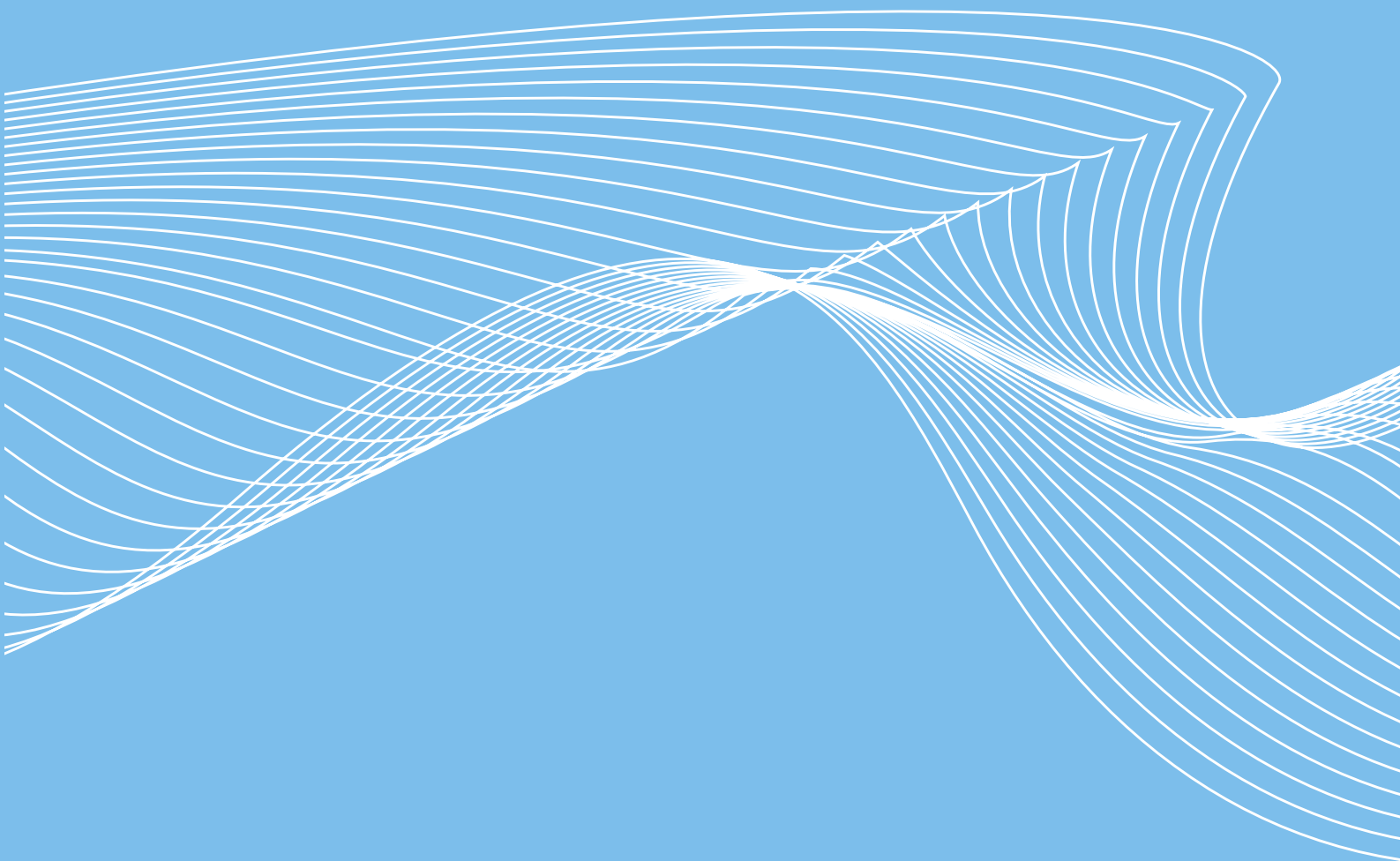


# A Strategic Framework for Scottish Aquaculture



SCOTTISH EXECUTIVE

**Making it work together**

# A Strategic Framework for Scottish Aquaculture





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## Foreword



I am very pleased to publish our Strategic Framework for the aquaculture industry in Scotland.

For too long the industry has been bedevilled by often ill-informed criticism of its operation which has not served in any way to advance debate. The present document emerges from a rather different process in which industry and its critics sat down together, jointly to agree the way forward.

It was important that this long overdue dialogue took place. The significance of the aquaculture industry to our rural economy in particular cannot be overstated. In many remote areas of Scotland its presence supports the necessary infrastructure of community life. It has made and will continue to make an important contribution to promoting rural diversity. And of course it is vital not only for the jobs it provides, but in its role as our largest food-exporting sector, producing 50% (by value) of Scotland's total food exports.

That modern Scotland needs a thriving aquaculture industry is clear and irrefutable.

Looking ahead, aquaculture must grow sustainably if it is to continue to build on its success. That means it must develop in ways which can be accommodated within the overall capacity of the environment to sustain it. The industry itself is in no doubt about this. It is significant in that context that most of the commitments to action contained in this document were proposed by the industry representatives on my Working Group themselves.

In other words, the Strategic Framework which is described in the following pages is characterised by the industry's willingness to work collaboratively with its stakeholders in the interest of what is best for Scotland. Commentators often refer to the relative youth of the industry – it has existed here for some thirty years only. I believe, however, that its contribution and commitment to the Strategic Framework are a mark of its maturity. This is a very clear statement of intent, which I am happy to endorse.

A handwritten signature in black ink, appearing to read 'Allan Wilson'.

**Allan Wilson, MSP**

Deputy Minister for Environment and Rural Development



# Executive Summary

This Strategic Framework document is in four parts.

Part One (pages 2 to 4) explains how the Ministerial Working Group accomplished its task, sets out its vision for the aquaculture industry in Scotland and describes the economic, environmental, social and stewardship aspects of the overarching principle of sustainability to which it had regard in developing the Strategic Framework.

Part Two (pages 5 to 12) describes the context in which the aquaculture industry in Scotland is operating, lists the recent policy developments and other initiatives which bear on its operation and considers the issues which it must confront if it is to develop sustainably.

Part Three (pages 13 to 40) explains how the vision set out in Part One is to be realised, listing the objectives and identifying priorities for action. (This information is also set out in tabular form in Appendix 3, showing which bodies are responsible for delivering the actions and in what timescales.)

Part Four (page 41) explains how it is proposed to monitor and publicise progress in delivering the Strategic Framework's objectives.



# Vision and guiding principles

## Introduction

- 1.1 This Strategic Framework document has been developed by the Ministerial Working Group for Aquaculture. The Group was set up following a series of preliminary bilateral meetings with stakeholder interests chaired by the Deputy Minister for Environment and Rural Development at the Scottish Executive, or one of his senior officials, throughout the first half of 2002. It comprised a wide range of stakeholders in the aquaculture industry in Scotland. (See Appendix 1.) It accomplished its task in part through subgroup working, but also met six times in plenary session between June and November 2002 under the chairmanship of the Minister or, again, one of his officials, and then once more, on 17 February 2003, following wider consultation on the draft proposals in the period from December 2002 to February 2003. The central and local government, other public body/regulatory, private sector, wild fisheries and NGO representatives on the Group all have a direct interest in the Strategic Framework's objectives and have all contributed to their formulation.

## Strategic Environmental Assessment

- 1.2 The EU Strategic Environmental Assessment Directive (1) came into force in July 2001 and will be implemented in the UK by July 2004. As a systematic process for evaluating the environmental consequences of programmes and plans, Strategic Environmental Assessment (SEA) is widely accepted as a valuable means of integrating environmental information into decision-making.
- 1.3 While it did not directly influence the preparation of this Strategic Framework document, the Directive will impact in due course on the delivery of at least some of the actions listed in Appendix 3. Some of these will constitute plans and programmes in terms of the Directive, and its requirements will need to be observed in undertaking them. The Directive will help to achieve sustainable development through its promotion of integrated environment and development decision-making, through the design of environmentally sustainable policies and in consideration of the best practicable environmental options.

## The Vision

### 1.4 Our shared vision is that:

**Scotland will have a sustainable, diverse, competitive and economically viable aquaculture industry, of which its people can be justifiably proud. It will deliver high quality, healthy food to consumers at home and abroad, and social and economic benefits to communities, particularly in rural and remote areas. It will operate responsibly, working within the carrying capacity of the environment, both locally and nationally and throughout its supply chain.**

## The guiding principles

- 1.5 The Scottish Executive has publicly committed to sustainable development, which, balancing economic progress with social justice and environmental responsibility, is a central element of the Programme for Government whose key role was reaffirmed in the Scottish Parliament on 9 January 2002. Sustainability is therefore the overarching guiding principle for our vision for aquaculture in Scotland and in preparing this document we have had regard to its economic, environmental, social and good governance or stewardship aspects, each of which is reflected in the guiding principles below and in our consideration of the issues in Part Two.
- 1.6 The definition of sustainability we have employed here is that developed in 1987 by the World Commission on Environment and Development:

*Sustainable development meets the needs of the present without compromising the ability of future generations to meet their needs (2).*

## The economic principle

- 1.7 Aquaculture should be enabled to make a positive contribution to the Scottish economy through being internationally competitive in the marketplace and economically viable at a national level.

## The environmental principle

- 1.8 The industry should work in harmony with nature, managing and minimising transient environmental impacts, and avoiding significant, cumulative, long-term or irreversible changes to ecological systems, to cultural remains or to valued landscape and scenery.

## The social principle

- 1.9** Aquaculture should foster strong community links, recognising and supporting the needs of local communities and working with community initiatives to manage local environments for mutual benefit. It must be integrated within its community, liaising locally and nationally on all appropriate matters.

## The principle of stewardship

- 1.10** While the first three principles relate to outcomes, the principle of stewardship relates to the ways in which these principles will be observed. It is about delivering outcomes sustainably. It embraces the precepts of transparency, integration, co-ordinated government and fit-for-purpose regulation, partnership and stakeholder participation, accountability, ethics and regard for animal welfare, and a culture of best practice and continuous improvement. This both reflects and develops the concept of stewardship set out in the Government's first Marine Stewardship Report (3).

# The context

## Background

- 2.1 Commercial aquaculture began in Scotland in the 1970s, although research and small-scale fish and shellfish production had by then been under way for some years. Since the 1970s, the industry has developed into a major employer in rural Scotland, with just under 2,000 direct jobs and between 4,000 and 5,000 in the supporting sectors. Around 75% of these jobs are in the Highlands and Islands. The industry, which includes a significant, and growing, organic sector, generates annually more than £500m of turnover at “farm gate” and through secondary processing, and now accounts for around 50% by value of all Scottish food exports. Production in 2001 was some 139,000 tonnes of salmon, almost 5,500 tonnes of rainbow trout, and 3,000 tonnes of cultivated shellfish. Techniques to farm alternative species such as halibut and cod are now reaching commercial fruition and the industry is keen to diversify. While much of its production arises from activities in marine waters, the trout sector and early stages of salmon rearing rely on Scotland’s high quality freshwater resources.
- 2.2 For some time, however, there has been increasing disquiet in some quarters about aspects of the finfish industry’s operations. Environmental concern has focused on the impact on wild salmon and sea trout stocks, on the seabed below finfish farms and on the wider marine ecosystem. In 2001-02 the Transport and the Environment Committee of the Scottish Parliament conducted a rolling inquiry into aquaculture (4).

## Policy developments and other initiatives

- 2.3 Recent initiatives involving the Scottish Executive and other key stakeholders have been designed to improve working relationships, regulation and industry practices.
- 2.4 The Executive-chaired Tripartite Working Group (TWG), whose membership is drawn from the Scottish Executive, the fish farming industry and wild fishery interests, seeks to ensure through Area Management Groups (AMGs) and Area Management Agreements (AMAs) the maintenance of healthy wild salmon and sea trout stocks alongside a sustainable aquaculture industry.

- 2.5 The Executive's 2001 review of aquaculture regulation was designed to produce a more streamlined and transparent regulatory process. Its key proposals, now being implemented, included enhancement of the Scottish Environment Protection Agency's (SEPA) statutory powers, streamlined application processes, measures to improve control of sea lice and further work to determine the carrying capacity of coastal waters.
- 2.6 The Aquaculture Health Joint Working Group (AHJWG) was created to improve the general health, welfare and management of farmed fish. The Code of Practice to Avoid and Minimise the Impact of ISA, introduced in August 2000 (5), informs development decisions by regulators and industry.
- 2.7 A Containment Code of Practice, aimed at reducing escapes of farmed fish, was introduced in November 2000 (6). In the Spring of 2002 notification of escapes and suspected escapes became mandatory.
- 2.8 The Aquaculture Forum, established by the Highlands and Islands Convention, informs the development of future planning arrangements, in particular at local authority level.
- 2.9 The Water Environment and Water Services Bill completed its passage through the Scottish Parliament early in 2003. In due course it will bring marine fish farms out to the three-mile limit within the scope of the Town and Country Planning legislation.
- 2.10 Meanwhile, revised Locational Guidelines for the Authorisation of Marine Fish Farms in Scottish Waters were published in January 2003 (7). These offer advice, consistent with a precautionary approach, to planning authorities on potential farm locations.
- 2.11 The Scottish Executive, other public sector bodies and the aquaculture industry are all committed to improving scientific understanding of the issues surrounding aquaculture. The Executive commissions a programme of research and development on animal health and the environmental impacts of aquaculture. Fisheries Research Services (FRS) are responsible for carrying out statutory fish and shellfish health inspections and disease control.
- 2.12 The Scottish Executive is working with the Department for the Environment, Food and Rural Affairs (DEFRA) and the Welsh Assembly to produce a GB-wide strategy in the Summer of 2003 to promote the health and welfare of animals kept by man. Within this, Scottish-specific delivery arrangements will be developed and Scottish stakeholders fully involved. The strategy will support the commercial viability of the aquaculture sector and the health and welfare status of its stock.
- 2.13 Within the European Community, aquaculture, which is regarded as an increasingly important industry, is covered by the Common Fisheries Policy (CFP). The UK is the largest aquaculture producer in the European Community, growing 30% by volume of the Community's total production, and the Scottish aquaculture industry represents 90% by value of all UK aquaculture. Under the current review of the CFP, the Commission proposes a strategy for aquaculture (8) designed to assure the availability of healthy products to the consumer, promote an environmentally sound industry and create employment in fishing-dependent areas. (See Appendix 7.)

- 2.14 Individual agencies have developed policies and procedures to guide their respective regulatory and advisory duties. These include the development of policy on Natura 2000 sites, which require special assessment and protection to ensure that the integrity of their specified conservation interest is not compromised.
- 2.15 The management of aquaculture must take account of the EC Habitats and Birds Directives (9, 10), particularly the listing of wild salmon and of freshwater mussels (which rely on salmonids for the distribution of their larvae) as Species of Community Interest, and of particular marine habitats, under the Habitats Directive.
- 2.16 The UK is committed to a range of international agreements which guide management action. These include the OSPAR Convention (11), which seeks to prevent and eliminate pollution and to take measures necessary to protect the maritime area against the adverse effects of human activities, to safeguard human health, conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected. They also include a number of commitments under the NASCO Convention (12) to minimise the impacts of salmon aquaculture on wild salmon stocks.
- 2.17 The Government published its first Marine Stewardship Report, *Safeguarding Our Seas: A Strategy for the Conservation and Sustainable Development of our Marine Environment*, in May 2002. This provides a vision for clean, healthy, safe, productive and biologically diverse oceans and seas. Its underlying principles will guide future decision-making in Scotland on activities impacting on the marine environment, including aquaculture. They are: sustainable development; integrated management; conservation of biological diversity; robust science; the precautionary principle; and stakeholder involvement. Delivery of the vision requires the adoption of an ecosystem approach to manage our use of natural resources sustainably and strategically and to maintain the health of ecosystems.
- 2.18 The Scottish Environment Protection Agency has developed a consenting approach under the Control of Pollution Act 1974, including the application of novel modelling techniques, to set limits on the discharge of wastes from finfish farms to natural waters, ensuring that safe environmental standards are not exceeded. This site-specific regulatory approach is the first of its kind among the fish farming nations and SEPA's procedures manual, available to the public, sets out clearly how it is applied. SEPA will review methods and standards as new information becomes available, ensuring its regulatory approach is underpinned by sound scientific principles.
- 2.19 SEPA is to launch a comprehensive online pollution inventory in 2005. Consultation on its format and scope started early in 2003.
- 2.20 In January 2001, the Scottish Executive published *Smart, Successful Scotland* (13). This outlines the Executive's enterprise strategy, underlining the role of the Enterprise Networks (Scottish Enterprise and Highlands and Islands Enterprise). It highlights priority areas in which Scotland must succeed if it is to achieve sustainable long-term economic growth, and groups them under the following strategic themes:



- growing businesses: supporting innovation and entrepreneurship, assisting new companies to get started and existing companies to develop further;
- global connections: encouraging Scottish companies to increase their involvement in global markets; and
- skills and learning: ensuring business has access to the skills and expertise it needs to be competitive.

