Human Factors and containment of salmon in aquaculture installations

Steve Bracken: Marine Harvest Scotland

Paul Haddon: Marine Scotland, Scottish Government

August 2013

The Scottish Government

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Industry and Government working in partnership to deliver continued improved containment of farmed fish in Scotland

Paul Haddon

Marine Scotland Aquaculture Unit

August 2013

The Scottish Government

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Marine Scotland - Integrated management of the seas

Delivering sustainable economic growth whilst ensuring protection of Scotland's marine environment and biodiversity

- Aquaculture and salmon & recreational fisheries both key sectors
- Scottish Ministers want sustainable growth in both
- Food & drink sector identified as key economic area for development
- Farmed salmon Scotland's biggest food export with demand still growing
- Scotland largest producer of farmed Atlantic salmon in EU
- 158,000 tonnes produced in 2011 and worth £585 m at farm gate

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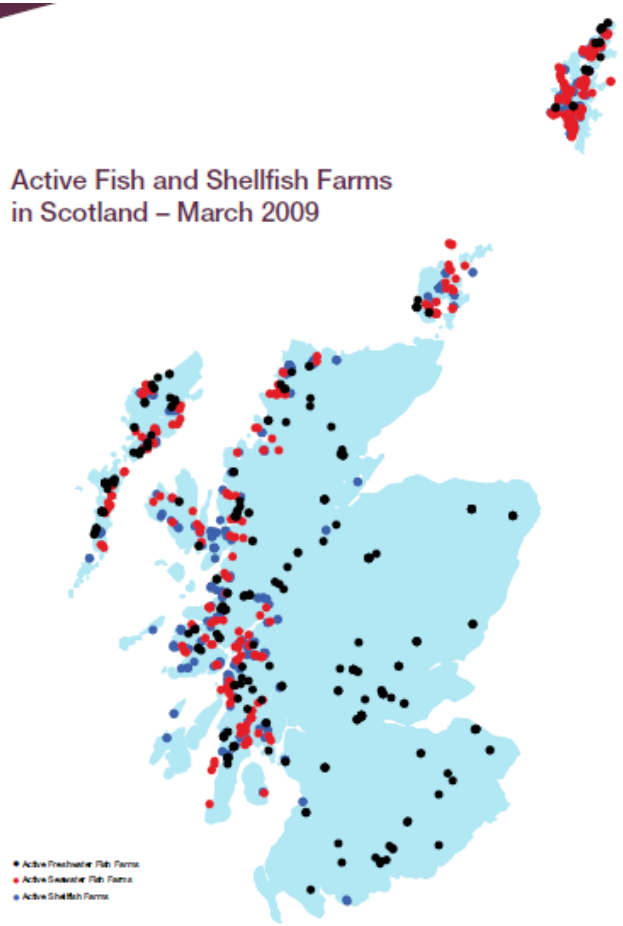
Scottish aquaculture production



There are 448 registered active finfish sites and 335 registered active shellfish sites in Scotland (Marine Scotland Science, April 2009).

- **254 marine finfish sites (mainly Atlantic salmon also trout and halibut)**
- **228 freshwater finfish sites (salmon, rainbow & brown trout, Arctic char)**
- **330 shellfish sites (dominated by blue mussel also Pacific & native oyster; Queen & King scallop)**

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Challenges

- **Providing space for sustainable growth – competing demand, environmental impacts, potential interactions and relationships with wild fish/fisheries**
- **National perspective vs local development accountabilities and sensitivities; time taken to agree authorisations/'red tape'**
- **Sea lice, disease control and containment of fish**
- **We believe the impact of aquaculture in Scotland to be sustainable and will maintain regulatory oversight to ensure this continues**

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Regulatory Framework in Scotland

- Fish farm businesses authorised and subject to inspection for containment measures, disease control and sea lice management by MS Fish Health Inspectorate
- Farms licensed and controlled by the Scottish Environment Protection Agency to ensure environmental impact from industry are assessed and managed
- Planning permission required for sites from local authorities
- Majority of finfish farming industry signed up to voluntary Code of Good Practice

