



marineharvest

Myopathy a Scottish industry perspective

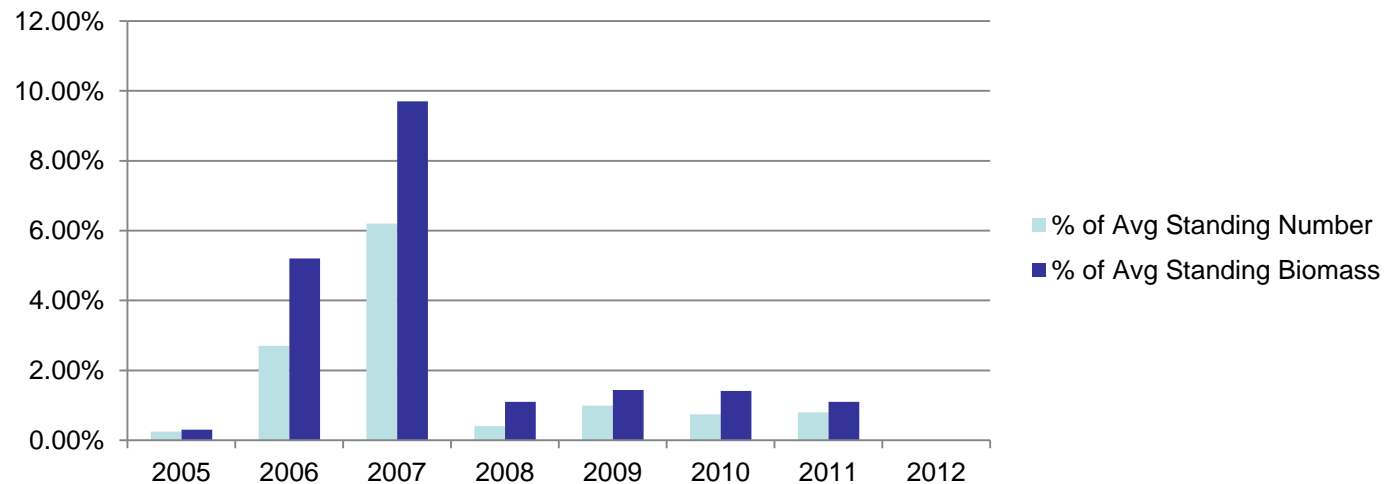
Dave Cockerill – Marine Harvest Scotland

Trondheim Feb 2014

Historical myopathy morts, PD?

- Myopathy has been responsible for up to ~40% of mort biomass
- PD/SAV has been the dominant factor, (Histopath, seroconversion, PCR and CPK)
- Significant reduction in PD losses from 2008
- 2009 fish were the first to be vaccinated for SAV (problem sites only)
- Insignificant mortality since 2012

