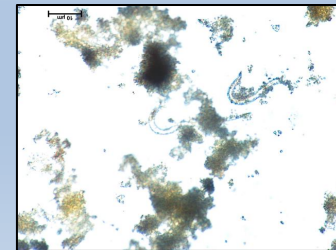
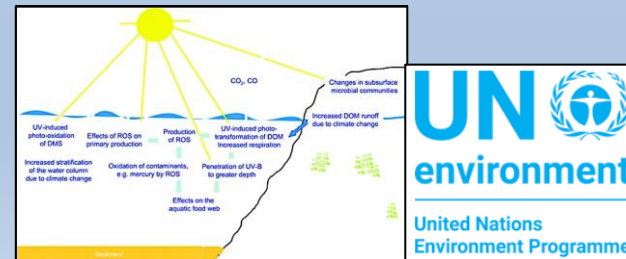
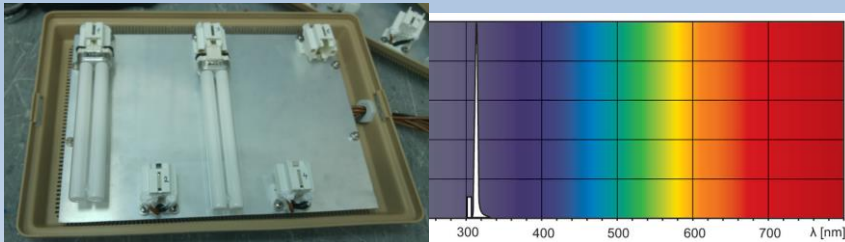


# WP4. Understanding complex interactions between animal, environment, pathogens & health for risk assessment

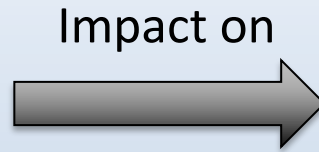
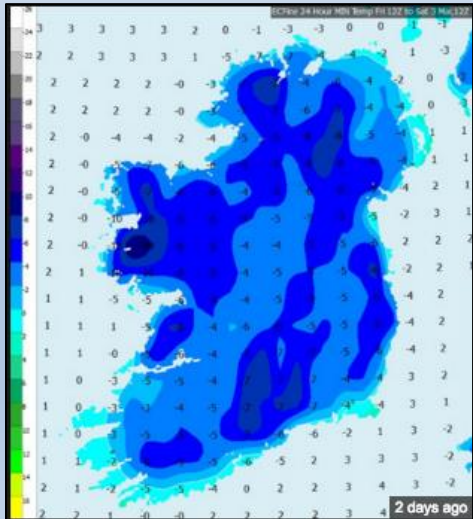
Sharon A. Lynch, Gary Kett, Erin Molloy, Ciara Mcdonald,  
Kathryn Cox, Sian Egerton, Sarah C. Culloty



