MANILA CLAM HANDBOOK

Kent & Essex Inshore Fisheries and Conservation Authority

www.kentandessex-ifca.gov.uk

K. Stuart, July 2025

THE MANILA CLAM

Manila clams (*Ruditapes philippinarum*) are filter feeding bivalves of **high commercial value.**

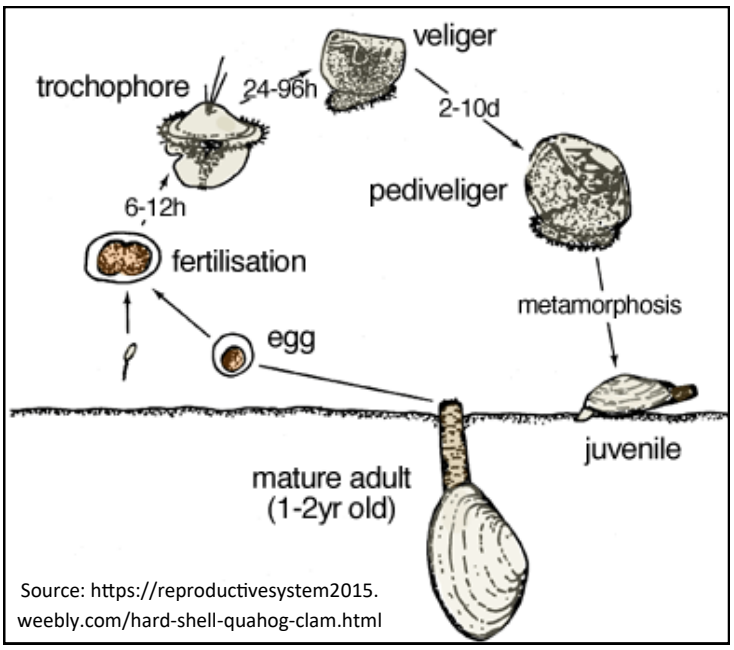
- Manila clams are native to the temperate coasts of the **western Pacific** including Russia, Japan, China and Korea.
- They were introduced to the Pacific coast of north America and throughout Europe for the purposes of **aquaculture** in the 1970s.
- Due to the **adaptability** of Manila clams, they have since spread, and wild populations are now found across the globe.

- Manila clams have been in the United Kingdom since the 1990s, are now naturalised, and since 2018 have increased in abundance in the **Thames Estuary.**
- KEIFCA are looking into the possibility of an established clam fishery within the Thames Estuary.
- A **trial fishery** occurred in 2024, for more see: www.kentandessex-ifca.gov.uk

Outer Thames Estuary Clam Fishery vision:

"Seek to create a small-scale, sustainable Manila clam fishery that has a reputation for producing a high-quality product for a thriving local market, supported by investment in local processing infrastructure, while safeguarding the environment through industry-driven stewardship of clam beds."

MANILA CLAM BIOLOGY



Source: https://reproductivesystem2015.weebly.com/hard-shell-quahog-clam.html

- Manila clams are **broadcast spawners**, releasing eggs and sperm into the water column.
- Spawning occurs during spring, triggered when water temperatures **exceed 14 °C**.
- Manila clams are **highly fecund**.
- After fertilisation, they undergo a **larval phase** lasting between ten days and three weeks.
- Larvae then settle in **soft sediments**, generally in areas of low salinity.
- Once attached to the sediment, larvae will undergo **metamorphosis** into juvenile clams.

SEXUAL MATURITY

1 - 3 years old (Tumnoi, 2012)

10 - 30 mm (Southern IFCA, 2021)

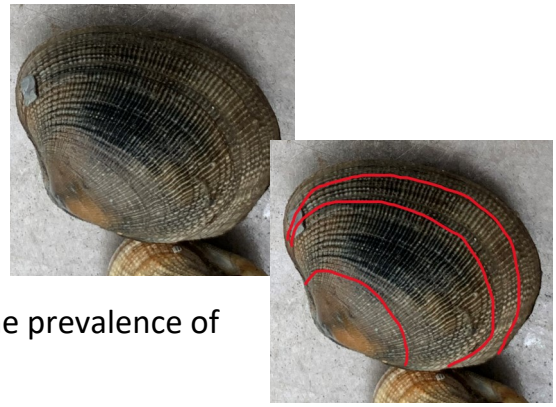
Legal minimum size is determined by a range of factors, including size at sexual maturity.

Aim to allow clams to **reproduce at least once** before becoming vulnerable to harvest.