*Smart, Successful Scotland* is a comprehensive strategy, aimed at every region and every sector of the economy. Food production and advanced food processing are highly technical businesses and the production of cultivated fish products is exactly the type of high-tech industry that *Smart, Successful Scotland* seeks to promote. Highlands and Islands Enterprise's strategy: *Smart, Successful Scotland, the Highlands & Islands Dimension* ([www.hie.co.uk](http://www.hie.co.uk)) combines the three strategic themes of *Smart, Successful Scotland* with a Strengthening Communities theme, recognising the integrated nature of economic and social development in a rural environment, and particularly in more remote and fragile areas.

## National Healthy Eating Campaign: Healthy Living

- 2.21 At the beginning of 2003, the Executive launched a major healthy eating campaign (the first part of its *Healthy Living* campaign) to increase consumer demand for healthier foods such as fish products by inspiring the nation to respond to a call to action. Targeted at a primary audience of Scottish adults to age 75 across the social spectrum, the campaign delivers important, basic, healthy eating messages, while directing people to a new telephone adviceline and website where they can get practical advice and information. The food industry, including aquaculture, is positioning itself to promote and respond to increased consumer demand for healthier eating options.

## The issues

- 2.22 In the preparation of this document the issues confronting aquaculture which the Working Group addressed were considered under the same broad heads as the guiding principles in Part One. The inter-relationships between the industry and other stakeholders were carefully considered. On the one hand, the industry has an over-riding need to develop and grow in order to meet market expectations. It also needs to remain competitive and attract sufficient investment to deliver the long-term commitment to quality, best practice and the demonstrable level of sustainability discussed within this Strategic Framework document. On the other hand, the environment and the interests of other stakeholders must be respected and the principles of risk management must therefore be diligently applied. We concluded that some locations within Scotland's aquatic environment will justify particular precaution, although in other areas there is no major threat from the existence, or the controlled development, of aquaculture. Industry development in areas deemed sensitive should be carefully controlled until a scientific assessment has confirmed whether or not further activity can be sustained. In either situation, we agreed that industry expansion should be permitted only where the quality of operating practices can be guaranteed.

## Economic issues

**2.23** Our aspiration is to see Scottish aquaculture positioned nationally and internationally as a commercially competitive core industry, delivering products reputed for their quality and sustainability. The European Commission has set development targets for aquaculture in the EU, and we believe the Scottish industry can sustainably deliver its proper share of these targets, particularly in:

- increasing employment, especially permanent and skilled employment in rural areas and remote communities;
- increasing the value of sales throughout the supply chain;
- increasing the volume and value of exports;
- the encouragement of start-up companies;
- the regular development of new primary and added-value products to meet consumer needs;
- species diversification to provide a basket of high quality Scottish seafood products;
- the encouragement of technology transfer; and
- the attraction of essential inward investment.

These aspirations, which must be achieved within the parameters of this Strategic Framework document, will enable Scotland to optimise the benefits of a successful aquaculture industry.

**2.24** Apart from the environmental constraints, the growth envisaged will be contingent on the industry's continuing to be responsive to the market, to retailer requirements on quality assurance and to consumer demand for healthy products which are safety-assured and which offer good value for money. Both finfish and shellfish farming (both molluscan and crustacean) will wish to continue to develop and expand their product ranges to meet the many different market opportunities and consumer needs. The whole industry will need to be able to do this competitively in a fast-moving global market which is heavily influenced by low-cost commodity producers. Additional costs imposed uniquely on Scottish producers should be avoided wherever possible. To develop further, aquaculture will need suitable additional capacity, but this will be subject to carrying capacity limits still to be determined, or management and technological advances to reduce environmental impact.

**2.25** Aquaculture will need to be well-resourced. To be successful, the industry will require:

- competitive access to adequate commercial investment;
- a licensing regime which fosters sustainable, long-term investment;
- government support for export promotion;
- government readiness to intervene on matters relating to trade procedures and market stability;
- a fish health regime which safeguards the needs of both farmed and wild fish resources;



- a sound research and development base, to provide both long-term R&D and closer-to-market technical innovation;
- well-qualified staff with opportunities for continuous skill development;
- an appropriate allocation of FIG (Financial Instrument Fisheries Guidance) or other structural funds;
- commercially affordable insurance or alternative contingency arrangements capable of underpinning investor confidence in the context of the Government's management of fish health measures;
- an efficient infrastructure, which is sensitive to the industry's own requirements and to the environment; and
- a well-financed and stable processing sector.

## Environmental issues

- 2.26** Scotland's coastal environment and waters are of exceptional quality. Scottish landscapes and wildlife are internationally renowned. They are important not only for their own sake, but also because they underpin a certain quality of life and because they are the foundation of the Scottish tourism industry. They need to be understood as a source of multiple benefits, providing livelihoods from different sources (including from aquaculture, which relies on good water to protect fish health and the reputation of its products) as well as space for wildlife and opportunities for recreation and enjoyment.
- 2.27** Like many other industries, aquaculture creates an environmental footprint. However, as regards impacts from organic wastes, the area of seabed affected by aquaculture is insignificant in terms of the total coastal resource (as the *Review and Synthesis of the Environmental Impacts of Aquaculture* (14) confirms). Finfish cage-rearing techniques in particular rely on natural processes to disperse and break down waste emissions. If appropriately managed, some impacts, such as the deposition of biodegradable organic solids on the sea bed below and close to fish cages, are usually localised and transient. But fish farms may also cause wider-scale effects: for example, from nutrient emissions (particularly in poorly flushed waters) and the risk posed by residues of medicines and other chemicals should safe limits be exceeded or unauthorised compounds used. It is therefore important to identify and protect the sensitive or critical processes and interactions between different groups of aquatic flora and fauna, setting appropriate environmental standards to guide the regulatory process. This ecosystem approach must be further developed if informed, site-specific decisions are to be taken on further expansion without exceeding the environment's capacity to assimilate wastes.
- 2.28** High standards of water quality are protected by European Directives such as 79/923 (15). The industry must work within the carrying capacity of the environment, defined in terms of its impact on water quality, on the fauna and flora of the water column and seabed, and on the landscape, scenery and cultural heritage, taking fully into account the cumulative impact of multiple aquaculture developments.

- 2.29 It must also continue to develop efficient and cost-effective ways of reducing polluting emissions per unit of production. This may involve investment in new technology such as systems to improve feed conversion and reduce wastage, and careful management of sea bed sediments to prevent unacceptable impacts. Such impacts may also be reduced through careful siting, design and husbandry. Development of polyculture techniques to intercept and recycle nutrients arising from finfish farming should be trialled to identify appropriate options for Scotland's inshore waters. Environmentally sensitive aquaculture, particularly shellfish farming, should be encouraged.
- 2.30 Developments of a certain type or scale may be less appropriate in areas which are valued for their wildlife or scenery, or their cultural heritage value, especially when their cumulative impact is taken into account. A small number of areas should be kept free of aquaculture, particularly those which are valued for their so-called *wild land* quality, both to preserve this quality and so that they may be available to act as scientific controls to assess the impact of development elsewhere.
- 2.31 Through appropriate planning, regulation, guidance, and the adoption of best practice and of the precautionary principle, aquaculture should be encouraged to develop in ways which can be accommodated within the overall capacity of the environment. Further expansion beyond this point cannot rely on the direct discharge of wastes and will require development of appropriate waste management methods.
- 2.32 The industry should utilise fish feeds which can be sourced sustainably, including from wild fisheries deemed sustainable by national or international regulatory authorities. It will also consider using unavoidable fish industry discards and waste from fish processing (while safeguarding against intra-species recycling of discards and waste to avoid the potential risks of disease spread) and new non-marine feed sources as alternative feed stocks. An assessment of feed sources should include a multinational analysis of all the above options.

## Social issues

- 2.33 The aquaculture industry is of vital importance to many rural and remote communities where it makes a significant contribution to promoting rural employment diversity. In some communities, where there may otherwise be few job opportunities, perhaps 30% or more of the workforce will be dependent on its operation. In these areas its activities will also provide a foundation for the necessary infrastructure of community life, such as the local hall, shop, petrol station or primary school, as well as the development of new housing, all of which will serve to keep these and other services in the community. The employment opportunities it generates are often complementary to the needs of crofters and others. *Smart, Successful Scotland: the Highlands & Islands Dimension* recognises the inter-relationship of economic and social development in a rural environment and the importance of considering any sector, particularly in more remote areas, in the context of its impact on the wider local community and economy.

- 2.34** If it is to be generally acceptable in these rural and remote locations, however, the industry must enlist community support for its activities. This may involve commitment to change, to address issues where there is concern. Building better community relations means engaging in partnership initiatives and genuine consultation, with full stakeholder participation. The industry will take measures to develop understanding of its aims and will encourage scrutiny of its actions: for example, through the provision of local visitor centres, open days and other appropriate measures.

## Stewardship issues

- 2.35** The industry relies on a healthy, unpolluted environment to optimise production and the quality and reputation of its products. As well as meeting standards set to protect the environment, it must acknowledge its responsibility for meeting appropriate standards of welfare and disease control. If they are to enjoy public confidence, these standards and the measures taken to meet them should be developed and implemented transparently, with full stakeholder participation. Transparency and demonstrable adherence to environmental standards will be further enhanced in due course by Strategic Environmental Assessments of those of the commitments encompassed by this Strategic Framework which constitute plans and programmes in terms of the SEA Directive, and a review of the standard of EIAs for individual aquaculture projects.
- 2.36** Marine aquaculture's operations need also to be considered in the context of integrated coastal zone management (ICZM), which will provide a framework for co-ordinated management of the coast, its environment and its use by the businesses which rely on it. A coastal strategy for Scotland is being developed within the Scottish Coastal Forum. It aims to meet the standards of the ICZM recommendation 2000/413/EC (16) and will inform and guide all who have a role in managing the coastal zone.
- 2.37** Integrated working on the ecological status of our coastal waters will be further assisted by the production of River Basin Management Plans and sub-Basin plans, which will extend to three nautical miles offshore, under the Water Environment and Water Services Act. SEPA and the other competent authorities must seek to operate better co-ordinated and integrated planning and regulatory systems, and to ensure the involvement of all stakeholders in local river basin advisory groups, which may have aquaculture subgroups.
- 2.38** The industry must develop and implement systems for encouraging best practice and continuous improvement, which should in turn be encouraged by appropriate public incentives to reward progress. Demonstrating progress will be crucial in proving that the Scottish aquaculture industry is meeting the commitments within this Strategic Framework document.

# Realising the Vision

- 3.1 We would expect to realise the Vision set out in Part One of this document by meeting the following objectives, to secure the over-riding principle of sustainable development for Scotland's aquaculture industry.

## Following the economic principle:

- to achieve an internationally competitive and economically viable industry;
- to maximise the value to the Scottish economy of the aquaculture industry and its products, both in terms of jobs and of investment;

## Following the environmental principle:

- to operate within the biological, assimilative and visual carrying capacity of the environment;
- to ensure that the impact of the industry on the biodiversity, landscape, cultural heritage and recreational uses of the sea and coast is minimised and significant impacts avoided;

## Following the social principle:

- to ensure that communities are involved in the development of, and benefit both socially and economically from, aquaculture;
- to encourage more people to benefit from Scotland's healthy, nutritious aquaculture products;

## Following the stewardship principle:

- to adopt sound welfare conditions in the management of farmed stock;
- to adopt best practice in the management and control of disease and pathogens and best environmental practice;
- to provide appropriate regulating support and infrastructure;

- to encourage the industry to manage its operations in pursuance of these objectives, rather than relying on regulation alone to set operational boundaries; and
- to demonstrate a responsible approach through continuous improvement.

3.2 Much that is happening now in Scottish aquaculture is already contributing to these objectives. To guide the industry's future development, however, the following priorities for action have been identified, reflecting areas where there is a need for heightened effort. (None of these implies a reduction of effort in other areas of policy activity.) The priorities are also listed in Appendix 3, which shows in tabular form what is proposed. The relative importance of different priorities will change over time, as current challenges are effectively tackled, and new challenges emerge. We therefore propose to keep Appendix 3 under review, and revise and re-issue it every year to eighteen months so that the degree of progress being made towards achievement of the objectives is visible.

## In pursuit of the economic objectives

### Commercial investment

3.3 If the aquaculture industry is to provide sustainable benefits to Scotland, it must be able to attract long-term, commercial investment: only by so doing will it remain competitive in the global market. The industry trade associations will work with the public sector to accomplish this. The Federation of Scottish Aquaculture Producers (FSAP) proposes to prepare a plan to encourage investment in Scottish aquaculture which will cover such issues as the length of aquaculture leases with the Crown Estate, the allocation of FIFG structural funds and the challenges to business of meeting health legislation. Its initial report will be completed by December 2003 and recommendations will then be developed with the relevant parties.

### Comparative costs of aquaculture production

3.4 The Scottish aquaculture industry contends that its costs are higher than those of its competitors in other countries. The disparities are said to relate to direct regulatory and rental costs, as well as to imposed inefficiencies of scale deriving from regulatory constraints. The industry, the Crown Estate and the Scottish Executive will therefore consider whether an independent study should be commissioned to look at the costs which regulation imposes on aquaculture businesses in Scotland in relation to the protection which is derived from it and its impact on competitiveness, and to compare these costs with those in other countries. The study would need also to address wider issues of competitiveness, including comparisons of environmental management, husbandry, efficiency of feed utilisation, health surveillance and treatment, and survival. Such a study should provide evidence of whether there are indeed competition problems to be addressed. If it is to proceed, the study's terms of reference, budget and contractor would be agreed in the Spring of 2003 and the study itself required within six months.

## Export strategy

- 3.5** Exports of Scottish aquaculture products are vital for the industry and are growth areas for high value products. They account for up to 50% of Scottish food exports. To secure and develop existing business, the industry proposes to formulate an export strategy, analysing key export markets and potential markets to identify opportunities for profitable growth and new exports. The exporting companies, the trade associations and the public sector will all be involved. In the first instance a strategic analysis will be commissioned during 2003 by HIE and Scottish Enterprise in consultation with the industry, Seafish, SDI and FFB (Food from Britain), with the aim of delivering a targeted action plan for the Spring of 2004.