# Objective Subtask 4.3.2 Impact of Environmental Factors

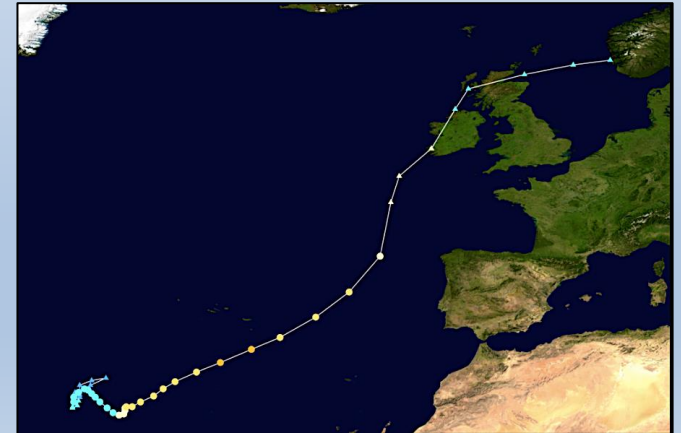
Trial 1: Thermal stress

Trial 2: SPM, turbidity  
and reduced salinity



1. Oyster performance  
(survival, tissue damage, cellular & humoral response)

2. Oyster pathogens



# Laboratory Trial 1: Thermal Stress

Control

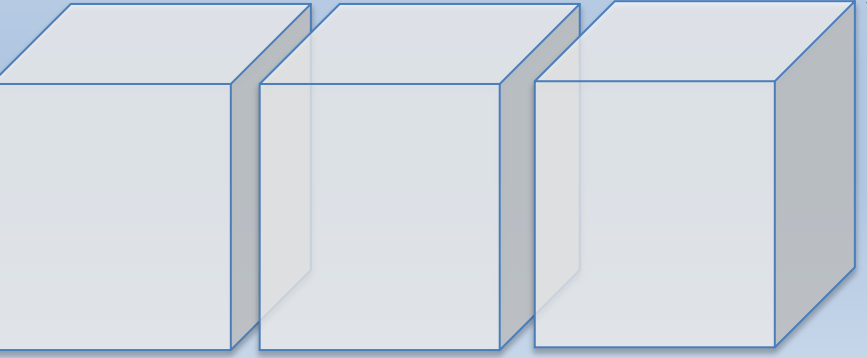
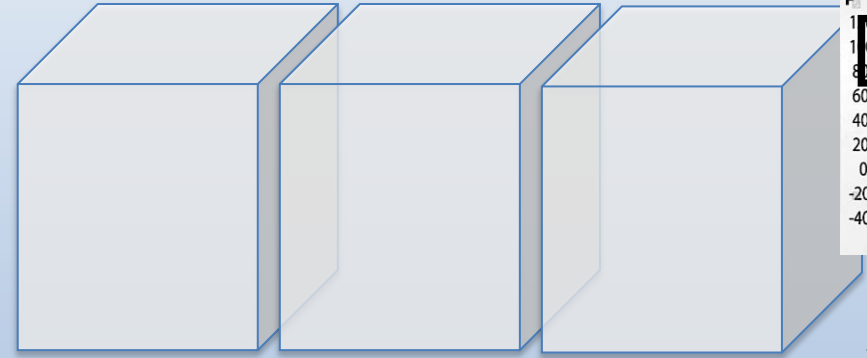
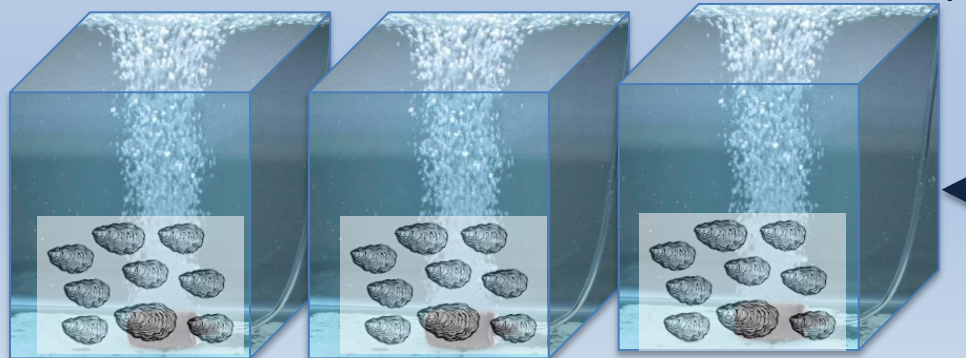
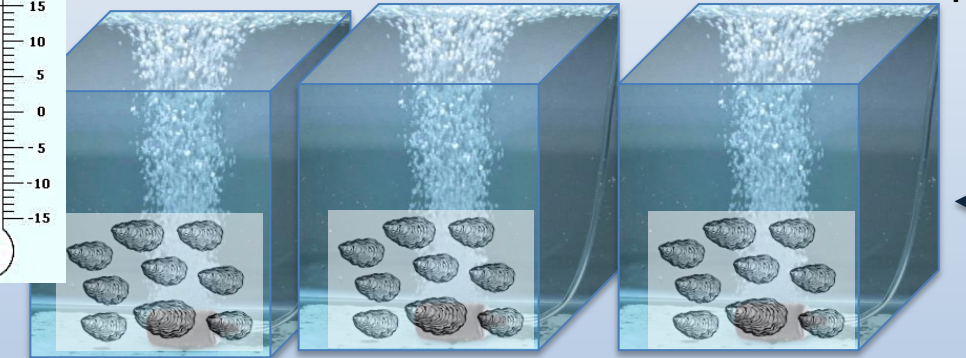
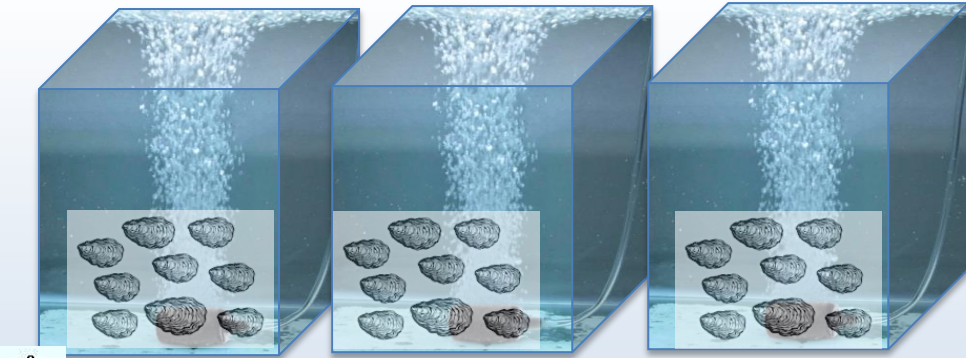
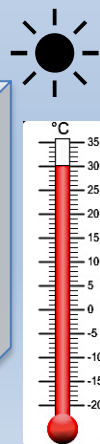
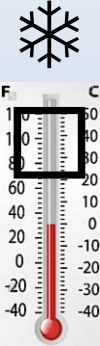
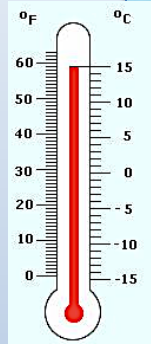
7 Day Trial

Stessor-7 hours over 3 days

Aerial Exposure

Experimental

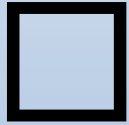
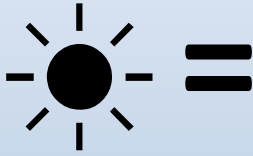
Experimental



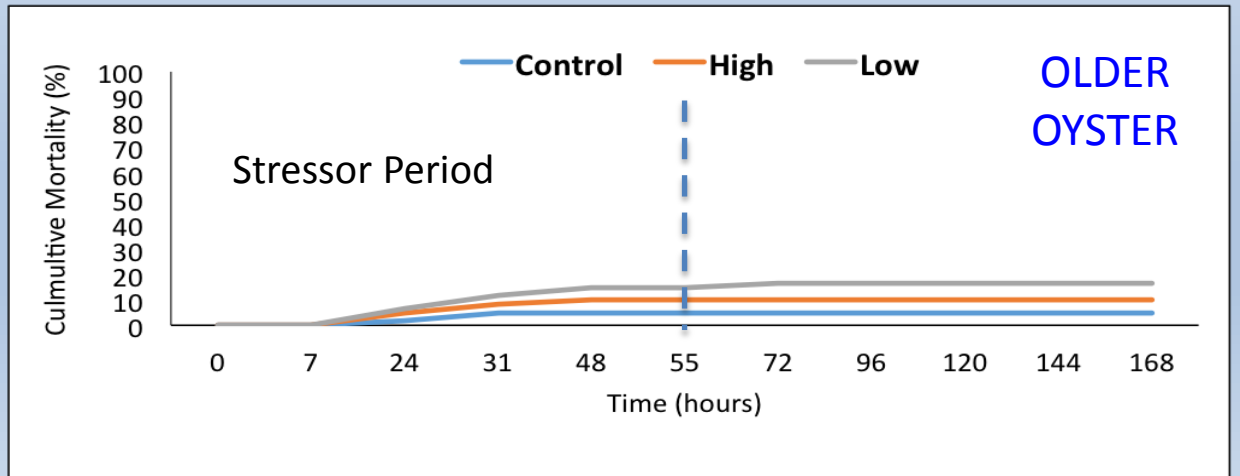
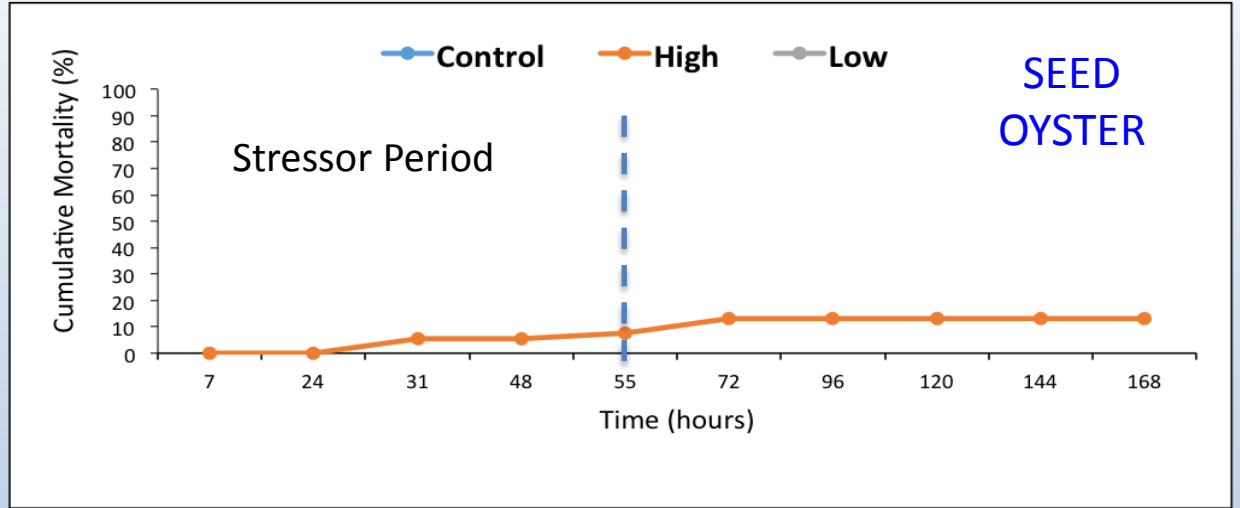
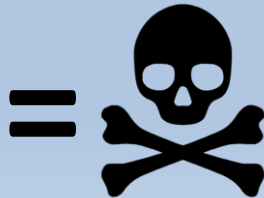
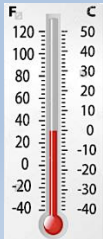
# RESULTS:

