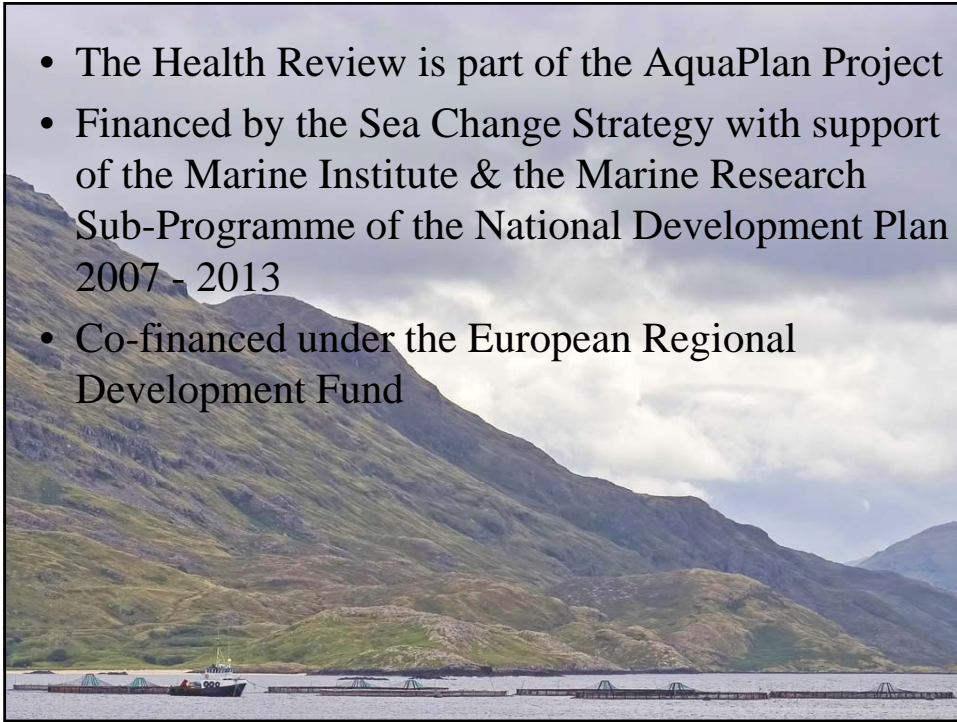
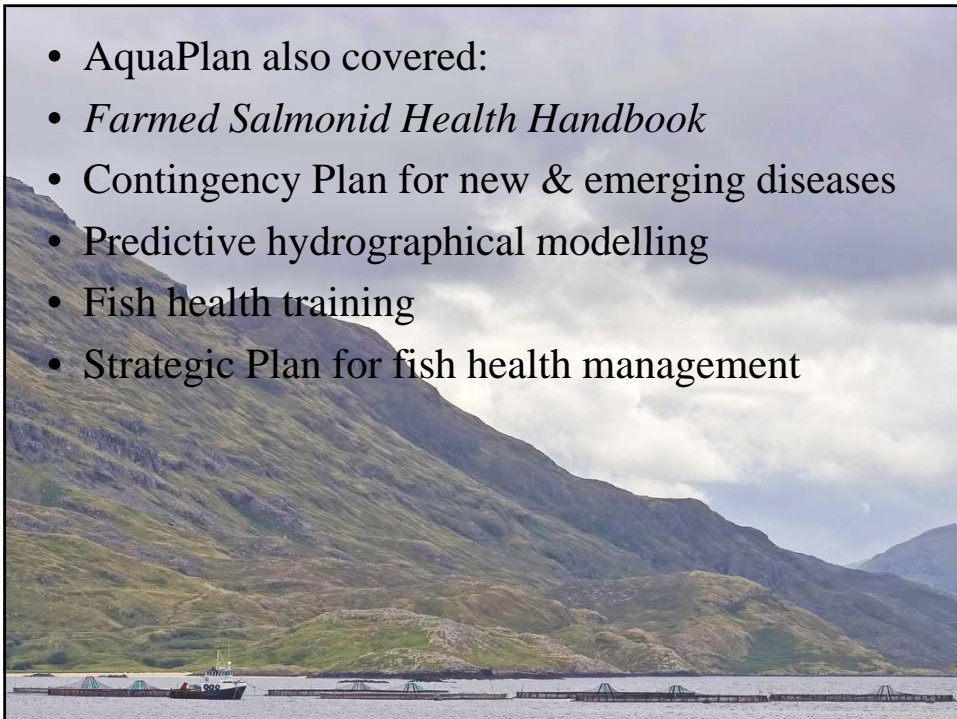




