TRANSPORT AND THE ENVIRONMENT COMMITTEE

AGENDA

10th Meeting, 2002 (Session 1)

Monday 25 March 2002

The Committee will meet at 1.45 pm in the Corran Halls, Oban, to consider the following agenda items:

1. Aquaculture Inquiry (in private): The Committee will consider possible areas of questioning for witnesses on its inquiry into aquaculture.

2. Aquaculture Inquiry: The Committee will take evidence as part of its inquiry into aquaculture from—

   Lord Jamie Lindsay and Dr Graeme Dear, Scottish Quality Salmon

   Dr Richard Slaski, British Marine Finfish Association

   Dennis Overton, Aquascot

   Doug McLeod, Association of Scottish Shellfish Growers

   Douglas MacDiarmid and Iain Sutherland, Highlands and Islands Enterprise

   Malcolm Gillespie, Seafish Industry Authority

   Professor Randolph Richards

   Dr Dick Shelton

   Dr Kenneth Black

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The following public papers are relevant for this meeting:

| Submission from Scottish Quality Salmon  | TE/02/10/1 |
| Submission from British Marine Finfish Association | TE/02/10/2 |
| Submission from Association of Scottish Shellfish Growers | TE/02/10/3 |
| Submission from Highlands and Islands Enterprise | TE/02/10/4 |
| Submission from Sea Fish Industry Authority | TE/02/10/5 |
| Submission from Professor Randolph Richards | TE/02/10/6 |
SCOTTISH QUALITY SALMON

EVIDENCE TO THE TRANSPORT AND ENVIRONMENT COMMITTEE ON PHASE TWO OF THE INQUIRY INTO SEA CAGE FISH FARMING

Introduction

Scottish Quality Salmon is pleased to have the opportunity to offer further comment on the issues relating to the strategic development of the aquaculture industry in Scotland.

Scottish Quality Salmon is a quality assurance led membership organisation established to offer whole chain assurance from fish feed company to salmon farmer to smoker and processor. Membership is strictly dependent on adherence to independently inspected and internationally accredited quality standards encompassing fish health and welfare, production processes, product quality and environmental considerations (EN 45011 and ISO 14001). Members account for around 65% of the tonnage of the salmon produced in Scotland. This salmon is marketed in the UK under the Tartan Quality Mark and in France under the prestigious Label Rouge accolade, granted by the French authorities to only the very highest quality foods.

The impact of the salmon farming industry in Scotland

- Scottish salmon farming is valued at £300 million (ex farm) with the remaining aquaculture interests in Scotland valued at £10 million.

- Scottish salmon, by value, accounts for nearly 40% of all Scottish food exports.

- Recent research undertaken by the University of Stirling has determined a premium of up to £40 million per annum for Scottish salmon over its international competition.

- The salmon farming industry supports 6,500 jobs, 70% of which are in the Highlands and Islands.

- The industry has facilitated further enterprise generating local and international business opportunities for suppliers to the industry ranging from feeding equipment to sea pens and exporting to countries such as Norway, Faroes and Iran.

- The industry, especially through Scottish Quality Salmon and its predecessor Scottish Salmon Growers Association, has funded, and remains committed to research to further develop the highest standards of fish health, welfare and environmentally friendly methods of farming.

- Scottish Quality Salmon leads the way for salmon farmers along with SEERAD and wild fisheries interests in the Tripartite initiative which is working to protect and enhance the future for both wild salmon and sea trout interests and salmon farming.

- Remote rural communities are strengthened by the salmon farming industry which injects an average £100 million in wages as well as local business support and community initiatives.
Scotland is producing salmon whose beneficial health properties conferred by high Omega-3 levels are endorsed by over 5,000 scientific and medical papers. The Scottish Diet Action Plan recommends a doubling of consumption of oil-rich fish, like salmon, to improve the nation’s health, particularly in relation to heart disease and the Scottish Executive is also looking at ways to improve the quality of school meals for children for both short and long term benefits for Scotland’s health.

Business analysts predict the loss of almost 1,000 fish processing jobs as a result of diminishing white fish supplies but consumer demand for salmon has trebled providing a viable alternative to fill those processing jobs.

With many of the world’s fish stocks in decline, fish farming is well placed to supply the increasing demand for fish. Scotland can be in the forefront of this opportunity and lead the way in high quality fish production.

Salmon farming is already a leading industry for Scotland and in order to maintain and enhance that position within a strategic framework for Scotland plc. It needs, and deserves, a Ministerial and Executive Strategy and endorsement to deliver its maximum potential for the benefit of Scotland.

The Transport and Environment Committee specifically asks:

1. What the respective roles of the Executive and the aquaculture industry should be in taking forward the future of aquaculture in Scotland
2. How the aquaculture industry can increase its competitiveness in the international marketplace
3. How the industry can best achieve environmental sustainability in the future

1. Scottish Quality Salmon believes that the Executive's role should be regulator, sponsor and also advocate for such an important industry. This role should encompass the following primary functions including strategic co-ordination of the policy, regulatory and technical arena in which the industry operates and advocacy for the industry in Scotland’s wider political and economic arena.

- Develop strategy to maximise Scotland’s potential for a quality driven, sustainable salmon farming industry recognising both niche marketing opportunities and high quality brands such as Tartan Quality Mark and Label Rouge Scottish salmon.
- Deliver governance, based on that strategy, which is co-ordinated, coherent and confident.
- Commit to joint Government and Industry R&D as part of a long term strategic vision, beginning with further studies on carrying capacity.
- Offer a wider range of feasible options, sites and financial support where greater flexibility (eg relocation and rotation) would allow particular site issues to be addressed to the satisfaction of all relevant stakeholders.
- Recognise and reward joint stakeholder initiatives such as participation in the Tripartite Area Management Groups, work with NGOs and other responsible environmental bodies.
- Support those complying with independently accredited and internationally recognised standards leading to a high quality, sustainable route and recognise, reward and motivate those investing in a high quality, long term future for the Scottish industry and its employees.
• Recognise the vital springboard that salmon farming provides for diversification into other species in terms of its existing investment, technology, R&D, market intelligence and skilled personnel.

• Review the current burden in the form of rents paid to The Crown Estate which represent an extra tax on the industry which contributes to the industry's uncompetitive position.

• Promote training and educational provision that recognises the importance of aquaculture to the rural economy.

• Develop an infrastructure (transport, schools, housing, etc) that recognises the importance of aquaculture to the rural economy.

• Position the industry, here and abroad, as a strategic, quality-led industry for Scotland engendering a national pride similar to that achieved from the whisky industry.

• Promote the role that salmon farming plays in marine wealth creation in a similar way to other countries which depend on aquaculture as a major strategic industry.

As the leading industry body for salmon farming, Scottish Quality Salmon believes it can lead the way towards a long term, sustainable future for Scottish aquaculture. Its commitment includes:

• Independently inspected Product Certification Schemes, accredited to EN 45011 for smolts, fresh, smoked salmon and organic salmon under UKROFS accreditation.

• Development and implementation of environmental management systems to internationally recognised standards (ISO 14001)

• Ongoing mandatory Codes of Best Practice including National Treatment Strategy for Control of Sea Lice, Containment, Code of Practice on Scottish Salmon Farms and the Control of Predatory Wildlife.

• Participation in Area Management Groups and Agreements.

• Funding of research into fish health, welfare, management strategies in collaboration with internationally recognised academic institutions.

• Ongoing monitoring for potential threats to the industry eg Gyrodactylus salaris and preparing appropriate contingency plans

• Collaboration and consultation with Food Standards Agency, Highlands and Islands Enterprise, The Crown Estate, SEPA, Veterinary Medicines Directorate, RSPCA, SSPCA, wild fish interests and other NGO and responsible environmental bodies

• International promotional work, particularly in France where Scottish Quality Salmon members can market salmon under the prestigious Label Rouge mark.

• Representation in Holyrood, Westminster and Brussels

2. The lack of formal recognition or the provision of incentive for the work that Scottish Quality Salmon has initiated and continues to develop is undermining Scotland’s long-term requirement for premium standards and international competitiveness. Companies currently operating in increasingly aggressive, global markets and gaining no public sector advantage for independently accredited and inspected quality standards will inevitably re-consider the lower cost, lower quality options.

