Biosecurity considerations in an IMTA Health Management Plan

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Biosecurity – infectious disease

- Working definition:
  - a system of measures (i.e., inputs, movements and other activities), each with a set of procedures, that taken together minimize the risk of introduction and spread of infectious organisms within or between aquatic animal populations.

Outline

- Biosecurity
- Biosecurity at a salmon netpen site
- Biosecurity when IMTA is added to a salmon netpen site
- Conclusions

Biosecurity measures
- infectious disease control

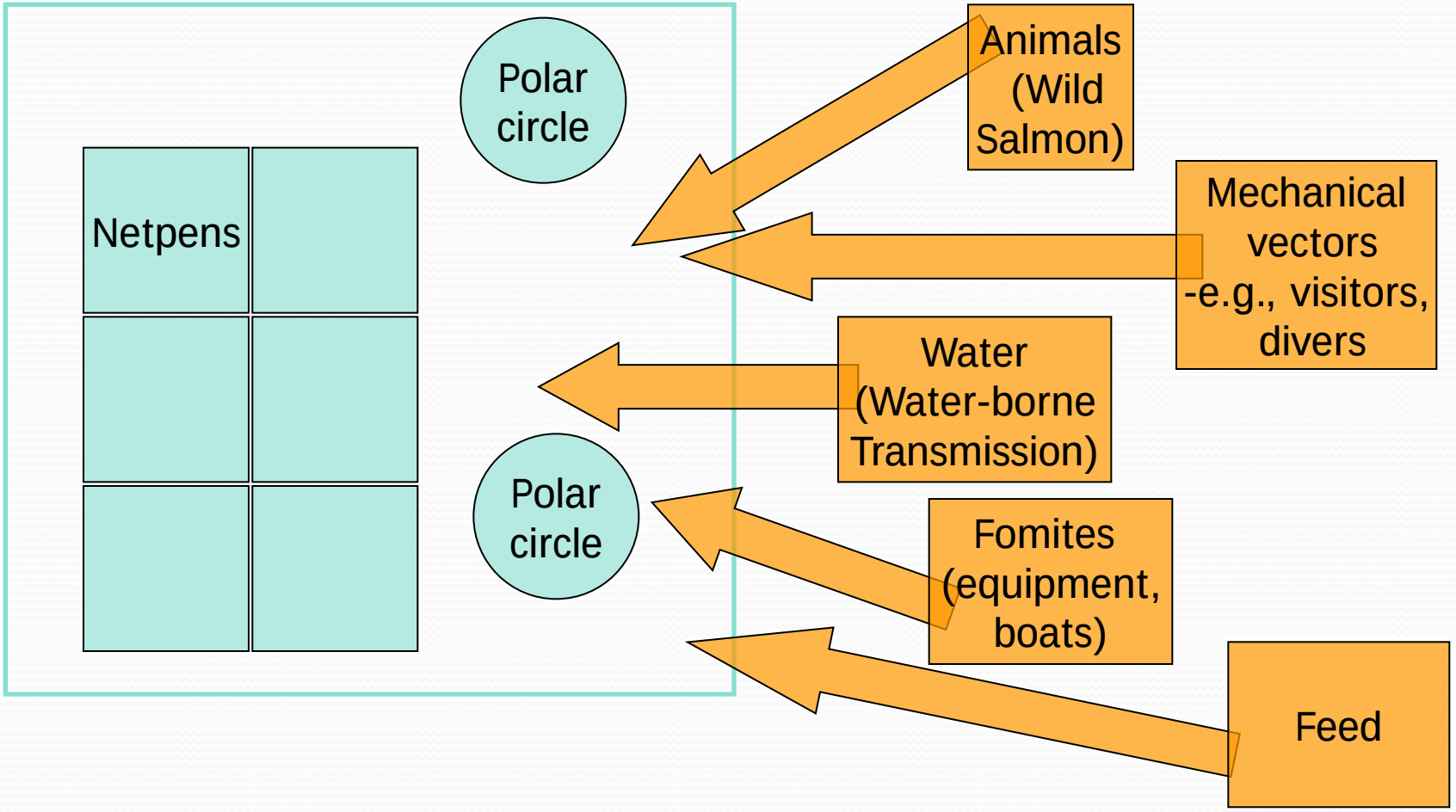
1. Bioexclusion (prevention of pathogen entry)
2. Within-site infectious disease control (management of pathogens within a facility)
3. Biocontainment (prevention of pathogens release)