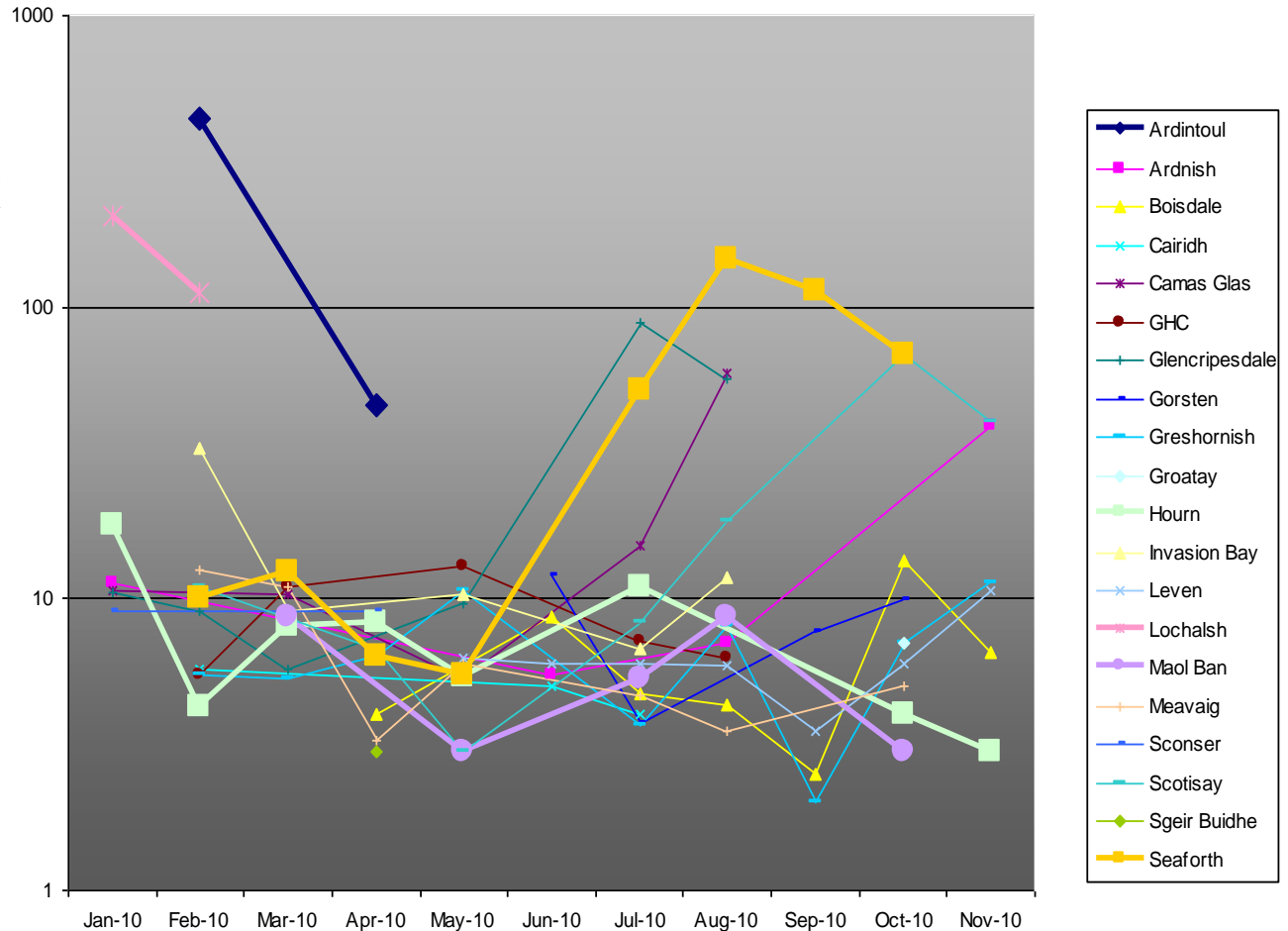
PD (and other myopathies) morts / calendar year