Companies are already investing in training, business planning and scale of production but strategic government investment, as evidenced in other countries, would assist the further development of both the industry and best practice. A quality-led industry would be able to compete more effectively in the international arena if underpinned by a national aquaculture strategy and regulatory framework that recognises quality as a priority and key objective. In this respect, Scottish Quality Salmon was pleased to respond to the Review of Regulations Governing Aquaculture in Scotland at the end of September 2001.
Positive support, both at home and internationally, from the Executive, political parties and commentators will promote not only Scottish quality produce, but also best practice and investor confidence. In particular, Scottish Quality Salmon calls for the Executive to recognise the industry’s contribution towards marketing of all Scottish food and drink.

3. Sustainability in its widest sense is critical to salmon farming in order to capitalise on and advance the industry. It is important for everyone in Scotland, particularly the rural communities, that Scottish Quality Salmon, the Scottish Executive and MSPs work together to protect the premium value of Scottish salmon and its future capacity to contribute to Scotland plc.

Environmental sustainability, in particular, is absolutely crucial to the future of the industry; it is not an optional extra. Scotland has a successful industry because it is an ideal environment in terms of hydrography, temperature and coastal geography. Progress since the early days of the industry has been immense. Vaccination programmes and the development and use of targeted and increasingly environmentally benign veterinary medicines have aided this progress. The use of antibiotics has declined, and the use of ad hoc sea lice treatments has been falling since 1998 when the National Treatment Strategy for Sea Lice, developed by Scottish Quality Salmon, was introduced. This is in addition to the Integrated Management Strategy pioneered by Scottish Quality Salmon including farming single year classes of fish andfallowing.

Scottish Quality Salmon members already source key feed ingredients from sustainably managed fisheries and are also considering wider environmental issues such as the substitution of a proportion of plant oils or protein in fish feed. The organisation is also developing close working links with the Marine Stewardship Council to address sustainability issues for marine resources.

Sound, objective scientific knowledge is critical in ensuring a sustainable environmental future for the industry. In Scotland, the industry has access to academic excellence, such as the Institute of Aquaculture in University of Stirling and the Marine Laboratory in Dunstaffnage, where research is conducted into many aspects of salmon farming which have environmental significance. In other countries, such research is considered to be a strategic fundamental contribution to securing long-term prosperity assisted by government.

The industry recognises that further carrying capacity investigation is a vital and urgent requirement to inform the debate about the development of the industry, although it is important that this is carried out from a holistic viewpoint to mirror the stance already adopted by SEPA, balancing socio-economic needs and environmental consideration.

Members of Scottish Quality Salmon recognise the fundamental importance of environmental consideration, not just for their own business prosperity, but also for all other marine stakeholders, and therefore the development of Environmental Management Systems (EMS) to internationally recognised standards is a mandatory tenet of membership of the organisation. This is further reinforcement of Scottish Quality Salmon’s commitment to best practice principles to secure a sustainable future for salmon farming in Scotland.

Submitted by Scottish Quality Salmon, Durn, Isla Road, Perth, PH2 7HG 01738 587000. Contact Julie Edgar, Communications Director.
BRITISH MARINE FINFISH ASSOCIATION

Summary of

BMFA STRATEGY 2002-2004

Prepared for

The Scottish Executive
The Transport and Environment Committee

February 2002

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NEW MARINE FIN FISH SPECIES
- HEADLINE SUMMARY -

- The British Marine Finfish Association (BMFA) serves to support its members in their development of “new species” aquaculture

- The BMFA is also an active participant in the activities of the Federation of Scottish Aquaculture Producers (FSAP) – the overarching industry body which is now leading political representation for the sector in Scotland – and is conducting most of FSAP’s executive functions as part of its responsibility as Chair of the Federation

- The new marine species sector in Scotland is now growing quickly:
  - £4 million of first sale value due in 2002
  - Currently employing 45 fte’s on farms plus stimulating a further 35-40 fte’s in HIE region
  - £1.2 million in on-farm salaries in 2002, which is £384,000 of Tax and NI into the exchequer

- The market-focused 10-year target of the Association’s members are realistic, sustainable and significant for Scotland:
  - 30,000 tonnes per annum of cod & haddock combined – a modest 8% of the UK market
  - Up to 10,000 tonnes per annum of high value halibut
  - Total first-sale value of some £100 million per annum
  - Likely direct employment of 600 full time equivalents (fte’s) within the next 10 years + upstream and downstream multipliers
    - Which at current rates could amount to 2,400 fte’s in total for Scotland
  - Probably the most significant aquaculture sector in terms of job growth over the next decade, achieving the stated SEERAD policy of:
    - Strengthening Communities
    - Building Businesses
    - Developing Skills
  - Contributing £9 million per annum into wages in remote and fragile rural and coastal communities within the Highlands and Islands – which is £2.6 million per annum into state coffers via. Tax and NI.

- The Association has an ambitious programme of political and technical representation, research and development, member information services and strategic public relations for 2002 – with well-defined targets

- Looking ahead to the next few years, the Association is committed to helping its members to develop quality assurance and accreditation schemes and other initiatives which promote long term environmental sustainability

- Some of the Association’s members are now approaching positive cash flows – having faced years of significant investment in developing their new businesses

- Marine Species development provides the Scottish Executive with an opportunity to nurture serious enterprise in the Highlands and Islands area. The Marine Species sector is the focus for enterprise in the aquaculture sector, offering a controlled market-led expansion of the industry, not only creating new wealth and employment but also helping to secure the salmon sector and its valuable contribution to the Scottish economy.
THE BMFA

The Association exists to support the business development activities of its members, who are developing new aquaculture opportunities which are largely focused on the West Coast and Islands of Scotland. The overarching Mission Statement of the Association can be encapsulated in four phrases:

**BMFA Mission Statement**

- Foster a climate of financial and regulatory support from national and regional authorities, such that members can achieve their full commercial potential
- Provide members with knowledge of the market for Marine Fish products
- Establish frameworks for best practice and quality assurance schemes for the developing industry
- Organise and focus research activities which address key technical constraints facing members, and where possible finding external sources of funding for such work

In practical terms BMFA’s activities encompass all of the areas outlined above. Political and technical representation has become increasingly important, as the already heavily regulated aquaculture industry faces new European and national legislation, and as Scotland debates its national vision for a future aquaculture industry. Research and development remains important to the sector, and the Association’s role in seeding and managing strategic R&D initiatives continues. Dissemination of information is accomplished by way of a regular Newsletter, and by the ever-growing Annual Workshop. Technical, market and business studies are undertaken directly, or supported indirectly, and these are vital in shaping the “market focus” of this new branch of aquaculture.

The Association’s involvement in the Scottish aquaculture industry far outweighs the sub-sector’s current contribution in terms of volume or value. The BMFA’s role as current Chair of FSAP could not have come at a more crucial time in Scotland, and all indications are that the broader industry and its supporters have welcomed the Association’s contribution.

The Association’s membership at the close of 2001 stood at 22 companies and organisations. Half of these companies are actively involved in developing production, and the remainder are interested potential upstream and downstream beneficiaries of new species farming. With the main production companies still not achieving positive cash flow from their years of investment in this sub-sector (although getting close to it in 2002), their financial contribution to BMFA truly represents a commitment to a professionally organised future for their sector.

*Speakers at the 2001 BMFA Workshop*
BMFA ACHIEVEMENTS IN 2001

The BMFA has been very active in support of members over the year, and has significant milestones to report:

Research & Development

- BMFA-related Projects – 9 in total
- Contribution to CARD (Committee for Aquaculture Research & Development)
- Crown Estate’s Research Committee – a £200,000 p.a. budget

Representation

- Aquaculture Health Joint Working Group – seeking pragmatism and good science in issues such as marine VHS and IPN
- DEFRA Health Working Group – similar activities at UK level
- FIFG:
  - Sit on HIE area “Management Group”:
  - R Slaski now part of overall UK FIFG Programme Management Committee
  - Represent all GB aquaculture (except shellfish)
  - A chance to influence budget allocations
- Seafish Aquaculture Advisory Committee: - invited to take a more active role in the new Seafish advisory committee structure
- Highland Aquaculture Forum - Local authority involvement - potentially very important for the future
- Numerous ad hoc consultations - SEERAD, FSA, DEFRA, etc
- SEERAD Reviews of Aquaculture – review of regulations, National Strategy, Transport & Environment Committee

THE FUTURE

In shaping its programme for 2002 and beyond, the Association has recognised three major areas of strategic importance for its members and the industry as a whole (text box below reprinted from the Chairman’s address to the Annual General Meeting in November 2001):

<table>
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<th>Issues for the Future</th>
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<td>Technical issues and research will move from production to quality issues and reduction of environmental impact</td>
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<td>Where are we going to grow the fish? - are we going to have to displace salmon or supplement it</td>
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<td>Political pressure and popular support will be an on-going challenge</td>
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The BMFA is fully embracing these challenges for the future:

- Investigation of Quality Accreditation schemes as a marketing and voluntary regulation tool – commitment to “best practice”
- Investigation of ISO 14001 Environmental Management Systems options for new species
- Appointment of media consultants and development of a comprehensive public information programme
The ASSG welcomes the opportunity of contributing to the Committee’s deliberations on this subject, which will follow the aspects for review identified in the call for submissions.