- The Health Review is part of the AquaPlan Project
- Financed by the Sea Change Strategy with support of the Marine Institute & the Marine Research Sub-Programme of the National Development Plan 2007 - 2013
- Co-financed under the European Regional Development Fund

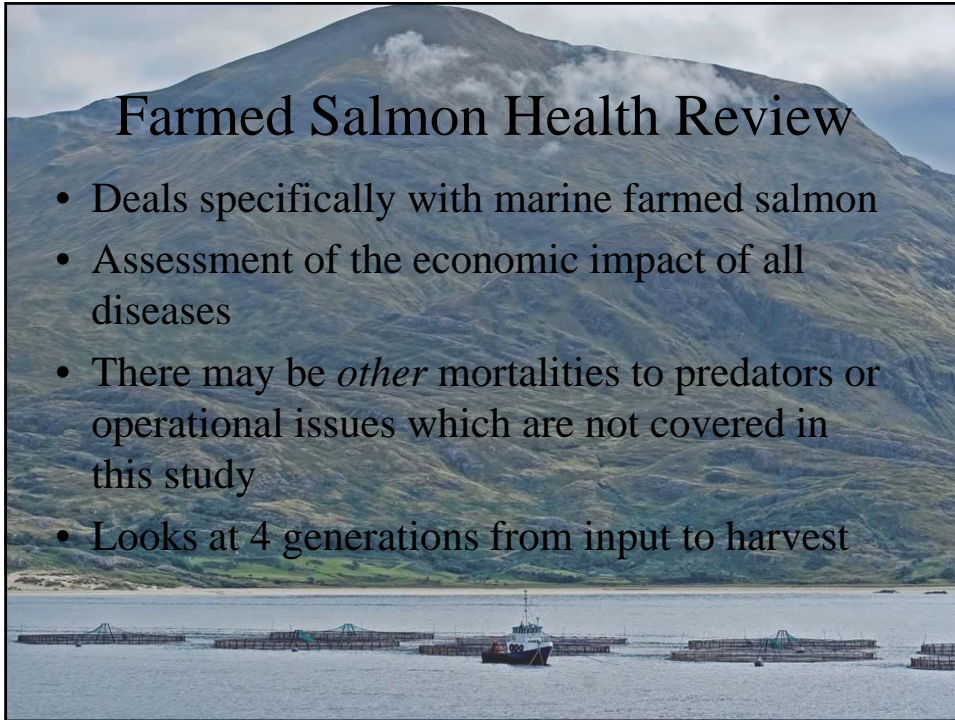


- AquaPlan also covered:
- *Farmed Salmonid Health Handbook*
- Contingency Plan for new & emerging diseases
- Predictive hydrographical modelling
- Fish health training
- Strategic Plan for fish health management



