

Animal Welfare & Model Development

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Epidemiological Modeller

Pathogens, welfare & consequences

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Oyster banned in herpes scare

Disease ... oyster movement has been banned

By STAFF REPORTER
Published: 22 Jul 2010

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FISHING bosses have BANNED moving oysters from southern England after thousands of the shellfish contracted HERPES.

TOP STORIES
NEWS SPORT BIZARRE

Killer is freed for shopping spree
KILLER who blamed fiancé's knife death on

- Pathogens are a major limiting factor in aquaculture systems.
- They impact on:
 - Mortality
 - Growth
 - Welfare
 - Quality
 - Trade
 - Saleability
- Great research emphasis on prevention & control

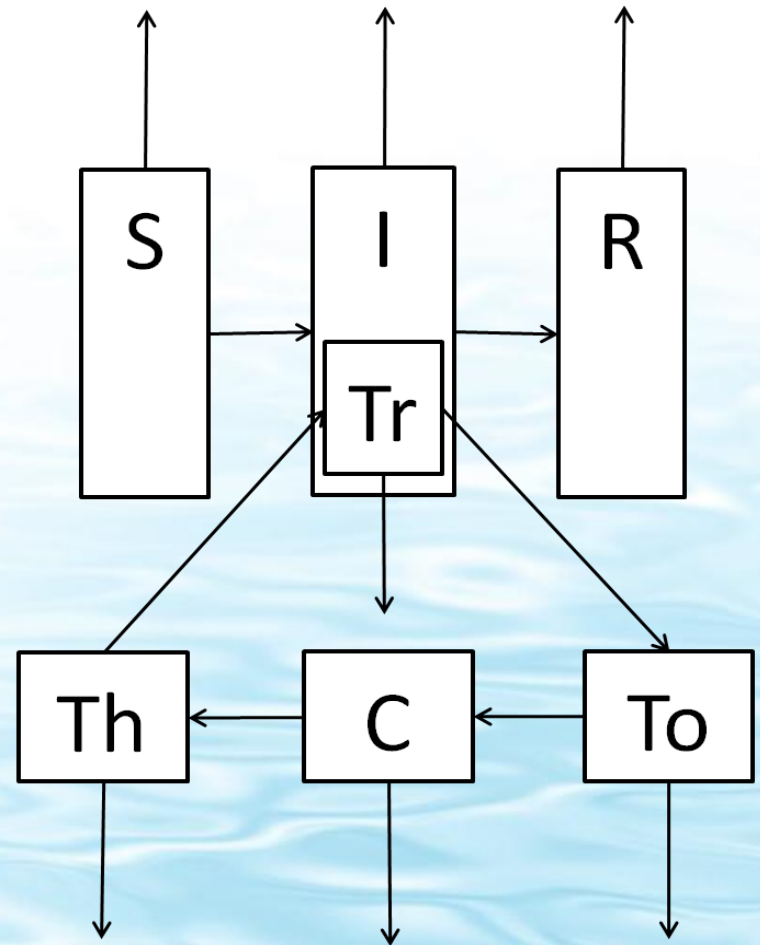
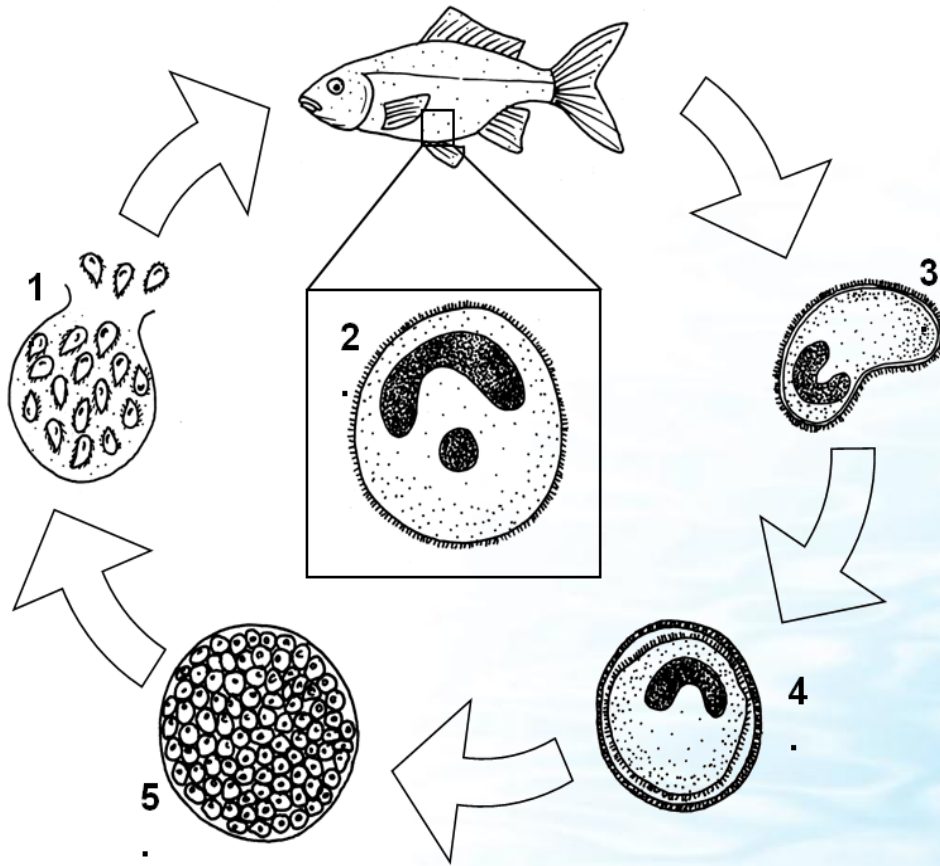
Pathogen modelling