- **What the respective roles of the Executive and the aquaculture industry should be in taking forward the future of aquaculture in Scotland:**

  (a) The role for **Executive** should be limited to higher levels of engagement:

  - The provision of an overarching envelope of strategic guidance (Locational Guidelines, NPPG, etc), within which industry operates, SEPA regulates and Local Authorities plan;

  - Strategic objectives and obligations should encompass the maintenance and improvement in water quality (bacterial, viral, chemical, physical), with adequate resourcing of SEPA, as the competent authority, to effectively monitor the selected parameters;

  - Recognition of legitimate competitive demands on access to the marine resource from differing sectors and promoting the Principles of ICZM as the method of conflict resolution;

  - Acknowledgment of the negative aspects of mono-culture fish farming and support for the synergetic benefits of integrated aquaculture (reduced disease, lowered indiscriminate nutrient input to the environment) within a balanced ecosystem approach;

  - Funding of research aligned with and contributing to the achievement of the strategic objectives, particularly into modelling of assimilative capacity in, firstly, critical hydrographic systems, and eventually all relevant regional inshore waters, as this would create an essential tool for scientifically based management decision making for the future;

  (b) The role for **industry** includes:

  - Implementation of management ‘best practice’ (including closer liaison with nearby fellow aquaculturalists, AMAs and synchronised lice treatments) and promotion of
policies which maximise sustainability in the widest sense (minimisation of the ‘ecological footprint’);

- Support for research into polyculture operations, combined with pilot projects reflecting integrated cultivation (nutrient enhancing/nutrient extracting), in recognition that this approach is a cost-effective alternative to the full internalisation of environmental costs (internalisation of nutrient discharges removal costs for a 600 Ton salmon farm has been calculated to reduce an IRR from 40% to 20%, while removal via bioremediation (seaweed) plus marginal internalisation reduced the IRR to 30% [Alvarado, P. C.; 1996; Universidad de Lagos]);

- Support research into innovative lice treatments, which minimise the impact on the environment and adjacent users of the inshore waters;

- Act in a responsible manner towards the communities where it is based, its employees (remuneration levels, training programmes, etc), other users of the marine environment and the environment (flora and fauna, marine and terrestrial);

- **How the aquaculture industry can increase its competitiveness in the international marketplace:**

  - **For finfish farming:**
    - to prioritise ‘quality’ in husbandry terms, in order to divorce the Scottish product from the commodity market (low prices, low value added) and escape from the debilitating process of chasing the market price downwards;
    - to develop incremental revenue streams from the addition of proximate nutrient absorbing operations such as shellfish or seaweed cultivation;
      - to actively develop added value, processed products;
      - to promote vocational training across all husbandry and processing activities;

  - **For shellfish cultivation:**
    - to modernise and improve technology and techniques for molluscan husbandry, to gain economies of scale without sacrificing the inherent product ‘quality’ which derives from the quality of the environment;
    - to establish a market intelligence system, in order to secure a higher proportion of the economic rent for the producer;
      - to develop additional added value, processed products;
      - to promote vocational training across all husbandry, depuration and processing activities;

- **How the industry can best achieve environmental sustainability in the future:**

  The various suggestions raised under the first item, above, should support a trend towards ‘sustainability’ from the aquaculture industry; but the main requirement is to remedy the lack of clear insight into assimilative capacity.

  Such capacity is, of course, not a single number for a sealoch, even for an individual species - the capability of an ecosystem to sustain productive growth is a manipulatable
matrix. More nutrient enhancing farming can, under the correct conditions, support additional nutrient extractive operations.

As a result, by managing the nutrient budget of complementary aquaculture operations on an integrated basis, sustainable expansion can be ‘managed’ without breaching biological carrying capacity limits.

But without this expertise, it becomes a difficult task for private sector decision makers and public sector officials to plan or manage the sector in anything approaching an optimal fashion, leading, inevitably, to the emergence of precautionary, regulated, ‘bantustans’ of mono-culture.

However, there may well be constraints from other parameters, such as space, impact of lice treatments from salmon farming, alternative uses, aesthetics, etc..

Equally, there may be support for positive discrimination, in specific areas, in favour of particularly positive activities, such as shellfish cultivation which is characterised by low environmental impact, a high job creation ratio to investment, minimal ecological footprint, an enhanced recruitment to the wider capture shellfisheries and an attractive product for the health conscious consumer.

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HIE welcomes this inquiry into the aquaculture industry by the Scottish Parliament. This is an industry which has developed over recent years to become one of the most important elements in the economy and communities of the Highlands and Islands. That said, it is one element in the social, economic and environmental context of the Highlands and Islands and as such must co-exist with an increasingly wide range of other interests.

Given the appropriate regulatory and political environment, we believe that the aquaculture industry can develop further the range of social and economic benefits it brings to the Highlands and Islands. While there is scope to improve the environmental performance of the salmon farming sector, the growth of shellfish production and the emergence of marine fin fish as commercial farming opportunities offer scope for expansion of direct aquaculture employment as well as in processing and service businesses – including environmental monitoring and management operations.

The industry is estimated to support some 7,000 jobs across Scotland, three quarters being in the Highlands and Islands. Of greatest value in economic and social terms has been the on-farm employment dispersed throughout the rural hinterland and particularly around the coastal margins of the remote mainland and islands. It is in these localities that economic development has been most difficult and in reality there are very limited economic alternatives to the employment provided by salmon farming.

Accommodating an aquaculture industry of more than 150,000 tonnes annual output around the hills, lochs and coastline of the Highlands and Islands has been no mean feat and, viewed in its historical perspective, we would suggest that the businesses and agencies involved with this industry over the last 30 years have on the whole performed well. However, we would be concerned if these comments were viewed as indicating complacency on our part. Salmon farming has reached a scale in Scotland where answers must be available to those asking perfectly legitimate questions about the environmental interactions of this new industry.

We share the widely held view that scientific knowledge and understanding is deficient in this area but would emphasise that it is vital that crucial issues such as aquaculture carrying capacity are derived on objective grounds based on the highest quality science. The outcomes of this review have the potential to add significantly to the operating costs of the industry in Scotland. This is of particular concern in the case of salmon farming which faces global competition from certain producer nations where regulatory costs are arguably considerably lower than those faced by EU based producers. Where there is the risk that unsound regulatory decisions may result in significant damage to the environment or indeed to the aquaculture industry, we believe that it is essential that regulation is through objective, transparent decision making, underpinned by the highest quality of science.

Following completion of the Executive’s review of the aquaculture industry and this Parliamentary inquiry, we believe that it will be possible to establish a demonstrably sustainable aquaculture industry with wide ranging social and economic benefits for Scotland as a whole and for the Highlands and Islands in particular. There is also the opportunity to set in place effective and efficient aquaculture regulatory systems which will be a model of good practice for other nations to follow.
Scotland has an aquaculture industry:

- what are its costs/benefits and what is their objective measure?

The benefits of the emergence of a substantial aquaculture industry are comparatively easy to measure and include direct and indirect employment, sustaining of infrastructure such as shops, schools, services, roads, ferry and air links in the remote peripheral communities of the Highlands and Islands. There is a particularly good fit of employment needs (small work teams) with small remote communities of the Highlands and Islands. There are also benefits to the diet and health of the wider population through consumption of omega 3 rich foodstuffs, salmon being a major source of such fatty acids.

While the benefits are quite readily identifiable, and have been measured in recent economic studies, including PACEC 1999, wider community impacts and economic costs are more difficult to quantify. Every action has a consequence. For example farm sites represent an opportunity cost in the broadest sense perhaps through lost fishing, yachting activity, loss of amenity through wilderness quality. On the other hand it can fairly be argued that aquaculture adds qualities to the landscape which are sought by many visitors to the Highlands and Islands - varied landscape, human activity in communities sustained by aquaculture as well as enjoying the culture of these communities.

- where does the balance of economic, social and environmental "need" lie?

The industry serves a critical economic need across the Highlands and Islands through diversification of the local economy, bringing free market forces to bear in an area where traditional primary sector businesses have had relatively weak market linkages. A salmon farm on the west coast of Lewis for example, will source raw materials (feed ingredients) and sell its products on global markets. In addition to on-farm employment, many supply and service businesses have been established to meet the needs of this new industry, introducing further diversity to local economies.