## Mortality

SEED  
OYSTER



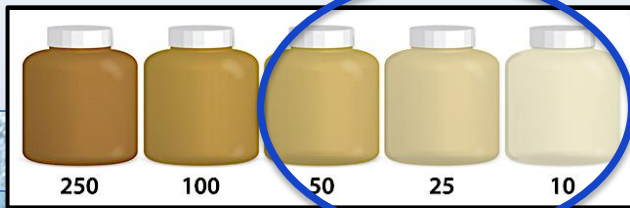
OLDER  
OYSTER



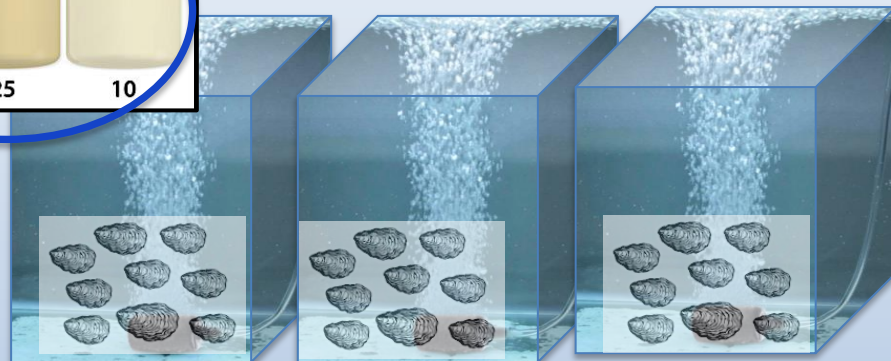
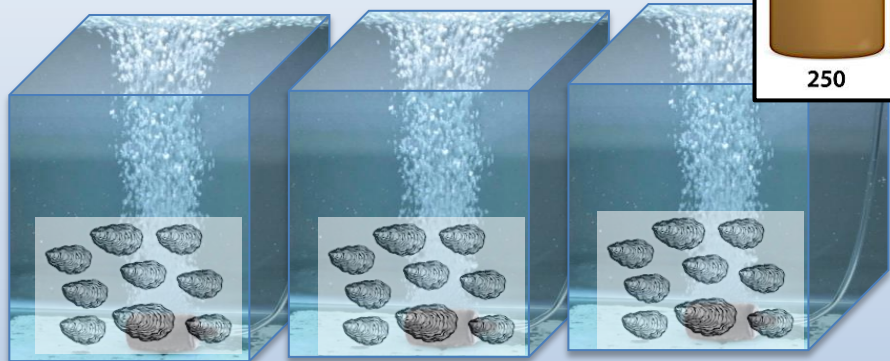
# Laboratory Trial 2: SPM, Turbidity & Salinity