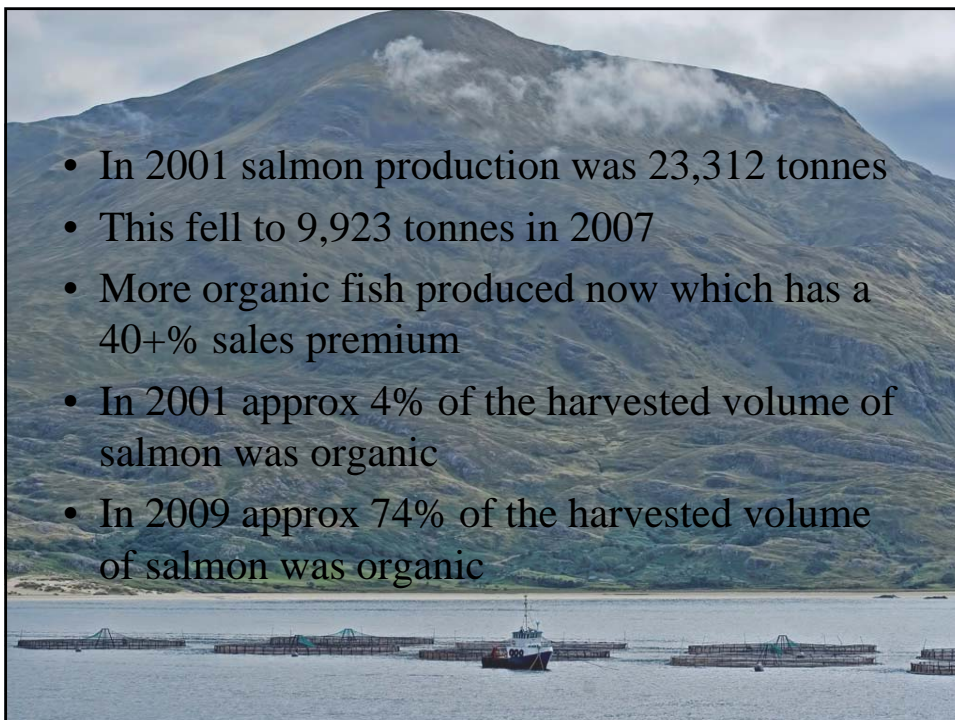
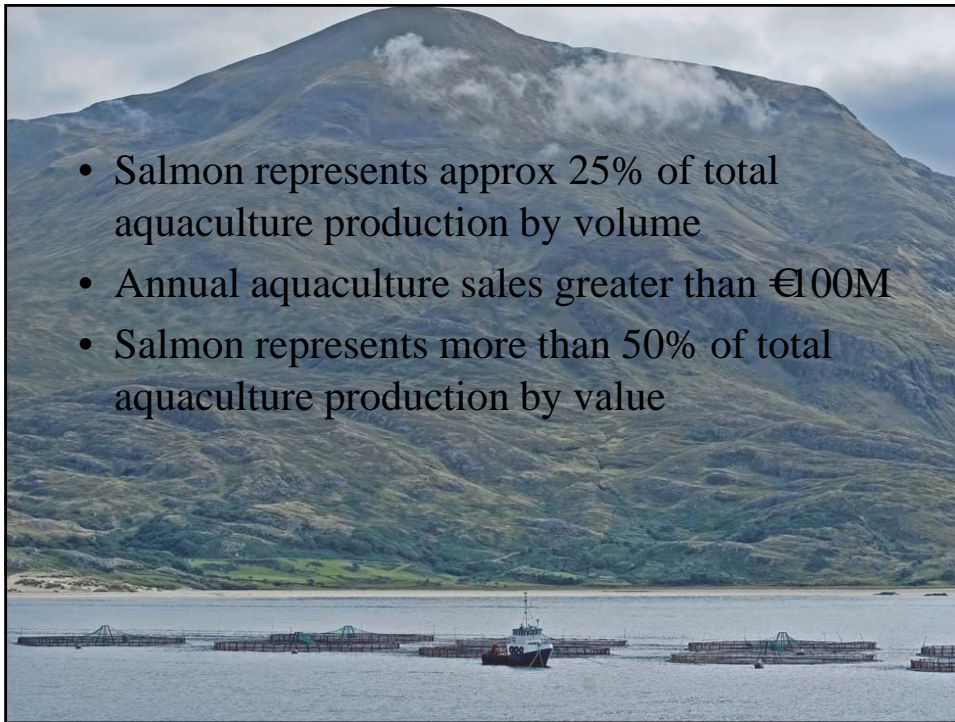
## Farmed Salmon Health Review

- Deals specifically with marine farmed salmon
- Assessment of the economic impact of all diseases
- There may be *other* mortalities to predators or operational issues which are not covered in this study
- Looks at 4 generations from input to harvest



## Why Salmon?

<b>Salmonids 2009</b>	<b>Tonnes</b>	<b>€Million</b>
Salmon	12,210	€65.4
Trout	478	€1.7
<b>Total</b>	<b>12,688</b>	<b>€67.1</b>



## Purpose of the Health Review

- To provide a framework for better management
- To provide data for targeted research
- To provide data to improve production & sales
- The study is still on-going. Suggestions from farmers and health professionals are welcome

## Scope of the Health Review

- 4 Input Generations:
  - Winter 2004 + Spring 2005
  - Winter 2005 + Spring 2006
  - Winter 2006 + Spring 2007
  - Winter 2007 + Spring 2008