## Downstream or whole-chain commitment

- 3.6** Retail and food service sector support for the principles set out in this Strategic Framework document, and acknowledgement that environmental best practice adds to costs, are important. Maintaining a competitive product for final consumers in a global industry such as aquaculture requires that all sections of the supply chain become partners in delivering the environmental benefits and sustainability that are sought.
- 3.7** The commitment of the fish/aquaculture processing sector to the principles encompassed by the Strategic Framework is also seen as important. Its purchasing decisions will often determine what retailers and the food service sector stock. Scottish aquaculture needs a viable processing sector with sufficient capacity and investment. At the same time, the Scottish finfish processing sector and the jobs it supports are increasingly dependent on imports of wild demersal fish and aquaculture products as seafish landings decline.

## New species

- 3.8** With the decline of wild stocks, the aquaculture industry is rising to the challenge of helping to fill the fish gap. (Aquaculture represents an opportunity to supplement output from a sustainable catching sector.) Demand for recognised species is increasing (farmed Scottish halibut and cod have already started to arrive in the market place, and haddock will follow soon) and, as consumer preference moves closer to added value and processed products, and retailers look for unique selling points, opportunities to include as yet untried species will arise.
- 3.9** The industry will research (and seek to anticipate) customer demands, meeting these by investment in new products and technologies appropriate to each sector. As market share and penetration increase, Scottish producers must continue to fill demand if it is not to be met by imported products – to the detriment of the home industry. It is also in this area that specific branding can build on quality schemes developed and agreed with partners.



- 3.10** Sites and development opportunities must be investigated ahead of demand, especially with local inshore and freshwater fishing interests. The industry would like to see an integrated, multi-species approach to sharing the coastal zone with different sectors and other users. Locally, management zones might be occupied at any time by any of the sectors (salmon, halibut, cod, haddock, trout). As an interim measure, multiple species may have to be farmed on a single site for the first three to six years of the development of a particular sector. For shellfish, a mix of individual shellfish units and shellfish farming integrated with finfish are options for the future which are already being piloted. The industry will identify means of increasing production in response to market demand within the constraints of carrying capacity (still to be determined). Longer term, it will explore ways of diversifying through further new species, assessing their potential and developing fully-costed critical paths to market for each one. Scotland can thereby build on its reputation for high quality aquaculture products, securing market share, established market recognition and increased opportunity for wealth generation.
- 3.11** However, as a matter of priority, the challenges posed by the development of new species must also be assessed. The Aquaculture Health Joint Working Group, which views the emergence of the marine finfish sector as a positive contribution to the sustainable development of the Scottish aquaculture industry, has as a first step identified the following issues for further consideration in relation to the interactions in the culture of fish (cod, haddock, salmon and halibut) and shellfish in Scotland.
- 3.12** First is the opportunity for cross-infection between fish species and the emergence of novel diseases. The new sectors will apply the current ISA Code of Practice where this is relevant, pending the development of a generic code applicable to all sectors which will have specific sections to take account of individual sectoral needs. They will notify abnormal mortalities suspected of being caused by an infectious agent, to provide early warning of potential problems. The Aquaculture Health Joint Working Group has also recommended that feeding unpasteurised fish to farmed fish should be prohibited, to reduce the risk of transmission of infectious diseases.
- 3.13** Risk assessments will be carried out by the appropriate regulator in conjunction with the applicant to determine the need for, and the duration and timing of, fallowing in relation to the environmental and health conditions on any site, taking into account other users within the management zone.
- 3.14** All operators will be encouraged to enter into area management agreements. Modifications to existing AMAs may be required to take account of the farming of new species.
- 3.15** Containment is important in reducing the potential both for disease transmission and for contamination of the genetic integrity and fitness of wild fish. The requirement for notification of escapes and suspected escapes, developed primarily for salmon and trout, applies to the new species also, but the current Containment Code of Practice will be expanded to take account of the different needs of the new sector.

- 3.16** The main risks to fish health associated with the interaction between shellfish and finfish farming are those arising from passive transmission from depuration plants and relaying. Where these operations are undertaken, a risk assessment should be made. Shellfish growers should be involved wherever area management agreements are in prospect.
- 3.17** Apart from the health and welfare issues, wider environmental issues will also need to be considered. These will include in particular the risks posed by escapes of new species for wild stocks and of any novel techniques which may be required to manage these species in cultivation. Particular care will need to be taken over the potential impact of non-native species and any which have the potential to establish in the wild in Scottish waters should be avoided. The Executive is currently consulting on proposals to make a number of species and/or genera of non-native freshwater fish subject to licensing arrangements and these arrangements will be capable of extension to other species should that prove necessary. The proposed Scottish Aquaculture Research Forum (see below) will be invited in due course to consider these and related issues.

## Shellfish sector

- 3.18** Expansion of the shellfish sector, including diversification of species (both molluscan and crustacean) is to be encouraged in Scotland as an environmentally sensitive activity, with support as appropriate from the relevant planning authorities and development agencies. There is scope for direct community involvement in this sector through investment or participation in small-scale, crofting shellfish farming.

## Adding value through differentiated products and niche markets

- 3.19** Scotland's potential for differentiated products, premium brands and niche marketing opportunities can be developed. The industry is capable of achieving premium and value-adding opportunities in the market by delivering branded differentiation and niche products such as organic, but it will need to work with the relevant public sector bodies (HIE, Scottish Enterprise, SEERAD) to enhance the potential of its brands and the associated product quality standards (TQM, Label Rouge, SQT, Shetland, Orkney).

## Polyculture

- 3.20** Polyculture systems and species require full evaluation to clarify the practicalities of their application, and to determine the economic and other benefits which might result. Any study of polyculture (by which we mean nutrient budget management) must address the need to find markets, or environmentally and economically acceptable disposal routes, for all the products. We anticipate that the proposed Scottish Aquaculture Research Forum (see below) will undertake the task of delivering the appropriate research.



## Genetically modified organisms (GMO)

- 3.21 Although the principles of selective breeding are well established, there have been expressions of public concern about the use of genetically modified crops in the food chain and the appropriateness of their use in livestock production, in aquaculture as in agriculture. There are presently two main areas of potential application of GMO technologies in aquaculture.
- 3.22 The first is the use of GMO vegetable products in fish feed, where their potential value lies in their contribution to the sustainability of feed ingredients as well as to more stable feed prices. However, so long as their use is linked with consumer concern, the industry in Scotland has declared that it will not use them.
- 3.23 The second application is the use of GMO technologies (more specifically, transgenics) in breeding fish for commercial aquaculture use. This also plays no part in Scottish commercial aquaculture production. The industry considers, however, that, were the public perception of transgenics to change, it could not ignore the potential of the technologies. Any proposal to use transgenic fish would require the consent of the Scottish Ministers. If granted, approval would be based on the statutory advice of the Advisory Committee on Releases to the Environment and would also take into account advice from other relevant agencies such as the Food Standards Agency and Scottish Natural Heritage. Meanwhile, Scottish research institutions supporting the industry will continue to develop their knowledge as the application of genetic techniques may be expected to play some role in the future.

## Training and retraining

- 3.24 Overall, the level of skill needed by aquaculture workers is expected to increase. Employers have identified skills gaps among their staff, with job-specific skills, communication and problem-solving heading the list. Demand is increasing for multi-skilled staff, including university graduates, who can work across the range of operations involved in aquaculture. Up-to-date labour market information is needed to allow identification of skills shortages and identify manpower and training needs for the future.
- 3.25 The Scottish Executive-sponsored FutureSkills Scotland and Careers Scotland will address future skills needs and recruitment issues. A skills action plan which identifies the current and future skills needs of the industry is required, to enable the development of skills and business growth diversity to be addressed. Lantra (a former National Training Organisation) is the Trailblazer Sector Skills Council (SSC) for the Environmental and Land-based Sector. It will have a major role to play in developing such an action plan for the aquaculture industry. It already has a well-established Aquaculture Industry Group which is responsible for the development of Lantra policy for the industry and agrees work programmes, funding permitting. It is responsible for the development of National Occupational Standards (NOS), which form the basis of the vocational qualification, and has been directly involved in the promotion of aquaculture SVQs. (There are currently NVQs/SVQs in aquaculture at Levels 2 and 3.) A partnership of Lantra, SQA and HIE has been instrumental in developing

promotional materials and is now seeking to recruit employers/employees to undertake these qualifications.

- 3.26 As a prelude to developing a strategic approach to training and retraining, to underpin the industry's longer term objectives, Lantra proposes to undertake, with HIE funding, an assessment of current staffing levels, the qualifications held by the workforce, the skills gaps and the learning and training needs. This assessment should be complete by the Spring of 2003.
- 3.27 The skills aquaculture needs must be developed in the communities near which the industry's facilities are located. This will enhance the likelihood of retaining a well-trained population in these areas, with consequent economic and social benefits to the communities concerned. This is a priority for fisheries-dependent communities and has particular relevance in the field of engineering. New operating principles such as Hazard Analysis Critical Control Points (HACCP) will become increasingly important in all food production operations: EU food legislation is already being widely introduced in food businesses and new legislation requiring their introduction in feed businesses is currently under consideration. There will therefore be a significant requirement to retrain the existing aquaculture workforce and related sectors, as well as training new entrants to the industry. The Food Standards Agency plans a major programme of HACCP training in 2004 and there will be benefits from initiatives in the aquaculture industry being harmonised with those in the other food sectors. In collaboration with the Scottish Executive (ELLD: the Enterprise and Lifelong Learning Department), training providers will start to develop suitable course material and delivery packages in 2003-04.

## Teaching Company Scheme

- 3.28 The Teaching Company Scheme (TCS) operates through programmes in which academics (mainly university-based) work with companies on strategic projects lasting two to three years to institute major technical or management change. They jointly supervise the recent, high-calibre graduates who carry out the main project work. The Scheme's success in encouraging technology and knowledge transfer is widely acknowledged.
- 3.29 Within the Scottish Executive, ELLD has the lead sponsorship role. The areas in which it supports projects therefore essentially mirror DTI sectoral interests and do not include aquaculture. While it is clearly desirable that TCS schemes should become available to the fisheries sector, this would require significant additional funding (perhaps of the order of £100-£150K per annum to make it worthwhile). SEERAD will seek to identify potential sources of such funding in the course of 2003.

## Broadband

- 3.30** Broadband is the best enabler of e-business and e-business means improved competitiveness. Its commercial benefits include cost reductions, developing and delivering goods and services in new ways, and enabling the availability of supplies to be checked online. For the aquaculture industry, broadband e-business might mean enhanced customer relations and faster access to global markets.
- 3.31** In setting up the Pathfinder projects in the Highlands and Islands, and in the South of Scotland, the Executive recognised the importance of broadband to rural communities and to business development and the likelihood that, under existing procurement practices, the market was unlikely to meet the anticipated demand for broadband services. Since the Autumn of 2001 therefore, it has been working in partnership with the Highlands and Islands and South of Scotland Pathfinder areas to identify precise requirements. An Invitation to Negotiate document was being issued to shortlisted suppliers in the early part of 2003. It included a requirement for suppliers to provide costings for subsea cable links from the mainland to the Northern Isles and from the mainland to the Western Isles.
- 3.32** The Scottish Executive's broadband strategy was published on 2 December 2002. (The text is available online at [www.scotland.gov.uk/connectingscotland/makingithappen](http://www.scotland.gov.uk/connectingscotland/makingithappen).) This sets out the range of activities being undertaken in Scotland to encourage the supply of demand for broadband, including a major new initiative to accelerate and extend the provision of DSL services.

## Developing public understanding

- 3.33** A better public understanding is needed of finfish aquaculture and the statutory safeguards to which it is subject if the significant benefits to Scotland of a successful, sustainable industry are not to be undermined. Incomplete information or inaccurate perceptions can jeopardise public confidence in both the industry and its regulators and thereby needlessly damage sales, jobs and communities. Investment programmes which are crucial to the delivery of a high-quality and best-practice-based aquaculture industry may also be damaged. An initiative designed to improve the public's understanding of the industry, its governance and other relevant issues will therefore be mounted. This will formally commence with the publication of this Strategic Framework document and will be an ongoing process. It will also address the specific qualities and benefits of the shellfish sector, with the prior involvement of, and collaboration with, the industry and its representative bodies.

## Relationship between Seafish and the aquaculture industry

- 3.34** The Sea Fish Industry Authority (Seafish) is a statutory body which provides a variety of services to the UK fishing industry. Since 1965 it has conducted research projects for the UK marine aquaculture industry from its Marine Farming Unit at Ardtoe in Argyll. In February 2003 it announced that it was in preliminary discussions with potential academic partners with a view to transferring ownership of Ardtoe to a third party. If these negotiations are unsuccessful, Seafish will close the site in the Autumn of 2003. In view of its impending withdrawal from direct research at Ardtoe, however, it will strengthen its aquaculture development team. It is also proposing to provide funding for independent scientific/academic research into marine finfish and shellfish cultivation.
- 3.35** Seafish's Aquaculture Advisory Committee (AAC) makes project and funding recommendations to the Seafish Board. An assessment of Seafish's relationship with all elements of the aquaculture industry in Scotland will be included on the agenda of the next AAC meeting, in April 2003. The membership, which includes representatives of key industry trade associations and organisations, will discuss this issue and possible options for the future. (The involvement of SEERAD and DEFRA will be sought at a later stage if necessary.) The AAC's aim will be to reach conclusions by the Summer of 2003.

## Structural funds

- 3.36** Structural funding options will fall to be reassessed during the currency of this Strategic Framework document. European structural funding under the Financial Instrument for Fisheries Guidance (FIFG) is available to the Scottish aquaculture industry for the period to 2006. There are two Scottish programmes, one covering the Highlands and Islands, the other the rest of Scotland. Competition for funds in the former area is particularly strong.
- 3.37** FIFG funding has been demonstrably successful in assisting Scottish aquaculture to develop strategic projects. The current aquaculture allocation (about 9.3% of the total UK FIFG package until 2006) is, however, less than the industry would wish, as the over-subscription in the HIE area scheme demonstrates. An increase in funds would enable more high quality and innovative aquaculture projects to start in Scotland – particularly in the areas of minimising environmental impact and increasing diversification.
- 3.38** The development by the European Commission of a strategy for aquaculture may lead to revision of the current FIFG regulation during 2003. This will determine the uses to which funding may and may not be put during the second half of the 2000-06 programme. However, it is meanwhile not clear whether, or to what extent, FIFG will be available beyond 2006. Community enlargement and previous structural funds investment are both factors which suggest a reduction in future availability, and possibly in the rates of grant too.

- 3.39 Nevertheless, it is open to Member States to seek to influence Community thinking in revising the terms of existing, and shaping the content of future, Structural Fund regulations and SEERAD will seek to do so when the opportunity presents.