The jobs provided by such fish and shellfish farms fulfil a social need in that they sustain employment in the most remote and peripheral parts of the Highlands and Islands as well as supporting processing employment in the larger population centres and. In areas such as Ardmurachan, Harris, north west Sutherland, the industry sustains up to 30% of the working population and is crucial in helping secure local services and infrastructure for the benefit of local communities and visitors to these areas.

The environmental need is that the industry operate in an environmentally acceptable manner, following sustainable practices and not jeopardising current or future businesses based on the marine resource of the Highlands and Islands. We believe that the current scale of the industry has been achieved in remarkably short time with surprisingly little serious adverse environmental impact. The industry is totally dependent on a high quality environment, both for rearing stocks of fish and shellfish which are themselves indicators of high environmental quality and for marketing imagery when promoting the aquaculture industry’s products. With a young industry, there appears to be scope to evolve and expand the industry at a modest rate while at the same time lessening the severity of certain environmental interactions. These are positive benefits of economic activity which is dependent on high quality aquatic environments. The development of salmon farming has helped raise awareness of the role of acid rain in the decline of Salmonid populations, a decline in which sea lice from salmon farms have been implicated. There has also been crossover from R&D on salmon farming which has raised the level of knowledge and understanding of the biology of wild salmon populations.
What purpose does the Scottish aquaculture industry serve?

- how can it help to meet growing market demand at a time when catches of other species are declining (the so-called "fish gap")?

Long term global trends indicate that the yield from capture fisheries has levelled out. Reductions have been especially notable in landings of demersal species for direct human consumption such as cod. Demand for seafood is growing in developed nations as a premium high quality protein foodstuff and in non-developed nations as a basic protein source. Scottish aquaculture is well placed to address the demands of the former but not the needs of the latter. The Scottish aquaculture industry contributes some 150,000 tonnes of seafood raw material to markets primarily in the UK and mainland Europe. The industry cannot make a direct contribution to the protein needs of the developing nations but can provide expertise and R&D support through for example the University of Stirling’s Institute of Aquaculture, to help develop indigenous aquaculture production. Purchases of primary and processed materials (fish meal, cereals) and exports of by products (e.g. fish heads and frames to Nigeria) may be viewed as Scottish aquaculture making a positive contribution to developing nations.

The growth in supply of farmed salmon has in large part countered the decline in cod supply to the UK market and in this context it is evident that aquaculture can and does offer scope to ease fishing pressure on wild fishery resources. Production of fish in an enclosed cultivation system also offers retailers full traceability not only of the food fish but also the feed fed to the food fish. In the context of wild salmon, supplies of farmed fish have progressively lowered the open market price and have in the process enormously reduced the financial incentive for salmon poaching thus providing at least one significant benefit to the wild resource.

The merits of harvesting industrial fish species to feed to farmed fish may be debated (see below) but in terms of meeting market demand, improved management of demersal fisheries may take 10 years or more to be realised whereas aquaculture has demonstrated an ability to deliver significant additional quantities of seafood for direct human consumption. Industrial fisheries appear to be managed in their own right on a sustainable basis. While that situation continues, the supply/demand of aquaculture feeds will simply follow free market forces. Aquaculture is also a minor user of fishmeal compared with livestock feed compounding. The benefits of omega 3 fatty acids are maintained to the final consumer when conveyed via salmon farming, whereas they are lost through e.g. pig or poultry rearing. Furthermore the conversion of fish meal to edible flesh is considerably more efficient in fin fish farming than is possible with warm blooded livestock.

- how can it help the diet & health of the nation?

Salmon farming can and does help the health of the workforce supported directly and indirectly by the industry, most immediately through the employment and wage income it sustains. Also the Scottish industry is providing high quality, protein rich, low fat seafood (approximately 75,000 tonnes per annum to the UK consumer), most of which is rich in omega 3 fatty acids, vitamins and trace minerals. Clearly these foodstuffs can only provide benefits however if people chose to buy and consume them – which means that they must be competitive and desirable in the food market.

A further significant benefit which we see as being provided by salmon farming in particular is the exposure of rural entrepreneurs and communities to global market issues without the market support of systems such as the CAP and the CFP.
How is each sector of the industry placed to compete internationally both now in the longer term (5-10 years)

There is no question that salmon farming specifically has developed into a global industry which is dominated by commodity trading practices. Key advantages which remain to be exploited by the Scottish industry’s international competitors relate to labour and environmental costs although there may be lesser differences in costs of sourcing raw materials and servicing markets. South America is seen as providing the most serious challenge to West European salmon and shellfish producers with growing exports of farmed salmon and scallops. Chile has relatively low labour costs, proximity to sources of fish meal and some suggest that enforcement of environmental regulations may be less rigorous. Harmonising of the environmental regulations is a highly desirable objective as this would enable fair international competition on commercial rather than political grounds.

The situation is rather different for shellfish farmers in Scotland who are developing their output and the UK market alongside existing large industries in Europe. They face the prospect at some point in the future of attracting lower cost products into the UK market they have been nurturing.

While workforce training delivery can be present logistical difficulties to trainers and trainees due to the geography of the Highlands and Islands, we believe that workforce skills must be accorded a higher priority – particularly when labour costs are comparatively high the standard of certain key competitors. The emergence of new species in marine fin fish farming, technological changes including recirculation based production and the need for greater environmental monitoring by the workforce demonstrate the importance to this industry’s future of training facilities such as the North Atlantic Fisheries College in Shetland and the Seafield Centre in Wester Ross in delivering workforce training and enabling distance learning via IT systems installed on virtually every significant marine cage farm site.

In the broadest terms we see the future for aquaculture as a broadly based sector, in terms of species, company sizes, geographical production areas and end product characteristics. The global market for farmed salmon is generally accepted to have developed the characteristics a commodity market. Opportunities exist for the further development of distinctive premium quality products linked to Scottish origin branding but it is important to appreciate that while this approach may be appropriate for niche products it is unlikely to be able to deliver premium prices across the Scottish salmon farming industry.

• how can the industry diversify?

This is principally a matter of diversifying species produced by the Scottish industry, as a means of providing a series of viable business options to operators of marine fish cage farms and, at a strategic level, reducing the vulnerability of workforce and dependent communities through the industry’s excessive reliance on one farmed species. For most of the last 25 years the only commercial option to a cage farm operator was to stock salmon smolts. Now, a small number of sheltered inshore cage sites in Ardnamurchan, Lewis and South Uist are rearing halibut and project a harvest in 2002 of over 300 tonnes.

We would favour a diverse range of business size and ownership, although accepting that commercial pressures have concentrated ownership in increasingly few overseas based companies. We believe that local ownership and management of businesses in general provides operations which are more innovative and more responsible to local interests. However businesses need to be able to secure investment to diversify into new species and particularly into new production sites and therefore must be viable - or be able to demonstrate future profitability. Our wishes must therefore be tempered by commercial reality.
The high recent level of trade interest in farmed cod, and to a lesser extent halibut, has been strongly market led and retailers’ interest extends also to haddock (with a multi-partner demonstration haddock farming project now underway) with farmed mussels and species from the Mediterranean such as sea bream and sea bass becoming increasingly common on the fish counter.

It is essential that aquaculture regulation recognises that these new species differ from salmon with regard to issues such as the nature of their environmental impacts, their potential for impacting on wild or other farmed fish or shellfish including the risk of transmission of disease and parasites.

- how might it otherwise increase competitiveness?

We do not believe that the aquaculture industry in Scotland and particularly the Highlands and Islands is in a position to pursue the role of lowest cost producer of any of its aquaculture products. Clearly markets differ considerably for individual species and their different fresh, frozen and processed formats. The opportunity remains for industry to exploit the cachet of Scottishness by identifying discriminating markets and promoting and differentiating quality product ranges which can secure a price premium. Branded produce which can demonstrate enhanced standards of environmental or welfare performance will also provide niche opportunities with the Organic standard the most obvious example. Small and medium sized salmon farms in Orkney, Shetland and North Uist have attained the Organic certification and are obtaining premium prices, however the absolute price level will be linked to mainstream commodity market trends – as well as supply and demand within each market niche - but a premium will have to be maintained to cover the additional costs of operating in, for example, a more stringent environmental regulatory climate.

The aquaculture industry will continue to be subject to global free market pressures and will have to embrace efficiency and capacity investments as required by that market. Marine fin fish cultivation is a young industry which has grown rapidly in western Europe. There is considerable scope for such a young industry to evolve, improve and adapt its operations with respect to legitimate areas of concern.

