

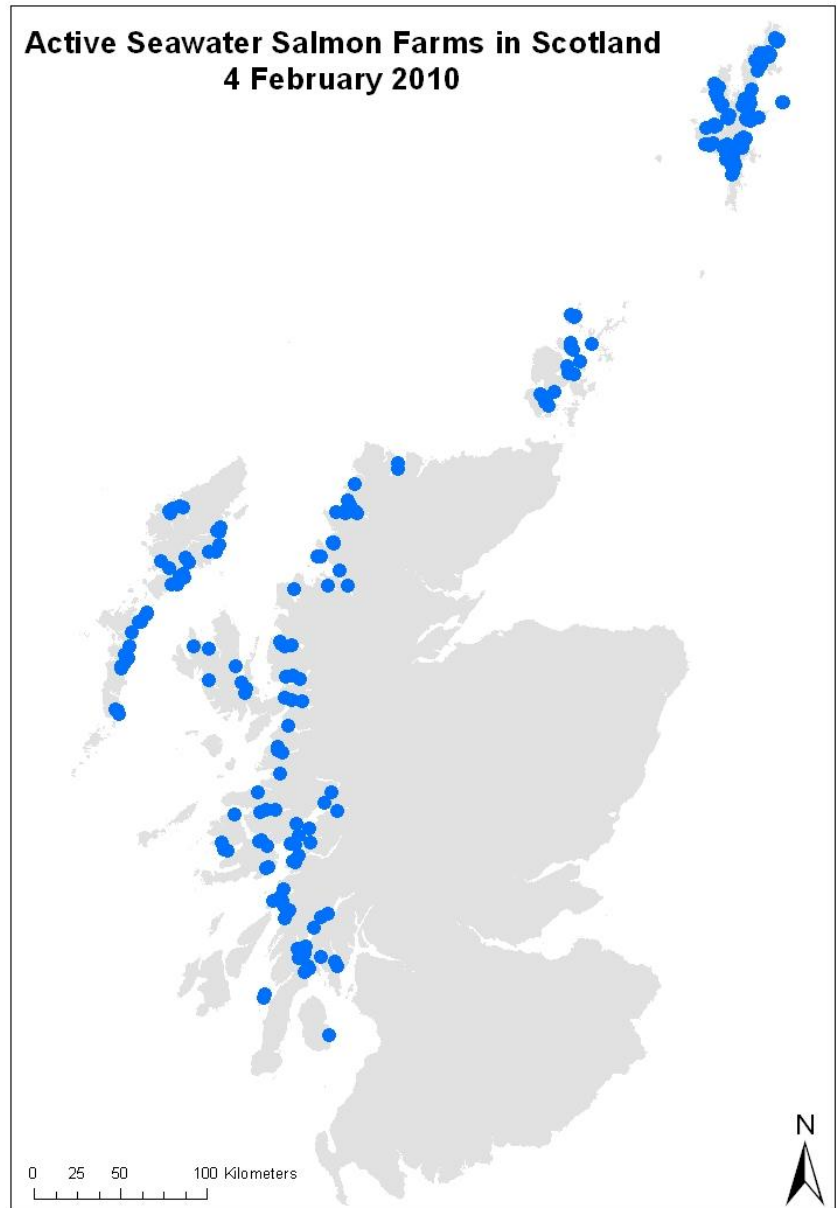
# Sea Lice – Overview

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# Who are Marine Scotland?