## In pursuit of the environmental objectives

### Carrying capacity

- 3.40 Scotland's aquaculture industry relies on the environment for its resources and services (see above), and the carrying capacity of the environment is therefore fundamental to achieving a sustainable level of development. However, *carrying capacity* is often used as an overarching term and requires further definition to identify crucial elements which are important to the regulatory process. The Transport and the Environment (T&E) Committee's Phase 1 Report discusses this at some length (at paragraphs 19 to 32) and usefully defines *carrying*, *environmental* and *assimilative* capacity. We have adopted these definitions here.
- 3.41 The shellfish sector relies on a plentiful supply of natural particulate food to sustain the growing cultured biomass. Over-exploitation of this *biological carrying capacity* may result in poor growth rates and an inability to achieve marketable size. The finfish sector relies on the environment's *assimilative capacity* to cope with the wastes arising from rearing fish in cages but a precautionary approach, driven by an incomplete understanding of these processes, may constrain developments below their full potential. It is vital that sensitive environments and priority habitats are adequately protected, but preferably without recourse to the regulatory process, with its attendant costs for all parties, to resolve conflict. A more desirable outcome would ensure that the aquaculture industry were enabled to use natural resources wisely, maximising development opportunities where site characteristics permitted. The capacity to disperse and break down wastes from fish farms through natural processes is finite and expansion of the industry must be guided by reliable predictive methods if the environment is to be adequately protected. Inputs from aquaculture must be considered alongside other sources of each component, whether anthropogenic or natural, within the area under assessment.
- 3.42 Effective regulation is fundamentally about the assessment of risk to the environment, and then its management, through the issue of an authorisation, working within limits of acceptable environmental change. The assessment of applications for discharge consent follows such a process, looking at a range of different risks, and assessment techniques are applied for each element. Assessment techniques for environmental impacts below and close to the cages are now well advanced. Relying on the fairly simple predictive modelling techniques presently available, the Locational Guidelines for Marine Fish Farms take account of the wider-scale and cumulative effects of nutrients and other wastes, targeting a precautionary approach on further development in areas considered at high risk. The onset of unsatisfactory effects may be a gradual process, and there is a need for refinement,



particularly for waste nutrients and therapeutic chemicals capable of causing effects over a wider area, before any relaxation of this precautionary approach could be considered. The further development of predictive modelling should therefore follow the ecosystem approach through identification of fundamental or sensitive ecological processes to ensure that relevant pollutants do not reach concentrations which would interfere with the natural balance and variation of those processes. The Locational Guidelines will be kept under regular review and incrementally improved and strengthened as progress is made. When planning responsibility for marine aquaculture is in due course transferred to planning authorities, the Guidelines will provide the basis for a National Planning Policy Guideline/Scottish Planning Policy<sup>1</sup> document on fish farming.

- 3.43** A Crown Estate-funded scoping study on carrying capacity was published in the first quarter of 2003 (18) and SEPA also published in January 2003 a report by Professor Paul Tett, Napier University, reviewing the occurrence of harmful algal blooms in Scottish coastal waters (19). Both reports have a significant bearing on the carrying capacity debate, particularly in developing better means of estimating the assimilative capacity of the environment. A working group of experts will be established under SEPA's chairmanship, with industry participation, to carry out an assessment of these studies. This group will delineate research priorities and propose an action plan based on the ecosystem approach, identifying gaps in existing knowledge and alternative modelling strategies.
- 3.44** Its report, with options for model development, should be available for public consultation by the Autumn of 2003. Confirmation that funding agencies will prioritise their research budgets accordingly will be sought within the same timescale. Work can then proceed to develop an improved modelling approach and validate it using field data by March 2006. If this proves acceptable to the regulators, it will be followed by public consultation. Final amendments can then be made and the improved modelling approach put in place for the assessment of development proposals in high risk areas by December 2006.

In the meantime, SEPA and the other relevant authorities will continue to act, as at present, on the basis of their best current understanding of carrying capacity as informed by the Locational Guidelines for Marine Fish Farms.

- 3.45** Different principles are needed in assessing assimilative capacity with regard to fish disease and, in particular, sea lice. This issue is dealt with separately below. Issues associated with landscape, amenity and aesthetic impact fall within the definition of environmental capacity and are also discussed below.

<sup>1</sup> Scottish Planning Policies (SPPs) provide statements of Scottish Executive policy on nationally important land use and other planning matters, supported where appropriate by a locational framework. Existing National Planning Policy Guidelines (NPPGs) will have continued relevance to decision-making until such time as they are replaced by an SPP.

## Data gathering

- 3.46** The research teams working on carrying capacity studies will focus on modelling principles and other areas of science. However, to produce good quality carrying capacity guidelines at the local level will require significant background environmental data, including on the history and movement of disease, sealice and escapes. It might be possible to enlist in its collection the assistance of those organisations already operating locally, many of whom will have staff who are well trained in data acquisition and logging. (This would be their in-kind contribution to the carrying capacity study programme.) In this way a wealth of essential environmental, and possibly some vital historical, data (to which the carrying capacity study teams would not otherwise have access) might become available.
- 3.47** We anticipate that SEPA will lead this exercise, working collaboratively with FRS, fish farms, District Salmon Fishery Boards, Fisheries Trusts and angling clubs, SNH, local environmental groups and local and community council staff. They will identify the parameters to be routinely measured and who should record and transmit data from each location, and agree a standard reporting format and transmission timetable for the data. Links to other monitoring programmes eg on behalf of OSPAR, the National Marine Monitoring Programme, Natura 2000 and the Shellfish Waters Directive will also need to be established, to avoid duplication of effort.

## Land-based aquaculture

- 3.48** Land-based aquaculture can be entirely appropriate for the juvenile production stages of many species of finfish, and may be suitable for the on-growing production of some high-value species in particular situations. However, since it is calculated to add significantly to production costs in comparison with cage on-growing, so much so that it is fundamentally uneconomic, it is regarded as generally unsuitable for the replacement of cage production of on-grown fish for human consumption.

## Location and relocation of farms

- 3.49** In due course, as more is known about the carrying capacity of the environment, there will be a need to assess whether some farms, particularly where consents were granted under earlier regimes, sited in poorly flushed or particularly sensitive areas, are now having a harmful cumulative impact on their environment. This is of most concern where sites have been designated for particular interests under the EC Habitats Directive. Additionally, the siting of such farms in some cases may impact on wild Atlantic salmon and sea trout and thus indirectly also on freshwater mussels, which are Species of Community Interest under the Habitats Directive. In several parts of the Highlands and Islands wild stocks of salmon and sea trout are already severely depleted or even extinct. While the reasons for this are complex, and the influence of salmon farming is likely to be only one of several possible factors, it is important that action is taken to minimise any anthropogenic influence which might be endangering wild stocks.

- 3.50** Criteria to determine how close to wild stocks farms may be sited and the impact of sea lice are technically difficult issues for which the Scottish Executive meanwhile has little scientific data on which to develop any form of evidence-based policy, and the precautionary principle may need to be applied, especially with respect to Natura 2000 sites. Experiments or trials to estimate the scale or effectiveness of relocation in ameliorating the decline in wild stocks are likely to be expensive and will deliver only over a long timeframe. Nevertheless, the Scottish Executive is aware of the desire within the Scottish Parliament and elsewhere to see progress on this front and is also conscious of the damage which uncertainty as to Government intentions can do to industry confidence. It will therefore establish in 2003 a stakeholder group to prepare criteria against which to assess whether or not any finfish aquaculture site is poorly located, with an explanation of the underlying scientific rationale. Its report, which will be subject to full consultation, will list those sites which are considered to be inappropriately located and explain why. It will consider whether alternative sites can be located near the shore-based facilities designed to support them; the proximity of sites to workforce; the health and safety issues associated with sites' being relocated to more exposed areas or further away from their support base; and the opportunities for species diversification to reduce impacts on salmonids.
- 3.51** The Group will also make an assessment of the likely benefits and effectiveness of relocation of those farms which are sited close to rivers important for migratory fish, following a scoping study reviewing research and field data in Scotland and abroad on relative louse infection levels on wild salmon smolts and sea trout and the proximity of fish farms to river estuaries.
- 3.52** Bilateral meetings with affected site owners and their representatives will commence thereafter, with a view to concluding the process by December 2005. Relocation may entail a cost to operators and ways of alleviating that cost, for example by increased production within the carrying capacity of a new location or by financial assistance, will be considered as the policy is developed.

## Scottish Aquaculture Research Forum

- 3.53** Research should underpin nearly all of the decisions which Scotland will make in furtherance of its aquaculture development over the next few years. Current funding is provided largely through specific research providers (FRS, SAMS, Seafish). Since the demise of the LINK scheme, which tied in an industry contribution and focused research to requirements, there is no source of funding with a multi-stakeholder research prioritisation committee, except the Crown Estate's with £200k per annum allocated within the period 2002-03 to 2005-06.
- 3.54** The Crown Estate Aquaculture Research Committee (CEARC), however, might become the basis of a wider Scottish Aquaculture Research Forum (SARF), whose meetings will then coincide with CEARC meetings. The research funding bodies will need to be willing to commit funds to its research budget. Given the need to make rapid progress on research priorities it is proposed that, rather than waiting for proposals to be submitted for consideration, SARF should be constituted to develop project objectives which will guide researchers in framing their proposals. Its remit would cover:



- environmental impacts;
- technical and biological cultivation research; and
- health and fish welfare science.

The twin benefits would be an industry which is sustainably self-managed and externally regulated on a scientific basis, and a thriving Scottish research sector, within which there are several centres of excellence working on a range of key disciplines.

- 3.55** To ensure proper integration, the Scottish Executive will explore options for SARF's administration with existing bodies which promote research. The Crown Estate Research Committee discussed the principle of SARF at its meeting in January 2003 when it was proposed that SEERAD promote an inaugural meeting of the Forum (involving the existing CEARC with an independent Chairman and representation from other interest sectors such as the local authorities) to determine questions of remit, membership and research priorities.

## Research priorities

- 3.56** Pursuance of the environmental principle in paragraph 1.8 would suggest that top priority should be given to those effects which pose a risk of cumulative, long-term or irreversible changes to ecological systems, with transient impacts assuming second priority. SARF should therefore recognise the following major areas as first priority for research in line with the *Review and Synthesis* Report (chapter 7), as follows:

- measures to prevent cross-infection of sea lice between farmed and wild stocks and the linked issue of medicine usage;
- measures to prevent escaped farmed fish damaging wild stock through interbreeding;
- carrying capacity issues (particularly assimilative capacity) and measures to prevent wider scale effects arising from nutrients in so-called "hot-spots", and medicines/chemicals; and
- sustainability of feed supplies (fish meal and fish oil).

- 3.57** Scientific research under SARF's aegis and work on carrying capacity will focus on biological sciences. However, questions of landscape and scenic amenity and the relationships with other industries and coastal users also fall within the broad definition of carrying capacity. SNH will lead in developing an approach to these issues, in the wider context of ICZM, and will keep SARF involved. Approaches to landscape and scenic carrying capacity should then inform local authority zoning plans, together with revisions of the Locational Guidelines and the proposed Marine NPPG/SPP for fish farming.

- 3.58** In addition to the first priority research areas identified above, the following more specific topics were identified by an Environment Subgroup of the Ministerial Working Group, and complement the priorities which were identified in the *Review and Synthesis of the Environmental Impacts of Aquaculture* (Appendix 4):

- effects of waste solid matter on sediments and the effectiveness of recently improved husbandry and feed delivery systems in reducing the environmental impact of fish farms;
- effects of waste and natural nutrients (from aquaculture and other sources) on pelagic ecology, including their potential to influence algal blooms and toxin production;
- effects of other wastes introduced by aquaculture on marine ecosystems;
- potential for nutrient extraction through polyculture and possible benefits for assimilative capacity;
- the interactions between aquaculture units and predator species;
- the standard of fish farm EIA;
- the up-take and effectiveness of, and compliance with, voluntary measures taken by the aquaculture industry: e.g. Area Management Agreements or Codes of Best Practice;
- additional benefits of accredited environmental management systems in delivering improvements in the environmental performance of fish farms;
- comparison of environmental impacts between salmon and marine species farms;
- environmental costs of fish farming to allow objective comparison with other social/economic costs/benefits;
- reasons for decline of wild salmonid populations; and
- environmental effects of “novel” marine finfish or shellfish species cultivation.

(Some of these are already encapsulated in other priority actions described elsewhere within this document.)

## Feed sustainability study

**3.59** As available stocks of most known commercial fish species for human consumption decline, demand for aquaculture and mariculture products is projected to increase dramatically in the next few years towards filling the so-called fish gap – the projected shortfall in supply of fish for human consumption. In practice, however, all finfish aquaculture currently relies on wild-caught fish (industrial species such as anchovies, sardine, jack mackerel, horse mackerel, sandeel, sprat, pout, blue whiting, capelin and herring) sourced globally to produce fish meal. This raises questions about the sustainability of the industrial fisheries which supply the fish oil and protein for farmed fish feeds, not only in terms of the state of the stocks themselves, but in terms of their capacity to sustain other species of fish and birds. A full understanding of the sustainability of fish meal/oil fed to farmed fish therefore urgently needs to be developed internationally to inform decisions about the future expansion of fish farming in Scotland, both of salmon and trout, and of more recently farmed species such as halibut and cod. At present, supplies of industrial fish are monitored and assessed scientifically by FAO and ICES, but only very limited supplies of sustainably managed fish meal or oil (and hence feed) are available which are independently certified (for example, by the Marine Stewardship Council) and the UK organic aquaculture standard has to rely on fish processing by-products.

- 3.60** Both the industry and its stakeholders need to be reassured - on the basis of the best scientific knowledge available - that ingredients used in feed supplies are sustainable and what the options are. The European SEAFEDS Workshop is due to report in April 2003 on the sustainability criteria developed by participants. In the light of its findings, the Scottish Aquaculture Research Forum will consider what further study of global aquaculture feed supplies, their sustainability and the options is necessary to provide an understanding, not only of how aquaculture feed supplies might be sustainably secured in the future, but also how they might be sourced cost-effectively and in the best health interests of the consumers of Scotland's aquaculture production. Such a study is likely to require multinational participation.

## Certification schemes

- 3.61** Certification schemes have an important role to play, enabling trade buyers and consumers alike to be confident that the product they are purchasing meets high standards of production, welfare, environmental management and product quality. Such schemes need to be internationally recognised and be credible to both public and private stakeholders. They must be clearly communicated to consumers so that their significance and benefits are understood and to ensure they are distinguished from non-Scottish production. (Recent research conducted by the Food Standards Agency on certification and quality assurance schemes in agriculture highlighted a level of confusion among consumers over the meaning of specific certification/quality assurance marks.) Companies' commitment to environmental management systems and food certification will be encouraged. The regulators, Seafish and the industry will collaborate with other stakeholders to develop incentives for companies to gain competitive advantage through such commitment.

## Sea lice management

- 3.62** The industry, Government and wild salmonid interests will continue to work collaboratively to determine the interactions between sea lice and wild salmonids, and to ensure that negative interactions are addressed through regulation and management. Given the constraints on resources, it may be necessary to attach a higher priority to some salmon and sea trout stocks than others and action will be prioritised to protect these, through continued development of Area Management Agreements (AMAs) as part of the Tripartite Working Group process, through the revised Locational Guidelines and in due course through the relocation policy. In the principal areas of *organic* salmon production (Orkney primarily, but also Shetland), there are no representative bodies for wild fish interests. If they can be created in areas where organic salmon are being produced, concordats similar to AMAs between wild and organic farmed fish interests should be signed. The organic certification bodies will consider this as a potential condition of organic certification.
- 3.63** Consistent with the advice of the Tripartite Working Group (TWG), all fish farms will be encouraged to adopt integrated sea louse management strategies, as indeed the leading companies are already doing. These will include: synchronous year class stocking within

defined management areas; regular and accurate sea louse counts; effective treatments to achieve zero, or near zero, ovigerous sea louse levels – as is happening already on some sites; and the adoption of novel techniques to reduce reliance on chemo-therapeutants.

- 3.64** Industry and other relevant stakeholder associations must give a strong lead if they are to secure widespread support from their members for these voluntary initiatives. SEERAD will review their overall effectiveness through audit checks carried out by the Fisheries Research Services, or another suitable contractor, and the TWG National Development Officer. On the basis of a comparison of this data with TWG objectives, the Executive will then consider whether regulation is necessary.