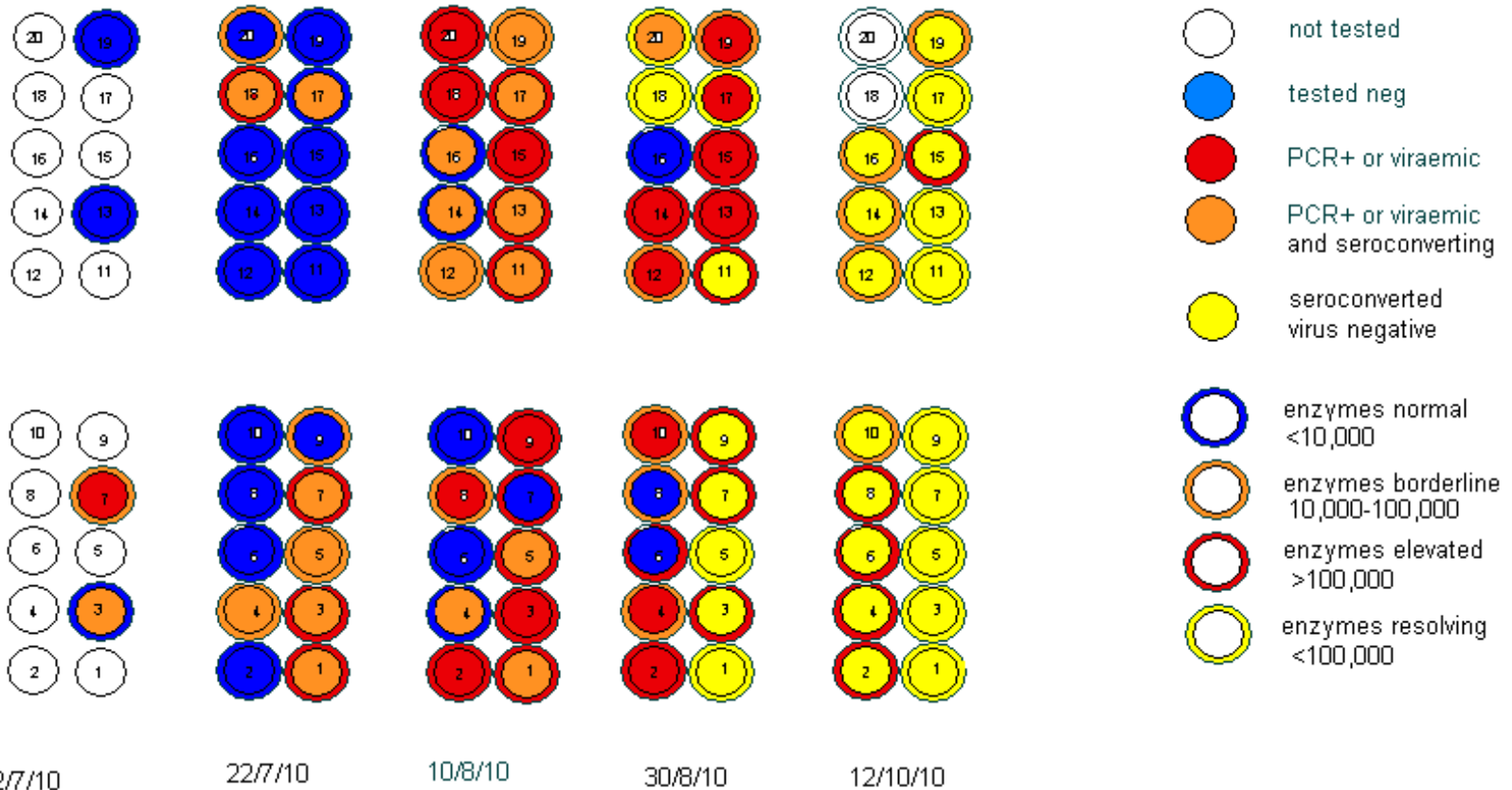
CPK average values for all sites 2010 (LOG SCALE)

CK Levels per site 2010
(Unitsx1000/Litre)

- The last significant clinical PD case was summer 2010, Loch Seaforth
- Significant Mortality ~100K fish (10% of site)
- Typical pathology, PCR positive for SAV1, sero-conversion
- CPK elevations, (gold line on chart)