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Fish farm escapes

- Escapes are falling. 40,957 fish lost in 2012 - second lowest year of reported escapes since statutory reporting introduced in 2002
- Current confirmed escapes for 2013 is 30,776 fish
- Reflects increased awareness of containment issues, significant industry investment in new equipment and training
- Changes introduced to introduce statutory equipment and training standards will continue this trend – being developed with industry
- Measures will ensure continued improved containment and minimise the risk of escapes occurring

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Aquaculture & Fisheries (Scotland) Act 2013

- **Bill passed by Scottish Parliament in May 2013. Act expected to commence in September 2013**
- **Builds on existing regulatory framework and includes:**
- **Powers to prescribe technical requirements for equipment and training to:**
  - **ensure installation and deployment of equipment that is well maintained and appropriate for the site conditions**
  - **Impose a duty for adequate training to use prescribed equipment, and requirements on operators to keep records in relation to training and equipment**
- **Powers to take samples from fish farms to trace escapes**

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Development of Scottish Technical Standard (STS) and Technical requirements

- Informed by expert group - industry (nets, pens, moorings and farmers), insurers and regulators - to ensure appropriate and proportionate for Scottish industry
- Covers open pen, land-based facilities, ponds, raceways and hatcheries - nets, pens, mooring systems and screens
- Sets standards for design, construction, materials, manufacture, installation, maintenance & size of equipment
- Flexible to take account of site specific environmental conditions e.g. wave height, wind & current speeds; and flood risk assessments for land-based, pond and raceway sites
- Future-proofed for technological developments, novel farming approaches, moves further offshore or climatic changes

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Development of Scottish Technical Standard (STS) and Technical requirements

- **STS developed alongside operational procedures, operators' manuals and training of operatives to ensure equipment is used appropriately and procedures followed correctly**
- **Training is an important part of requirements. Working with industry to ensure staff are appropriately trained - building on the best practice workshops and in-house schemes industry has already introduced**
- **Regulations to come into force autumn 2014 with lead-in period to allow existing equipment to be replaced. Larger companies expected to be able to meet the standard by 2016 with the smaller companies by 2020**
- **Inspection & audit regimes to be developed with industry but to dovetail with existing procedures**

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Development of Scottish Technical Standard (STS) and Technical requirements

- **Work well underway**
- **SARF 73 - *A report presenting proposals for a Scottish Technical Standard for Containment at Marine and Freshwater Finfish farms* published by SARF in 2012 identified 16 Knowledge Gaps (KGs)**
- **The KGs being addressed through three separate research projects including work on:**
  - **embedding drag anchors, Predator attacks on fish farms, Current adjustment factors, Net fouling, Net mesh strengths and size**
- **All are underway through SARF and due to report by spring 2014**

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Ministerial Group on Sustainable Aquaculture

- **MGSA established to work alongside the Aquaculture & Fisheries (Scotland) Act to secure sustainability of aquaculture growth and its interactions with wild fish**
- **Support Scotland's industry to achieve sustainable growth targets as set out in National Marine Plan Consultation - to grow marine finfish production sustainably to 210,000 tonnes (from 159,000 tonnes in 2011) by 2020**
- **Membership includes industry, wild fish interests, environmental NGOs, scientists and regulators**
- **Main strategic body supported by 7 focussed and project-based working groups: Interactions; Science and Research; Fish Health & Welfare; Containment; Shellfish; Wellboats & Capacity**

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MGSA CONTAINMENT WORKING GROUP

- **Containment Group established with remit to:**
- **Continue work on delivering a Scottish Technical Standard for fish farm equipment and associated guidance – including consideration of predator control**
- **Make recommendations on training requirements to ensure a skilled workforce including formal qualifications and consideration of an industry program of best practice workshops to prevent escapes due to human error**
- **Review escapes reporting processes including guidance, "cause" categorisation, and make recommendations for lessons learned/ industry dissemination.**

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Key is maintaining sustainable economic growth in Scottish aquaculture

