STABILITY OF INFECTION PATTERNS WITH TIME, THE CASE OF INFECTIOUS PANCREATIC NECROSIS VIRUS IN SCOTTISH FARMED SALMON

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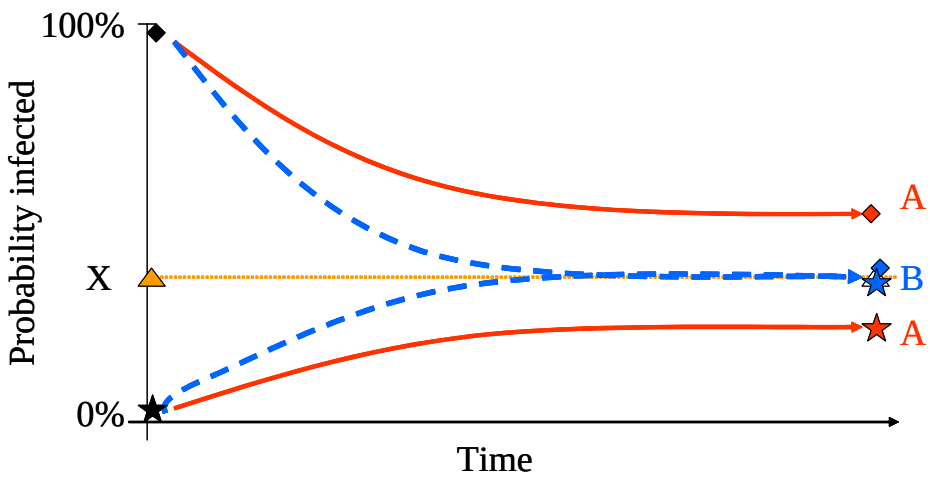
Is IPNV Persistent or Transient?

- Infectious pancreatic necrosis virus is widespread and increasing in Scottish salmon farms (90% marine sites)
- Is a sample taken 1 or 2 years ago a good indicator of a sites current infection status? Is infection persistent (or repeated) or transient?

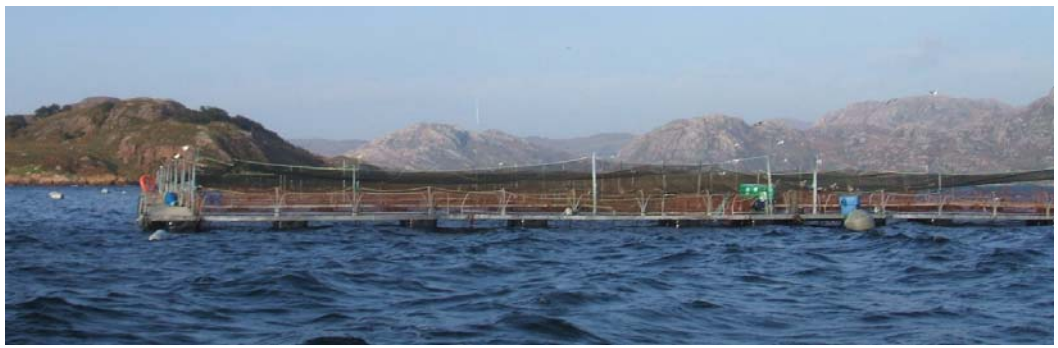
If transient then:

- the high prevalence indicates very high transmission rates
- samples rapidly lose their information value for infection control
- controls should be targeted above site level