14 Day Trial

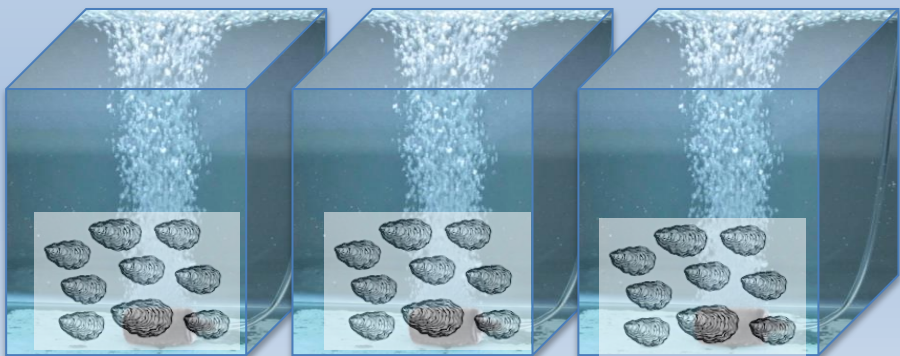
20 ppt, TU 25



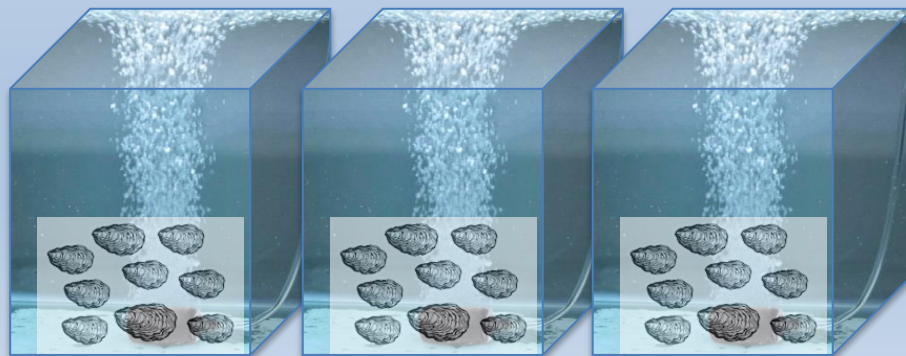
Control  
35ppt, TU 25



20 ppt, TU 40

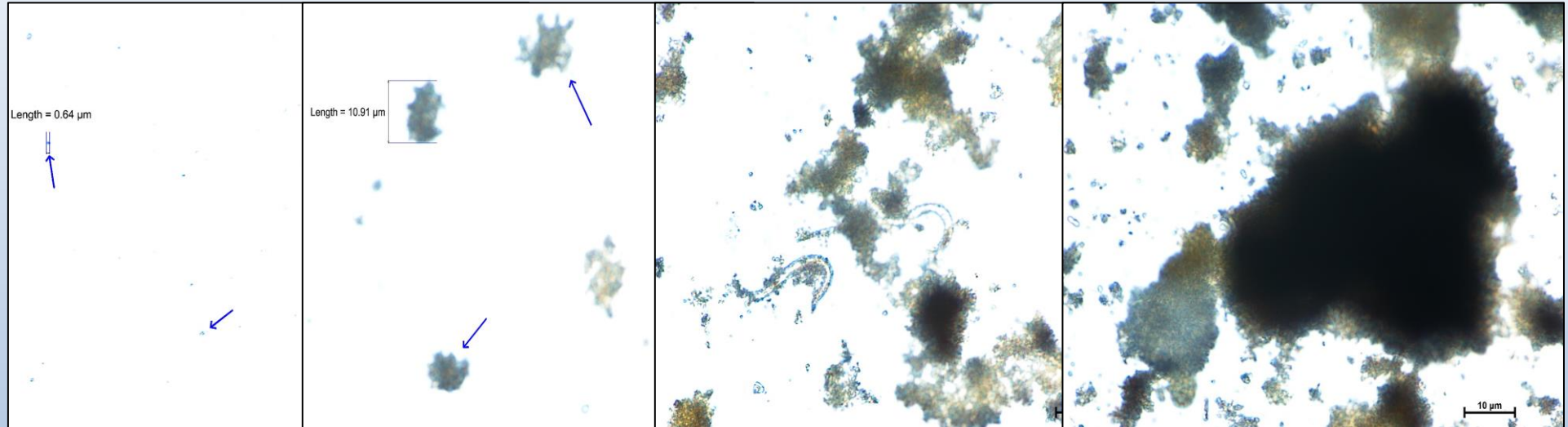


20 ppt, TU 10



## Results:

At 96 hr post T0-SPM “flocs” aggregate formations for the different turbidity levels



Control

"High" turbidity

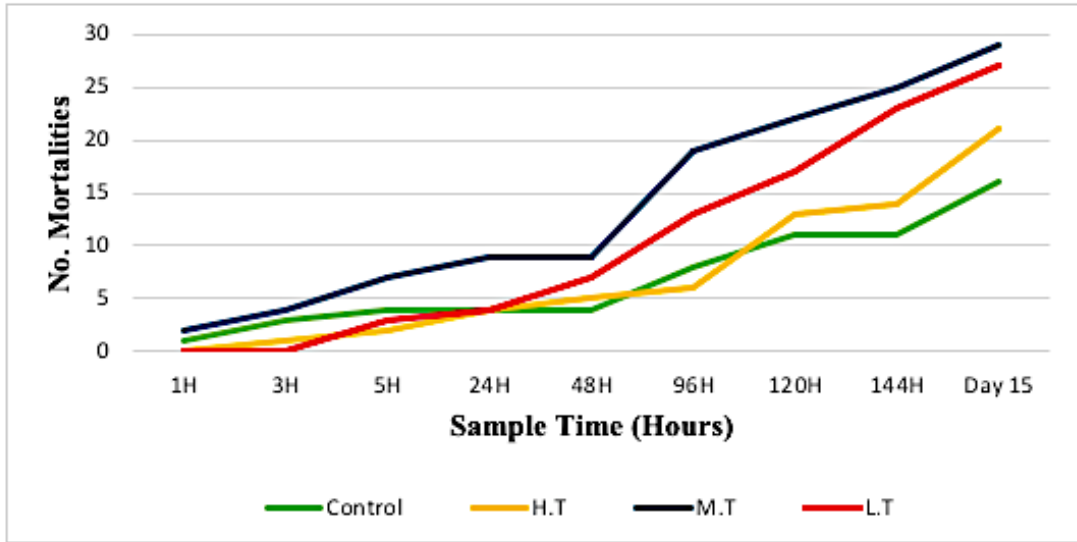
"Medium" turbidity

"Low" turbidity

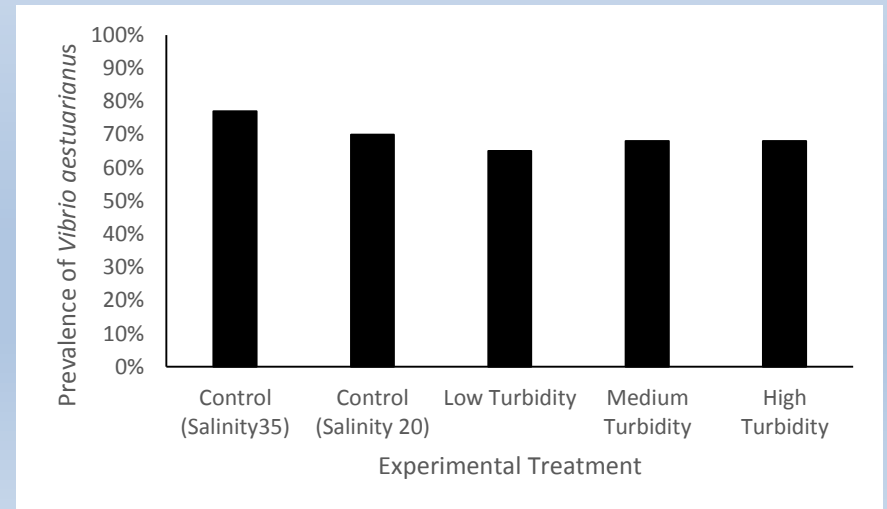
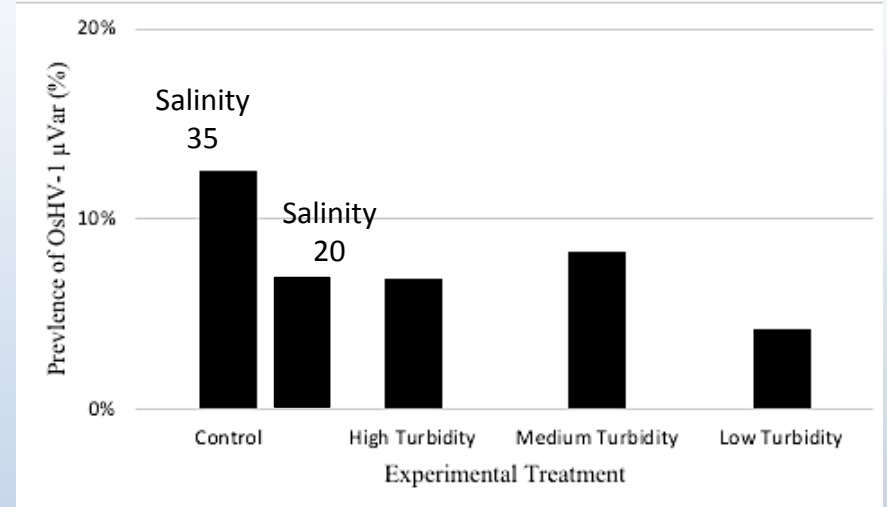