A crucial element in the industry’s ability to evolve and adapt in the future is its workforce. There will be a continuing requirement for training and retraining in the aquaculture workforce as one means of delivering the necessary competitiveness and high standards of business and environmental performance which will be demanded of this industry.

If the industry is to be sustainable (both in its own economic terms and environmentally):

- what factors (e.g. impact on fish stocks used for fishmeal) need to be taken into account?

The requirement for fishmeal has grown with diets for salmon farming requiring high grade fish meals. Conversion rates of industrial fish species to farmed salmon are better than those in the natural food chain and are significantly better for fin fish farming than for the rearing of livestock such as pigs and poultry which are the major users of fish meal. Feed manufacturers are however looking ahead to a time when fishmeal supplies could limit growth in the output of farmed fish (and shellfish such as tropical prawns). Trials are underway to examine the feasibility of sourcing vegetable proteins and oils for fish diets. Problems of palatability (to fish and to people) have been experienced but investigations continue, these factors being fundamental to the feasibility of such moves.
The salmon farming industry now specifies the geographical region of origin of fish meals for salmon feeds in order to minimise the levels of ubiquitous and persistent pollutants such as dioxins and PCBs. Concerns have been expressed by certain consumer sectors but retailers have been reassured of the safety of farmed fish by the measures in hand through the aquaculture industry and its feed suppliers.

Shellfish farming also has some theoretical impacts on fisheries since the process removes nutrients from the lower levels of the marine food web. There are also issues relating to predator management (e.g. eider duck). There is however the opportunity, in theory, to locate shellfish or seaweed farms in the vicinity of fin fish farms as a means of moderating the effects of nutrients introduced as a result of the fin fish operation. This will require considerable research before its feasibility can be established.

- what further growth would be compatible with our environmental aspirations?

HIE believes that the aquaculture industry can evolve its operations such that production of the current order of magnitude can be achieved well within acceptable levels of environmental impacts. Indeed we would suggest that with time, improved environmental performance of fin fish farming linked to production of farmed shellfish might enable output to approach the order of 200,000 tonnes per annum. The interpretation of “acceptable” may change over time but commercial operations can adapt to a range of regulatory or market pressures given a suitable period of time.

- what level of environmental pollution would be regarded as "acceptable" - can we devise a measure?

“Acceptable” impacts will vary with location and with time. In the 1980s there was furore over plans to site smolt cages in Loch Ness with extensive local and national media coverage before the application was approved by Highland Regional Council. A subsequent application to double the size of the cage site went through the Council unopposed and currently few if any visitors to Loch Ness are aware of the cage farm’s existence.

It is important that wherever possible, objective measures are established for acceptable environmental disturbance – such as SEPA has operated for a number of years. How aquaculture units are monitored to secure compliance with the environmental standards is something we believe is for regulators to arrive at in discussion with industry and others (e.g. local authorities and community interests).

We would suggest that with the obvious exception of wild salmon and sea trout, there is little clear evidence to date of anything other than inherently localised and short term or reversible impacts of cage fish farming. That said there is no basis for complacency and it is essential that the impacts of this industry be better understood at both local and regional levels.

- what can Scottish coastal waters (however defined) sustain?

This depends on the mix of species and technologies for fish and shellfish cultivation and the influences of a range of human activities such as fishing, farming, forestry, oil exploration and extraction, as well as short and medium term hydrographic and climatic changes affecting our marine environment. Our view, as stated above is that given the limited nature of demonstrable adverse impacts associated with the current level of industry activity, with widespread adoption by marine salmon farms in particular of the principles and practices of environmental management systems, the H&I could support an industry producing in the order of 200,000 tonnes of fish and shellfish per annum.
While industry, administrators and regulators alike have historically been involved in and condoned practices which would fall short of current best practice, it is important to recognise that hindsight is invariably perfect. Lessons need to be learned from past experience in shaping the future for this industry and its regulation. One lesson might be the need for more responsive handling of applications for the authorisation of new medications of medicine licensing. The availability of environmentally acceptable, efficacious treatments are a necessary part of any responsible farming operation.

- how might environmental impacts be reduced?

The aquaculture industry may be viewed as having a number of environmental impacts and therefore the means of their reduction are various – similarly their cost implications vary to industry and others. One consistent requirement however for achieving best environmental practice is a motivated, well trained and educated workforce and we expect to see environmental sciences assume much greater prominence in future aquaculture training qualifications.

The visual impacts of aquaculture in the landscape may be moderated by greater care and attention by the developer and regulatory bodies to the siting and design of fish farms as well as their installation/construction as well as through selection of materials and colours of shore bases, barges, roofs, parking of vehicles etc. As an example of another environmental impact, the possibility of accidental escape of farmed salmon is reduced through companies’ compliance with the Executive’s code of practice on prevention of fish escapes.

It has been suggested by some that a substantial proportion of marine fin fish aquaculture should be transferred from sea cages to pump ashore tanks (see comments under locational criteria below). It is possible that rearing of halibut will be economically viable in pump ashore farms but economic pressures currently appear to favour cages rearing beyond the nursery stage. Halibut and cod appear to have rather better feed conversion rates (and lower nutrient discharges) per tonne of production than salmon so if they substitute partially for salmon there will be an incremental reduction in nutrient loadings in coastal waters and in freshwaters (due to reduced salmon smolt placements).

There may be prospects of containing, and/or collecting the insoluble wastes from cage farms. Collection systems have been trialled in freshwater but with little success to date. One collection system supposedly in use in Norway uses a tarpaulin bag in place of the conventional cage net with water pumped into the cage and a piped exit flow. This would in theory permit treatment of the effluent flow which in turn raises issues about the fate of the products of the treatment process.

Nutrient budget management is an expression which has emerged in recent months. As mentioned above, units producing shellfish or seaweeds may moderate the quantity of nutrients released into coastal waters by fin fish farming and could reduce environmental impacts of the fin fish sector. The shellfish or seaweed units would of course themselves present environmental impacts of their own, particularly in terms of visual impact.

The specific impact, which is of greatest concern to us, has been that of sea lice on wild salmonids. The scientific arguments may continue but it seems clear that lice from farmed fish have had some level of negative impact on wild salmonids – amongst we believe a number of negative impacts (afforestation, legal and illegal exploitation, acid rain and climatic change – oceanic feeding areas). The essential prerequisite to a solution has been effective and environmentally acceptable treatments for sea lice on salmon cage farms. With these at last becoming available (after something like 10 years of R&D effort) there are realistic opportunities for salmon farming and fishery interests to generate constructive actions as we see in the Area Management Groups established under the Tripartite Working
The impact of fish and shellfish of farm origin on the genetic make up of wild populations is more subtle and probably of significance only to wild salmon given its reduced numbers and the tendency for fish to home to their parental river and develop discrete populations even within different parts of the same river. Efforts must continue to reduce the numbers of farm escapees. Suggestions that farms should be stocked with sterile fish are not currently feasible. Triploid (sterile) fish underperform in terms of growth, survival, susceptibility to sea lice and consumer appeal (may be perceived as GMOs).

**What should be the criteria for locating fish farms:**

- should farms be sited further off-shore?

Where a farm is demonstrably giving rise to unacceptable impacts upon other interests then clearly that site should curtail those impacts or face being closed down. Moving production facilities into more exposed locations may bring some environmental benefits but will also bring additional risks as well as costs to the farm operator (equipment and site servicing, storm damage, stock escapes) – which under current trading conditions are likely to be unsustainable for most businesses – and may interfere with a different set of stakeholders such as fishing and commercial navigational interests. Equally, simply moving a perceived problem is not a responsible solution and cannot be an acceptable alternative to ensuring that aquaculture businesses operate in an environmentally responsible manner.

- should they be land-based (*anywhere* in Scotland)?

It has been suggested that fin fish farming might be moved onshore. As many as a dozen pump ashore salmon farms were running in Argyll and in the Orkney islands in the 1980s. All have halted salmon production and have closed or converted to marine species since salmon production rapidly became an uneconomic prospect for pump ashore farms other than as broodstock units. While pump ashore farms offer a piped outfall – theoretically amenable to treatment – to site the current salmon industry onshore would require perhaps 100 coastal sites each of say 10-20 acres of flat ground (not bedrock) with pumps, large tanks and good road access. This would clearly pose an enormous challenge to the planning regime and would establish a very permanent concrete “footprint” for the industry, unlike the current system of cage farms which can be taken off site in a matter of days.