MINIMUM LEGAL SIZE

35mm shell length in the European Union and United Kingdom (Regulation (EU) 2019/1241).

In the Thames Estuary, it is estimated that Manila clams reach sexual maturity between **25mm and 30mm** shell length. However, this may differ with food availability and temperature.



- Manila clams undergo seasonal cycles of growth, influenced by **water temperature and food availability**.
- In summer, with high water temperature and food availability, growth is fast. During winter, growth slows. This results in **visible growth rings** that can be counted to **estimate age**.
- However, in Manila clams this is thought to be **unreliable** due to the prevalence of **"fake" rings**, often caused by environmental disturbance.

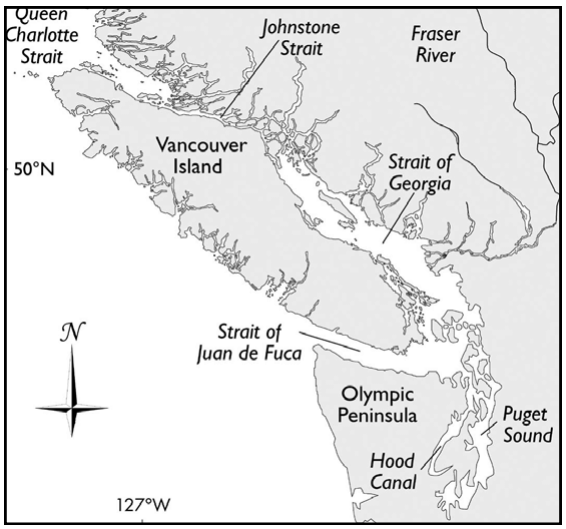
- Food availability, temperature, and genetics influence growth which results in Manila clams of **different shapes**.
- Some are **"elongate"** (long and skinny), and others **"globular"** (short and fat).
- This means that accurately sorting **undersize from sizeable** catch using conventional methods like a riddle can be challenging.
- Clams that are **undersize and globular** may not pass through the bars of a riddle, and instead be retained. Simultaneously, **sizeable, elongate** clams may pass through bars and be discarded.

MANILA CLAM ECOLOGY

Where do Manila clams live?

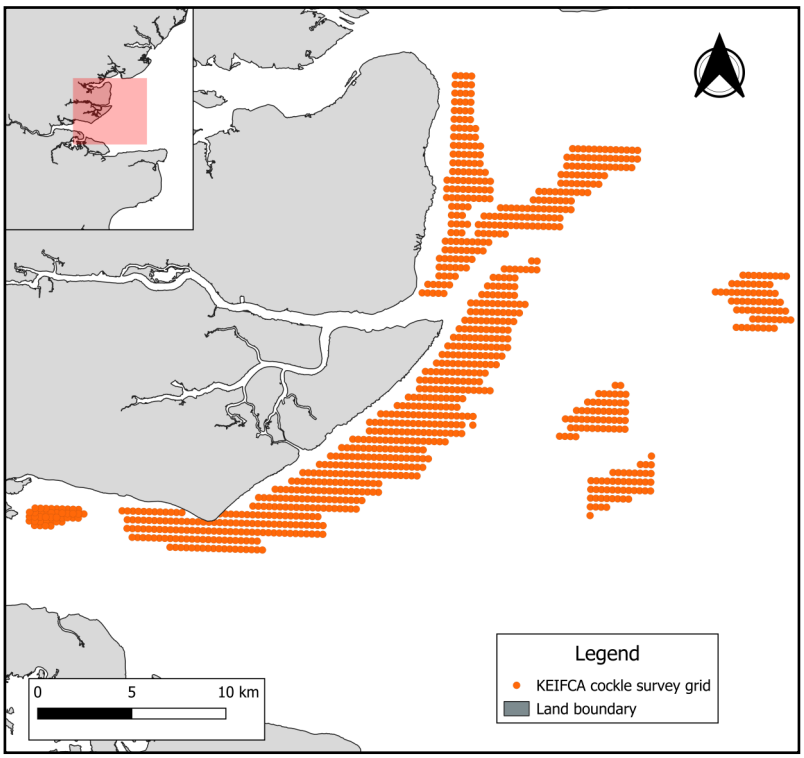
- Manila clams can be found buried in **soft sediments**.
- They often occur in **intertidal or shallow, subtidal** mudflats or sandbanks.
- Manila clams thrive in **sheltered** estuaries and bays that are **rich in nutrients**.