→Based on Risk Assessment methodology for the prevention and control of infectious disease

Likelihood of introduction

- Sources of pathogen introduction
  1. Aquatic animals
  2. Water
  3. Fomites
  4. Vectors
  5. Feed

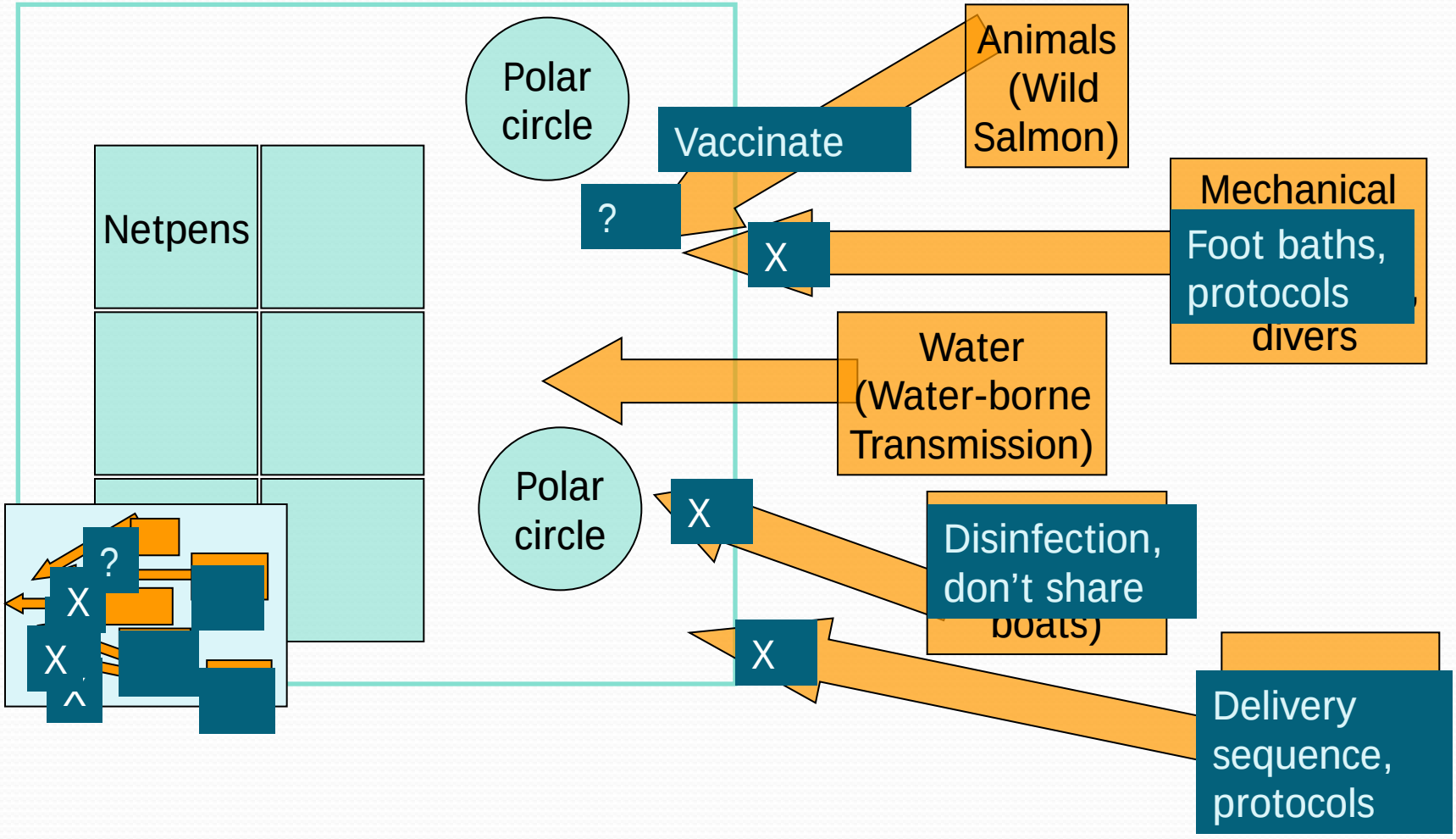
Identifying sources of salmon pathogen introduction