# Results:

## Higher mortality in oysters exposed to SPM

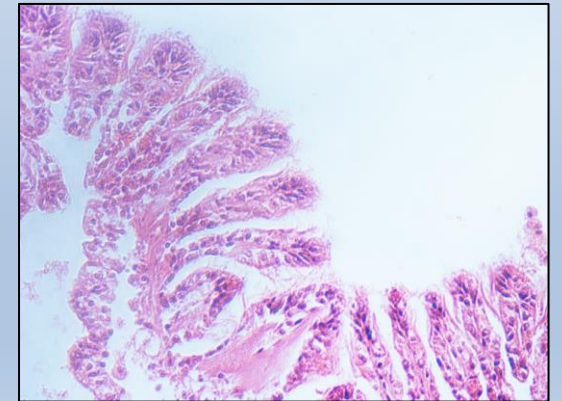
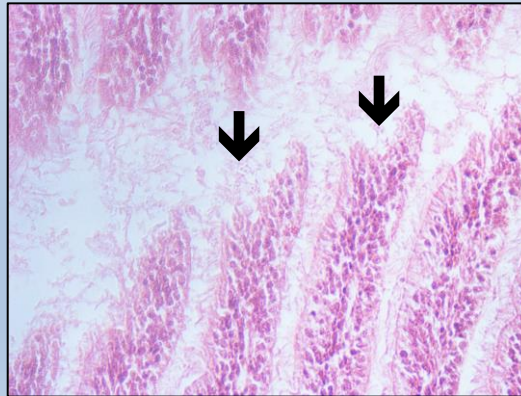
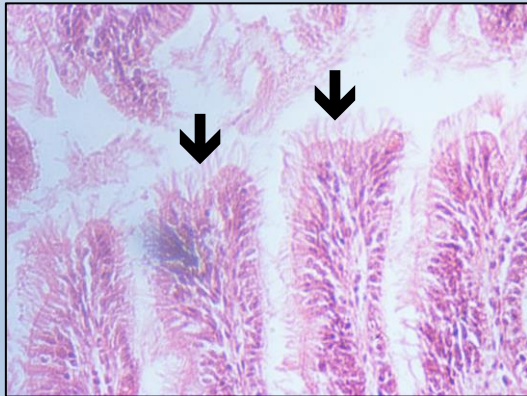
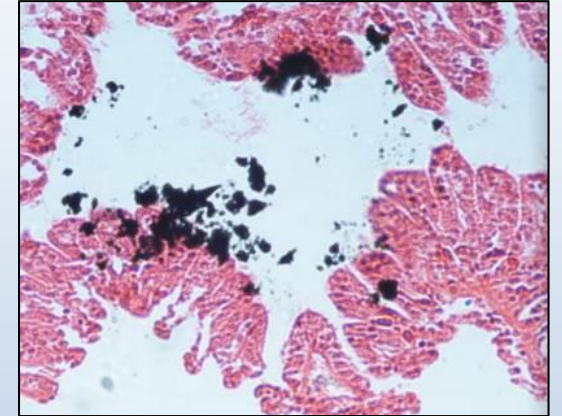


HT- "High" Turbidity (40 TU)  
MT- "Medium" Turbidity (25 TU)  
LT- "Low" Turbidity (10 TU)



## Results: Histology

Histology analysis indicate physical damage to gills in oysters in “High” and “Medium” SPM treatments



15 Days “High” Turbidity

15 Days “Medium” Turbidity

15 Days “Low” Turbidity



# Subtask 4.3.1. Impact of UV-B radiation - Experiments

**2017 - 2018:**

2 x Laboratory exposure trials



UV bulb exposure  
Vs  
Dark control

**2018 - 2019:**

Field trials I:  
Shore height



High shore  
Vs  
Low shore

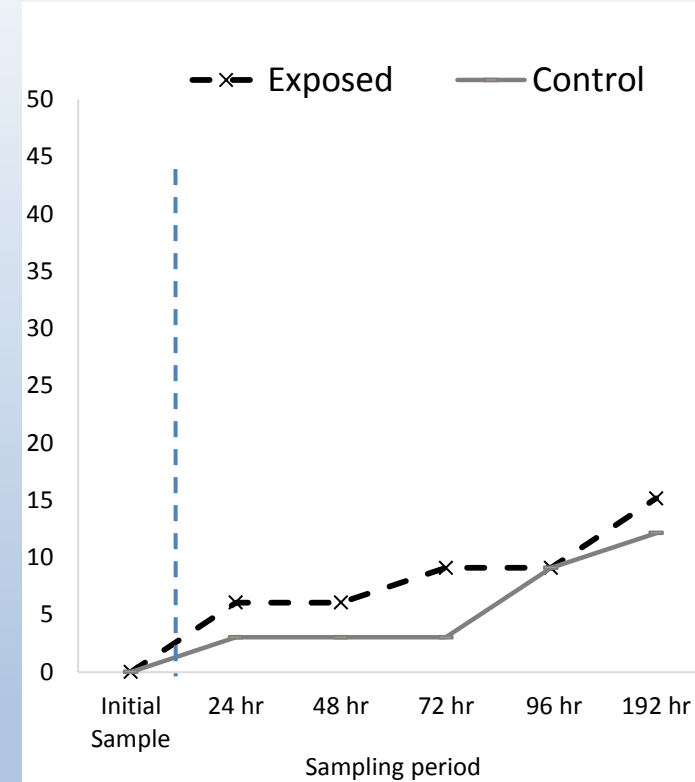
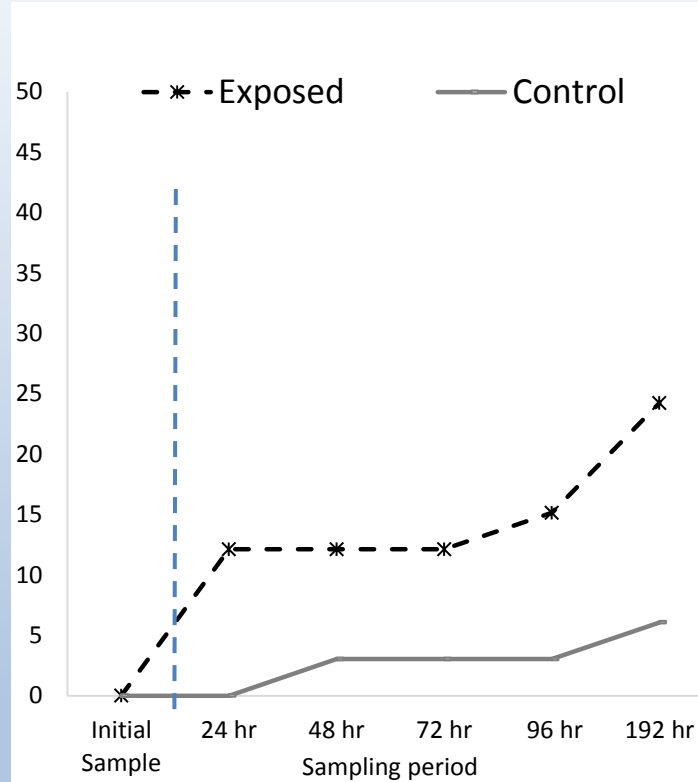
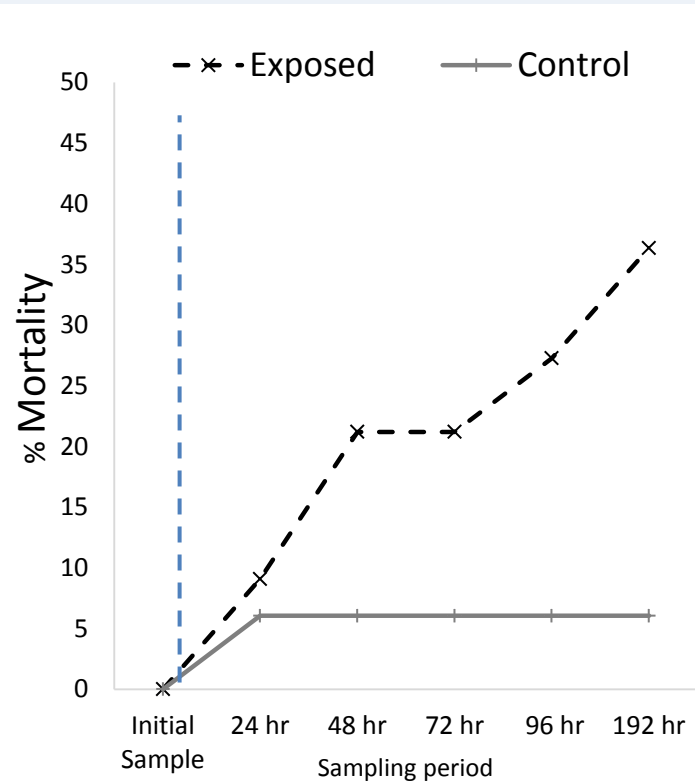
**2019 - 2020:**