## Prevention of escapes

- 3.65** The *Review and Synthesis of the Environmental Impacts of Aquaculture*, while reassuring in many of its assessments of the industry's footprint, concluded that escapes from salmon farms constitute a major threat to wild populations. For the industry too, loss of stock is a priority issue because of its financial implications. It will work to minimise escape incidents and thus curtail the impact of escaped fish.
- 3.66** Better information is needed on the causes of escapes. SEERAD will seek to enlist the co-operation of the industry in investigating failures resulting in escapes from both marine and freshwater aquaculture installations. The information thereby acquired will inform revised industry codes of practice for containment. Ways of implementing improved standards of construction and maintenance of aquaculture structures (cages, moorings, etc.) will be explored to minimise the future risk of system failure and stock escape.
- 3.67** An international assessment of current and prospective techniques for tracing or marking farmed fish will be conducted, involving FRS, with a report to SARF and TWG by the Spring of 2004. Work on the potential impacts of escapes on wild fish populations which may result in increased or periodic problems with competition, predation and hybridisation and interference with fisheries management and research will continue. The different risks posed by new species escapes will be examined by SARF.
- 3.68** All fish farms will be encouraged to adopt the Containment Code of Practice. Investigation of previous incidents, now the subject of mandatory reporting to the Executive, will be carried out to detect trends or common failures which might inform reviews of the Code. The Scottish Executive will consider in the light of this whether regulation is necessary to achieve minimum standards of cage design, equipment and maintenance, and to instigate prosecution for wilful or negligent acts (or omissions) resulting in escapes. The European Commission is to consider the introduction of rules to minimise the number of escapes and this may provide in due course a statutory framework; equally, appropriate measures may be introduced in the proposed Aquaculture Bill (see below).

- 3.69** Expertise needs to be developed to enable the regulators, and local authorities in particular, to advise on matters of cage and equipment design and security under the interim arrangements. Appropriate guidance will be drawn up by the Highlands and Islands Aquaculture Forum, which will wish to consult and co-opt experts from the insurance sector and those companies currently involved in cage design and supply. Fisheries Research Services will monitor compliance with the Containment Code of Practice and will investigate any failures of cage structures and equipment which result in escapes. The Crown Estate will use its powers to enter and inspect fish farms and require repairs to be carried out or defects to be remedied.

## Interactions with local wildlife

- 3.70** Aquaculture provides feeding opportunities for predators such as seals, herons, otters, saw-billed ducks and eiders, all of which are protected under existing legislation. Predation may entail significant financial losses for both shellfish and finfish farmers and frequently gives rise to calls for lethal control measures. What is needed is an objective assessment of the scale of predation and of the measures available to control it (including the selection of sites and husbandry techniques which reduce conflict with predators) so that solutions which are both consistent with domestic and European legislation and acceptable to the public can be developed. In the light of the proposed SNH scoping study, SARF will consider the issue and, if appropriate, commission the necessary research.

## Environmental Impact Assessment

- 3.71** Environmental Impact Assessment (EIA) aims to provide a regulatory safety net to ensure that the environmental implications of development proposals are fully considered in the assessment of whether or not development should proceed and on what basis. EIA can therefore play a major role in ensuring the sustainability of an industry.
- 3.72** There are, however, concerns that this safety net is not functioning as well as it might in relation to the aquaculture industry. For example, few Environmental Statements (ES) submitted to date under the 1999 Regulations (20) identify the cumulative impacts of fish farm developments and discharges. There is also considerable variation in the standard of ES submitted to inform EIA of fish farm developments.
- 3.73** COSLA will be invited to commission an independent review of EIA and in due course guidance for developers and regulators will be published on the minimum standards expected from fish farm EIAs. This will seek to ensure that future development of the industry proceeds on the basis of rigorous assessment of its impacts.



## In pursuit of the social objectives

### Encouragement of local community/industry liaison arrangements

- 3.74** Community acceptance and understanding of the aquaculture industry are vital. In some areas, companies already engage with local communities in a number of effective ways: for example, by holding fish farm open days and participating in local fishery trusts and community council meetings, and sponsoring sporting events. But there is room for wider engagement and this might be achieved in part by the establishment of community liaison groups, fisheries advisory groups or panels to deal with inter-sectoral issues, and local authority forums with community representation. Partnerships will vary from area to area, depending on what already exists and what the perceived requirement is. Industry associations and individual companies, especially the larger ones, with their workers, individuals from neighbouring communities and local authorities, all need to be involved. The target therefore is for good local liaison to be evident in the majority of aquaculture-important communities in Scotland by December 2003.
- 3.75** Once in force, statutory planning controls will ensure that marine fish farming proposals are subject to a more effective, transparent and democratically accountable system of regulation at the local level. Planning aims to achieve an appropriate balance between the interests of people, businesses and organisations proposing developments, and those of individuals and communities whose quality of life will be most affected by its decisions. It therefore needs to be transparent, and demonstrably objective and fair if public confidence is to be maintained. Effective public involvement in planning issues should help to address communities' uncertainty about aquaculture developments, but the need for regular dialogue with the industry will remain. There will be legitimate areas for discussion and action where the industry and community interact, which are not covered by overarching regulations or codes of practice. The establishment of any liaison arrangements will need to be well publicised and activities communicated to the wider community. Wider, more meaningful, liaison may help to reduce the number of objections. It is clearly therefore in the industry's own best interest to make local liaison succeed.

### Co-operative aquaculture ventures

- 3.76** The principle of community ownership of aquaculture is well-established in some countries and may be worth considering for some sectors of the finfish aquaculture industry in Scotland. (There is already a strong co-operative structure in place to look after 75% of Scottish shellfish production, marketing, etc.) Co-operatives in the seafood industry fall into two broad categories: local organisations involved in primary production within a distinct area, and national organisations which engage in the full range of industry activities such as processing, marketing and transportation. The former might be particularly suitable for encouragement in the bivalve shellfish cultivation sector; the latter is more applicable to the full range of the industry.

- 3.77** As one tier of Scottish aquaculture, powerful local co-operatives could help companies improve efficiency and marketing and render them better able to compete. Such co-operative arrangements might also provide the opportunity for community involvement, as well as enhanced PR value for the industry. Local enterprise agencies will advise groups which express interest in the development of either type of co-operative.

## Transport infrastructure

- 3.78** Transport infrastructure is vital to strong commercial activity. Businesses in remote, peripheral communities need access to the marketplace for their products through a modern transport system which sustains and connects communities and moves people, goods and services efficiently and safely. This is vital to underpinning and developing the economy of the Highlands and Islands and their links to destinations and markets throughout the United Kingdom and beyond. The main west coast fisheries in the Highlands and Islands are served by trunk routes which continue to benefit from significant ongoing investment by the Scottish Executive in its role as trunk road authority. Local and other transport planning is being taken forward through a joint transport strategy for the Highlands and Islands which is being developed by HITRANS, the Highlands and Islands Strategic Transport Partnership. This will be key in determining the strategic transport priorities and objectives for the region. The FIFG Ports facilities programme exists to assist the industry with improving local infrastructure, including the provision of new piers and jetties.

## New businesses

- 3.79** Business diversification and start-up schemes need to be specifically developed and the potential for different activities assessed. Both existing and future supply and service requirements must be identified. Liaison with existing service and supply businesses will provide an analysis of future needs. HIE and the Local Enterprise Companies will review the schemes currently available and attempt to match these with companies' future needs, which they will also review. A position paper will be prepared for early 2004.

## Regional management

- 3.80** River Basin District Advisory Groups, established through initiatives to meet the requirements of the Water Framework Directive, will allow stakeholder involvement in the establishment of River Basin Management Plans. They will need to ensure that aquaculture is fully integrated with the other uses of Scotland's natural water resources and that appropriate environmental objectives are set for internal and coastal waters.

## Promotion of healthy eating

- 3.81** Consumers expect food to be healthy and safe. To maximise the opportunities for aquaculture within the food market, Scottish fisheries products must be attractive to consumers by virtue of their quality, value and safety so that they become the purchase of choice. Becoming market-driven rather than production-led, the industry must be integrated with its markets in all their aspects, through existing, consumer-oriented brands such as Scottish Quality Salmon's TQM and Label Rouge, and generic seafood and other marketing and promotion mechanisms such as 'Seafood Scotland', Seafish and 'Scotland the Brand'. The industry will also seek to work with HEBS and FSA as well as with retailers to promote the benefits of fish products as part of a healthy, balanced diet. This will provide a platform for the development of new products and species.
- 3.82** The Scottish diet is typically low in fish and seafood. The recognised consumer benefits of fish as a component in a healthy diet (aquaculture products contribute omega-3 polyunsaturated fatty acids, particularly EPA and DHA) need therefore to be actively marketed, not only by the industry itself, but in conjunction with centrally funded campaigns to improve the health of the nation. Increased consumption would lead to better health and it is therefore proposed to mount a joint industry/Scottish Executive/Seafish programme to promote fish, including molluscan shellfish, as healthy eating in Scotland. A successful campaign would be applicable across the UK and further afield, offering Scottish producers a distinct marketing advantage.
- 3.83** In the first instance, the industry will establish a *Healthy Seafood Eating* task force early in 2003 through action by the FSAP/industry trade organisations to develop a budget and plan of action in liaison with HEBS and FSA. The campaign will be launched in the Summer of 2003 and domestic seafood consumption trends monitored annually thereafter.

## Quality assurance schemes for Scottish fishery and seafood products

- 3.84** Scottish production of seafood is currently very diverse in terms of its quality and its assurance. Some aquaculture sectors are active in this field, others are not. Scottish Quality Salmon (SQS), for instance, requires that its members be certified as complying with both product standards and Environmental Management Systems independently accredited to the international disciplines of EN 45011 and ISO 14001 respectively. With declining wild supplies and a distinct (if as yet undefined) eventual ceiling on sustainable aquaculture production in Scotland, it is essential that the industry work collaboratively to enhance its reputation for quality and thus its income from its primary production.
- 3.85** All Scottish aquaculture products will need in time to be covered by robust quality assurance schemes, fully supported where appropriate by promotional or marketing initiatives, appropriate both to customer expectations and to the species concerned. A co-ordinated approach will help confirm the quality and identity of Scottish products in the mind of the consumer. An enhanced set of quality schemes will encourage customer confidence in, and acceptance of, Scottish seafood products. Higher selling prices for primary production are less



certain, but represent a worthwhile goal for the industry. The schemes should be primarily producer-funded and independently audited. To be successful, they must involve the majority of producers, be easy to understand and operate, and be accepted by retailers and consumers.

## In pursuit of the stewardship objectives

### Local authority Zoning Plans for coastal marine waters

- 3.86** It is for planning authorities to decide, consistent with the central government guidance in the relevant National Planning Policy Guidelines/Scottish Planning Policies, and after consultation with the appropriate statutory bodies, what industrial development should be permitted, and where, within their own area. When in due course controls are formally extended into marine waters, local authorities will wish to have developed, as far as possible, supplementary local guidance zoning the development of aquaculture in their area. Indeed, some local authorities have already begun to develop coastal planning expertise and non-statutory planning guidance for developers.
- 3.87** Ahead of the extension of planning powers, it is for local authorities' own judgement how soon they begin to develop local aquaculture planning guidance or coastal planning teams. While such initiatives are to be encouraged, they will depend on other competing priorities and the availability of resources. However, local authorities will wish where possible to publish local guidance as it is finalised, ahead of the extension of planning powers. The absence of such powers should not prevent the development of local planning guidance or coastal planning expertise. Aquaculture stakeholders will assist local authorities, through partnership mechanisms for integrated coastal zone management where these exist, and otherwise informally, in developing local guidance and will contribute where coastal planning teams are established.

### Welfare assessment

- 3.88** The concept of stewardship embraces care of the environment and of the fish themselves. The two are not in conflict, but occasionally there will be a tension between environmental considerations and what is required for the best care of the fish. For example, ability to treat a condition such as a sea louse infection will be constrained by absence of consent to discharge the appropriate medicine and forward planning is required on the operators' part.
- 3.89** The group RUMA (Responsible Use of Medicines in Agriculture), established in 1997 to promote the highest standards of food safety, animal health and animal welfare in British livestock farming, has already formulated comprehensive guidance for the responsible use of antimicrobials in poultry, pig, sheep and cattle production and, with the assistance of the Fish Veterinary Society, is now embarking on the development of guidelines on the responsible use of medicines in aquaculture. Meanwhile, the industry will keep its use of medicines and

other chemical treatments to the absolute minimum required for (farmed and wild) fish health, welfare and good husbandry, using them wisely: for example, as part of an integrated sea louse management strategy. Improvements to the authorisation process for novel treatments are being achieved through closer collaboration between SEPA and the Veterinary Medicines Directorate, but the environmental assessment of these compounds can be complex and cannot be short-circuited. It is important that fish farmers have access to novel treatments as soon as possible and the regulatory authorities will strive to process applications for their use expeditiously, provided they can be sure that the environment is adequately protected.

- 3.90** All veterinarians working with fish, including members of the Fish Veterinary Society (FVS), should train themselves in welfare issues through EC guidance and industry codes of practice to enable them to play a full part in safeguarding the health and welfare of farmed fish, and contributing to a healthy aquaculture industry. They should become more involved in the recognition and control of notifiable diseases, receiving the necessary training and regular updates on developments in notifiable disease, and being involved in their control when such diseases are identified. FVS as the representative body for veterinary professionals must take the lead here, but will be supported in doing so by FRS and the Aquaculture Health Joint Working Group.

## Welfare indices for aquaculture species

- 3.91** Although research undertaken by the Food Standards Agency suggests that welfare considerations play little part in determining consumer purchasing decisions, consumers do have a legitimate interest in the way animals are treated during food production. Such publications as the 2001 WWF report on the aquaculture industry (21) and the Compassion in World Farming paper, *In Too Deep*, (22) serve to remind us of this interest and that high welfare standards are a contributor to consumer confidence and must be a high priority for the industry. The EU has recognised the importance of the issue, and the Council of Europe has established a Working Group, on which Scotland is represented by FRS and FEAP. An EC Directive may be expected in due course.
- 3.92** However, we see no need to wait for that before developing our own thinking. A subgroup of the Aquaculture Health Joint Working Group, with additional co-opted members as required, will be set up by the Summer of 2003 to study the implications of fish welfare considerations for current aquaculture practices, and report by the following Summer. Its report will translate into a series of recommendations to the Scottish aquaculture industry. Building these into Codes of Best Practice will signal that welfare is being positively addressed by the industry and will position it to respond to the EC Directive in due course.

## Development of industry Code of Best Practice

- 3.93** All industries impact on their environment and the interests of other stakeholders. Those which have a robust code of practice are more likely to achieve public acceptance, provided the code has been drawn up in consultation with a wide range of scientific experts and stakeholders, and clearly proscribes all questionable practices. A robust, audited code of practice may have the further benefit of obviating (in part) the need for detailed, costly and inflexible regulation.
- 3.94** The finfish aquaculture industry will therefore develop by December 2003 a Code of Best Practice (to cover *inter alia* issues of disease control, welfare, and health and safety) and, within that, a Code of Best Environmental Practice. Every licensed aquaculture operator in Scotland will be expected to be formally subscribed to one or other of these Codes by the Summer of 2004.
- 3.95** Compliance should be externally monitored and audited.

## Waste disposal

- 3.96** As a relatively new industry, aquaculture, and salmon farming in particular, has yet to find acceptable means of dealing with certain of the by-products of its operations. The most pressing issue is that of disposing of fish carcasses following outbreaks of disease or large-scale kills caused by jellyfish or algal blooms. Processed waste such as the offal from salmon harvested for human consumption is less problematic. Most of it is converted into animal feeds or pet foods. Fish from mortalities, however, require to be disposed of by rendering, incineration or, exceptionally, by burial in controlled landfill. None of these methods is readily available in the Highlands and Islands. Although some fish farm mortalities are ensiled, which destroys most pathogens, the lack of approved waste disposal options has led to stockpiling around the area until they can be collected. (A significant volume is disposed of in Norway, under licence.) Stakeholders (notably HIE, Seafish, the UK Association of Fish Meal Manufacturers, local authorities and the industry) will therefore continue working collaboratively to develop by the end of 2003 a collective waste management infrastructure for the safe disposal of by-products from the industry.