Developing mitigation measures

- Identify measures to reduce the risk of introduction to negligible
  - Unique to each site
  - Physical (spatial) barriers
  - Functional (temporal) barriers

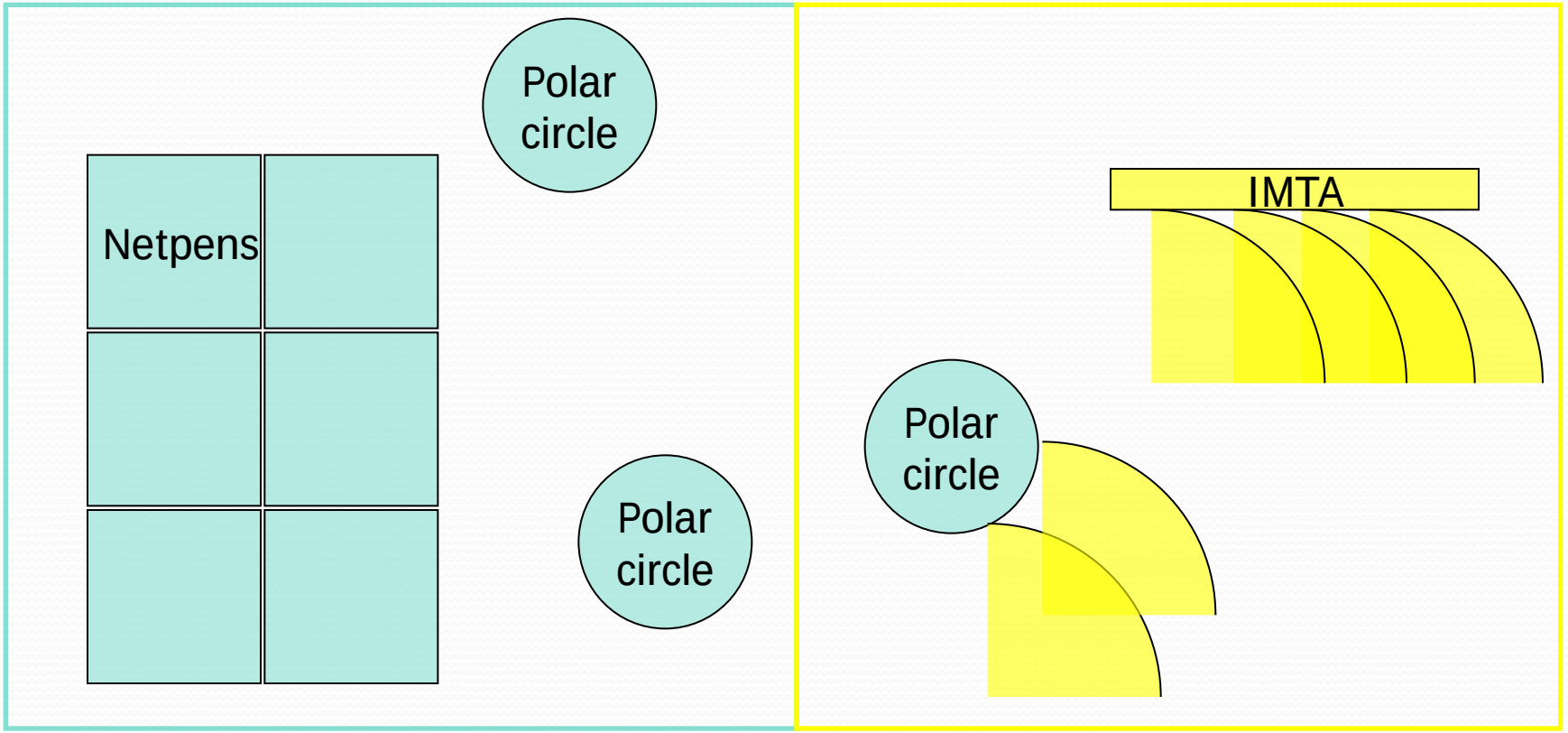
Identifying mitigation measures



Finfish Health Management Plan

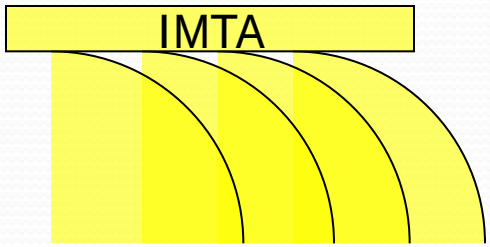
- Biosecurity
  - Site layout
  - Understanding of operations
  - Analysis of potential pathogen introduction (bioexclusion)
  - Documentation of mitigation measures
  - “Residual risk”

IMTA



IMTA – additional sources of pathogens for salmon

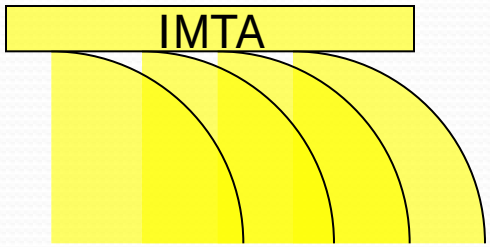
- IMTA species
  - Molluscs
  - Crustaceans
  - Invertebrates (other)
  - Algae, plankton
  - Marine plants



- Each may carry a pathogen of risk to salmon
  - Requires aquatic animal health and ecology expertise to identify which pathogen(s) are possible, and probable (risk assessment)

IMTA – additional sources of pathogens for salmon

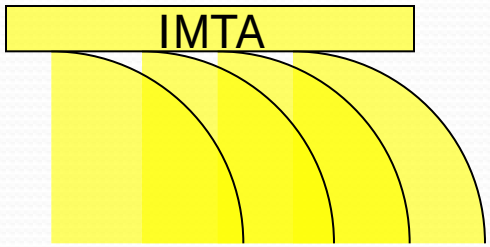
- Biological vectors
  - Parasites – molluscs as intermediate host
- Mechanical vectors
  - Bacteria, viruses, parasites might be protected by the shell, be concentrated in tissues and fluids
  - Bacteria – *Piscirickettsia, Aeromonas salmonicida*
  - Bacteria of human health concern – *Vibrio spp*.



- Myxosporidians
- Microsporidians
- Salmon viruses?

Sources of introduction

- Routes of entry into the salmon is through epithelium
  - By mouth (gut)
  - Through the gills
  - Through the skin
    - Includes lesions (e.g., wounds in which the skin or mucous may be compromised)