Field trials II:  
UV blocking filters



No UV  
UV-B only  
UV-A + UV-B  
Filter control

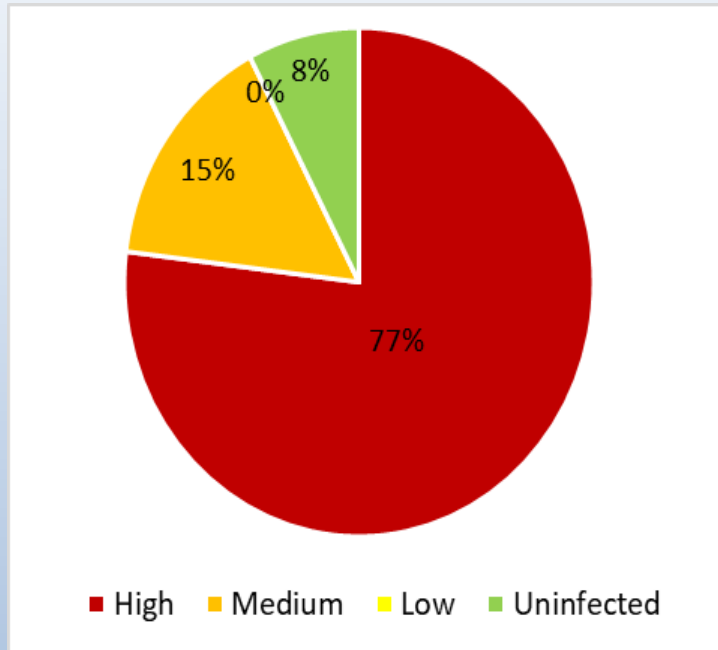
## Subtask 4.3.1. Lab Trial I – Oyster mortality



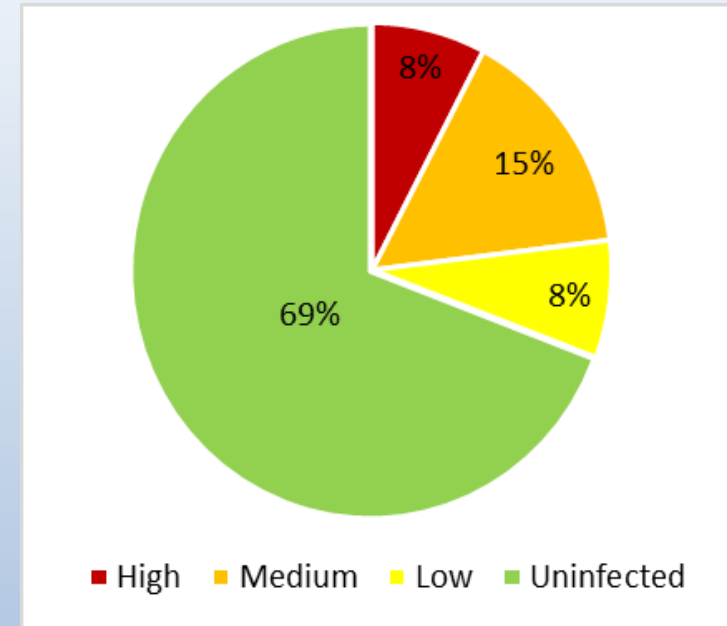
- Mortality significantly higher in UV exposed seed than control groups
- Size dependant effect: smaller oysters = higher mortality

## Subtask 4.3.1. Lab Trial I – *V. aes.* Infection intensity

Control: Moribund individuals



UV-Exposed: Moribund individuals



Intensity	cT value
Uninfected	>37
Low	35 - 37
Medium	30 - 35
High	<30

- > 90% of moribund oysters in control group had 'High' or 'Medium' infection levels
- 8% of moribund control group were uninfected
- > 23% of moribund oysters in UV-exposed group had 'High' or 'Medium' infection levels
- 69% of moribund UV-exposed group were uninfected