Optimal Conditions	
Temperature	13 — 21 °C
Salinity	24 — 31 psu
Sediment grain size	1—2 mm
Burial depth	1 — 5 cm



VS

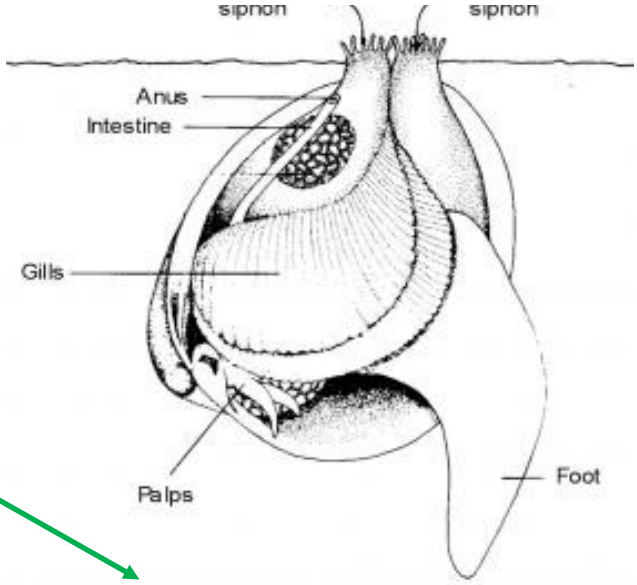
- The Thames Estuary is **geographically different** to many other locations that Manila clams inhabit.
- Places such as the Strait of Georgia are shallow, sheltered lagoons, whereas the Thames is **exposed to wave action**, and characterised by constantly shifting sandbanks.
- This may have implications on the **stability of stock levels over time**, especially in the face of additional stress such as fishing.



- This map details the survey pattern of KEIFCA's annual cockle survey, during which, clam presence is recorded.
- From these surveys, two significant populations were found on either side of the River Crouch, in shallow subtidal and intertidal sand flats.
- Large fluctuations in water temperature occur in the Thames, reaching **4°C in winter**, and **above 22°C in summer**.
- If a fishery was established, it would be the **northern-most** wild-caught commercial stock in the UK.
- With **water temperature increases** driven by climate change, it is expected that Manila clams will continue to extend northwards.

What do Manila clams eat?

- To feed, Manila clams extend their **siphons** out of the sediment—one siphon **taking in seawater**, and the other **expelling waste products**.
- This water is filtered over their gills, where food particles, such as **phytoplankton** and **organic debris** are ingested.
- Manila clams are adapted to survive fluctuations in the availability and composition of food sources.



AVAILABILITY

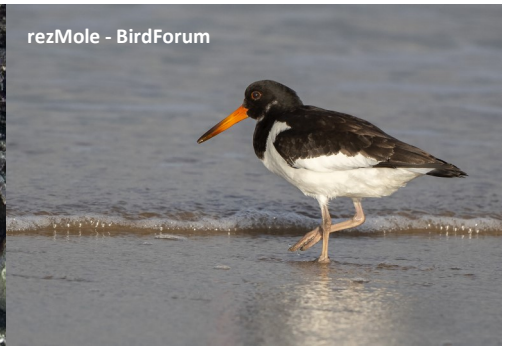
Compensatory growth has been evidenced in aquaculture studies. After periods of starvation, clams are able to **accelerate growth** to "catch up".

COMPOSITION

Manila clams are known to **switch** between food sources when their preferred diet of phytoplankton is limited.

What eats Manila clams?

Life History Stage	Main Predators
Larvae	Adult Manila clams, Pacific oyster (*Magallana gigas*), cockles (*Cerastoderma edule*), **brown shrimp** (*Crangon crangon*).
Juvenile	Oystercatchers (*Haematopus ostralegus*), common starfish (*Asterias rubens*), **shore crab** (*Carcinus maenas)*.
Adult	**Oystercatchers** (*Haematopus ostralegus*), large edible crabs (*Cancer pagarus*), common starfish (*Asterias rubens*).



- Most birds find large shellfish are difficult to consume—sizeable Manila clams may not be a diet staple. But oystercatchers have specialised bills, and may feed on **larger Manila clams** than other shore birds.
- A model based on the Poole Harbour ecosystem suggests that the presence of Manila clams **increases overwintering survival** of oystercatchers, and is evidence of the importance of Manila clams in their diet.
- Manila clams stocks are currently located in several **Marine Protected Areas**, some designated for overwintering oystercatchers. Thus, **bird energetics** may need to be considered when determining the **environmental impact** of a Manila clam fishery in the area.

Do Manila clams get sick?