## Diseases & Conditions

- Gill Disease
- Pancreas Disease
- Failed Smolt
- Algal Bloom
- Sea Lice
- Unspecified Lesions



- Rickettsia
- IPN
- Deformities
- Brain Parasite
- Furunculosis
- Systemic Vibriosis
- Amoebic Gill Disease



## Gill Disease

- Caused by variety of water borne irritants
- Jellyfish, plankton, protozoans, bacteria
- Increased mucous, inflammation, fusion, necrosis
- Respiratory stress, inappetence, poor growth, mortality
- Annual occurrence in many sites
- Significant problem, affects all sizes



## Pancreas Disease (PD)

- Caused by salmonid alphavirus (SAV)
- Lesions in pancreas & muscular tissue
- Sudden drop in feeding, lethargic, anorexic
- Annual occurrence in many sites
- Significant problem, affects all sizes



## Failed Smolt

- Smolts transferred to sea too early or late
- Osmoregulatory problems, don't feed
- Occurs annually to varying degrees
- Minor problem, only affects post transfer fish



## Sea Lice

- Parasitic crustaceans *L. salmonis* & *C. elongatus*
- Osmoregulatory problems
- Secondary infections
- Reduced feeding & growth
- Significant problem, affects all sizes



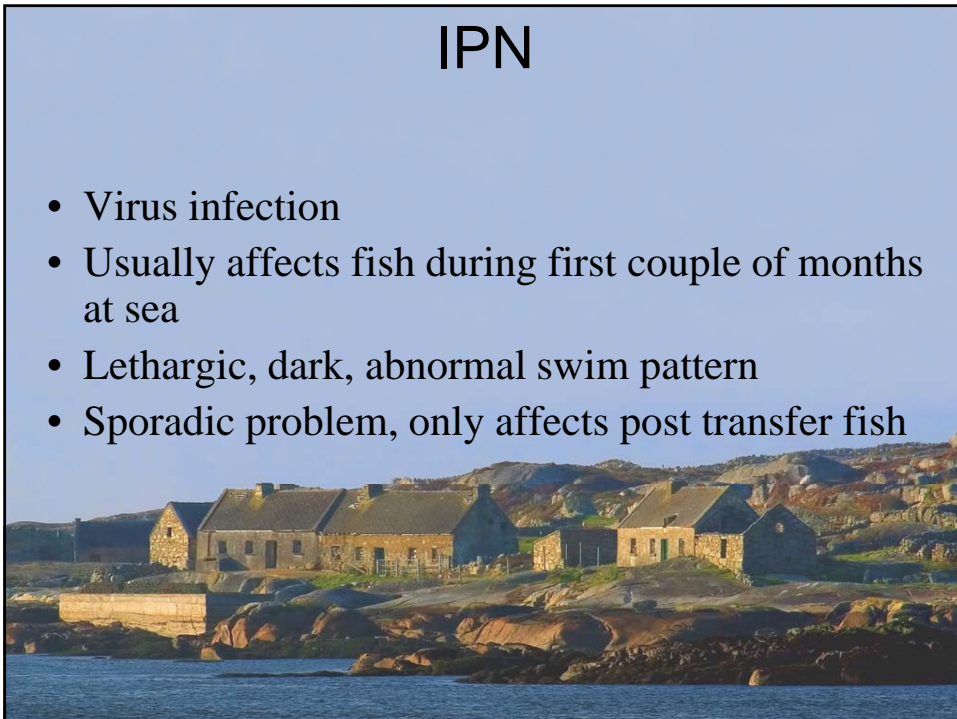
## Rickettsia

- Bacterial infection
- Usually autumn/winter
- Lethargic, dark, swim near surface
- Sporadic problem, affects all sizes