## Subtask 4.3.1. Field Trial I – Description

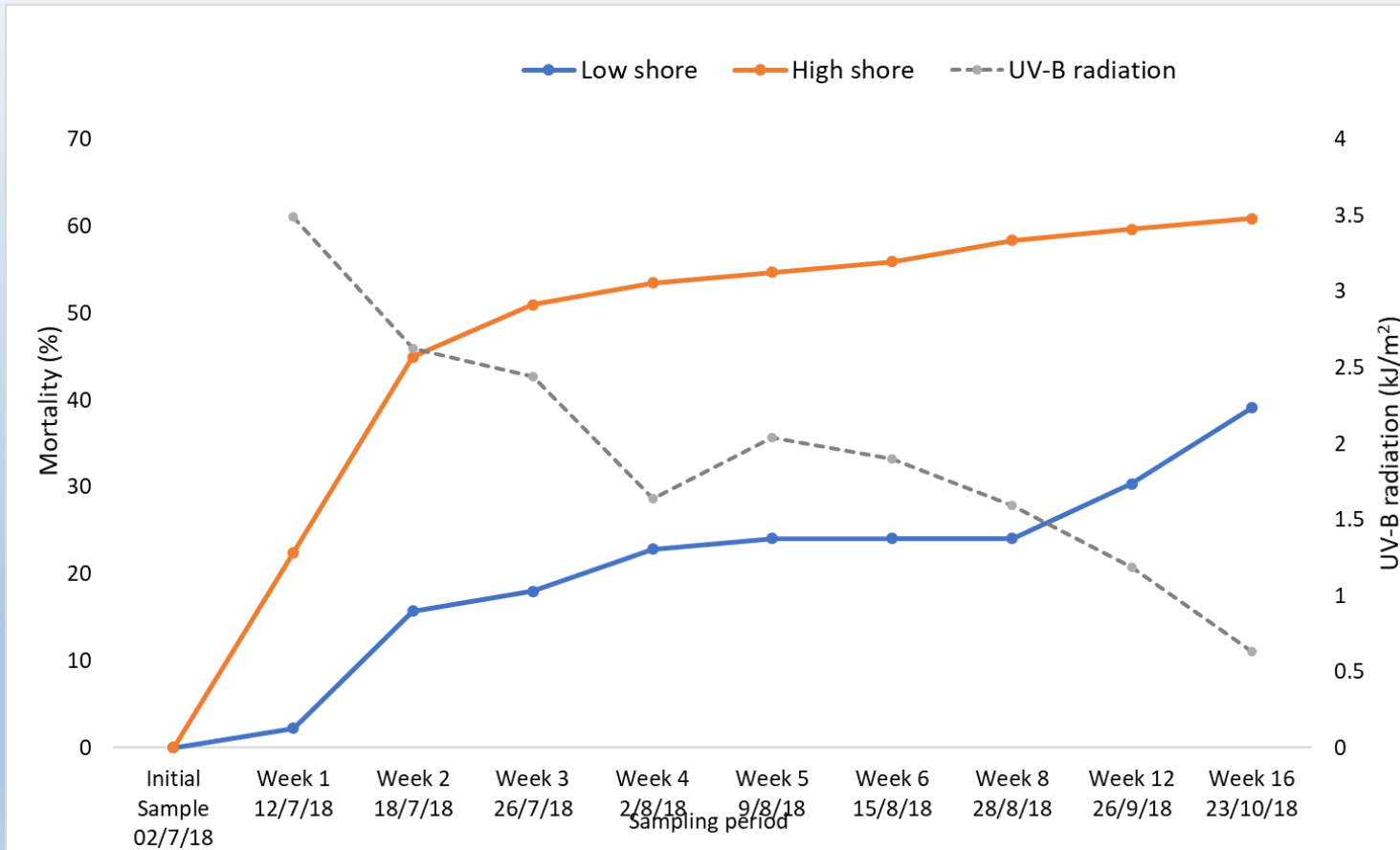
- 1st July 2018 – 23<sup>rd</sup> October 2018
- N = 3,000 oyster seed (mean 0.3g) laid on 'low' and 'high' shore
- Samples (n = 30) taken periodically for mortality, morphometric and pathogen infection data



Dungarvan Bay



# Subtask 4.3.1. Field Trial I – Oyster mortality



- Higher mortality in high shore groups
- Difference in mortality highest during periods of high UV-B.

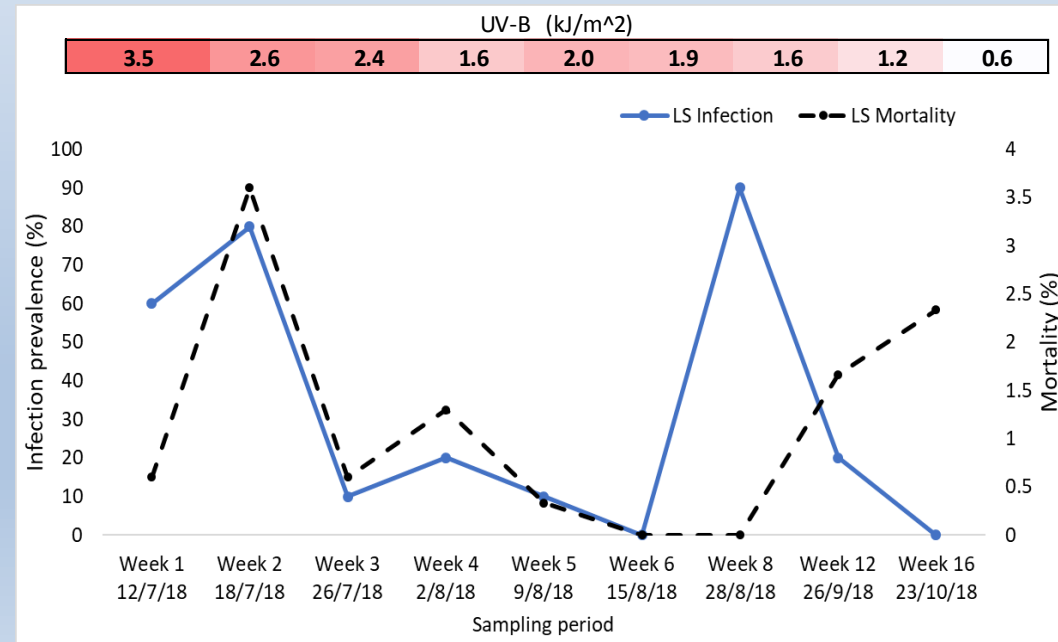
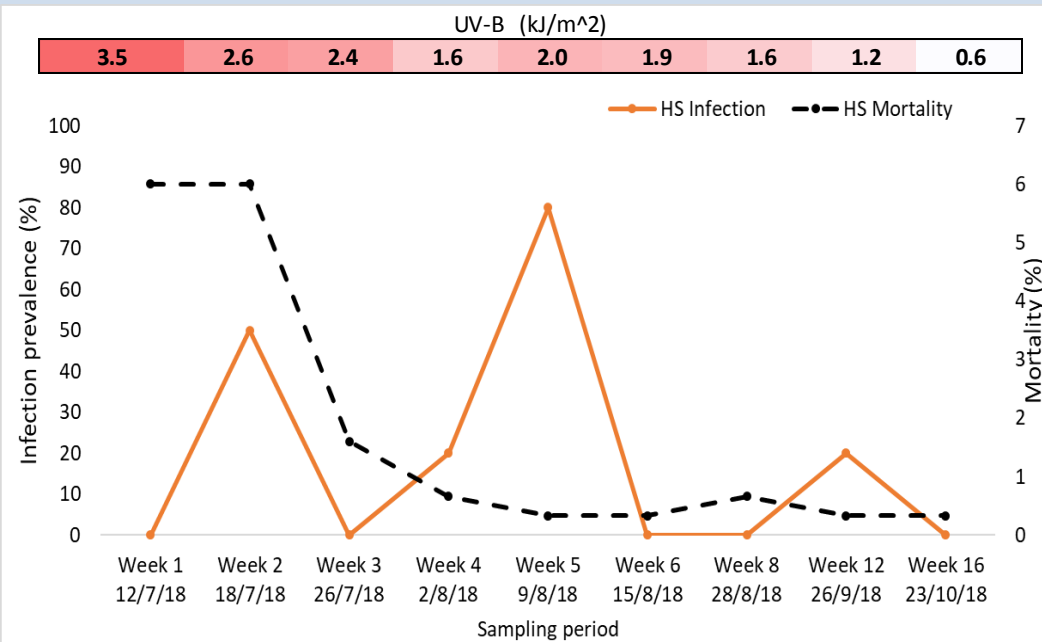
# Subtask 4.3.1. Field Trial I – *V. aes*. Infection prevalence