1. Facilitate outbreak investigations.
2. Direct surveillance.
3. Assess pathogen impact.
4. Understand the processes.
5. Estimate values for missing parameters.
6. Facilitate control & management.
7. Make predictions (trends vs. exact outcomes).
8. Inform policy & economic assessment.

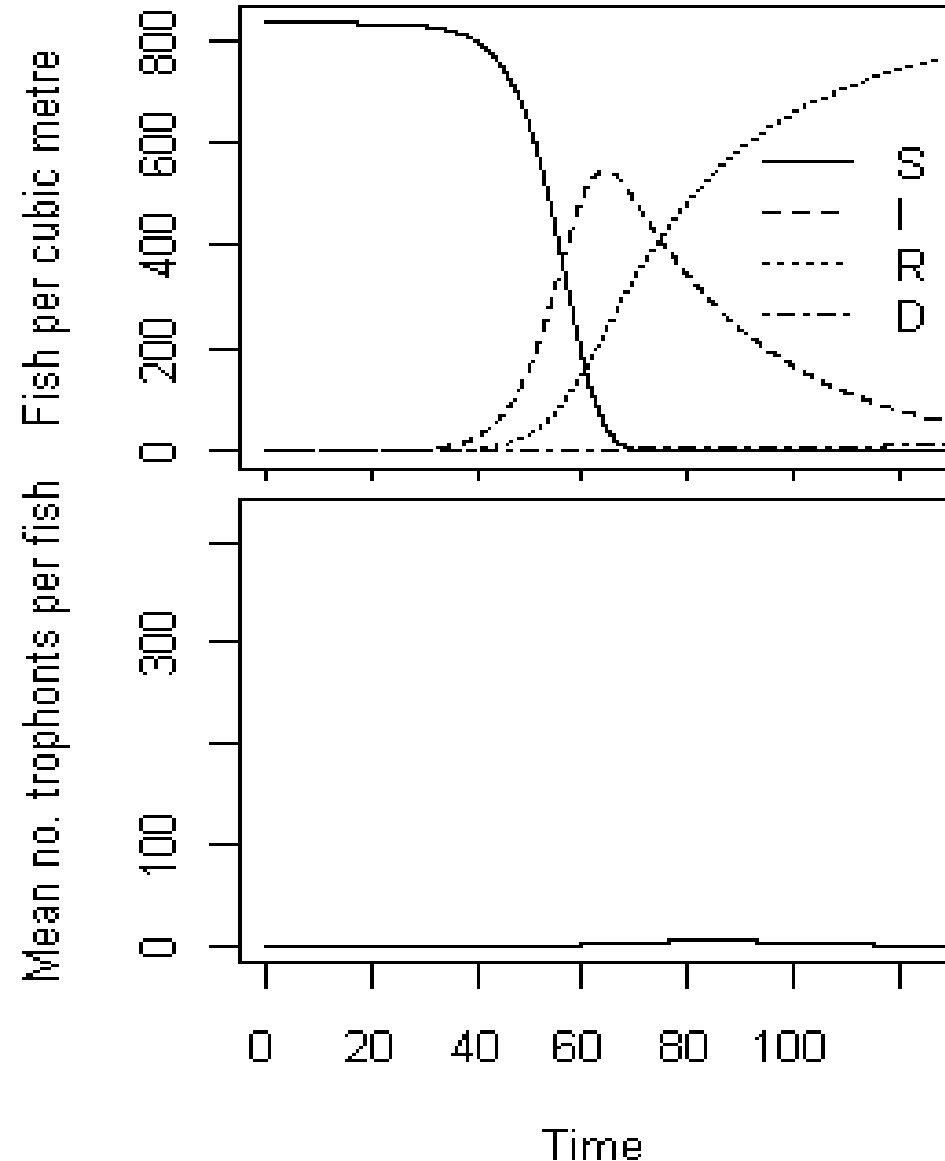
Model development

- Understanding the industry/systems is key.
 - Stakeholder engagement and observation.
- Knowledge of the pathogen life-cycles.
 - Experimental and field studies.
- The influence of the environment.
 - Stakeholders, and experimental/field studies.
- Different approaches may be required at the different levels.
 - Fish-to-fish vs. farm-to-farm transmission.