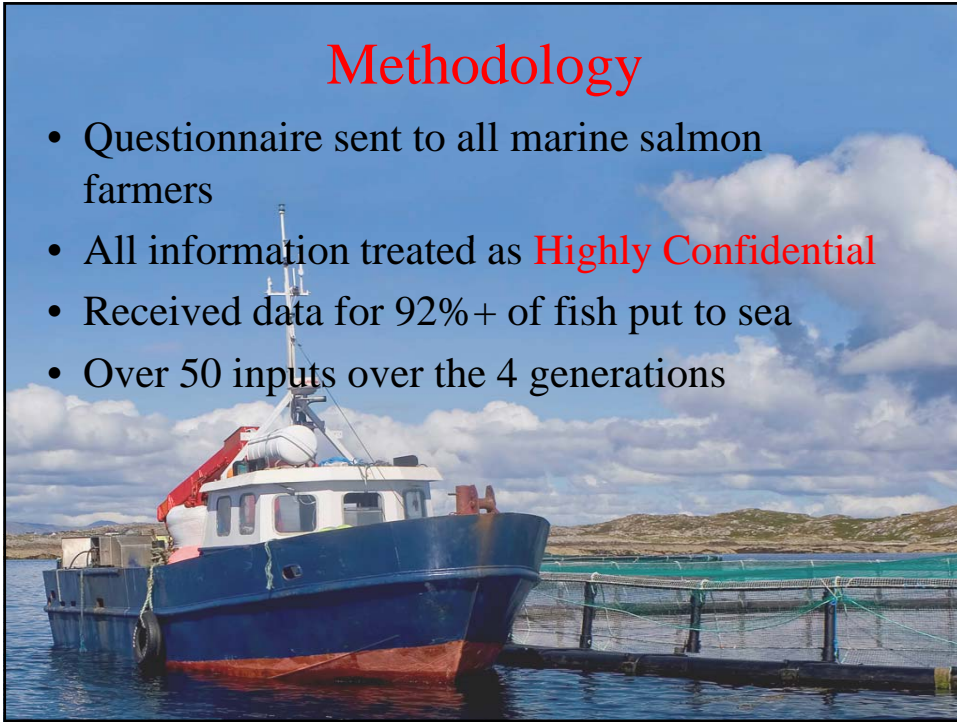
## IPN

- Virus infection
- Usually affects fish during first couple of months at sea
- Lethargic, dark, abnormal swim pattern
- Sporadic problem, only affects post transfer fish



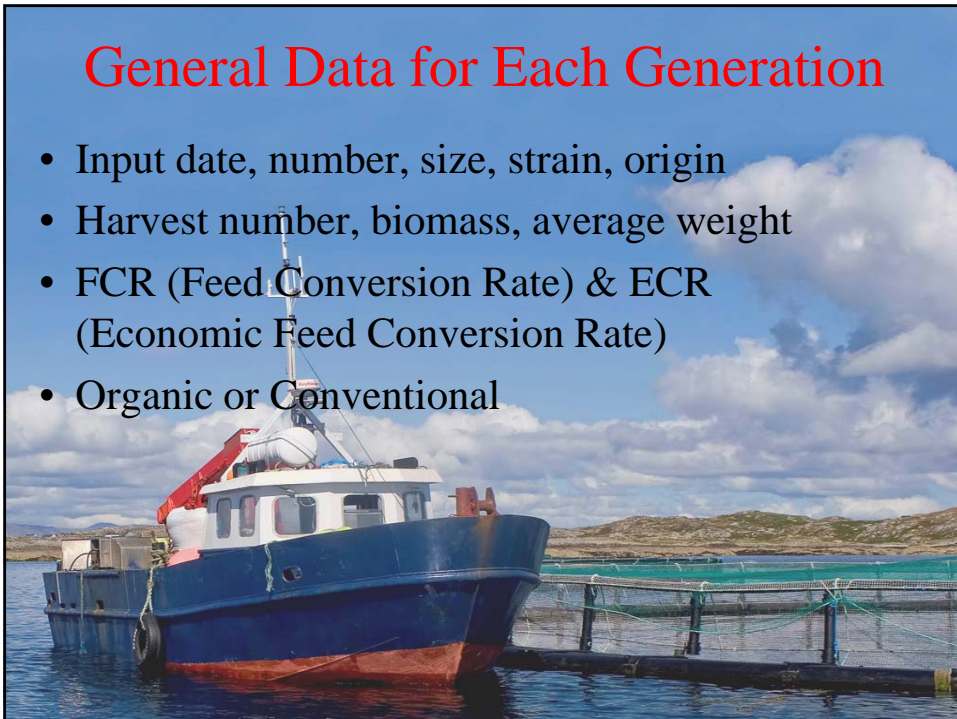
## Methodology

- Questionnaire sent to all marine salmon farmers
- All information treated as **Highly Confidential**
- Received data for 92%+ of fish put to sea
- Over 50 inputs over the 4 generations



