

## Buffer Zones: Sustainable management of shellfish production areas



### SUMMARY

Bivalve shellfish, such as oysters, mussels, and clams, are filter-feeding organisms which poses a unique food safety risk, as they can be more exposed to human and agricultural waste contaminants in catchment areas adjacent to the waters in which they are grown and feed in, as well as to naturally occurring pathogens and toxins present in their environment. Areas surrounding sewage sources can be designated as exclusion or 'buffer' zones for shellfish production, due to the risk of contamination with human pathogens, particularly viruses such as Norovirus. This knowledge output consists of a report and protocol which will help regulators and the shellfish industry to identify the information needed to undertake a Buffer Zone assessment, and to develop a dynamic Buffer Zone that responds to contaminant spills and discharges, thereby reducing risk to the shellfishery.



### KNOWLEDGE NEED

Buffer Zones are a regulatory approach to limit food hygiene risks from shellfish harvested in close proximity to potentially contaminated wastewater discharges. These zones would prevent shellfish harvesting in these contaminated areas. The use of Buffer Zones around shellfish production areas is not required under current EU legislation. However, the European Food and Safety Authority (EFSA) Panel on Biological Hazards, and the European Reference Laboratories for monitoring bacteriological and viral contamination in bivalve molluscs, have both recommended the implementation of Buffer Zones. Furthermore, following a trade agreement made between EU and US food regulatory bodies, EU Member States that wish to export shellfish to the USA must establish Buffer Zones around point sources of wastewater discharges impacting Shellfish Production Areas. Proximity of shellfish beds to sewage discharges, salinity, temperature, and several other environmental factors must be considered to establish dynamic Buffer Zones that respond to spills. There is a need for protocols to assist regulatory agencies and industry figures on how to fine-tune Buffer Zones that move with a contaminant front, identify the timing, extent and duration of contamination, and depuration rates. These measures would minimise the impact of contamination on shellfisheries, and better safeguard public health.



### IMPACTS

This knowledge can be applied by end-users specifically in regions where the shellfish industry is struggling with contamination issues, or with access to markets due to a lack of confidence in the quality of product from their area. This will help to identify impacts of contamination, and to support the development of appropriate mitigation measures. The implementation of buffer zones would increase the availability of safe shellfish for consumption, and improve consumer trust and perception of the seafood industry, in turn supporting economic activity.

**Contributes to the UN Sustainable Development Goal 12:** Responsible consumption and production.

## END-USERS & APPLICATIONS

- ➔ **Shellfish producers/farmers/harvesters:** can use the knowledge and protocol to safeguard their produce by ceasing harvesting at contaminated sites in good time, and as such prevent losses
- ➔ **Shellfish regulatory agencies:** can use this knowledge to implement more targeted Buffer Zones at shellfish production sites, ensuring the availability of safer shellfish on the market and protecting public health
- ➔ **Scientific Community:** researchers working in the area of seafood management and safety can use the knowledge and data to support further Research and Development of additional models and protocols

## DISSEMINATION AND EXPLOITATION

### Dissemination activities for scientific community:

- Open access deliverable: D1.4 seafoodtomorrow.eu/deliverables
- Open access validated data sets:
  - zenodo.org/record/2791316#.YFniya\_7TIU
  - zenodo.org/record/2677737#.YFniy6\_7TIU
  - zenodo.org/record/2658090#.YFniza\_7TIU
  - zenodo.org/record/2657388#.YFni0K\_7TIU

### Exploitation activities for seafood industry:

- Horizon Results Platform: seafoodtomorrow.eu/horizon-results-platform
- Cefas and IRTA will share this knowledge with shellfish producers in Spain and the UK

### Exploitation activities for policy makers:

- Managers, regulators and policy makers will be reached through the final **SEAFOOD<sup>TOMORROW</sup>** event, EC info session, and a dedicated EU policy event.

## RESULTS

Using available data, hydrodynamic models were developed to establish and quantify impacts of sewage sources on two shellfish production sites, the Upper Fal Estuary in the United Kingdom and Alfacs Bay in Spain. Dye tracing studies were then used to validate the models. Based on these studies, a protocol for Buffer Zone implementation was set out. The protocol provides a means for determining dynamic Buffer Zones using predictive models, and effectively communicating the model outputs in a way that facilitates effective risk management. It offers guidance on predictive modelling, based on the use of hydrographic and pollution source tracing studies that can be applied to viruses and biotoxins, and could allow for highly localised closures at Shellfish Production Areas.



## INNOVATION STATUS

Technology Readiness Level 3 - experimental proof of concept

**Patents and IPR:** Not applicable



## FUTURE RESEARCH

Further research and observational data are needed to complete the study and qualify the system. However, the results would already be useful for producers to test the protocols, and for regulating authorities to promote the implementation of buffer zones as a sustainable management system to protect public health. Potential areas for further research include testing the models at additional shellfish production sites across Europe. These tests could involve conducting field studies during spill events to validate hydrodynamic models, and investigations into time required for shellfish to deplete contaminants taken up during the event.

## CONTACT AND CONTRIBUTORS

**Contact:** Michelle Price-Hayward, [michelle.price-hayward@cefas.co.uk](mailto:michelle.price-hayward@cefas.co.uk) | Jane Heywood, [jane.heywood@cefas.co.uk](mailto:jane.heywood@cefas.co.uk)

**Contributors:** Cefas, IRTA