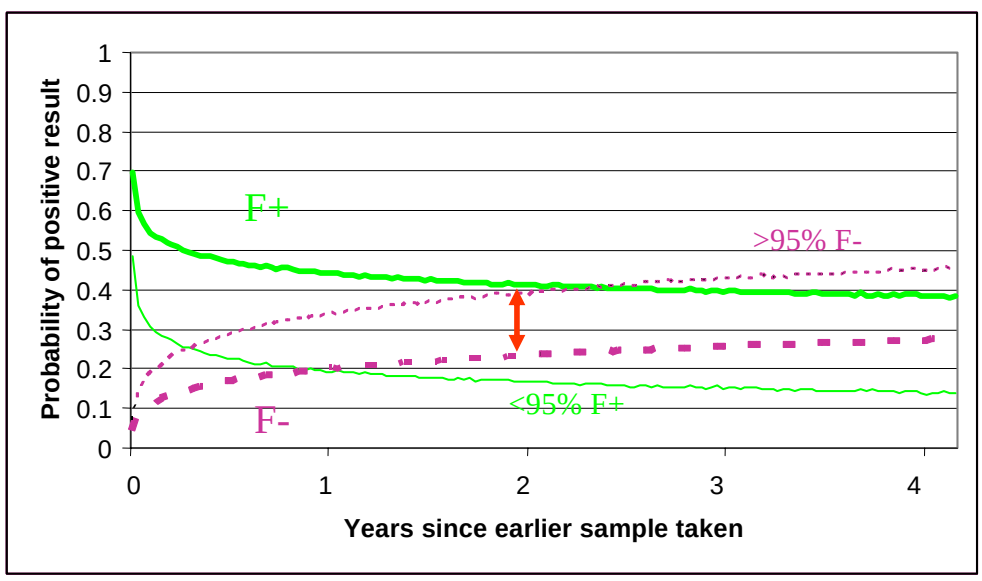
How to identify persistence

- What is the probability that +ve site will test +ve, relative to the probability that a site that tested -ve will test +ve after a given time?
- Ratio of conditional probabilities $P(I^+_T|I^+_0)/P(I^+_T|I^-_0)$
- Theory A. Pathogen persists, or repeatedly infects the same site, even after prolonged period sites that tested +ve are more likely to still test +ve than are formerly -ve sites
- Theory B. Pathogen is transient an infects sites at random, formerly -ve sites are just as likely as former +ve sites to test +ve after T (converging on regional average)

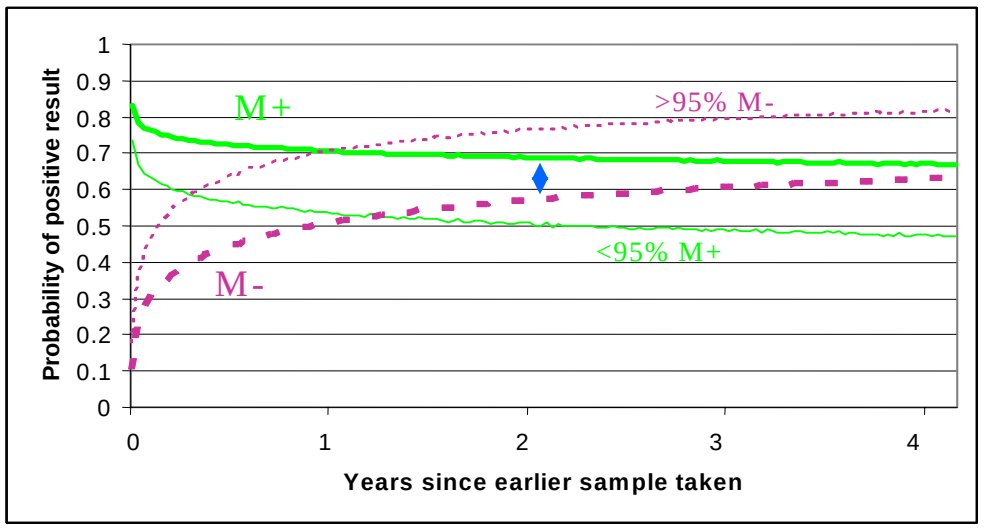


Method

- Sort sample from each site into pairs (e.g. 1&2, 1&3 and 2&3)
- Divide pairs into two sets: I. earlier sample +ve or II. earlier sample –ve
- Sort lists by time T between earlier and later sample
- Find probability of +ve versus T for list I
- Multilevel logistic regression model used to account for inter-regional (i) and inter-annual (j) variation
- Repeat for list II
- $P(I_T) = Logit(a_{ij} + b_{ij}ln(T+1))$



Results from freshwater: incomplete convergence = some persistence



Results from marine sites: infection convergence = dynamic

Conclusion

IPNV infection does not persist on marine sites for periods of >2 years: Infection is transient. This may reflect harvesting and fallowing cycle after 18 months. Some freshwater sites show response to infection history several years later: infection is persistent