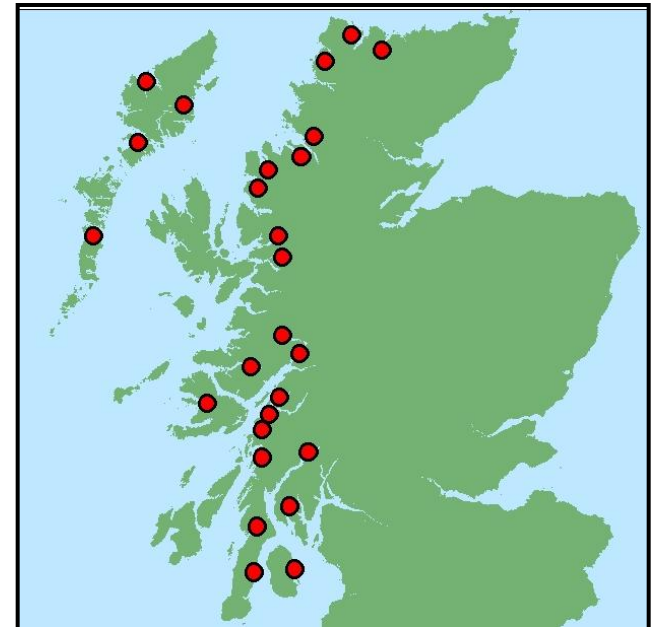
- Marine management organisation in Scotland.
- Directorate of the Scottish Government - formed April 2009.
- Integrating scientific research, compliance monitoring, policy and management of Scotland's seas.

**Long term funding and work programme addressing sea lice management.**



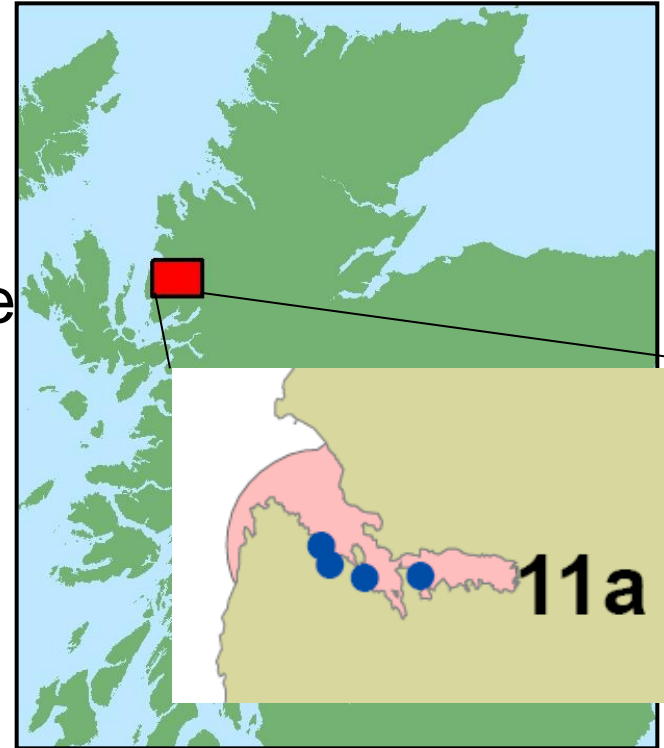
# Tripartite Working Group: Sea trout netting

- TWG – government funded initiative
- Information on lice burdens on wild trout collected during spring/early summer
- Currently analysing data collected during 2001-2009.