## General Data for Each Generation

- Input date, number, size, strain, origin
- Harvest number, biomass, average weight
- FCR (Feed Conversion Rate) & ECR (Economic Feed Conversion Rate)
- Organic or Conventional

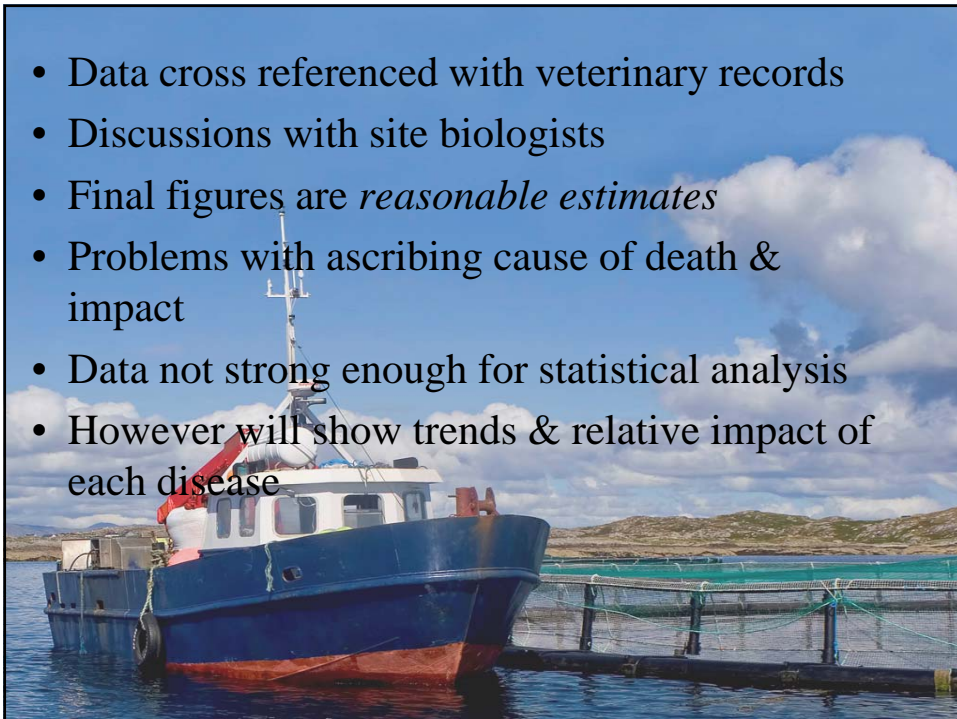


## Specific Data for Each Disease

- Morts number
- Morts average weight
- Estimated impact of disease on final av. wt.
- Estimated impact of disease on final ECR.
- Estimated biomass of production grade fish as a result of the disease
- Treatment costs

