculture leases: <ul style="list-style-type: none"> - East Loch Tarbert
Variations in scale and distance	Expansive scale: <ul style="list-style-type: none"> - South Uist (expansive backdrop) Straights and enclosed sea lochs: <ul style="list-style-type: none"> - Loch Seaforth Indented coastlines with islands: <ul style="list-style-type: none"> - Loch Roag - Outer Loch Erisort - North Uist
Developed and undeveloped coast	Developed coast <ul style="list-style-type: none"> - East Loch Roag Undeveloped coast <ul style="list-style-type: none"> - North and South Uist
Recognised scenic value	South Lewis, Harris and North Uist NSA South Uist Machair NSA

Shetland Isles: Landscape/seascape criteria

Landscape/Seascape Criteria	Examples where the criteria juxtapose with aquaculture leases
Viewpoint elevation	High-level viewpoints overlooking aquaculture leases: <ul style="list-style-type: none"> - A970 overlooking Mangaster Voe - A970 Dales Voe/Wadbister Voe Low level viewpoints overlooking aquaculture leases: <ul style="list-style-type: none"> - B9074
Variations in scale and distance	Straights and enclosed sea lochs: <ul style="list-style-type: none"> - Mangaster Voe - Clift Sound Indented coastlines with islands: <ul style="list-style-type: none"> - Burra Islands
Developed and undeveloped coast	Developed coast <ul style="list-style-type: none"> - Trondra/Burra Islands Undeveloped coast <ul style="list-style-type: none"> - Ronas Voe - Mangaster Voe
Recognised scenic value	Shetland Isles Area NSA

4.3 Case Study Locations: Descriptive Summary of Landscape and Scenic Resource

Three case study locations for interviews have been selected. They are all islands, and therefore have an abundance and variety of coastal landscapes and views. Each of the case study locations have a distinctive character and different scenic qualities, but all of them include leases located in areas of seascape which meet the criteria set out in Section 4.2.

The following section describes the wider variety of landscape settings which can be encountered within the case study locations. This provides a landscape and scenic context for the study.

Each of the case study locations has a distinct seascape/coastal landscape character, offering different experiences for the visitor and providing different opportunities for siting aquaculture. This section summarises key seascape characteristics largely common to all the islands and draws out some of the differences.

4.3.1 Scale of seascape

All the case study locations offer opportunities to experience the sea as a vast horizon, and more intimate seascapes enclosed by higher landform and islands. Variations in scale are considered important by *Hill et al* (2001) and by *Grant* (2008). The more extensive the horizon, and the larger the scale of the sea, the harder it is to determine the size of unfamiliar objects. Conversely, structures set into small scale seascapes will be more likely to appear large or obvious.

- On the Isle of Mull, larger seascapes are more likely to be encountered to the south and west, where the island overlooks the Atlantic, while the Sound of Mull offers a more intimate experience of scale.
- In the Outer Hebrides, most coastal views are back-dropped by the vast expanse of the wider seascape, although smaller scale seascapes are experienced where narrower sea lochs and the many areas where islands and skerries are scattered across the water.
- On Shetland, larger seascapes are most likely to be experienced from the more exposed cliffs and promontories, accessed from more minor roads and on foot, although South mainland offers expensive views east from the A970 over the North Sea. Many of the coastal views are characterised by enclosed sea lochs or narrow Voes, where islands are scattered across the outer reaches.

4.3.2 Sea lochs

Sea lochs area relatively popular location for fish farms, as they are often relatively sheltered. All the case study locations have sea lochs, but each have different characteristics:

- Isle of Mull has sheltered, relatively contained, moderate scaled sea lochs, such as inner Loch na Keal, often with simple, regular coastlines, orientated east-west, resulting in shadows cast along the southern shore.

- The larger sea lochs in the Outer Hebrides tend to have a more irregular coastline (eg West Loch Tarbert), while narrow and well contained sea lochs, such as Loch Seaforth, have a more simple coastline and are often in shadow.
- On Shetland, sea lochs range from narrow waters gently enclosed by low level terrain, to more steep sided fjords. The sea lochs are particularly characterised by their extensive inland reach, with only a narrow neck open to the sea. One further distinction is that while some of the lochs are orientated east-west, often, they can be orientated north-south, so that they can catch the light for much of the day.

4.3.3 Indented coastline with islands and skerries

Fish farms are often located amongst islands and skerries, as the fragmented pattern can camouflage their presence, particularly if the structures are small and do not dominate in terms of scale. There is a wide range of this type of fragmented coastline between the three case study locations.

- Off the west coast of Mull, at the mouth of Loch na Keal and around Ulva, the scattered and varied character of the many islands is a particular feature, visible from high level as well as low level views.
- In the Outer Hebrides, the ragged interlock between land and sea is at its most intense, particularly on the West coast of Harris and the Uists, where the densely convoluted and fragmented coastline sometimes blurs the distinction between island, skerrie, fresh water lochan and sea.
- Numerous islands off an indented coastline is a prevailing characteristic for much of Shetland's coast. These provide much needed shelter, so are often the setting for fish farms.