Within Site Epidemics

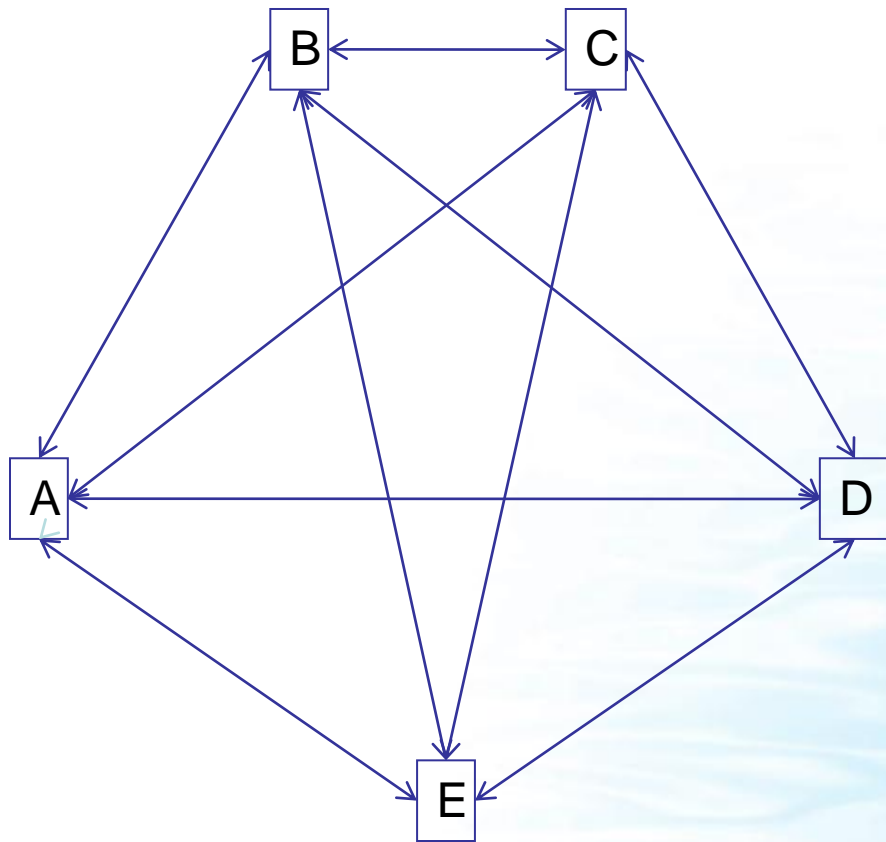


Within Site Epidemics



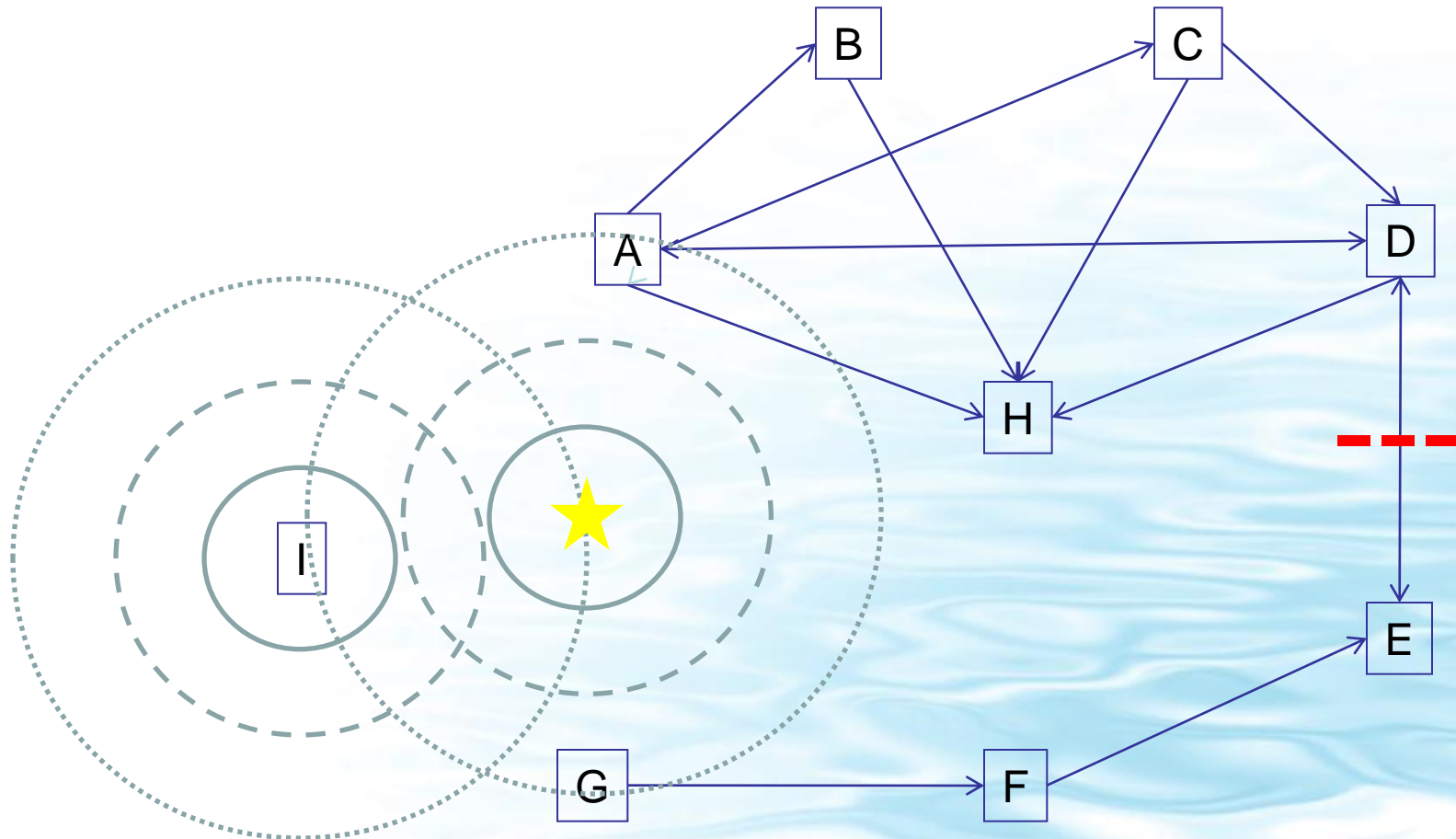
- I.D. knowledge gaps
- Assess impact = 20% mortality.
- Predict the peak of the epidemic - height & time.
- Determine site infectivity e.g. downstream spread.
- Assess the sensitivity of the system to different variables.
- Evaluate controls