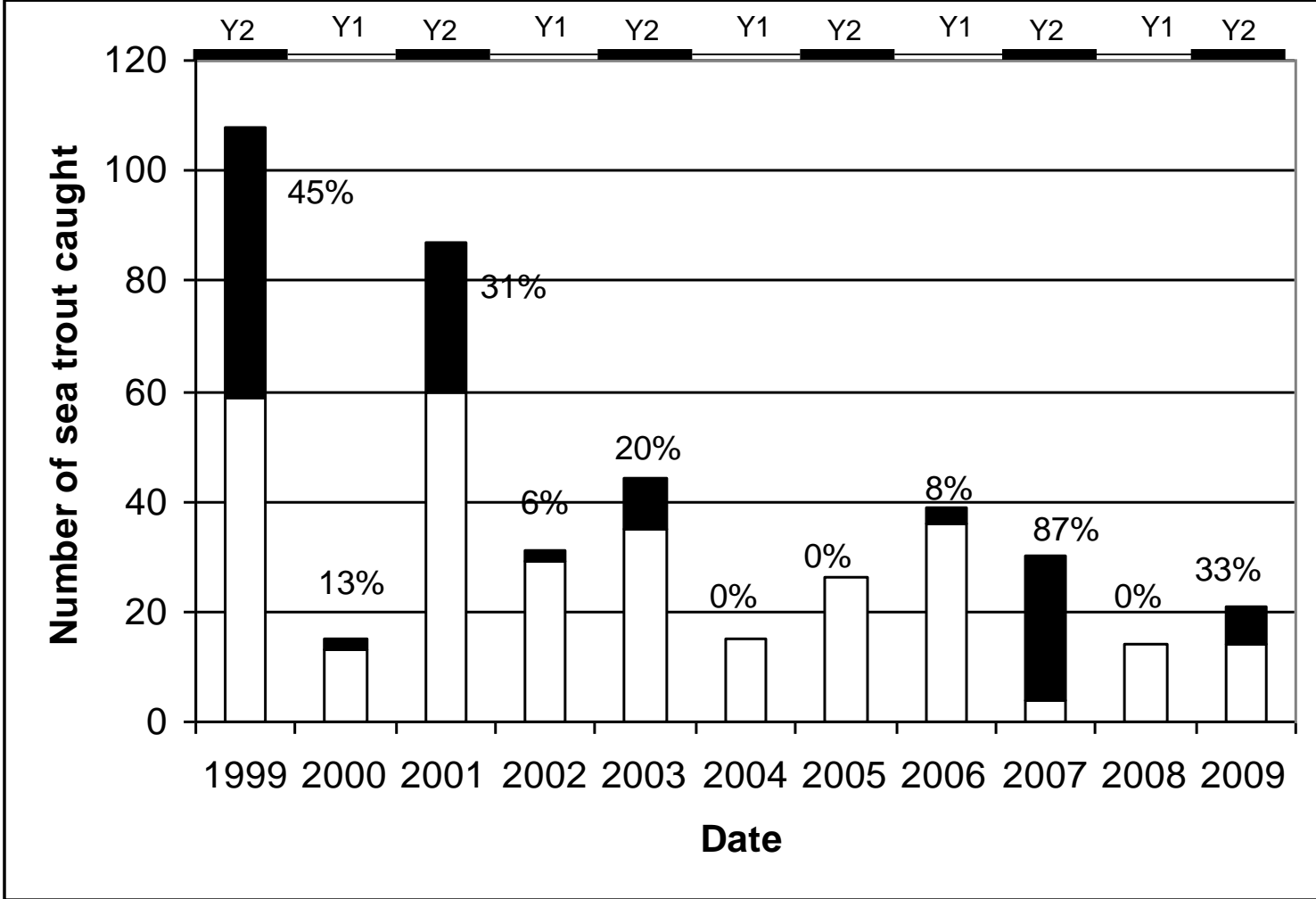


# Monitored site: Loch Torridon

- Sea trout examined in detail
- Plankton sampling used to examine density of lice in the environment
- Sentinel salmon
- Information collected on farm lice levels through local management group
- Acoustic tracking used to examine habitat use of sea trout
- Sampling of early returning fish undertaken to examine yearly changes in lice burdens