4.3.4 Sounds and narrows

As with sea lochs, Sounds and narrows can be popular locations for fish farms, where as well as being relatively sheltered they can offer the opportunity for faster flowing currents. There is a wide range of different types of narrows across the three case study locations.

- The Sound of Mull is a long, sheltered straight, frequently used by maritime traffic including ferries and yachts, with stretches of relatively regular coastline as well as more indented shorelines, all contained by low relief.
- The Sounds which link the chain of islands in the Outer Hebrides have an irregular, fragmented coastline and are dotted with numerous islands, with little containment as they are relatively open to the wider sea.
- On Shetland, Sounds range from long narrow straights, which have similar characteristics to the sea lochs, to more expansive areas of seascape, as at Yell Sound, where the coastline is very indented and there is a strong visual link to the open sea.

4.3.5 Wooded coastline

As noted in *Grant* (2000, 2008), a wooded foreshore can act as a dark, or at least varied textured backdrop to structures located in the water close to shore, particularly when viewed from a low level viewpoint.

- The Isle of Mull has the most extensive lengths of wooded shoreline in the three case study locations, with most woodland adjacent to the Sound of Mull and Loch Scridai.
- On the Outer Hebrides, woodland is very sparse, although the moorland vegetation can offer a similar dark coloured backdrop in some locations.
- Shetland, on the other hand, is characterised by its general lack of trees, and in many locations, the colour of the surrounding vegetation is light grassland, creating an overall light and reflective setting for fish farms.

4.3.6 Remoteness

All the case study locations offer opportunities for exploring more wild and less accessible coasts, but they also have attractive coastal towns and settled coasts which contribute to overall distinctiveness.

- On the Isle of Mull, there appears to be no aquaculture leases near the less accessible south facing coastline and the outer promontory of Ardmeanich, both of which are less developed stretches of coastline.
- In the Outer Hebrides, there are many stretches of less accessible coastline and remote hills which overlook the sea.
- On the Shetland Isles, many of the more remote coasts are adjacent to cliffs and promontories, where there is also considerable exposure and aquaculture leases are less likely to be encountered. In addition, however, a sense of remoteness can be experienced when travelling to the more far flung islands and aquaculture may be encountered in these more secluded locations.

4.3.7 Views experienced while travelling

All the case study locations offer elevated viewpoints and low level views from both roads and coastal footpaths. In addition, the coast of the Islands of Mull and the Outer Hebrides in particular are frequented by recreational yachts.

- On the Isle of Mull, roads often hug the coastline at a relatively low level, but there are elevated views, such as along Loch Tuath and the Sound of Mull, and from classic mountain peaks such as Ben More. There are also and spectacular dramatic panoramas revealed when crossing over high level mountain passes, such as above Grubin.
- Viewpoints on the Outer Hebrides are frequently relatively low level, as much of the land is low lying and islands are linked by causeways, with high level viewpoints from the South Lewis and Harris hills as well as low summits on the more southern isles.

- Elevated viewpoints on Shetland can be encountered along roads and from footpaths, including for example, views to the North Sea from elevated sections of the A970, and south along the west coast of the Mainland from the A971. Low level viewpoints are generally encountered from more minor roads, stretches of coastal roads and where narrow necks of land or causeways link islands.

4.3.8 Coastal attractions

There are a wide range of visitor attractions located on the coast in all three case study locations. It would appear that very rarely do these attractions coincide with aquaculture leases. This may be that it has been siting policy to avoid locating fish farms close to popular visitor attractions.

- On the Isle of Mull, key coastal attractions include Duart castle, the town of Tobermory, the islands of Iona and Ulva, and natural features at the Fossil tree and the Carsaig arches.
- The extensive sandy beaches, for example on the eastern coasts of Harris and the Uists are a key attraction of the Outer Hebrides, along with ancient historic sites which have a coastal setting and the flowering machair grassland.
- Many of Shetland's most important historic sites have a coastal location, including Jarlshof, Mousa Broch and St Ninian's Isle, while other coastal attractions include spectacular coastal landscapes such as Esha Ness and islands such as Papa Stour.

5 PLANNING POLICY CONTEXT

5.1.1 National planning policy context

Prior to the Town and Country planning (Marine fish farming) (Scotland) Regulations 2007, the lead authority for approving the siting and design of fin fish farms in most of Scotland was the Crown Estate, who took advice from Planning Authorities and other consultees into account when determining applications for a sea bed lease. Local Planning Authorities became the determining authority in April 2007, although a licence for use of the sea bed is still required from the Crown Estate, along with other regulatory provisions from other bodies.