Scaling up: limitations

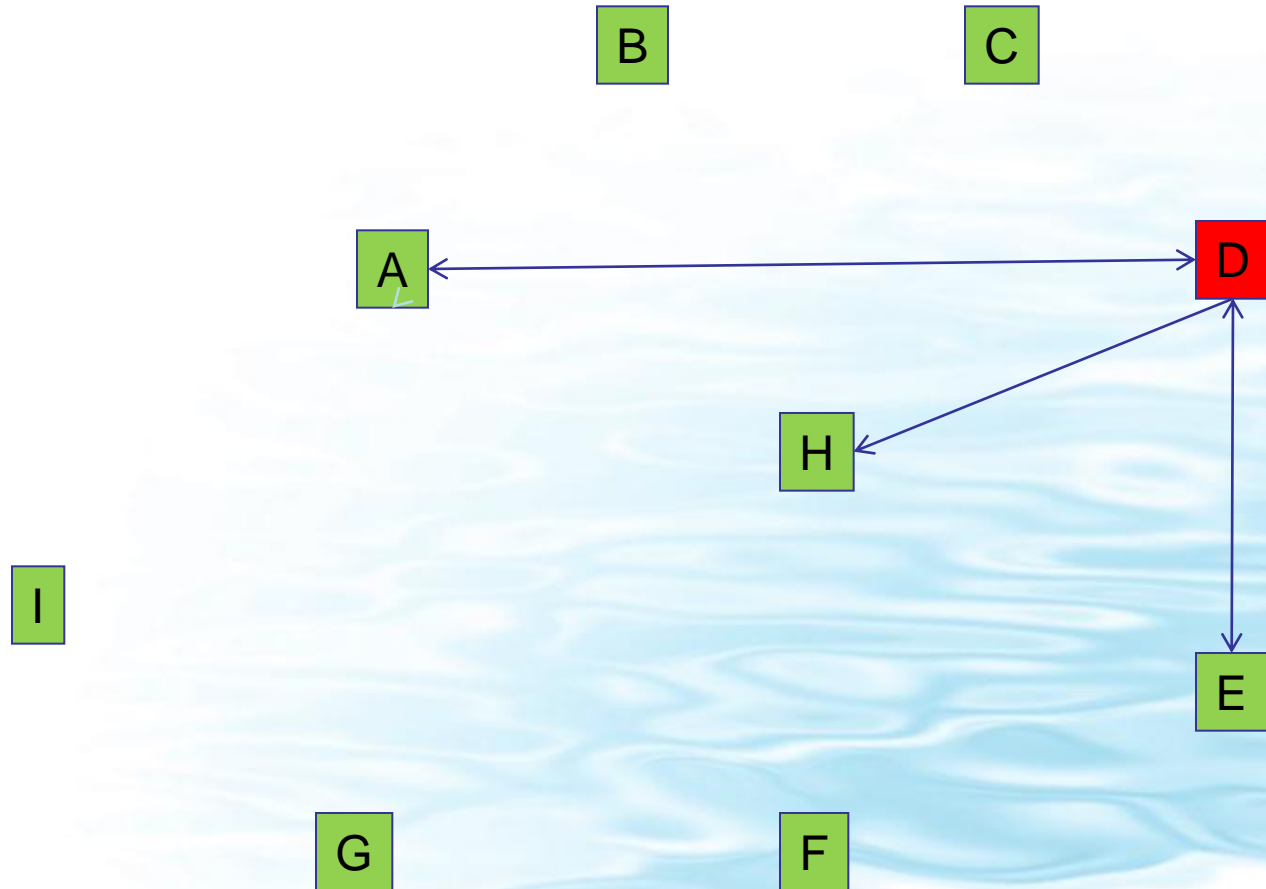


- Epidemic models can be scaled up to study farm-to-farm spread.
- Often over predict the speed and impact of an epidemic.
- This is due to the assumption of random mixing/infection.
- Which gives each unit an equal probability of infection.