There is no fundamental objection in principle to land based aquaculture units. In broad terms, they promise improved control of all aspects of the unit’s operation but at much higher capital cost and similar running cost. The refinement of recirculation technologies has seen a significant increase in the number of freshwater salmon units operating recirculation technology and it will probably feature in future production of juvenile halibut, cod and possibly haddock. New pump ashore developments may explore the opportunities offered by modern renewable energy technologies, such as water pumps, wind generators, alongside pump ashore farms to reduce energy costs but this would probably require a more favourable fiscal regime than currently applies to such installations.

The precise location of future land based units will be based on the usual commercial factors as well as national and local planning requirements. Our view is that it is unlikely that salmon will be farmed profitably in seawater pump ashore units, however there may be commercial opportunities to develop a limited proportion of farmed halibut output in pump ashore units.
• should they be otherwise re-located (and if so, when and under what conditions)?

As above, where a farm is demonstrably giving rise to unacceptable impacts upon other interests then the site should curtail those impacts or face being closed down. The precise circumstances are difficult to define and perhaps can only be defined on a case by case basis.

In the absence of commercially viable offshore technologies it has to be recognised that, in terms of current knowledge and understanding, Scottish coastal waters have little opportunity to accommodate new aquaculture sites (we would suggest particularly so with regard to fin fish sites). This makes it all the more important that decisions on closure and relocation should only be considered when other remedies have been exhausted.

Aquaculture will be bound by the terms of the new Water Framework Directive:

• what will be the Directive’s impact on the industry?

The impacts of the water framework directive are not yet fully understood – by industry or by regulators. It does appear to offer a crucial opportunity for the relevant Scottish legislation to be revised to reflect the emergence of (and potential future developments in) marine and freshwater aquaculture.

One feature of the new water legislation will be the adoption of River Basin Management systems, which represents a philosophy which HIE strongly advocated in responding to the Salmon Task Force report in 1997 in the form of Integrated Catchment Management. There would appear to be analogies with the TWG approach of establishing Area Management Groups to develop Area Management Agreements.

Whatever detailed implications there are for the aquaculture industry, it appears that those who utilise and otherwise interact with water resources will have to contribute to the management and conservation of the water resource. We cannot see this as anything other than a positive move.

• on what basis will aquaculture be expected to co-exist with other water users?

We would suggest that all water users would have certain rights under law. Aquaculture businesses will continue to require high water quality standards and as such are more likely to be disadvantaged by other users’ activities than the reverse. This industry can, in principle, serve as a sentinel for the aquatic environment.

What should be the role of the public sector:

• can it be both regulator and sponsor?

The public sector covers a wide range of interests and responsibilities (statutory and otherwise): local authorities, Scottish Executive, Enterprise Networks, SEPA, Food Standards Agency. In our response to the earlier SEERAD consultation on industry regulation we expressed the view that, while we sympathised with the industry’s request for a single regulatory body for aquaculture, it was not really a practical option. It is clear that the range of responsibilities discharged by these bodies cannot be encompassed in a single organisation without compromising their distinct operations and would run counter to the philosophy
which led to the separation of food safety from food production responsibilities within government with establishment of the Food Standards Agency.

We believe that the public sector must carry the overall responsibility for regulation. However there may well be areas in which the private sector could play a greater role in delivery of regulatory functions (e.g. lab monitoring work on fish disease, algal toxins etc). There is a need for the relevant agencies to come closer together to improve the standard, transparency and consistency of regulatory service and the Highlands and Islands Convention Aquaculture Forum offers a valuable opportunity to explore some of these matters.

- should it continue to be investor?

The current and prospective nature of the aquaculture industry, in terms of domestic location and international competition, is such that selective support through HIE Network and FIFG can be fully justified. Indeed support will be required to help the salmon sector in particular to implement the necessary environment and competition driven investments which are in prospect. The value to the Highlands and Islands, to the UK and to developing countries of the growing base of aquaculture research expertise also deserves continued public funding (coming from various sources e.g. DTI LINK, Research Councils). Research and understanding of the environmental interactions of this industry has lagged behind commercial activity, both here and abroad, and further public support will be vital to delivering the underpinning knowledge to inform future regulation and operation of this important industry.

- what should it be?

Public funds will be required to meet at least part of the costs of the regulatory regime. It is entirely appropriate that the industry makes a reasonable contribution towards these costs although the balance of contribution by general taxation and by direct charge is a complicated matter for industry to negotiate with regulators as and when necessary.

As far as possible, public funds should serve as a catalyst to secure participation by industry and wider commercial interests (feed firms, insurers, retailers etc.) Clearly, research which is near market should secure greater levels of private funding than should research of a more strategic, pre-competitive nature.

**What should local government’s role be in the regulatory process:**

- can/should it be more than regulator?

We would suggest that the future operation of planning legislation and national planning guidance would be the principal role of local government with regard to the industry. Shetland Islands Council have discharged control of coastal aquaculture developments and Highland Council have embraced the revision of Aquaculture Framework Plans for the larger sea lochs along their coastline. Clearly there are other local authority functions such as Environmental Health and economic development as defined by Local Economic Fora. We see a valuable role for local authorities in partnering Enterprise Network Activities where these have been agreed by the relevant Local Economic Forum.

**What aspects of the industry should be supported by government research:**

- what criteria should be applied in identifying research priorities?
We would suggest that limited public funding should be focused on securing through strategic research the underpinning knowledge necessary to provide the aquaculture industry with an appropriate regulatory environment in which to operate. The changes in regulatory environment which most anticipate will come about as a result of this review will generate winners and losers in the industry. Given the local and national importance of the aquaculture industry and the environments in which it operates, it is essential that regulators’ decisions are based on the best available information, secured by objective well resourced scientific investigations.

At a UK level the Committee for Aquaculture Research and Development (CARD) was established in the early 1990s following a House of Commons committee investigation of aquaculture and was charged with identifying strategic research priorities and increasing the cost effectiveness of publicly funded research by avoiding duplication of effort and encouraging co-operation among institutions. There is a clear need, post devolution, for a forum to carry out the functions of CARD in identifying strategic research priorities and directions specifically for the aquaculture industry in Scotland. We would see a continuing role for CARD in view of existing trout and shellfish production in England and Wales with emerging marine fish recirculation based onshore farms. Processor, distributor, retailer and consumer interests supplied by Scottish aquaculture will continue to have their centre of gravity in the south of the UK and it is important that Scottish aquaculture retains a strong presence in CARD.

Below this level of strategic research of national and possibly international importance, we suggest the closer the research is to the “near market” category, the lesser the requirement for public funding of aquaculture research. HIE may participate as a partner in certain research and development projects, over the long term however we would expect the financial burden for anything other than strategic research moving increasingly to the private sector. The DTI LINK Aquaculture programme served to reorient many researchers’ activities in the context of the medium to long term needs of the industry and it is widely regretted that it was not possible to secure a continuation of this programme.

• should there be some external scrutiny of the research proposed/undertaken?

We would argue that there is a need for expert scrutiny of all requests for public funding. Research may well require external scrutiny but it is important not to lose sight of the customer in all these processes and programmes. As noted above, the aquaculture industry greatly regret the inability to continue the DTI LINK Aquaculture but this programme had a lengthy decision making timescale and appears to have had certain inflexibilities which frustrated many involved in the programme.

• what should be the FRS role in aquaculture-related research?

There is a clear role for the Fisheries Research Services in aquaculture-related research involving both the Marine Laboratory and the Freshwater Fisheries Laboratory. In hindsight, greater integration of the working of the two laboratories might have improved the overall handling of the emerging problem of sea lice from farmed fish. While FRS has for some years been a research contractor competing with other laboratories and institutions, it has an extremely important role to fulfil through its strategic research including advice for ministers and is still widely regarded as a source of impartial information founded on sound scientific research.

The current mix of “advice to ministers” and contracted research appears to be generally satisfactory although there have on occasion been alleged conflicts of interest and Allan Berry’s allegations are one such example. It is important that FRS retains its reputation for
independence and we would suggest that further consideration be given to ways in which FRS can undertake contract research through competitive tendering while at the same time maintain a reputation for independence from commercial and political considerations.

- should there be joint-funded industry/Government research projects (e.g. new technology, new species)?