THANK YOU

Useful links:

www.sarf.org.uk/reports/

www.legislation.gov.uk/asp/2013/7/contents/enacted

www.scotland.gov.uk/Topics/marine

www.scotland.gov.uk/Topics/marine/Fish-Shellfish/18364/18692/escapeStatistics

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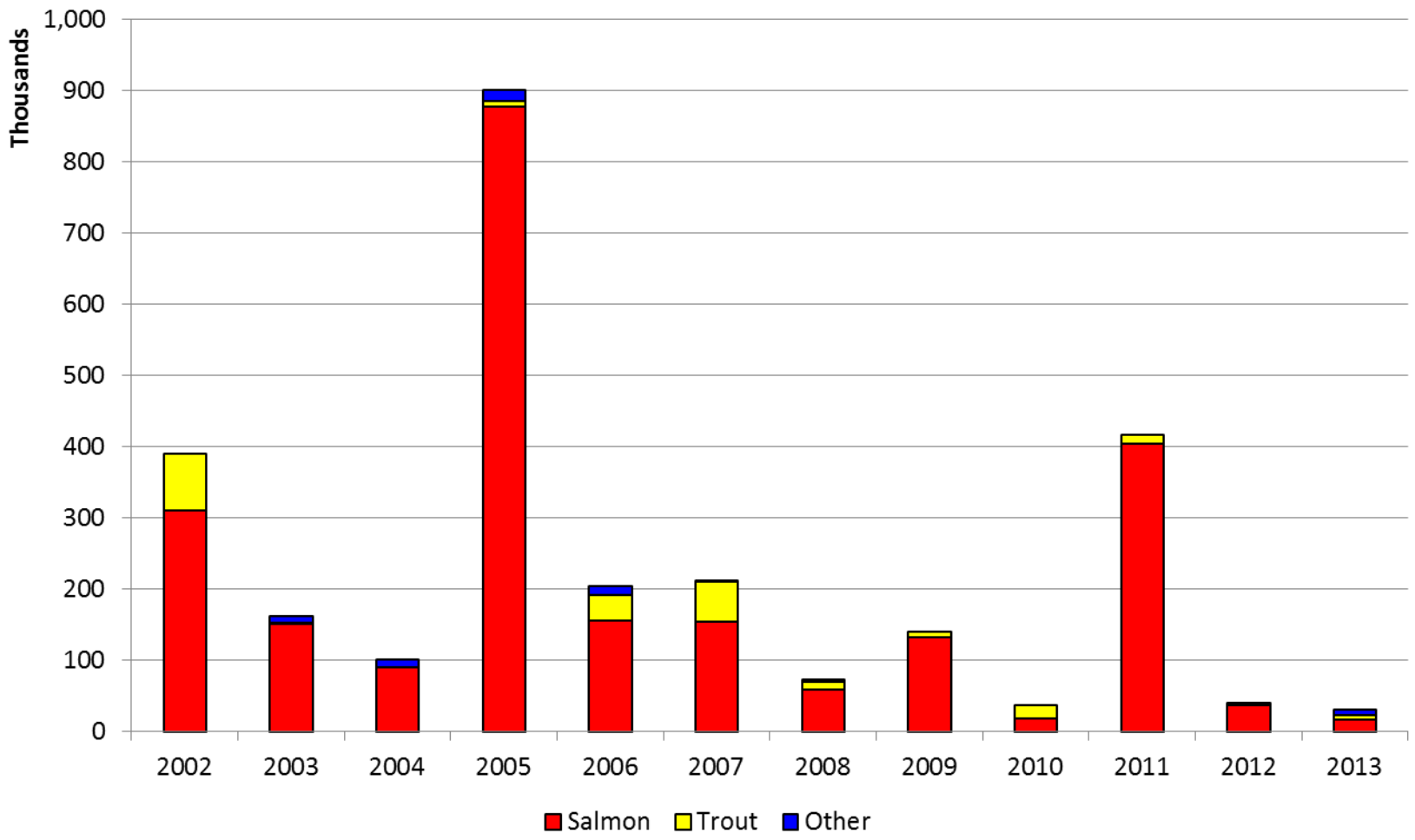
Human factors in new standard, containment work and training in Scotland

Steve Bracken, Business Support Manager, Marine Harvest Scotland & Chair of Improved Containment Working Group (ICWG)

Trondheim 12th August 2013

Scottish Industry - recorded numbers of escapes (salmon, trout & halibut)



Loch Seaforth, Western Isles – after the storm

Scottish Technical Standard (salmon and trout)

- Justifiable in reducing escapes
- Proportionate to the risk
- Appropriate to the Scottish environment
- Appropriate to the Scottish industry
- Enforceable and auditable
- Future proofed

(and input from SINTEF)

Improved Containment Working Group (ICWG)

Training

Equipment

Predator control

Audit

New developments

Mitigation of escapes

Closed containment

Freshwater

SSPO industry workshops

Please provide examples of best practice which have helped to reduce the threat of an escape incident.