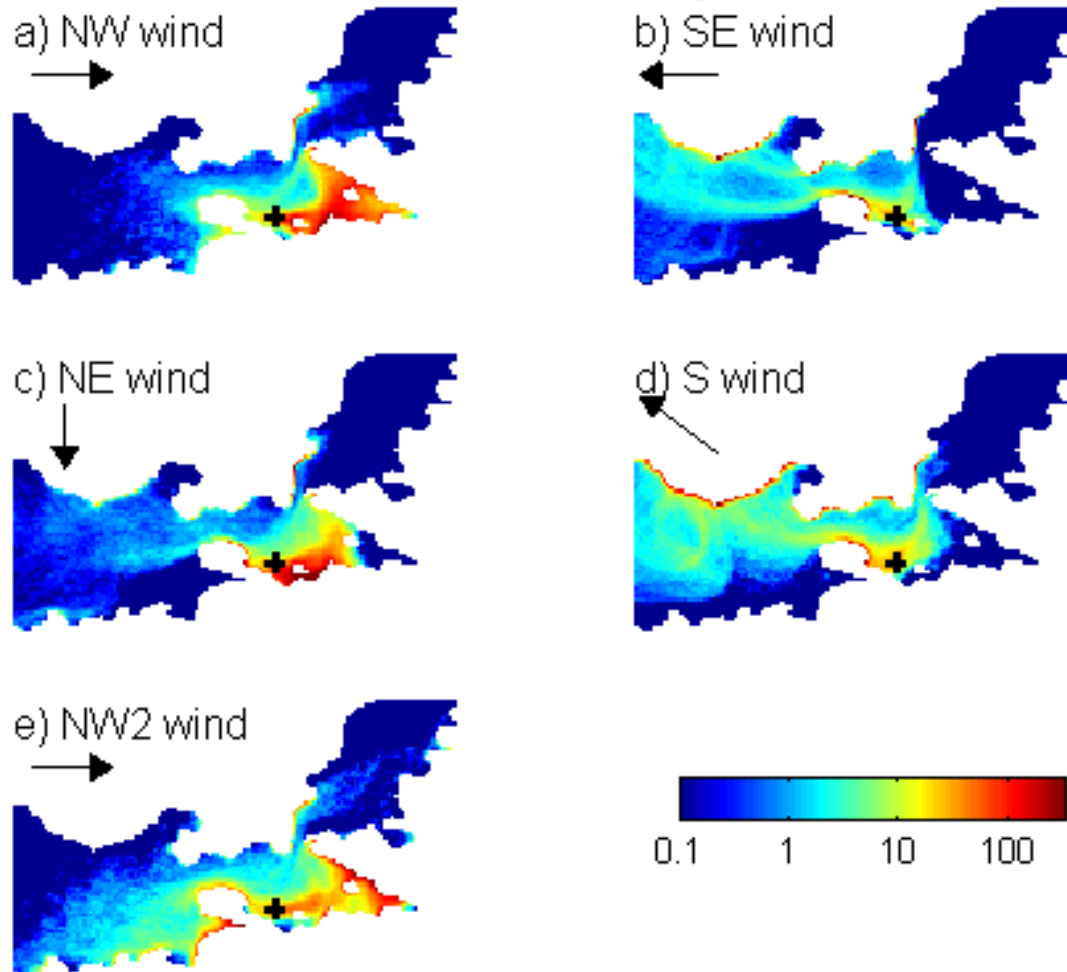


# Modelling sea lice dispersal

- Coupled model created for Loch Torridon area
- Hydrodynamic model generates currents
  - 100 m horizontal intervals, 15 depths
  - 10 minute time-steps
  - Wind, river and tidal forcing
- Particle model
  - Use 2-d surface currents to move particles
  - Simulates larval maturation
- Output locations of particles at given times

