Control of disease requires the identification of self-contained compartments within which an outbreak can be confined and then eradicated. These may be catchments or sub-catchments in freshwater. Marine pathogen dispersal depends on tides and other currents. Pathogens may also be spread by human-induced movements such as movement of fish stocks or products or by equipment and personnel. Different networks of contacts lead to different distances and patterns of spread and hence of disease outbreaks. Only small numbers of long-distance contacts are required for a ‘small world’ network under which isolation of compartments is extremely difficult.

Spread of pathogens

**Transport of fish and fish products**
- Live fish: high risk may be over long distances
- Eggs: moderate risk, but commonly over very large distances
- Dead fish: lower risk especially if eviscerated

**Equipment and personnel**
- Well boats higher risk
- Shared equipment and personnel moderate risk, usually fairly local movement

**Environment**
- Through water may be risk, but generally localised
- Escaped/wild fish or birds

Networks of spread
- Local and long distance spread
- Small worlds, only a few long distance
- Contacts required to spread throughout network
- Wave spread of disease in locally connected system
- Power law distribution of contacts
- Key nodes with large numbers/long distance contacts

Large-scale spread of ISA reflects shipment of fish stocks

A sophisticated dispersal model of sea lice larvae wind-driven currents very significant. Purple arrow = source location, white = river.

A simple model of local ISAV transport: non-tidal Currents make little difference to transport patterns.