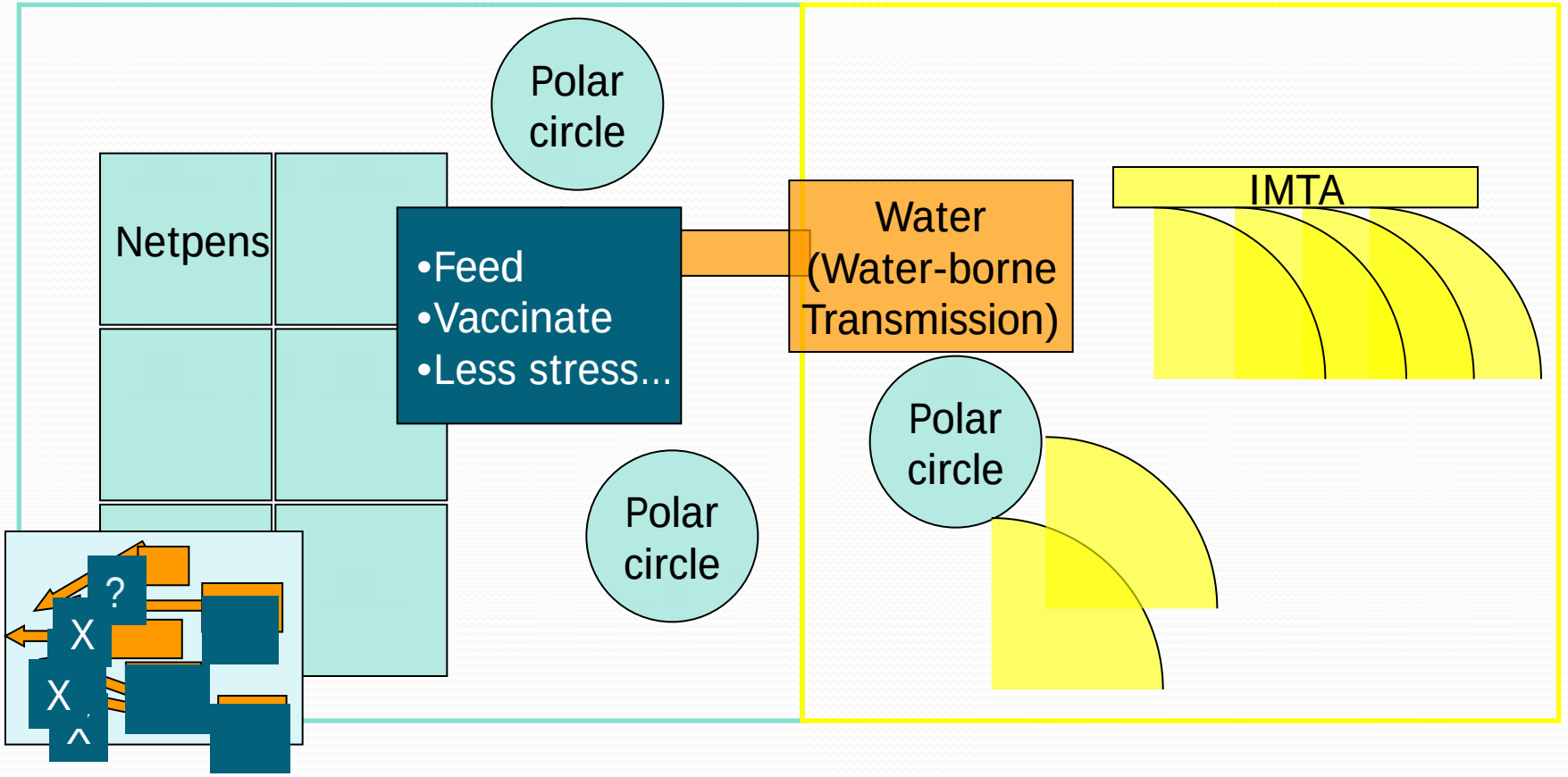


- → Waterborne
  - All the other routes (aquatic animals, fomites, feed) are not probable in this scenario
  - Copepods?

Mitigation measures

- Waterborne introduction
  - Can't stop waterborne exposure in a net pen
- But building up host health and immune status decreases the probability of infection and the subsequent expression of disease via waterborne exposure
- Oral route
  - Manufactured feed, optimal feeding strategy
- Gills/skin
  - Vaccination - systemic protection (e.g., furunculosis)
  - Husbandry measures to decrease likelihood of skin or gill injury (e.g., managing densities)

IMTA – mitigation measures



Summary

- IMTA presents more complex situation for biosecurity
- The IMTA species may be able to transmit disease:
  - Biological vectors for parasites
  - Mechanical vectors for bacteria, viruses, parasites
- So Bioexclusion for an IMTA netpen site requires
  - Knowledge of diseases for both species
  - Aquatic animal health and ecology expertise
  - More complex mitigation measures

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Thank you!

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