National planning guidance on coastal issues within the town and country planning system is outlined in NPPG13: Coastal Planning. This encourages Local Authorities to 'identify which stretches of coast should be regarded as developed, undeveloped or isolated and set out the policies which should apply in these areas.'⁶ The definition of developed, undeveloped and isolated are as follows:

- 'The Developed Coast includes towns and cities as well as substantial free standing industrial and energy developments. It may also contains sites of significance for national and international nature conservation, important

⁶ Scottish Executive, 1997. 'National Planning Policy Guidelines 13: Coastal Planning', paragraph 14

cultural heritage resources as well as valuable areas of open space and recreation such as golf courses.

- The Undeveloped Coast includes agricultural and forestry land, low intensity recreational uses and smaller settlements which depend on the coast for their livelihood. Extensive sections of the undeveloped coast are protected by national and international natural heritage designations and contain important cultural heritage resources.
- The Isolated Coast is distant from centres of population and lacks obvious signs of development or other human activity. Such areas, which are likely to be limited in number and extent, are also likely to be relatively inaccessible. Some parts of the isolated coast may be protected by national and international natural heritage designations and may contain important cultural heritage resources⁷

5.1.2 Oban and Island of Mull (Argyll and Bute)

The planning policy framework for marine fish farming around the Island of Mull is outlined in the Modified Draft Local Plan for Argyll and Bute⁸. Policy LP AQUA 1 states that:

(A) There is general support for shellfish and fin-fish farming subject to there being no significant adverse effect, directly, indirectly or cumulatively on:

1. Communities, settlements and their settings;
2. Landscape character, scenic quality, and visual amenity;
3. Loch Lomond and the Trossachs National Park;
4. National Scenic Areas and Areas of Panoramic Quality;
5. Statutorily protected nature conservation sites, habitats or species, including priority species and important seabird colonies along with wild fish populations;
6. Navigational interests;
7. Areas of Isolated Coast (coastal area of very sensitive countryside);
8. Sites of historic or archaeological interest and their settings;
9. Recreational interests;
10. Areas of Search for Wild Land;
11. Existing Aquaculture sites; and
12. Water quality.

5.1.3 Outer Hebrides

The planning policy framework for marine fish farming in the Outer Hebrides is outlined in the Outer Hebrides Local Plan (2008)⁹. Policy LP/ED4 'Aquaculture and Marine Planning Powers' states that:

In assessing (marine fish farm) development proposals the following considerations will be taken into account:

⁷ Scottish Executive, 1997. 'National Planning Policy Guidelines 13: Coastal Planning', paragraph 14

⁸ Argyll and Bute Council, June 2006. Modified Finalised Draft Local Plan, pages 58/59

⁹ Comhairle nan Eilean Siar, March 2008. 'Outer Hebrides Local Plan', page 9

- a) location and design of installations and associated facilities;
- b) biodiversity, landscape and other natural heritage features;
- c) access and servicing considerations;
- d) appropriate measures to deal with the issues of pollution, disease and navigational considerations;
- e) appropriate operational (including associated noise and lighting impacts) management, monitoring and site restoration arrangements;
- f) the incremental or cumulative impact of the proposal.
- g) the impact of development on communities, tourism and upon areas used for recreational purposes.

5.1.4 Shetland Isles

Marine fish farming developments in the Shetland Isles fall within the scope of the Zetland County Council Act 1974, which 'places a duty on the Council to promote the conservancy of, and control of development in, the coastal area of Shetland between MHWS and the 12 mile limit.'¹⁰ This is the only Local Authority in Scotland which has this particular responsibility, and the result is that the Shetland Isles authority has taken a lead role in the siting and design of marine fish farms through the guidance offered by its Works Licence Policy.

The Shetland Isles Structure Plan¹¹, approved in 2000, concludes that 'In terms of coastal planning guidance, the coastline is considered to be undeveloped, except for areas at Lerwick and Sullom Voe. Although much of the coastline may appear isolated or remote, there is always considerable marine activity.'¹²

The Council's structure plan policy indicates that in determining marine fish farm applications it will take into account:

- a) the implications for fishing interests.
- b) the need to ensure that safe navigation is maintained.
- c) existing marine fish farms in the locality.
- d) the availability of any necessary infrastructure and potential impact on existing infrastructure, when relevant.
- e) the implications for recreational interests.
- f) potential effects, including cumulative, on the environment and natural heritage interests.¹³

The Council's Local Plan¹⁴ policy focuses on development actually on the coast and makes no specific mention of marine fish farming.

¹⁰ Shetland Islands Council, 2000. 'The Shetland Structure Plan 2001 – 2016' Paragraph 4.6

¹¹ Shetland Islands Council, 2000. 'The Shetland Structure Plan 2001 – 2016'

¹² Shetland Islands Council, 2000. 'The Shetland Structure Plan 2001 – 2016' Paragraph 4.1

¹³ Shetland Islands Council, 2000. 'The Shetland Structure Plan 2001 – 2016' Policy SP CST3

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