Progression of infection and pathology through site

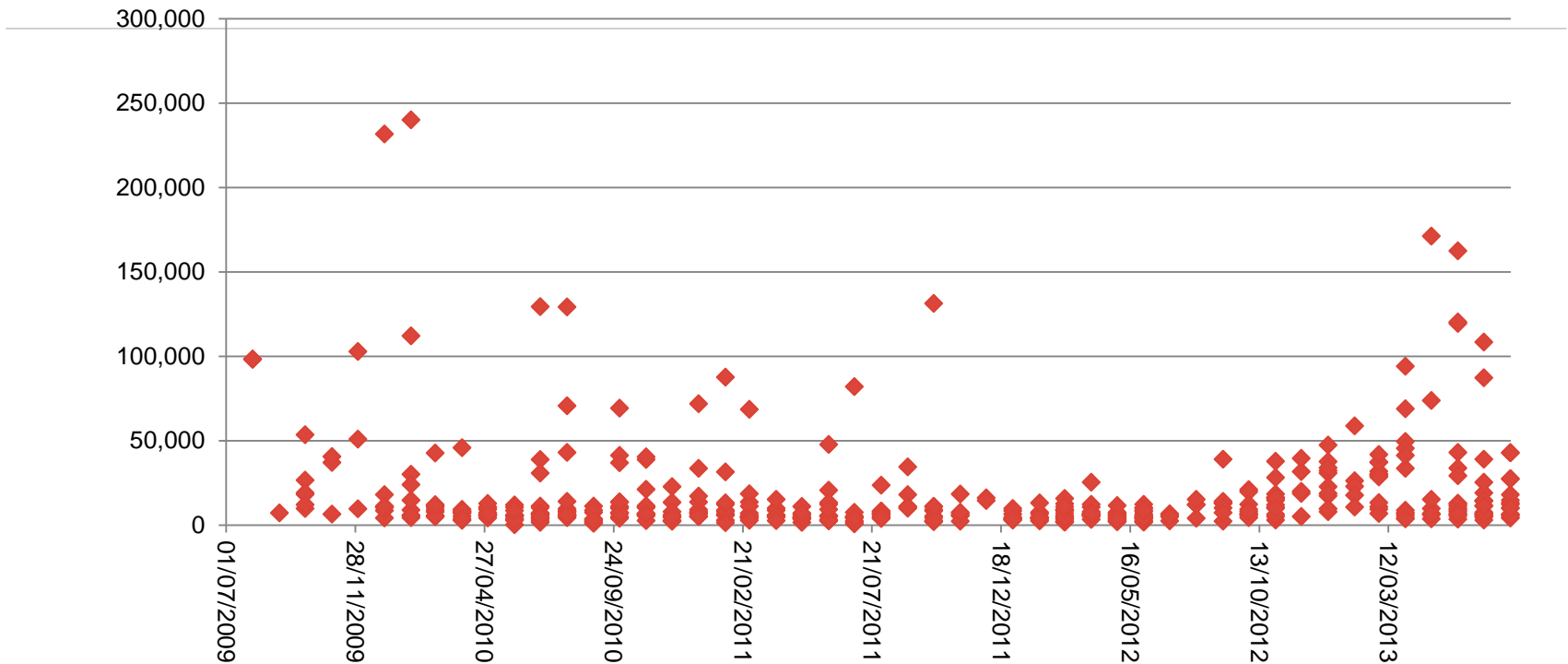


- Using routine screening to detect presence of SAV from 2/7/10
- Follow up 22/7/10 shows incomplete infection across the farm
- Significant spread by 10/8/10 almost all affected
- Recovery starting 30/8/10, virtually complete by October

Current monitoring regime

- › Aim to blood sample all sites on a monthly basis 12 fish (3 fish X4 pens)
- › Any elevations of CPK are followed up with PCR for SAV, PRV and sometimes CMS as well as checking for SAV seroconversion on the same samples
- › Additional samples from more pens (sometimes all)
- › Recent supplementary survey (small scale) on hearts at harvest PCR for SAV, PRV and CMS
- › FINDINGS:
 - › No convincing SAV seen since Jan 2012
 - › PRV is widespread ~95% of sites and has been ever since we have been able to test for it.
 - › SAV is currently rare ~5% (weak positives on heart PCR)
 - › CMS is very rare ~1% (weak positives on heart PCR)