## Aquaculture Bill

- 3.97** The statutory provisions under which aquaculture is currently obliged to operate were designed for other purposes and are not wholly apt. As legislative time permits, the Executive will introduce an Aquaculture Bill in the Scottish Parliament. Proposals for inclusion, fully reflecting differences between the finfish and shellfish sectors, will all be subject to discussion with stakeholders once a Bill is in prospect. At that time, consideration will be given *inter alia* to whether industry compliance with higher than minimum environmental standards might be met with lighter regulatory regimes.

## Water Environment and Water Services Act 2003

- 3.98** In advance of that, the Water Environment and Water Services Act will enable SEPA, through amendments to the Control of Pollution Act, better to regulate fish farming and prevent unacceptable effects. It will be possible to impose permit conditions which are more appropriate to the process, and mechanisms to require compliance with codes of best environmental practice are envisaged.

### Extension of planning controls

- 3.99** The extension of local authority planning responsibility to marine aquaculture is a primary and urgent goal. It will build greater acceptance of the industry by addressing the community's legitimate concerns about transparency and affording, through consultation, access to the consenting process. The Scottish Executive's preferred option would have been to introduce marine planning controls by way of a Planning Bill in due course, but it accepted that the Water Environment and Water Services Act represented an early opportunity to bring aquaculture within the ambit of local authority planning.
- 3.100** Once the new Act has received Royal Assent, the Executive will set up a stakeholder group to consider the detailed implications of extending planning controls to aquaculture (e.g. as regards the extension of planning authority jurisdiction, transitional arrangements, the expansion of Structure Plans to deal with the marine environment ) and to work up proposals for consultation. It is envisaged that the process of extending planning controls to marine aquaculture will be completed in 2005.

### Locational Guidelines

- 3.101** Local Authorities cannot prepare their local planning guidance for aquaculture in a vacuum: central guidance is required. Although they may draw upon the work of the Scottish Coastal Forum, and the principles of ICZM, they also need guidance directly related to aquaculture issues. The revised Locational Guidelines published in January 2003 will offer a basis for local authorities' work in the short to medium term. They will facilitate appropriate and precautionary development and local authorities for those planning areas in which aquaculture is, or may become, important should begin to develop their expertise. (Consideration locally of planning arrangements need not depend on the passage of legislation.)
- 3.102** Pre-application consultation will play an important role in the consenting process, bringing together regulators, developers and other user groups in the early planning stages, identifying area priorities and directing resources to the most important issues raised by a development proposal. It will also provide an opportunity to fine tune proposals to take account of any obvious difficulties before the formal application stage.

## NPPG/SPP for fish farming

**3.103** There are currently no planning guidelines in place for freshwater aquaculture. While to some this is a serious omission, the Scottish Executive is not meanwhile persuaded that there is a general *planning* need for any such guidance: there has been little call from planning authorities and no demand is reflected in planning appeals. However, as work proceeds to extend planning controls to marine fish farming, preparatory work will be undertaken in parallel to develop an NPPG/SPP for fish farming – both freshwater and marine.

## Lead regulatory body

**3.104** The value of establishing a lead body among industry regulators was the subject of quite lengthy discussion within the Working Group.

**3.105** Given that the existing regulators' functions are statutory, and could not therefore be set aside except by amending primary legislation, any new body set up now would require to be created administratively. In these circumstances, it is not clear how the role and functions which might be ascribed to it would fit with those of the bodies already in place. An alternative would be to identify one of these as lead body, but there was no consensus within the Working Group as to which should assume this role and what it would then do.

**3.106** In the absence of an agreed single model, it seems more appropriate to wait until after the proposed changes to pollution control legislation driven by the Water Framework Directive have been made and planning controls have been extended to marine aquaculture. Once these new regimes are bedded in, further consideration can be given to whether any perceived deficiencies in the regulatory regime might be remedied in the first instance within the national model.

**3.107** Our intention is that the whole Strategic Framework should be reconsidered in four to five years' time, when many of the proposed changes to the regulatory regime will be in place. A review at that time will assess the need for further improvements, including any need for a lead body if that matter has not already been finally resolved by then.

## Application of fish health legislation

**3.108** The current fish health regime relies upon a number of complementary EC Directives which are now the subject of review by the Commission and Community scientific experts. The current management regime, applied in the UK under Directive 91/67 EEC (23), is to maintain approved zone status for List II diseases in both the continental (terrestrial) and maritime environments. This arrangement provides a favourable trading regime with the EU and the third countries which maintains freedom from serious listed diseases, including VHS and IHN. It also allows free trading between the marine and terrestrial zones within the UK.

- 3.109** There is concern amongst those farming new species of marine fish that the maintenance of this regime in the face of an outbreak of VHS will lead to compulsory slaughter (without compensation) in farms which pose a minimal threat. Through the Aquaculture Joint Health Working Group, the Scottish Executive (SEERAD) will discuss with the industry, before the Summer of 2003, the requirements which the existing legislation imposes on both sides, to inform in due course the UK negotiating position on revision of the Fish Health Directives. The European Court of Justice is currently considering the matter of compensation for the compulsory slaughter of finfish held in aquaculture, and SEERAD and the industry will meet to consider the implications of its decisions once they are announced.

## Education programmes

- 3.110** Aquaculture has a significant impact on the economic and social wellbeing of the Highlands and Islands in particular and schoolchildren there should know something about it. A learning programme might include the production of different materials on fishfarming: as a topic in the 5-14 curriculum (within the subject area of *Environmental Studies – Living Things and the Processes of Life*), to acquaint children with the process of dealing with the complexities and controversies surrounding such an activity; as a topic in the higher course, Managing Environmental Resources, whose content includes aquaculture at all levels of new National Qualifications, to introduce pupils to the issues in a more advanced way; to teach appropriate skills in vocational courses where these are currently insufficient for the industry's needs; and in establishing community learning programmes designed to explore the social, economic and environmental aspects of fishfarming in a lifelong learning context. These materials will provide objective information about aquaculture as a food-producing sector and its environmental interactions. Together, they will promote the industry's crucial significance to communities in fishfarming areas, in a non-partisan way, to improve levels of understanding, responsibility, critical awareness and commitment to sustainability.
- 3.111** The findings and recommendations of the recent national debate on the future of education in Scotland are expected soon. Changes to the content and delivery of the curriculum may be proposed. Discussions will take place with education authorities and Careers Scotland with a view to developing materials suitable for school study modules which might be integrated into the curriculum to suit on a school-by-school or local authority area basis. Seafish is already involved in educational initiatives, including school visits: it will consider ways in which the dissemination of information about aquaculture could be incorporated in its ongoing programmes. The industry itself will become more proactive in encouraging interaction. Education authorities and schools will be encouraged to adopt greater flexibility in their approaches to content and delivery to ensure that programmes are tailored to individual pupils' needs.



## The quality of areas designated for shellfish

- 3.112** The harvesting of bivalve molluscs is bound by the terms of European Directive 91/492/EEC (24). This sets out microbiological quality criteria from which harvesting areas are classified by the Food Standards Agency in Scotland FSA(S). Only shellfish harvested from class A waters are permitted to go straight on to the market. Loss of an A classification therefore has major repercussions for shellfish farmers.
- 3.113** The quality of waters designated as shellfish growing waters is also governed , however, by the requirements of the Shellfish Waters Directive 79/923/EEC. Here, the relevant authority is SEPA. Problems have arisen where loss of class A status under the Harvesting Directive, due in particular to failure of the bacteriological standards, has not been matched by an apparent reduction in bacteriological quality under the Waters Directive. Two issues are relevant in the derivation and achievement of environmental quality standards: (a) the complex, non-linear relationship between bacterial levels in shellfish flesh and the waters they grow in, and (b) diffuse sources of those bacteria. Some research is available on the first issue, but SEPA has identified the need for further research on the impacts from diffuse sources of pollution, to determine the relationship between quality standard failures under the Harvesting and Shellfish Waters Directives.
- 3.114** The recommended research project, which would require significant resources, would involve the identification and quantification of sources of bacteria which put at risk the quality of shellfish waters and therefore their harvesting designation. In addition to the major sewage outfalls operated by Scottish Water, these sources include sewage from isolated dwellings and small settlements, agriculture (including diffuse run-off from grazing land as well as point sources), other activities/land uses contributing to riverine or direct marine inputs, and natural marine-based sources such as bird roosts and seal haul-outs. Once appropriate funding had been identified, the project, managed jointly by SEPA and FSA(S), would take at least two years to complete. Its results would be relevant in revising quality standards and monitoring procedures used for designating these protected areas as part of the River Basin Management process. They would also inform the regulatory process in terms of the improvements required to the quality of effluent discharges, and in due course other activities giving rise to diffuse bacteriological pollution.

# Implementation, oversight and review

- 4.1 All who participated in developing this Strategic Framework for the aquaculture industry in Scotland have a direct interest in its implementation. Responsibility for delivery of specific aspects is explicitly assigned within this document (Appendix 3).
- 4.2 The Scottish Executive will chair a working group representing stakeholder interests to monitor progress. It will publish, on behalf of all the stakeholders, a revised version of Appendix 3 every twelve to eighteen months so that the extent of progress made is visible. Where a target date for achievement of one or other of this document's commitments has been exceeded, the reasons for the delay will also be made explicit.
- 4.3 As the outcomes identified in the priorities for action in Appendix 3 are attained, they will contribute to a greater understanding of aquaculture's future strategic requirements. We believe therefore that it will be appropriate to reconsider the Strategic Framework in its entirety within the next four to five years.

# Appendices

## Appendix 1: Ministerial Working Group on Aquaculture

Allan Wilson	Deputy Minister for Environment and Rural Development, Scottish Executive ( <b>Chair</b> )
Lloyd Austin	RSPB, representing Scottish Environment LINK
Kenny Black	Scottish Association for Marine Science
Sandy Cumming	Highlands and Islands Enterprise
Michael Cunliffe	Crown Estate (to November 2002)
Mark Davies	British Trout Association
Stuart Elder	Bank of Scotland, representing Committee of Scottish Clearing Bankers
Phillip Gallimore	UK Agriculture Supply Trades Association
Malcolm Gillespie	Seafish Industry Authority
George Hamilton	Convention of Scottish Local Authorities
Tricia Henton	Scottish Environment Protection Agency (to October 2002)
Tom Inglis	Scottish Environment Protection Agency (from November 2002)
Jamie Lindsay	Scottish Quality Salmon
Doug McLeod	Association of Scottish Shellfish Growers

Maureen Macmillan MSP	Scottish Parliament Transport and the Environment Committee
Andrew Mallison	Marks & Spencer, representing Scottish Retail Consortium
Simon Pepper	WWF Scotland, representing Scottish Environment LINK
Ian Pritchard	Crown Estate (from February 2003)
David Sandison	Shetland Salmon Farmers' Association
John Sargent	Emeritus Professor, University of Stirling
Michael Scott	Scottish Natural Heritage
Richard Slaski	British Marine Finfish Association
Phillip Thomas	FSA Scottish Food Advisory Committee
Tony Wall	Fish Veterinary Group
Andrew Wallace	Association of Salmon Fishery Boards

### **Secretariat**

Jinny Hutchison	Scottish Executive Environment and Rural Affairs Department <b>(Deputy Chair)</b>
Gordon Brown	Scottish Executive Environment and Rural Affairs Department
Graham Thompson	Scottish Executive Environment and Rural Affairs Department (to August 2002)
Gordon Hart	Scottish Executive Environment and Rural Affairs Department (from October 2002)
Andy Rosie	Scottish Environment Protection Agency

## Appendix 2: The regulatory framework

The main regulatory and advisory bodies involved in aquaculture are:

- the Scottish Executive Environment and Rural Affairs Department (SEERAD);
- the Crown Estate;
- local authorities;
- the Scottish Environment Protection Agency (SEPA); and
- Scottish Natural Heritage (SNH).

**SEERAD** is responsible for statutory measures under the Diseases of Fish Acts 1937 and 1983 and the related EC fish health legislation to prevent the introduction and spread of serious pests and diseases of fish and shellfish which may affect farmed and wild stocks. All marine fish farms must be registered with the Department for disease control purposes. Certain diseases must be notified to the Department and formal procedures exist for the treatment and disposal of infected stock.

SEERAD's Fisheries Research Services carries out a wide range of basic marine fish farm research and offers advice on aspects of production and disease control. SEERAD also has wider responsibilities in relation to the protection of fish, fisheries and the marine environment. It advises the Crown Estate on the implications for disease control, existing fishing interests and the inshore marine environment of applications for marine fish farm leases, and is consulted by SEPA on discharge consent applications.

**The Crown Estate** is responsible for the management of the territorial seabed and most of the foreshore between high and low water mark. Anyone wishing to establish a marine fish farm must apply to it for a lease of the seabed, and foreshore where appropriate, within which the marine fish farm will operate.

Following a review of these arrangements, and public consultation, it was concluded that the Crown Estate's role in authorising marine developments should be reassigned to local authorities and planning controls are being extended into marine waters by the Water Environment and Water Services Act 2003. Meanwhile, local authorities have the lead role in advising the Crown Estate on marine fish farm proposals under interim administrative arrangements.

Different planning arrangements apply in Shetland and Orkney. In Shetland, under the Zetland County Council Act 1974, the Council has powers to licence works in coastal waters, which it exercises in conjunction with its powers as planning authority. Under these powers, the Council has developed policies for the development and regulation of salmon and shellfish farming. Under the Orkney County Council Act 1974, the Council exercises works licensing powers within certain designated harbour areas. In the event that a works licence is granted, the applicant must also apply to the Crown Estate for a lease in the usual manner.

**SEPA** has a duty to promote the cleanliness of Scotland's tidal waters and to conserve, so far as practicable, its water resources, balancing socio-economic elements. It is also required to promote the conservation of flora and fauna dependent on the aquatic environment. This includes safeguarding water quality and the condition of the seabed in the vicinity of fish farms. Under the Control of Pollution Act 1974, SEPA consent is required for the discharge of effluent from marine fish farms to coastal waters. SEPA is responsible for ensuring that appropriate monitoring of the aquatic environment is undertaken, and this is achieved by applying specific consent conditions and by its own audit monitoring.

**Scottish Natural Heritage** is responsible for advising Government on securing the conservation and enhancement of the natural heritage – wildlife, habitats and landscapes – for promoting its sustainable use, and for fostering its understanding and enjoyment by the public. When consulted on aquaculture applications, SNH takes into account proposed developments' proximity to, and potential impact on, wildlife, habitats and landscape.

Additionally, the Veterinary Medicines Directorate; the European Agency for the Evaluation of Medicinal Products; the Maritime and Coastguard Agency; the Health and Safety Commission and the Health and Safety Executive; and the Food Standards Agency all play a role in regulating the aquaculture industry:

- The **Veterinary Medicines Directorate** is an Executive Agency of the Department for Environment, Food and Rural Affairs protecting public health, animal health and the environment, and promoting animal welfare by assuring the safety, quality and efficacy of veterinary medicines in the United Kingdom.
- The **European Agency for the Evaluation of Medicinal Products** (EMA) co-ordinates the existing scientific resources of the Member States in order to evaluate and supervise medicinal products for both human and veterinary use throughout the whole of the European Union. The EMA network of partners includes the general public and the users of medicines, the pharmaceutical industry, health care professionals and international partners.
- The **Maritime and Coastguard Agency** (MCA) aims to develop, promote and enforce high standards of maritime safety and pollution prevention, to minimise loss of life amongst seafarers and coastal users, and to minimise pollution from ships to sea and the coastline.
- The UK **Health and Safety Commission** (HSC) and the **Health and Safety Executive** (HSE) are responsible for the regulation of almost all the risks to health and safety arising from work activity in Britain.
- The **Food Standards Agency** is an independent food safety watchdog set up by an Act of Parliament in 2000 to protect the public's health and consumer interests in relation to food.