Yes. There will always be areas in which commercial gain is in such doubt or is so distant in time that it proves difficult if not impossible to secure investment from commercial sources in research which would ultimately serve a common good. Environmental interactions of aquaculture is one example where clearly there has been “market failure” of the type described. Similarly, progress to species diversification in aquaculture has until recent years been an area in which investment by commercial operators has been limited and public sector intervention was necessary to stimulate activity.
Sea Fish Industry Authority – ‘Seafish’

Submission to the Scottish Parliament
Transport and Environment Committee


Background – Rôle of Seafish
The Sea Fish Industry Authority is a Non Departmental Government Body whose Board is appointed by DEFRA. The Authority’s annual budget of around £10m is 75% funded by a statutory industry Levy, which applies to wild and cultivated marine fish and shellfish, but not to salmon and trout. The remaining 25% of its income is earned from contracts and funded projects. The organisation has a UK-wide remit to support all sectors of the fish industry and is known generally as Seafish. Its staff of 150 provides services and support to the industry under the following departmental headings:

- Technology; Training & Standards – based in Hull
- Marketing; Trade Development; Economics & Statistics – based in Edinburgh HQ
- Aquaculture – based in Ardtoe, west of Fort William

Seafish Aquaculture
In 1965, the White Fish Authority, precursor to Seafish, established facilities at Ardtoe in Argyll and Hunterston in Ayrshire to investigate techniques for cultivating marine fish in UK waters. Potential future threats to fish supplies from the wild were recognised even at that early stage, and aquaculture was seen as a means of helping to maintain fish supplies to the UK consumer. Although the Hunterston Unit closed in 1981, Seafish has continued to invest around £1m pa, in the ongoing Aquaculture R&D programme conducted from its Ardtoe base.

The remit of Seafish Aquaculture is to ‘Assist and encourage the viable development of UK marine farming to supplement wild fish supplies in meeting future consumer demand for seafood’. However there are constraints to Seafish support for the Aquaculture sector. The ‘fishing’ sector perceives fish farming as a competing activity. Production of farmed cod and haddock is likely to come mostly through diversification of the salmon sector which does not currently contribute to Seafish levy. Newly established production of halibut is starting to impact positively on Seafish income and there is a need to recognise these sectors as all part of a joined up fish industry.

As a substantial funder of aquaculture R&D in the UK, Seafish has been represented on the UK Committee for Aquaculture Research & Development (CARD) since its inception. The Seafish Head of Aquaculture also represented the British Halibut Association (now the BMFA) which he chaired from 1987 until 1995, when it was taken over by the industry.
Aquaculture Contribution to UK Fish Supply

The UK now imports more than 70% of its total fish consumption, and much of this is cod and haddock. Catch quotas have been slashed to preserve stocks but home landings are falling to meet the full quota allocation. Much of the fish that is landed is small and not of adequate quality for the buyers. Consequently a significant proportion of imports is large, top quality cod and haddock which could be supplied by the aquaculture sector in the UK, instead of being imported. The same situation is being experienced worldwide, and with demand for seafood forecast to increase fish farming appears to be the only alternative source.

At present, processors can't get enough fish of the size and quality they need from local supplies. This has led them, along with top retailers, to contribute to joint projects with Seafish to investigate the feasibility of meeting their needs from UK farmed cod and haddock. Results from this work have been very good and have helped encourage the planned establishment of three new cod hatcheries in Scotland.

Aquaculture benefits c. f. Wild Catch
- Regular, year round supply
- Quality attributes tailored to markets
- Size & form available to order
- Controllable, known costs
- Compatibility with other supply chain factors - sustainable!
- Expandable to meet demand

The impact of increasing demand on future supplies of fish meal and oil has been recognised by the industry and much work is already underway on the potential for partial substitution with vegetable based oil & protein. It is worth noting that ‘new’ marine species like cod needs only 30% of the oil content of salmon diets. Cod, haddock and halibut also have different siting opportunities and limitations with potentially lesser environmental impacts and lesser wild stock concerns.

The present lack of government policy direction leaves the aquaculture industry open to attack and there is a need for clear policy direction to justify the ongoing use of natural resources for aquaculture in the face of other users’ claims. The sea areas required for production are publicly owned and controlled, so the industry can't be left entirely to market forces.

Requirement for a National R&D Strategy

Even from the early days of CARD, its industry members recognised an urgent requirement for some form of strategic framework for both the production of fish and shellfish in and adjacent to the sea, and the research that was conducted to support it. Such a strategy was, and still is, necessary primarily because of the limits on both the area of publicly controlled in-sea facilities available for
production, and the funding available for supporting research. In recent years the environmental issues surrounding in-sea production have become increasingly prominent in the public perception, particularly as there has been no overall plan or policy to support the farming activity. A strategy is now therefore essential to justify ongoing use of natural resources for aquaculture in the face of other users’ interests and environmental objections. This requires to be set within a well organised and integrated framework of coastal zone management.

Seafish wishes to see a sustainable aquaculture policy introduced in the UK. Seafish has adopted a strategy for the development of the UK shellfish cultivation industry. It is important that any marine finfish developments do not adversely impact on this sector, or vice-versa. All aquaculture production has the need for a healthy marine ecosystem. None of the production sectors should be compromised now or in the future by the activities of the others. Salmon, shellfish, whitefish/flatfish and the wild fisheries need to co-exist. There must also be recognition that outputs should be market led. Any public aquaculture strategy must embrace all of these factors if it is to be a balanced approach for development and control.

The strategy must also justify the support it will lend to the producers by its existence. It is only by making a well justified case for a level of production, and the resultant environmental impact, that the criticisms of the environmentalists will be answered in the future.

+ The marine ecosystem must be part of the consideration
  - Total carrying capacity for inshore waters to absorb and recycle nutrients?
  - Current relative scale of anthropogenic nutrient input, land use input and aquaculture inputs?
  - Carrying capacity for finfish based on excess nutrient/pollutant levels
  - Carrying capacity for shellfish is the inverse based on plankton availability

+ Other coastal resource users must be considered
  - Aquaculture is only one part of the wider issue of integrated coastal zone management

+ Trade and employment potential must be considered
  - Import substitution/export earning and regional development

+ Market demand for seafood products must be considered
  - Favourable position of UK products over other nations?
  - Overall demand and future supply considerations
Seafish would wish for and holistic approach to be taken when establishing a public aquaculture strategy. The balance between the use of the marine environment to produce Seafood products, and the extent to which the impacts of the operations are considered to be in the public interest, is a political decision. Seafish would wish to see a sustainable aquaculture industry develop for both finfish and shellfish as part of wider fish industry developments.

Establishing a market demand is a key element to the formulation of a strategy for sustainable aquaculture. Only by determining the price and volume the market will sustain can commercial production be considered. The cost structure of the production sector, as it is reliant on using a public resource namely the marine environment, must be able to accommodate any such resource charges over and above normal operating costs. If environmental charges are set too high through regulation or prioritisation of other uses above Seafood production, the market may not be able to sustain the overall production cost. If products are available and cheaper from elsewhere they will be drawn in. It is vital that the development of any Seafood production sector is preceded by a clear statement of public policy on the associated costs of gaining access to and use of the public resource, namely the marine environment.

Such considerations should apply equally to both shellfish and finfish production.

The Scottish Aquaculture Strategy should serve as a basis for prioritisation of essential research funding and provide guidance for sectoral support & interaction. It must provide answers to environmental objections and justify development on a defined scale. The Strategy will require support in the form of political lobbying by SEERAD. For development oriented research support the Seafish Aquaculture facility could be engaged to assist with collaborative industry programmes.

In light of the foregoing, Seafish welcomes the Scottish Executive’s intention to produce a strategy for aquaculture in Scotland and hopes that these comments will assist the Scottish Parliament in evaluating the process.

Malcolm Gillespie
Head of Aquaculture
Sea Fish Industry Authority
SUBMISSION FROM PROFESSOR RANDOLPH RICHARDS

Introduction

The Institute of Aquaculture at the University of Stirling welcomes the opportunity to contribute to phase 2 of the Scottish Executive enquiry into Sea Cage Fish Farming.

The Institute is the largest University department in the world, with 130 staff and in excess of 150 postgraduate students, providing research and training to both the Aquaculture industry and wild fish interests. The department received a grade 5 rating in the latest Research Assessment Exercise confirming its international standing and relevance to Scottish Education. It also acts as an EU Large Scale Facility for Aquaculture (the only other one being in Bergen, Norway) and regularly leads international programmes on Aquaculture research. Its research is at the cutting edge of aquaculture development and the Institute is currently building with an industrial partner the first commercial scale hatchery for cod and other marine species in the UK.

The Institute was awarded the Queen’s Award for Export Achievement for its efforts in the export of Scottish expertise in 1990.