## High Shore groups:

- **July:** High mortality (6%) & low infection (<50%)
- **August:** Mortality decreased (<1%), infection increased (+80%)
- **Sept - Oct:** Both mortality and infection prevalence lower than in summer

## Low Shore groups:

- **Early summer:** Rate of mortality coincided with infection prevalence.
- **Late summer:** Increased infection (+90%) preceded increased mortality (+2.5%)



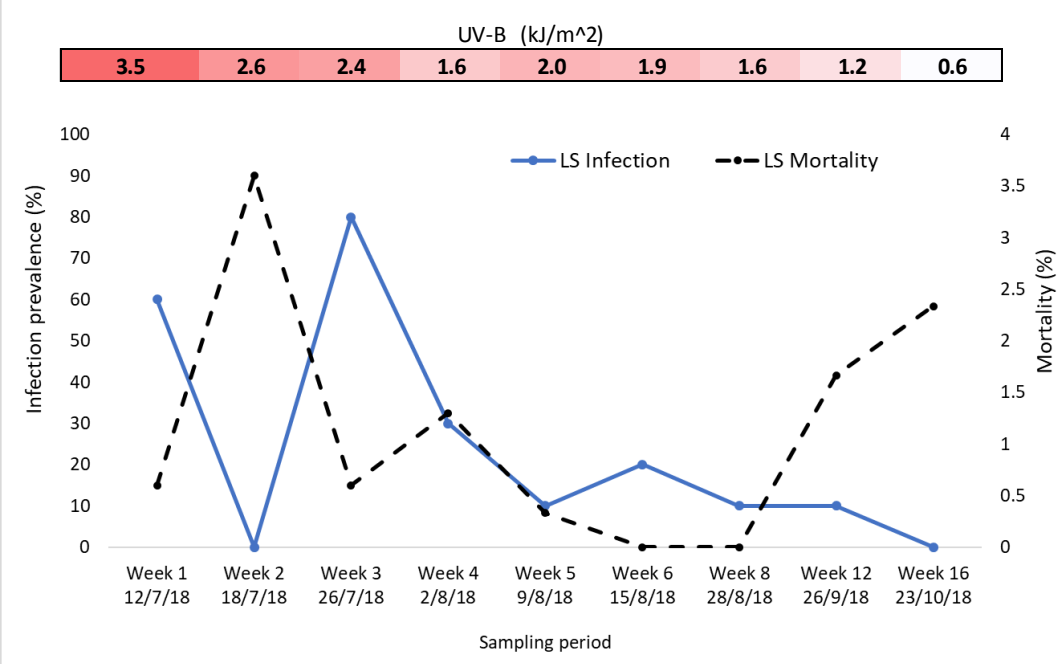
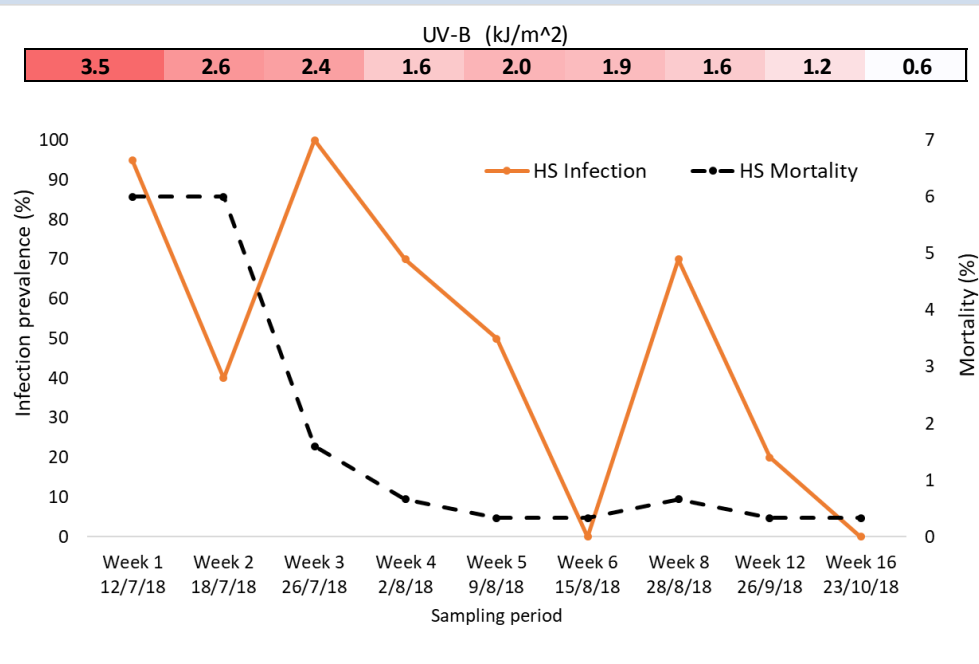
# Subtask 4.3.1. Field Trial I – OsHV-1 Infection Prevalence

## High Shore groups:

- Higher overall OsHV-1 infection than low shore
- Infection peaked in late July (100%) and late August (70%)

## Low Shore groups:

- Infection peaked in late July (80%)
- High mortality in October (2.5%) coincided with low infection (0%)



# Acknowledgements



<http://www.vivaldi-project.eu/>

<https://twitter.com/vivaldieuproj>

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