# Influence of wind on simulated distribution of copepodids

## Influence of wind: 7 day simulations

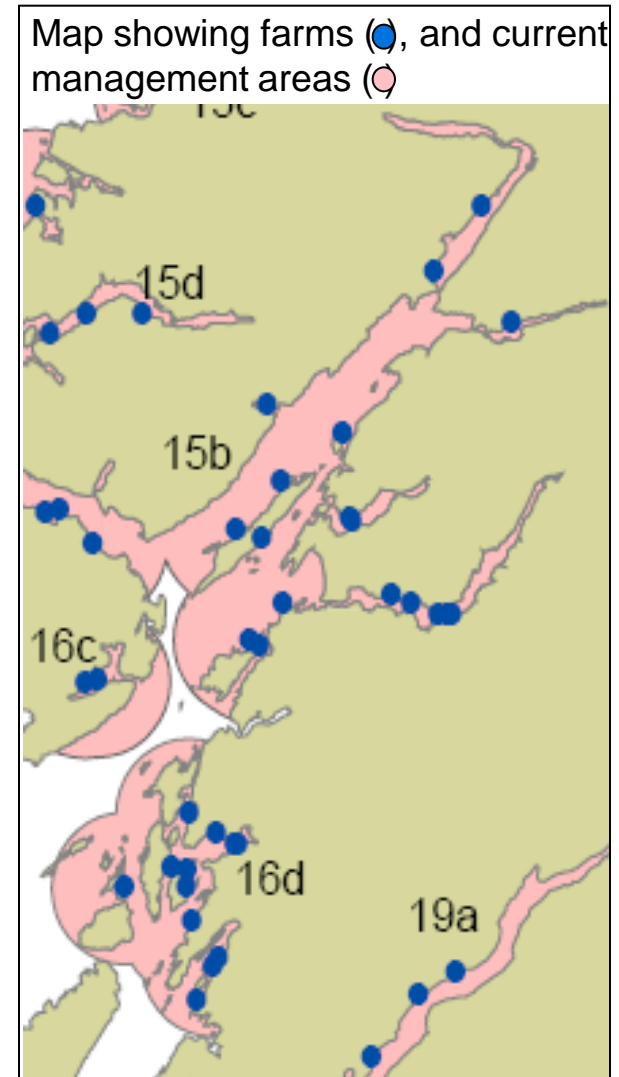


- panels show all particles
- Wind is the dominant contributor to particle transport and dispersion
- can be seen to control export/retention.



# Expansion of work to Loch Linnhe

- Understanding the dispersal of, and risk from sea lice, within Scottish coastal systems
  - 5 Year project starting April 2010
- Large area – 60Km long
- Many partners in the work – Marine Scotland, aquaculture industry, wild fisheries, Scottish Association for Marine Science
- Complex scenarios
- Dispersal and infection pressure between farms/farm groups
  - gradients
  - firebreaks



# Objectives of Loch Linnhe work

- develop a validated coupled bio-physical model to predict sea lice dispersal within Loch Linnhe
- compare data on the movement of wild salmonids within the Loch Linnhe with predicted sea lice dispersal
- investigate effect of SLICE treatment of smolts on returning wild fish numbers (effect of inshore sea lice on wild fish population)
- investigate presence of immunosuppressive effect of attached sea lice on host

# Outcomes from research in Loch Linnhe

- Prediction of areas where larval lice may be concentrated
- Evaluation of interactions between groups farms
- Evaluation of potential effects of changes to farm management, new farms/farm closures on larval lice distribution
- Informing establishment of management areas
- Evaluation of export (intra-regional) transport of lice
- Science that can be applied to modelling further large scale areas
- Improved knowledge of the effect of sea lice on salmonids
  - at the individual
  - at the population level

# Regulation – Aquaculture and Fisheries (Scotland) Act 2007

- Inspections and audits of fish farm sites
  - Inspection – sea lice, treatment record, stock
  - Audit – all records; inspection of stock, audit of sea lice counting procedure; audit of treatment administration?
  - Enforcement action
- Industry Requirements
  - Satisfactory measures – control prevention and reduction
  - Legislative requirements – ‘2008 Record Keeping Order’
  - Industry Code of Good Practice



# Regulation – Aquaculture and Fisheries (Scotland) Act 2007

- Industry Code of Good Practice
  - weekly counts 25 fish (5 fish from 5 cages)
  - suggested trigger 0.5 (Feb-June) 1 (July-Jan)  
*L.s.* adult female
  - management agreements
  - appropriate training
  - good practice in the use of medicinal products
- Record Keeping
  - training
  - lice counts
  - administration of medicinal products
  - methods to control /treat parasites
  - sea lice management groups