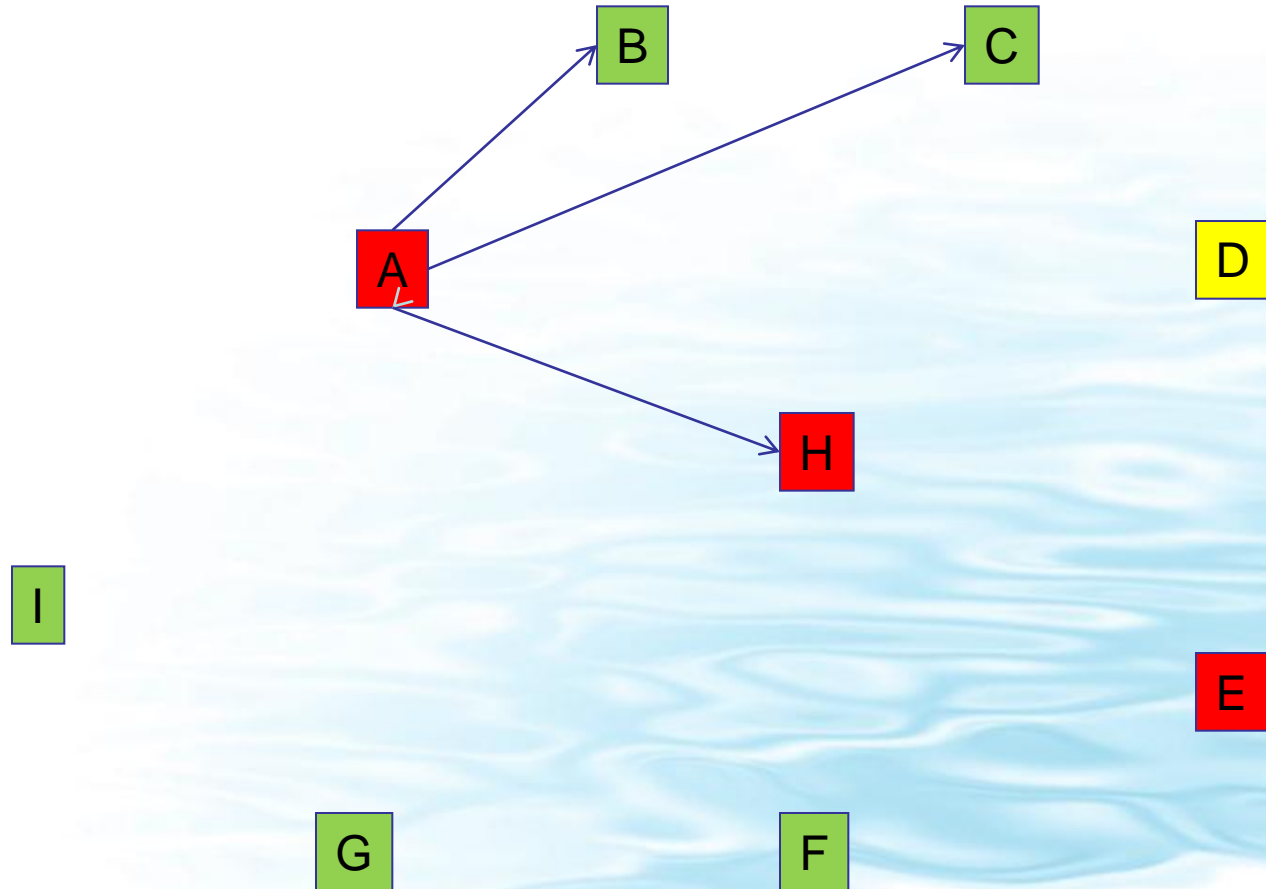
Network models



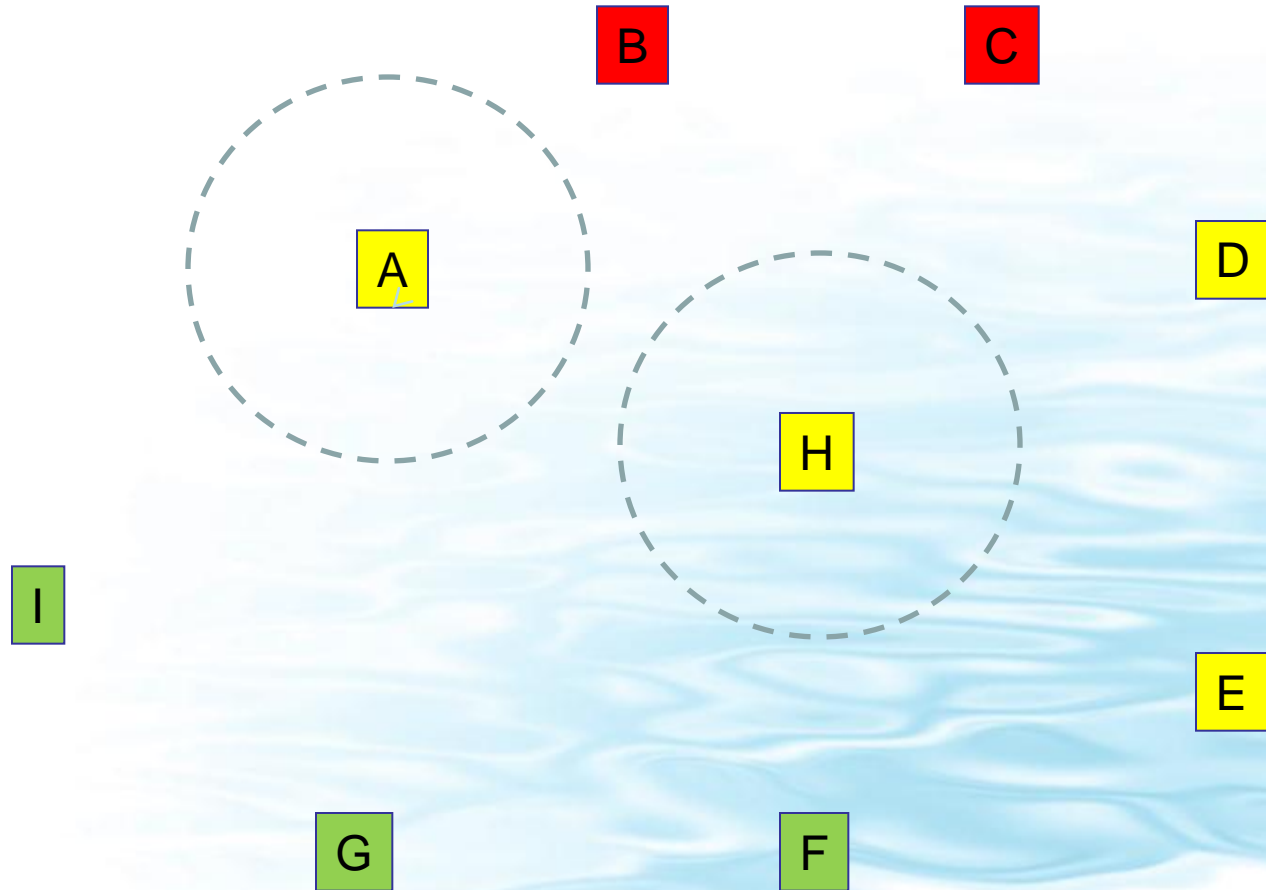
Combined models



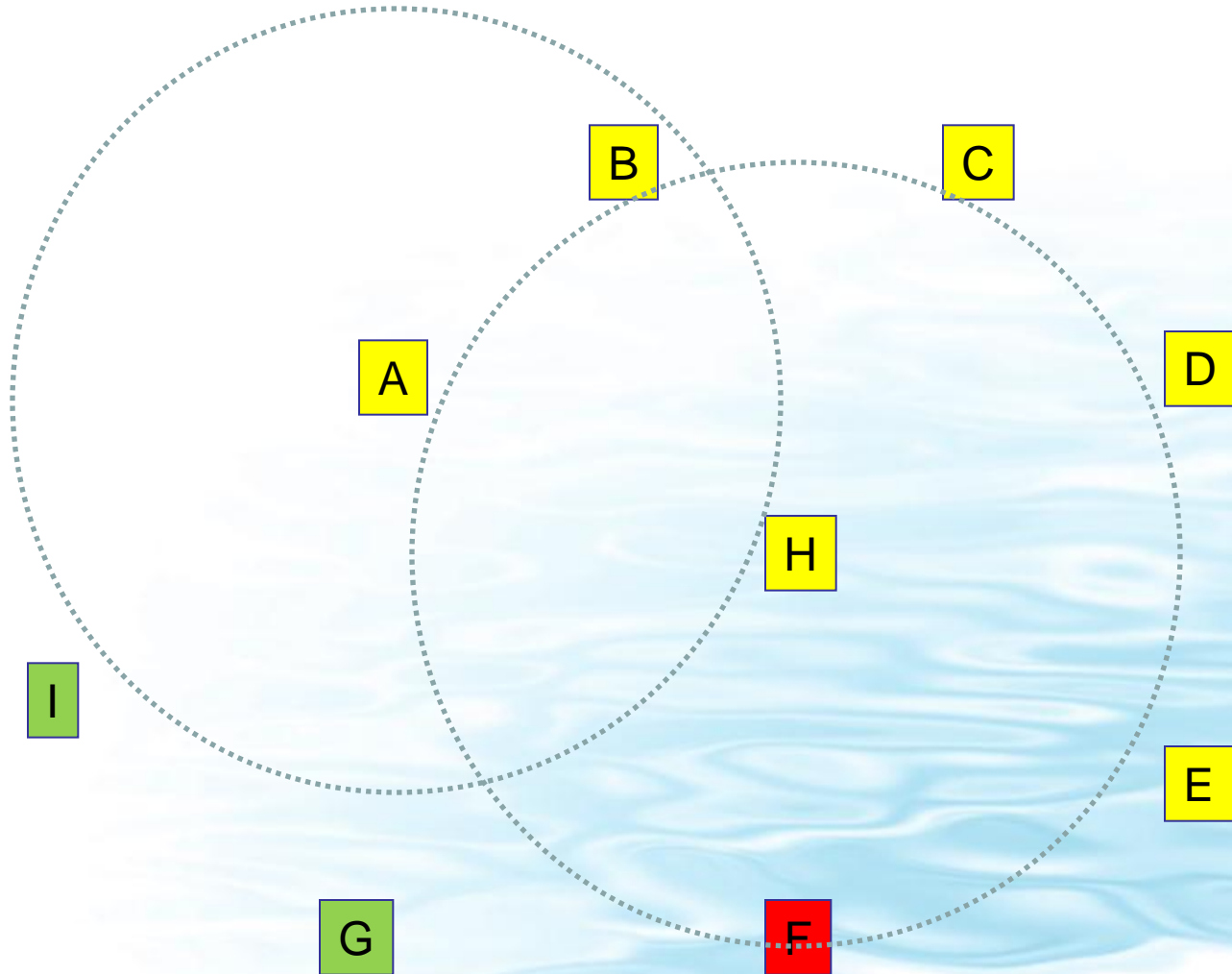
Combined models



Combined models



Combined models



Conclusions

- Pathogens can have a significant impact on aquaculture and wild stocks.
- Modelling provides a way of assessing:
 - Impact
 - Conditions conducive to disease.
 - Influence of anthropogenic change.
 - Management and control options.
- To do this we must understand:
 - The system.
 - Pathogen life-cycle.
 - Networks.

THANK YOU