It is the Institute’s view that Aquaculture plays a lead role in Agriculture and the rural economy in Scotland, is quality led and carried out in an environmentally sustainable manner. It has a vital future role to play in delivering quality products, and is at the forefront of the development of new species for aquaculture. A central strategy for the industry is urgently needed to properly control future development, promote quality and sustainability, further enhance the international status of aquaculture research in Scotland, and actively support aquaculture as a key, long-term, sustainable Scottish industry.

In terms of future strategy the following should be taken into account:

Cost-benefits of the Scottish Aquaculture Industry

The production, employment and export value of the Scottish industry is readily available from industry sources. Key points of economic, social and environmental importance are:-

a) Aquaculture production, led by the salmon industry, is valued at over £310 million and salmon currently represents approximately 40% of Scotland’s food export value.

b) The industry provides employment for more than 7000 Scottish people, largely (70%+) in the Highlands and Islands area where there are few other viable permanent jobs.

c) Marketing and processing outwith the production areas produce further significant employment within Scotland.
d) Much of the production is Scottish-branded and produces significant added-value in the global market, with quality schemes becoming increasingly important in this respect.

e) Environmental impact is closely controlled through the process of discharge consent and monitoring applied by SEPA. This utilizes increasingly complex and accurate models to predict, monitor and control outputs such as metabolic waste and the use of treatment agents. Though effects are produced in the “footprint” beneath the net pens, more wide-ranging effects have not been demonstrated. The current control system is very effective

**Purpose served by Scottish Aquaculture**

The consumption of fish, and especially oily fish, is recognized by a number of bodies including the Food Standards Agency to be essential to the nation’s diet in terms of the intake of omega 3 fatty acids and quality protein. Traditional global capture fishery landings have remained static or, in the case of many important species, dramatically reduced and aquaculture has been filling the “gap” created. Global aquaculture production is currently increasing at approximately 10% per annum.

UK landings of the most important wild fish species have decreased by approximately 50% in the last 30 years and have been replaced by a mix of importation and local aquaculture production (particularly of salmon and trout). Scottish aquaculture is already contributing significantly to UK market needs and is set to play an increasingly important future role in UK food supply and export. Significant opportunity is available in Scotland for the aquaculture production of species such as cod, haddock and a variety of flatfish. The increasing use of quality schemes (e.g. those utilized by SQS and QTUK) ensures that the Scottish product has a premium price and demand and contributes to the UK and international reputation of Scottish-produced food.

**International Competition both now and in the Longer Term**

Food production and sale is very much part of a global market. The use of quality schemes should ensure premium prices are obtained by Scottish producers and the application of environmental quality standards will also provide consumers with a guarantee of environmental sustainability. In terms of diversification, the processing industry is well-placed to provide the market with a range of added-value products of known provenance and produced to strict food safety and quality standards.

Scotland is also ideally situated to diversify into other marine species such as cod, haddock, hake and a variety of flatfish species. The level of industry “know-how” and access to internationally-rated research facilities will supplement the ideal Scottish environmental conditions for new species which will provide alternative uses for many existing sites currently used for salmon production.

The provision of research funding support through the Scottish Executive, the Industry, the Research Councils, together with support from the European Community is essential to maintain the research base and place Scotland at the forefront of new developments.
Sustainability
The bulk of the fish feed industry already sources feed from sustainably managed fisheries and it is essential that this is continued. Fish meals and oils provide an essential supply of omega-3 and omega-6 essential fatty acids but substitution of a proportion of fish oils with vegetable oil is currently being actively researched, whilst still ensuring balanced fatty acid composition in the fish produced. Careful sourcing of fish meals also ensures low levels of contaminants such as PCB’s. An EC research programme coordinated by the Institute of Aquaculture is investigating the genetic basis of the ability to produce omega 3 and omega 6 fatty acids in fish and should provide the opportunity to select broodstock more capable of converting less beneficial oils found in plants to more desirable fish oils.

A key element of future policy should be the use of “discards” and “black fish” from traditional capture fisheries, following the lead set by the Icelandic authorities.

The tools are available for predicting and monitoring environmental pollution from aquaculture – this should be applied on a site by site basis to ensure sustainability, but at the same time allow the industry to expand. The use of modelling suggests that considerable expansion could still take place in a safe and sustainable manner.

Environmental impacts can also be further reduced in the case of treatment product usage by the increased application of the National Treatment Strategy for the control of Sea Lice and the increased use of vaccines. Significant improvements are also being made in feed digestibility and the overall reduction in waste production provided by such developments should be supported and monitored.

Location of fish farms
There has been a gradual move away from sheltered positions at the upper reaches of loch systems to sites with better flow and water exchange. This has been essential because modelling and monitoring suggest that the more protected sites can only sustain lower tonnages of fish production. There is a limit to use of more “off-shore” locations as, though pen structures are increasingly robust, during severe storm conditions, fish are unable to maintain position within the pen and can be severely damaged by being driven against nets and descaled.

There is concern over the siting of certain farms at the mouths of important salmon rivers. Alternative sites should be provided within the planning process but the cost and practicality of such re-siting has to be carefully evaluated and supported by government.

Landbased sites are being used for elements of broodstock-holding and freshwater production and there is increasing use of recirculation technology. However, the capital costs are particularly high and are not justified, with the exception of particularly valuable stocks and there is an inherent risk of biomagnification of disease in recirculated sites.
Improvements in impact of existing sites can be made through more effective use of fallowing. In certain cases, the provision of extra sites would allow existing production to be maintained or increased but at the same time, reduce overall environmental impact. Relocation remains a potentially useful method of allowing increased production but economic and environmental factors have to be seriously evaluated in the planning process.

Water Framework Directive
This will allow an analysis of the effects of all users of the water resource available. The Directive’s impact should not be great in the Aquaculture Industry because the direct effects of aquaculture are already being seriously evaluated and controlled, often without concomitant control being applied to other users. Clearly there is an important role for central government in considering coastal zone management in its widest sense. Aquaculture has already promoted co-existence with other water users through its Tripartite Working Group arrangements and the use of Area Management Agreements. Such activities should be actively supported.

Role of the public sector
An excellent model is available in the way that the Norwegian government acts as regulator, sponsor and investor in Aquaculture.

The requirements of various European Directives make it essential that the public sector acts as regulator, for instance in the control of notifiable disease by SEERAD and the regulation of environmental impact by SEPA. The Executive has a strategic and coordinating role in development, policy and regulation of the industry and also has a crucial role to play in promoting Scottish Aquaculture as a key element in future Scottish Agricultural production and an important employer in less-favoured areas.

Key future activities should include:
- Commissioning of research, together with industry, which utilizes both in-house expertise and the international expertise available at Universities and research stations throughout Scotland. A particular recent success was the LINK Aquaculture programme, widely recognized as an effective way of using central funding and providing access to industrial and research council funding. Failure of the Executive to support the continuation of the scheme was seen by many as a major strategic mistake. The Norwegian Science Foundation is currently coordinating a Centres of Excellence Scheme which will provide £8 billion to promote Centres of Excellence in its key University departments. One of the four areas of research being supported in this way is that of Aquaculture Research, considered key to the future financial viability of the Norwegian State. It is important that the Executive recognizes the importance of aquaculture R & D to the future of Scotland.
- Support of quality schemes to ensure high industry standards and provision of a range of incentives to members of such schemes carrying out best practice in the industry in terms of environmental sustainability and production of coastal zone management schemes with other stakeholders.
- **Coordination of governance** to reduce the bureaucracy of decision-making and increase the transparency of the decision-making process.
- **Active promotion and financial support** for use of sites in improving the fallowing process, allowing rotation of sites and where necessary, relocation.
- **Promotion of training and educational opportunities** to ensure a highly-skilled and trained workforce which can service and support the industry and through it, the rural economy.

**Local Government**
The role of local government in providing planning consents ensures that the views of other users of the coastal zone are taken into account in considering aquaculture development proposals. It would not be practical or economic to expand this role further to duplicate many of the activities currently carried out by central government.

**Support of the Industry by Government Research**
Research priorities are currently defined through government/industry bodies such as CARD (the Committee for Aquaculture Research and Development). The Aquaculture Health Joint Working Group has also provided a useful forum for the exchange of views, development of policy and setting up of R & D priorities. This process should be maintained, but access to government research funding should be provided to other key players in aquaculture research such as the Universities so that the significant Aquaculture research capability present in a variety of institutions in Scotland can be properly utilized through collaborative research efforts.

External scrutiny should be applied to all research funding to ensure quality, relevance and value for money.

As mentioned earlier, government-industry programmes seen as a natural progression from the LINK Aquaculture programme should be actively supported and promoted by the Executive.

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