## Appendix 3: Summary of objectives, priority actions and those responsible

Title: Commercial investment		Para reference: 3.3
Federation of Scottish Aquaculture Producers (FSAP) to prepare a plan to encourage investment in Scottish aquaculture.		
<b>Timetable</b> December 2003	<b>Indicators/stages</b> Initial report completed with recommendations for further action.	<b>Lead body</b> FSAP
		<b>Who else involved</b> Retailers; Scottish Executive; HIE; local authorities; Crown Estate; and Banks.

Title: Comparative costs of aquaculture production		Para reference: 3.4
To consider need for independent study of the regulatory costs on aquaculture businesses in Scotland.		
<b>Timetable</b> May 2003 November 2003	<b>Indicators/stages</b> Discussion of need for study Study completed.	<b>Lead body</b> Trade associations and Scottish Executive
		<b>Who else involved</b> HIE and Crown Estate

Title: Export strategy		Para reference: 3.5
To develop Exports Action Plan.		
<b>Timetable</b> During 2003 Spring 2004	<b>Indicators/stages</b> Strategic analysis commissioned Targeted action plan developed.	<b>Lead body</b> Trade associations
		<b>Who else involved</b> HIE; exporting companies; Scottish Enterprise; Seafish; SDI; and Food From Britain

Title: Adding value		Para reference: 3.19
To develop the potential of branded products and the associated product quality standards.		
<b>Timetable</b> During 2003  2004	<b>Indicators/stages</b> Develop strategy to optimise Scotland's potential for, and premium from, differentiated products based on geographic origin and product/production qualities and attributes. Implement strategy.	<b>Lead body</b> Trade associations
		<b>Who else involved</b> HIE; Scottish Enterprise and Scottish Executive.

Title: Training and retraining		Para reference: 3.24 to 3.27
Skills gaps to be identified and action plan produced.		
<b>Timetable</b> Spring 2003 2003-04	<b>Indicators/stages</b> Current staffing, skills gaps etc. assessed. Course material and delivery packages developed.	<b>Lead body</b> LANTRA; trade associations; and HIE/LECs
		<b>Who else involved</b> Scottish Executive; local authorities; training providers; and FSA(S).

Title: Teaching Company Scheme		Para reference: 3.28-3.29
To extend TCS to aquaculture.		
<b>Timetable</b> 2003	<b>Indicators/stages</b> Funds identified.	<b>Lead body</b> Scottish Executive
		<b>Who else involved</b>

<b>Title:</b> Developing public understanding of aquaculture			<b>Para reference:</b> 3.33
To improve public understanding of the industry, its governance and other relevant issues.			
<b>Timetable</b> Spring 2003	<b>Indicators/stages</b> Strategic Framework launched, ongoing work thereafter.	<b>Lead body</b> Trade associations	
			<b>Who else involved</b> Retailers; Seafish; local authorities; FSA.

<b>Title:</b> Relationship between Seafish and aquaculture			<b>Para reference:</b> 3.34-3.35
To consider future relationship between Seafish and the aquaculture industry.			
<b>Timetable</b> April 2003  Autumn, 2003	<b>Indicators/stages</b> Issues discussed in Seafish Aquaculture Advisory Committee. Decisions published.	<b>Lead body</b> Seafish	
			<b>Who else involved</b> Industry trade associations and organisations.

<b>Title:</b> Structural funds			<b>Para reference:</b> 3.36 -3.39
To input as appropriate to review of FIGF funding for aquaculture.			
<b>Timetable</b> During 2003	<b>Indicators/stages</b> Mid-term review of FIGF.	<b>Lead body</b> Scottish Executive	
			<b>Who else involved</b> Trade associations.

Title: Carrying capacity		Para reference: 3.40-3.45
To develop a model for determining carrying capacity.		
<b>Timetable</b> Spring 2003 Autumn 2003  Spring 2006  Summer 2006 Autumn 2006	<b>Indicators/stages</b> Expert working group established. Report from working group with options for model development, followed by public consultation. Improved modelling approach developed, and validated using field data. Public consultation on proposed model. Improved modelling approach in place	<b>Lead body</b> SEPA
		<b>Who else involved</b> Trade associations; Scottish Executive; local authorities; SNH; wild fish interests; scientific bodies.

Title: Data gathering		Para reference: 3.46-3.47
To collect environmental data to inform carrying capacity guidelines at local level.		
<b>Timetable</b> Spring 2004  Spring 2005	<b>Indicators/stages</b> Parameters identified for routine measurement; standard reporting format and transmission timetable agreed. Monitoring network and data base to handle returns developed.	<b>Lead body</b> SEPA
		<b>Who else involved</b> Producers; trade associations; Scottish Executive; local authorities; SNH; local environmental groups; wild fish interests.

Title: Location and relocation of farms		Para reference: 3.49-3.52
To develop policy on location/ relocation of fish farms.		
<b>Timetable</b> 2003 2004   2004-05	<b>Indicators/stages</b> Stakeholder group established. Criteria/rationale to assess whether farms are poorly located developed. Scoping study reviewing research and field data on louse infection levels on wild salmonids. Consultation with industry and other stakeholders on proposals.	<b>Lead body</b> Scottish Executive          <b>Who else involved</b> Producers; trade associations, HIE; local authorities; CE, NH; SEPA; environmental NGOs; Scottish Fishermens Federation; wild fish interests; and scientific bodies.

Title: Scottish Aquaculture Research Forum		Para reference: 3.53-3.55
To establish a Scottish Aquaculture Research Forum.		
<b>Timetable</b> Summer 2003	<b>Indicators/stages</b> Remit, membership and research priorities determined.	<b>Lead body</b> Scottish Executive          <b>Who else involved</b> Trade associations; SFIA; HIE; local authorities; Crown Estate; SNH; SEPA; environmental NGOs; wild fish interests; scientific bodies.

Title: Sea lice management		Para reference: 3.62-3.64
To review effectiveness of voluntary sea lice management initiatives.		
<b>Timetable</b> Ongoing	<b>Indicators/stages</b> Audit checks by Fisheries Research Services or suitable contractor and TWG National Development Officer.	<b>Lead body</b> Scottish Executive
		<b>Who else involved</b> Producers; trade associations; SEPA; and wild fish interests.

Title: Prevention of escapes		Para reference: 3.65-3.69
To minimise escapes.		
<b>Timetable</b> Ongoing	<b>Indicators/stages</b> Better on-farm security; revised industry codes of practice on containment; exploration of improved standards of construction and maintenance.	<b>Lead body</b> Scottish Executive
		<b>Who else involved</b> Producers; trade associations; local authorities; SNH; environmental NGOs; and wild fish interests.



Title: Marking farmed fish		Para reference: 3.67
To conduct an international assessment of current and prospective techniques for marking farmed fish.		
<b>Timetable</b> Spring 2004	<b>Indicators/stages</b> Report to SARF and TWG	<b>Lead body</b> Scottish Executive
		<b>Who else involved</b> Trade associations; SNH; environmental NGOs; wild fish interests; and scientific bodies.

Title: Development of containment guidance		Para reference: 3.69
To produce guidance on fish farm cage/equipment design and security.		
<b>Timetable</b> Spring 2004	<b>Indicators/stages</b> Appropriate guidance to inform regulators	<b>Lead body</b> Local authorities (H&I Aquaculture Forum)
		<b>Who else involved</b> Insurance sector; suppliers; producers; trade associations; Crown Estate; Scottish Executive.

Title: Environmental Impact Assessment		Para reference: 3.71 -3.73
To review the quality of fish farm EIAs and develop guidance for developers and regulators on minimum standards.		
<b>Timetable</b> Spring 2004 Summer 2004	<b>Indicators/stages</b> Review completed. Guidance on expected minimum standards produced.	<b>Lead body</b> COSLA
		<b>Who else involved</b> Trade associations; Scottish Executive; Crown Estate; SEPA; SNH; environmental NGOs; wild fish interests.

Title: Community liaison arrangements		Para reference: 3.74-3.75
To develop local community/industry liaison arrangements.		
<b>Timetable</b> December 2003	<b>Indicators/stages</b> Good local liaison to be evident in the majority of aquaculture – important communities	<b>Lead body</b> Trade associations
		<b>Who else involved</b> Producers; local authorities; local communities; environmental NGOs; wild fish interests.

Title: New Businesses		Para reference: 3.79
To develop business diversification and start-up schemes.		
<b>Timetable</b> Early 2004	<b>Indicators/stages</b> Schemes currently available and companies' future needs reviewed; position paper produced.	<b>Lead body</b> HIE and LECs
		<b>Who else involved</b> Local authorities; service and supply businesses; trade associations.

Title: Promotion of healthy eating		Para reference: 3.81-3.83
To establish Healthy Seafood Eating task force.		
<b>Timetable</b> Early 2003 Summer 2003 Annually	<b>Indicators/stages</b> Healthy Seafood Eating task force set up. Campaign launched. Domestic seafood consumption trends monitored	<b>Lead body</b> FSAP; industry; trade organisations
		<b>Who else involved</b> Retailers; Seafish; Scottish Executive; FSA; HEBS.

Title: Local authority Zoning Plans		Para reference: 3.86-3.87
Local authorities to develop local guidance zoning the development of aquaculture in coastal areas.		
Timetable	Indicators/stages	Lead body
2003-04	Local guidance published	Local Authorities
		<b>Who else involved</b> Trade associations; SNH; SEPA; environmental NGOs; wild fish interests; Scottish Executive.

Title: Welfare assessment		Para reference: 3.88-3.90
All veterinarians working with fish to develop their knowledge of fish health and welfare issues.		
Timetable	Indicators/stages	Lead body
Ongoing	Regular dialogue with FRS and Aquaculture Health Joint Working Group.	Fish Veterinary Society
		<b>Who else involved</b> Scottish Executive; and Aquaculture Health Joint Working Group.

Title: Welfare indices for aquaculture species		Para reference: 3.91-3.92
To produce Welfare Code of Practice for farmed fish.		
Timetable	Indicators/stages	Lead body
Summer 2003	AHJWG subgroup set up to consider welfare issues and report.	Scottish Executive (AHJWG)
Summer 2004	AHJWG subgroup report published with recommendations for changes to codes of practice.	
		<b>Who else involved</b> Fish Veterinary Society; RUMA; CIWF; State Veterinary Service.

Title: Codes of Practice		Para reference: 3.93-3.94
To develop Code of Best Practice (including Code of Best Environmental Practice).		
<b>Timetable</b> End 2003  Summer 2004	<b>Indicators/stages</b> Production of draft Codes of Practice for consultation All licensed aquaculture operators in Scotland subscribed to Codes of Practice.	<b>Lead body</b> Trade associations
		<b>Who else involved</b> SEPA; SNH; Scottish Executive; FRS; CE; FSA(S); Seafish; environmental NGOs; local authorities; State Veterinary Service; and academic institutions.

Title: Monitoring Codes of Practice		Para reference: 3.95
To monitor and audit compliance with industry codes.		
<b>Timetable</b> Summer 2005	<b>Indicators/stages</b> First compliance reports published.	<b>Lead body</b> Scottish Executive
		<b>Who else involved</b> Trade associations; AHJWG.

Title: Waste disposal		Para reference: 3.96
To develop a collective fish waste management infrastructure.		
<b>Timetable</b> End 2003	<b>Indicators/stages</b> Waste management infrastructure developed.	<b>Lead body</b> Scottish Executive
		<b>Who else involved</b> Trade associations; HIE; Seafish; local authorities; the UK Association of Fish Meal Manufacturers; and SEPA.

Title: Aquaculture Bill		Para reference: 3.97
To enact legislation governing the aquaculture industry in Scotland.		
<b>Timetable</b> 2003-04	<b>Indicators/stages</b> Development of draft proposals for inclusion in Bill, in consultation with stakeholders.	<b>Lead body</b> Scottish Executive
As legislative time permits.	Bill introduced in the Scottish Parliament.	
		<b>Who else involved</b> All aquaculture stakeholders.

Title: Extension of planning controls		Para reference: 3.99-3.100
To extend local authority planning responsibility to marine aquaculture.		
<b>Timetable</b> Summer 2003	<b>Indicators/stages</b> Stakeholder group established.	<b>Lead body</b> Scottish Executive
Summer 2004	Draft proposals issued for consultation.	
2005	Planning controls extended.	
		<b>Who else involved</b> Planning authorities; aquaculture stakeholders.

Title: Planning guidance for fish farming		Para reference: 3.103
To produce SPP for fish farming.		
<b>Timetable</b> As per the timetable for extending planning controls.	<b>Indicators/stages</b>	<b>Lead body</b> Scottish Executive
2005	SPP introduced.	
		<b>Who else involved</b> Local authorities; aquaculture stakeholders.

<b>Title:</b> Fish health legislation		<b>Para reference:</b> 3.108-3.109
To establish UK position ahead of revision of EC Fish Health Directives.		
<b>Timetable</b> Summer 2003  2003-04	<b>Indicators/stages</b> Discussion with industry of legislative requirements. Revision of Fish Health Directives.	<b>Lead body</b> Scottish Executive
		<b>Who else involved</b> Members of AHJWG.

<b>Title:</b> Education programmes		<b>Para reference:</b> 3.110-3.111
To develop educational material about fish farming.		
<b>Timetable</b> Ongoing from 2003	<b>Indicators/stages</b> Development of appropriate study materials	<b>Lead body</b> Education authorities; schools and trade associations.
		<b>Who else involved</b> Scottish Executive; Seafish; SNH; Careers Scotland.

<b>Title:</b> The quality of shellfish waters and compliance with end-product standards for harvested bivalve molluscs		<b>Para reference:</b> 3.112 – 3.114
To determine the relationship between quality standard failures under the Harvesting and Shellfish Waters Directives.		
<b>Timetable</b> 2 years from project inception	<b>Indicators/stages</b> Interim report on field monitoring stage after 1st 12 months, final report 24 months after project inception	<b>Lead body</b> Joint SEPA/FSA(S)
		<b>Who else involved</b> FRS.



## Appendix 4: Research priorities

(extracted from The *Review and Synthesis of the Environmental Impacts of Aquaculture*)

<http://www.scotland.gov.uk/cru/kd01/green/reia-00.asp>

1. The following list of research priorities is not itself in priority order; nor is it exhaustive. As the aquaculture industry develops new species, husbandry practices and technologies, some of the research needs listed may acquire a different priority and new research priorities will emerge. It is intended, therefore, that this list be kept under continuous review, along with Appendix 3, as new findings become available.
2. Although the gross effects of fish farming on sediments are relatively well understood, much remains to be done regarding the dynamics of waste input, responses from the sediments in terms of the interactions between microbial and macro-biological processes, how these influence the chemistry of the sediments, and the physical processes of oxygen supply, sediment resuspension and mixing by water currents. These interactions take place against a background of seasonal changes and the 2-year farming cycle that results in great variation in the supply of organic materials to sediments. In addition, inter-annual variability in biological factors such as the supply of invertebrate larvae probably has effects that are not as yet well understood. These aspects are important as they affect: a) our understanding of the assimilative capacity of sediments with respect to farm wastes; b) the ways in which chemical contaminants in sediments are redistributed to the wider environment and; c) the ways sediments consume oxygen and release dissolved nutrients into the water column. Such studies will inform the determination of benthic carrying capacity.
3. Further studies should be undertaken of phytoplankton abundance and species composition in some lochs originally studied before 1984 and now the sites of major fish-farms.
4. A few key coastal sites should be chosen to bring together long-term programmes of monitoring of nutrients, phytoplankton and algal toxins. The historic and future data collected in this way should be subject to statistical analysis and compared with predictions from mathematical models. The sites should represent a range of loadings by fish farms.
5. Inflows of nutrients from the Atlantic Ocean and the Irish Sea should be monitored in Winter and in Summer; such inputs are likely to change because of climate change as well as changes in nutrient enrichment of the Irish Sea.
6. Better understanding is needed of water movements within sea-lochs and voes, between them and coastal waters, and in coastal waters.
7. Studies are required of the biology, toxicology and ecology of Scottish populations of harmful algae, especially of *Pseudo-nitzschia* species.