Issue	No of times cited
Increased specification of nets and / or cages.	19
Predator control (including ADD and predator nets).	19
Training (& knowledgeable / good staff).	15
Net trials / new net materials (including Dyneema® nets[8]).	11
Site inspections (including dive inspections).	8
Effective equipment.	7
Net weighting.	6
Sharing information between companies.	2

What single factor if developed further would promote the security and containment of fish farm stock?

Issue	No of times cited
Equipment (effective, site specific, maintenance etc).	18
Training (and knowledge).	18
Predator control (including ADD).	13
Increased net specification, net development (including Dyneema®).	11
Sharing information (between companies and / or suppliers).	5
Site inspections (including dive & net inspections)	5
Risk assessments & SOPs.	2
Profitability of salmon farms.	2
Research (Net trials, net weights, ADD).	1
Increased cage specification	1
Looking at how to reduce losses during transport	1
Site supervision.	1
Reducing the times that stock are handled.	1

Training - identified weaknesses

- Lack of recognised aquaculture qualifications
- Lack of trained site staff
- Escapes due to human error
- Lack of staff awareness of specific/new equipment
- Poor response to escape incidents/recovery actions
- Inconsistent or unclear company training strategies

Training - proposals

- In-house operational training
- Recognised qualifications
- Fit for purpose SOPs put in place and checks that staff understand and follow them
- Establish programme of industry best practice/training workshops
- Training road-show
- Ensure all sites have Action Plan for escapes and conduct a practice drill
- Training to include bottom-up feed back
- Targeted training e.g. use of hydraulics, ADDs, net cleaning
- Ensure better interaction/skills sharing between farms and across industry

Scottish salmon industry approaches to containment training

- Company specific containment training
- Formal qualifications and Modern Apprentices (100)
- Site specific requirements
- On site training “flawed net” - The Scottish Salmon Company

The Scottish Salmon Company

Stock Containment

Practical 2. Lifting a net.

- **Visit a mock cage and lift a net.**
- **What could happen.**
- **What to do in the event of a suspected rip. A rip during lifting. Finding a hole.**
- **Conclusion. Why it happened. How to avoid.**

Site specific requirements

Sapphire netting protecting water line

Seal blind and Sapphire netting

Circles

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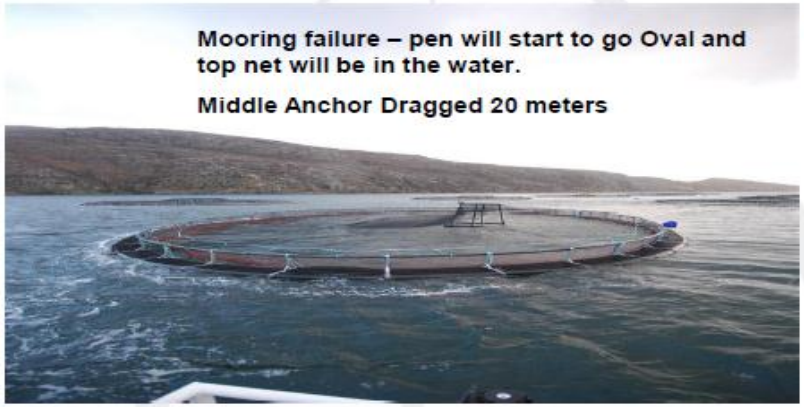
excellence in seafood



Last comments

"…highlight the importance of containment at every opportunity…"
Reay Whyte - Scottish Sea Farms

"…how important it is to highlight something that just doesn't look right…" Iain MacIntyre - Scottish Salmon Company

"…if you start a training programme it has to be maintained and evolve with time…" Lynn MacFarlane - Marine Harvest Scotland

Thank you

http://www.scottishseafarms.com/

http://www.scottishsalmon.com/

http://nos.ukces.org.uk/Pages/index.aspx

http://www.scottishsalmon.co.uk/

http://www.marineharvest.com/