Monthly CPK averages per site 2009-date



Elevations of CPK in 2009/10/11 assumed to be SAV related

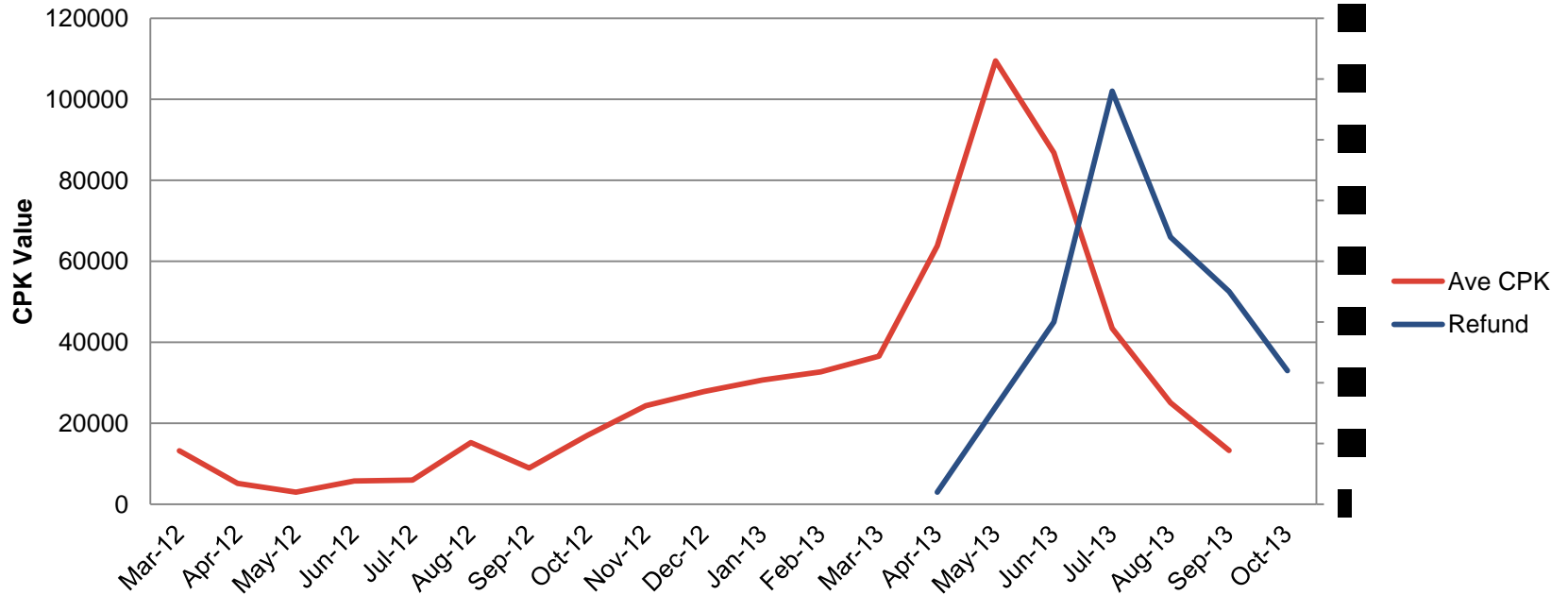
No convincing evidence of SAV/PD since Jan 2012

No significant CPK elevations during first half of 2012

Significant rises resume from Autumn/winter 2012 associated with PRV

Ave CPK Levels, Customer Refund and fillet downgrades 2012

Ave CPK (all sites), Customer Refunds



Customer refund for fillet marks, strongly mirrors average CPK peak, with a 2 month delay

Examples of fillet marks











Conclusions –

- › Visible lesions and fillet downgrades follow CPK elevations.
- › Mortality is not significant

- › Currently in the absence of SAV, CPK elevations appear to be associated with PRV, but more longitudinal work required??? PCR of hearts (gill?) throughout cycle and at harvest.

- › Future investigations, more histopathology of affected fillets
- › Assess the affect of functional feeds and anti-oxidant vitamin boosting
- › Delay harvest where possible until well after CPK levels return to normal.