8. Methods capable of detecting the presence of toxins in small samples of phytoplankton need to be developed: present methodology relies on analysis of shellfish tissues, and can thus provide only indirect information about toxic algae.
9. A better understanding is needed of the role of pelagic protozoa in coastal waters, lochs and voes; these organisms may be crucial in preventing the development of algal blooms, yet especially sensitive to pollution with metals or pesticides.
10. More information is required on rates of loss of nutrients from Scottish continental shelf and sea-loch waters, especially concerning the process of denitrification which takes place in organically enriched sediments.
11. Development of simple but robust models to predict undesirable disturbance to the balance of organisms and the quality of the water as a result of inputs of nutrient and organic matter by fish farms must continue. With priorities 2-9 above, this will inform understanding of the carrying capacity of the Scottish coast for aquaculture and other users.
12. Further study is required of the interaction of suspended-culture mussel populations with other components of the ecosystem, in terms of their scope for growth (phytoplankton availability), their impact on other suspension feeders in the food web and the potential for nutrient release from accumulated biodeposits. Such studies should be linked to the development of models to assist in the calculation of appropriate stocking densities for each bivalve cultivation area and the identification of sites where mussel cultivation could be practised to advantage.
13. Fuller study of the potential benefits of integrating aquaculture species is required, using a combination of nutrient extracting species on site with nutrient enriching species, with a view to increased productivity in the former and a net reduction in nutrient release from the latter, thus influencing carrying capacity.
14. There is a need to improve our understanding of the mechanism of toxification and depuration of ASP in commercially valuable species such as the king scallop. There is little information at present on the levels and mechanisms of production of domoic acid in *Pseudo-nitzschia* species isolated locally, the reason for prolonged toxin retention in king scallops or the potential impact of the ASP on shellfish physiology, fecundity and recruitment.
15. More information is required on the toxicity of emamectin benzoate, teflubenzuron, copper and zinc to benthic organisms commonly found in Scottish sea lochs.

16. More information is required on the long-term effects of cypermethrin, emamectin benzoate, copper and zinc on sediment-associated organisms. In particular:
  - what proportion of the chemicals, particularly the metals, present in fish farm sediments is bioavailable?
  - is there potential for these chemicals, particularly the metals, to accumulate up the food chain?
  - what happens when a site is fallowed and the sediment biogeochemistry changes? Do the chemicals that have accumulated, and are possibly not biologically available in the organically enriched sediment, become bioavailable as chemical remediation occurs? Are they released, and do they disperse over a wider area? Do they prevent recolonisation of impacted sites?
17. More information is required on the dispersion, fate and potential long-term effects of multiple cypermethrin treatments (at single and multiple farm sites) within a loch system.
18. More information is required on the potential effects of concurrent emamectin treatments at several farm sites within a loch system.
19. Antifoulant usage by the aquaculture industry should be quantified. Copper and zinc concentrations, speciation and toxicity in fish farm sediments need to be investigated.
20. Research is required to quantify the factors responsible for the transmission of lice between farms and wild fish. Improvements in understanding the mode and rate of transmission are essential in providing information on the relationships between infection of wild populations, lice burden on farms and separation distances between migratory fish routes and fish farms. This would also enhance understanding of the mechanisms by which farmed fish are infected with sea lice from wild populations and from other farms, would assist in determining the reasons why some sites have fewer lice problems than others and would therefore also assist in the selection of better sites for salmon culture.
21. Continued surveillance of the presence of escaped fish in wild populations and quantification of the effects in terms of population fitness are required.
22. Improvements need to be made in marking or tagging fish to enable easy identification of escapees.
23. New methods for reducing the fertility of farmed fish are needed.
24. Improved containment technologies, including technologies for reducing the costs of operation of fully contained systems, should be developed.
25. Studies of the causes and ecological consequences of the decline of wild salmonids are required.
26. The effects of acoustic seal scarers on cetaceans should be assessed.

27. Accurate fisheries data collection and mathematical modelling of the pelagic fisheries are required in the main industrial fishing areas to ensure the sustainability of these fisheries. The influence of climate oscillations (*e.g.* El Niño) and climate change on recruitment and spawning stock compared with the impact of industrial fisheries are also very difficult to quantify and little research has been published in this area. The sustainability of the blue whiting fishery in the North Atlantic fishery also requires urgent research.
28. The effects of near market use of plant meal and oil substitutes on fat and protein composition, flesh quality and taste in salmonids should be studied.
29. Studies are required on refining the vegetable oil and protein requirements of the cultured fish species relating to life stage and seasonal variations in digestibility experienced with certain vegetable oils.
30. Better information is required regarding blending oils, reducing the dependency of manufacturers on a few plant oils and tailoring the taste of the final product to the customer needs.
31. Information is needed about nutritional studies and the implications of substituting fishmeal and oils with vegetable alternatives for new species for cultivation, particularly cold-water species such as cod, haddock, turbot, halibut, Dover sole and lemon sole.
32. Research is required into the environmental impacts of new aquaculture species, including work on wastes, diseases, parasites and escapes.

## Appendix 5: Glossary

- ASP:** Amnesiac Shellfish Poisoning.
- Algal blooms:** concentrations of phytoplankton which produce toxins which can affect human health, oxygen levels in water and which can kill or harm fish and invertebrates e.g. by damaging or clogging gills.
- Anthropogenic:** (in this context) materials occurring in the natural environment which have originated from human activities.
- Aquaculture:** the rearing or culture of aquatic organisms using techniques designed to increase the production of the organisms in question beyond the natural capacity of the environment, the organisms remaining the property of a natural or legal person throughout the rearing or culture stage, up to and including harvesting.
- Area Management Agreement:**  
agreement established, under the Tripartite Working Group initiative, between fish farming companies and District Salmon Fishery Boards/Fishery Trusts with the objective of promoting and maintaining the good health of both wild and farmed salmonids.
- Assimilative capacity:**  
the ability of an area to maintain a healthy environment and accommodate wastes.
- Biodiversity (biological diversity):**  
the variability amongst living organisms, including the variability within species, between species, and of ecosystems.
- Biological carrying capacity:**  
the maximum natural biological productivity of a body of water; if cultivated organisms (shellfish or other species which take their food from their surroundings) exceed the carrying capacity of this water body, then the biological productivity will be depleted and the natural ecosystem damaged.
- Carrying capacity:** the potential maximum production a species or population can maintain in relation to available food resources within an area.
- Chemo therapeutants:**  
compounds used by the finfish industry to treat or prevent various diseases; these can be authorised veterinary medicines (for example anti-parasitics and anti-microbials) or other chemicals (for example biocides/disinfectants or anaesthetic agents); their discharge into waters around the fish farm requires a discharge consent issued under the Control of Pollution Act 1974.

<b>Depuration:</b>	holding bivalve molluscs such as mussels in sterilised sea water for 48 hours under conditions that allow them to filter normally to remove any bacteria accumulated in the gut; the sea water can be sterilised by ozone or ultra-violet light although the latter is the most common method used.
<b>DHA:</b>	docosahexaenoic acid, an omega-3 polyunsaturated fatty acid containing 22 carbons which is abundant in fish oils.
<b>Ecosystem:</b>	a community of interdependent organisms, together with the environment they inhabit and with which they interact ; this complex, integrated unit exists in a fine balance, so that even small changes to one part of the system can have knock-on effects on many other components of the system.
<b>Ecosystem approach:</b>	identifying and protecting critical processes in the ecosystem and the interactions between them.
<b>El Nino:</b>	a disruption of the ocean-atmosphere system in the tropical Pacific having important consequences for global weather: e.g. a rise in sea surface temperatures along the Chile/Peru coast leading to a decline in the productivity of these fisheries.
<b>Ensilage:</b>	(Ensilaging) the process of creating a stable material from animal or vegetable wastes by using the maceration and preservation in formic acid of dead fish and factory offal until it can be processed to an acceptable end point.
<b>EN 45011:</b>	European Standard for bodies operating product certification systems.
<b>EPA:</b>	eicosapentaenoic acid, an omega-3 polyunsaturated fatty acid containing 20 carbons which is abundant in fish oils.
<b>Eutrophication:</b>	the enrichment of water by nutrients, especially compounds of nitrogen and phosphorus, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms and the quality of the water concerned.
<b>Fallowing:</b>	practice of leaving cages empty of fish for a period of time to break cycles of disease and/or to allow the seabed to recover.
<b>FAO:</b>	United Nations Food and Agriculture Organisation, based in Rome, which monitors food resources, including fish world-wide, and provides independent scientific assessments of the status of individual fish stocks.
<b>FIFG</b>	(the Financial Instrument for Fisheries Guidance): Structural Funds through which the EU attempts to channel financial assistance to those regions which are less developed or in industrial decline, and to support training schemes for those seeking re-entry into employment.



**Fish gap:** the extent to which fish of one or more species are available at a level lower than the market demands, because wild fisheries for these species have been closed, partially or fully, in response to wild stocks' falling beneath safe biological limits.

**Foodservice sector:** a way of defining the part of the food-purchasing industry where the consumer buys food which has already been cooked (or prepared), and which is ready to eat; also known as "the catering sector", it includes eat-in establishments such as restaurants, and eat-out establishments such as fish and chip shops.

**Hazard Analysis & Critical Control Points (HACCP):**  
food safety hazard analysis system.

**HEBS:** Health Education Board for Scotland.

**ICES:** International Council for the Exploration of the Seas, an independent scientific organisation advising North Sea and North East Atlantic Governments on the status and management of commercial fish stocks.

**IHN:** Infectious Haematopoietic Necrosis, a contagious disease which can cause high mortalities in susceptible juvenile salmonids, a member of the rhabdovirus group, currently absent from fish farms in the UK.

**Integrated Coastal Zone Management (ICZM):**  
a multi-user system designed to establish sustainable levels of economic and social activity in our coastal areas while protecting the coastal environment.

**ISO 14001:** International Standards Organisation quality standards for environmental management systems.

**List II:** specific fish diseases which are controlled at an EU level by way of Directives, implemented in Scotland under national Statutory Instruments.

**MSC:** Marine Stewardship Council, an independent body set up to establish basic principals for sustainable fishing and to provide standards for certification of individual fisheries as sustainable.

**NASCO:** The North Atlantic Salmon Conservation Organisation, established under the Convention for the Conservation of Salmon in the North Atlantic Ocean, which came into force in 1983, whose objective is to contribute to the conservation, restoration, enhancement and rational management of salmon stocks in the North Atlantic Ocean.

**NVQ:** National Vocational Qualification.

**Natura 2000 sites:** a network of protected areas established under the EC Habitats and Species, and Wild Birds Directives.

**New species:** wild species being brought into cultivation for the first time.

**NGO:** non-Governmental organisations.

**Non-native:** a species that does not originate in Scotland and which has been introduced from other parts of the world by humans, either deliberately or accidentally.

**NPPG:** National Planning Policy Guidelines (to be known in future as Scottish Planning Policies (SPP)).

**Omega-3:** name given to a family of polyunsaturated fatty acids whose parent, omega-3 – alpha-linolenic acid (ALA), is described as ‘essential’ because, like vitamins, it must be obtained from diet.

**OSPAR Convention:** the 1992 Oslo-Paris Convention, to which the UK is a signatory, aimed at preventing and eliminating pollution of the marine environment in the North-east Atlantic from land-based sources and by dumping from ships and aircraft.

**Ovigerous:** egg-bearing.

**Polyculture:** the deliberate cultivation of more than one species of aquatic organism in close proximity, where each of the organisms in question has a distinct benefit to the commercial process.

**Precautionary approach:**

approach requiring *inter alia*:

- consideration of the needs of future generations and avoidance of changes that are not potentially reversible;
- prior identification of undesirable outcomes and of measures that will avoid them or correct them;
- initiation of corrective measures without delay, so that these achieve their purpose promptly;
- priority to conserving the productive capacity of the resource where the likely impact of resource use is uncertain;
- appropriate placement of the burden of proof by adhering to the above requirements.

**Precautionary principle:**

the principle that all responsible parties should act prudently to avoid the possibility of irreversible environmental damage in situations where the scientific evidence is inconclusive but the potential damage could be significant.

**Relaying:**

the sowing out of juvenile shellfish, for example scallops, for on-growing and eventual harvesting.

**Rhabdovirus:**

a class or type of virus, one example of which is VHS (see below).

**River basin:**

area of land from which all surface run-off flows through a sequence of streams, rivers and, possibly, freshwater lochs into the sea at a single river mouth, estuary or delta.

**River Basin Management Plans:**

required by the Water Framework Directive, plans subject to review every six years setting out the environmental objectives for water bodies and providing a summary of the measures that are being used to achieve them.

**Salmonid:**

members of the salmon family, specifically the Atlantic salmon and the sea trout.

**Sea lice:**

*Lepeoptheirus salmonis* Krøyer and *Caligus elongatus* Nordmann, natural marine ectoparasites of salmon.

**Social justice:**

the equal and fair distribution of social values such as freedom, income and wealth and the opportunity to take part in society.

**Sustainable development:**

development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

**SVQ:**

Scottish Vocational Qualification.

**transgenic:**

containing genetic material introduced from another species by techniques of genetic engineering.

**TQM:**

Tartan Quality Mark – symbol indicating compliance with Scottish Quality Salmon Product Certification Schemes for farmed salmon and smoked salmon, facilitating trace-back to source and assuring retailers and consumers that the salmon is Scottish and production processes have been rigorously and independently inspected at every stage.

**UKASTA:**

United Kingdom Agricultural Supply Trade Association, represents the interests of animal feed manufacturers, agricultural merchants and road hauliers to the agricultural industry.

**VHS:** Viral Haemorrhagic Septicaemia, a potentially serious viral disease of trout in freshwater farms, but currently absent from farms in the UK, a List II disease, and a member of the rhabdovirus group (see appropriate references).

**Visual carrying capacity:**

the degree to which a particular landscape or area is able to accommodate development or change without significant effects on the character for which it is particularly valued by people or without causing an overall change to its landscape character type; this capacity will vary according to the type and nature of the development or change that is proposed.

**Wild land:** uninhabited and often relatively inaccessible countryside where the influence of human activity on the character and quality of the environment has been minimal.

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## Appendix 7: A strategy for the sustainable development of European aquaculture (Extract)

### A vision for the future

Aquaculture in the EU developed well in the last two decades and this was partly allowed by the many Community initiatives that have been taken to support this sector. The Union has a vast legal armoury on aquaculture, and activities to enhance the legal framework are progressing. However, there is still room for further improvement, and the recent slowdown of growth must be addressed.

While the overall framework shows a potential for further development, aquaculture in the Union has still to cope with some problems, in particular in the context of health protection requirements, environmental impact and market instability.

In the next ten years aquaculture must reach the status of a stable industry which guarantees long term secure employment and development in rural and coastal areas, providing alternatives to the fishing industry, both in terms of products and employment.

To secure employment and well-being, European aquaculture must be an economically viable and self-sufficient industry. The Market has to be the driving force of aquaculture production: production and demand are finely balanced and any increase in production in excess of the likely evolution in demand should not be encouraged. The range of products must be enlarged, better marketing strategies have to be implemented. Private investors are, and have to remain, the leading force to put progress in practice, while a key role of the public powers will be to guarantee that the economic viability be parallel to the respect of the environment and the good quality of the products.

The fundamental issue is therefore the maintenance of competitiveness, productivity and durability of the aquaculture sector. Further developments of the industry must take an approach where farming technologies, socio-economics, natural resources use and governance are all integrated so that sustainability can be achieved.



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