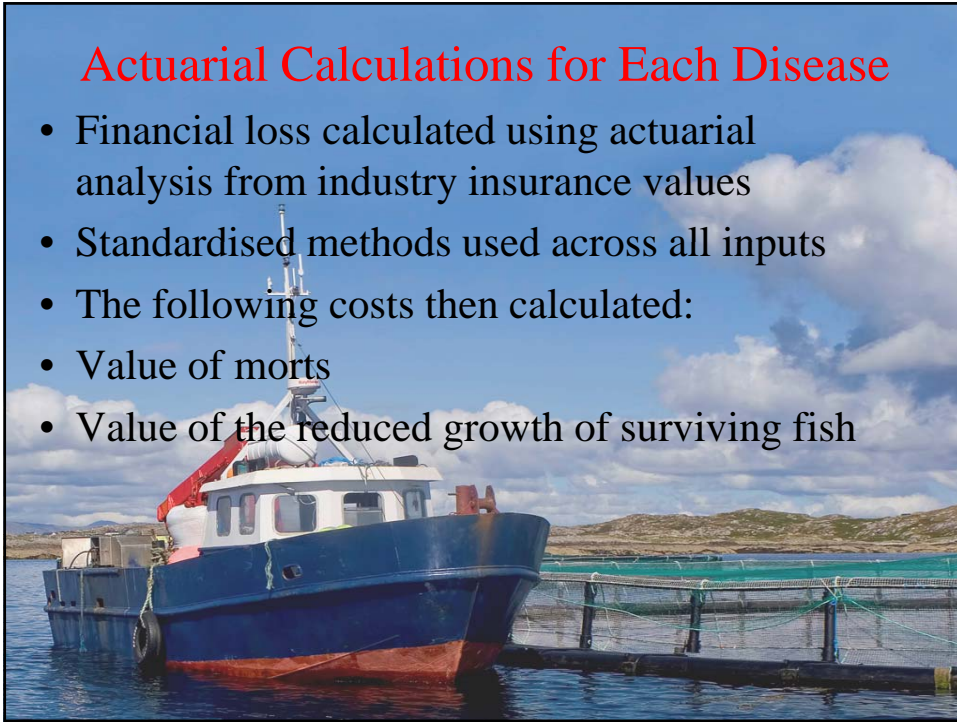


- Data cross referenced with veterinary records
- Discussions with site biologists
- Final figures are *reasonable estimates*
- Problems with ascribing cause of death & impact
- Data not strong enough for statistical analysis
- However will show trends & relative impact of each disease

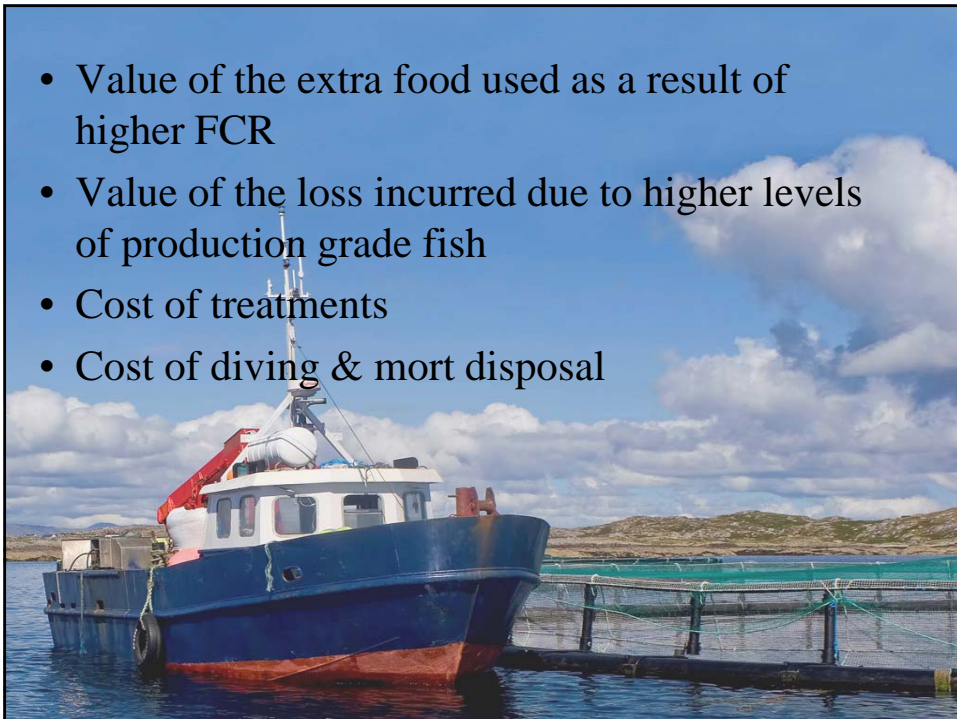


## Actuarial Calculations for Each Disease

- Financial loss calculated using actuarial analysis from industry insurance values
- Standardised methods used across all inputs
- The following costs then calculated:
- Value of morts
- Value of the reduced growth of surviving fish



- Value of the extra food used as a result of higher FCR
- Value of the loss incurred due to higher levels of production grade fish
- Cost of treatments
- Cost of diving & mort disposal



## Final Output

- Farms not named in report
- Only regional analysis – NW, W & SW
- Compared occurrence & impact of all diseases in 3 regions over 4 generations
- Compared occurrence & impact of all diseases in winter (S0) & spring (S1) smolts
- Today will just show data from one generation the winter 07/ spring 08 crop