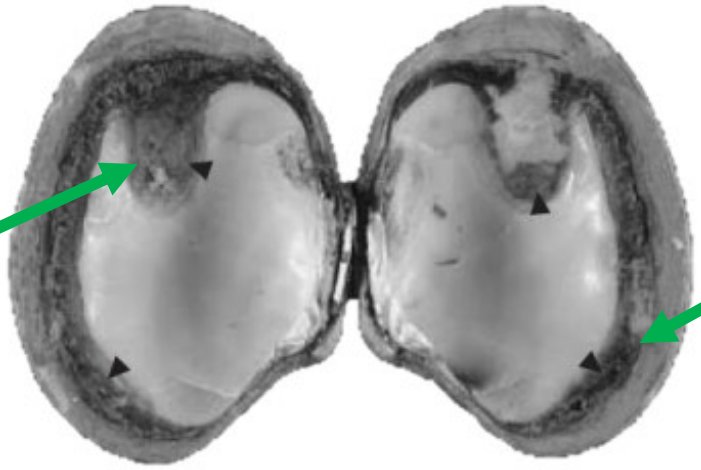
There are **two main diseases** that affect Manila clams across the globe: **Brown Ring Disease** (*Vibrio tapetis*) and ***Perkinsis spp*.**

- Manila clams are affected by other parasites, such as trematodes and the herpes-like virus, OsHV-1, but these are less prevalent.

1. Brown Ring Disease

- Caused by the bacteria *Vibrio tapetis* known as Vibrio P1, that infects the **inner surface** of the shell.
- The bacteria colonises the shell and disrupts regular calcium deposition, **inhibiting growth.** It then invades the **soft tissue** of the clam, causing extensive damage and eventually death.
- Brown Ring Disease has been associated with **mass mortalities** in cultured clam beds across the globe, including in Brittany, France, where clam culture was **decimated and never re-established**.

Brown deposits along the **mantle edge**



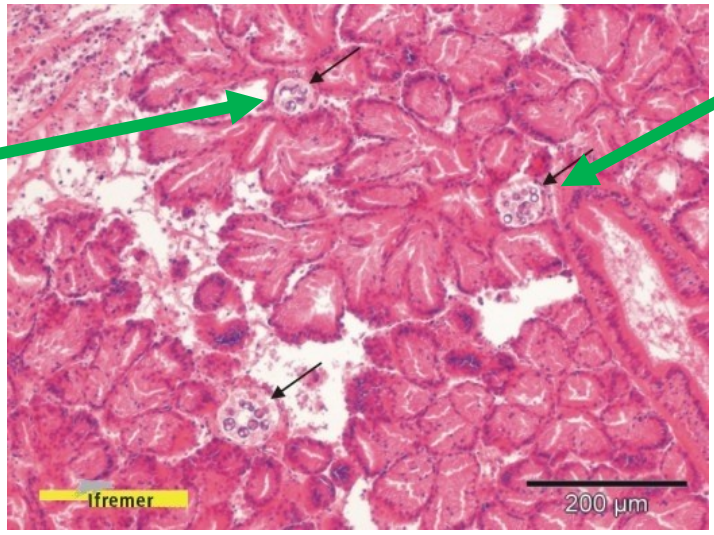
Identifying features include **brown deposits** in the muscle scar

Source: Eggermont, 2017

2. *Perkinsis spp.*

- Infection of soft tissue in Manila clams by the protozoan *Perkinsis spp.* causes significant tissue damage and, in severe cases, mortality.
- Infection of *Perkinsus* spp. has been cited as a major cause of Manila clam stock decline in Japan and South Korea

Cyst in the digestive gland of a Manila clam infected with Perkinsis spp.



Cyst in the digestive gland of a Manila clam infected with Perkinsis spp.

The presence of these two diseases in Manila clam populations means that **biosecurity checks are necessary** to ensure that no infections are brought to the Thames stock.

IMPACT OF MANILA CLAM DREDGING

Manila clams are harvested using a **dredge**. The dredge is towed across the seabed, while a blade **penetrates the sediment** and funnels clams into the dredge body. Some dredge designs use **water jets** that **fluidise the sediment** before the blade passes through.

In the 2024 Manila clam trial fishery, several gear types were tested. Of these, **water injection batch dredges** (pictured) were the **most appropriate** for harvesting clams.

- This gear type had the **lowest damage rates**, which is important for the sustainability and economic feasibility of the fishery.
- It also harvested clams within a tide, which fishermen deemed to be an **economically viable** rate.

Dredges have an **impact on the environment.** It should be noted that studies looking specifically into the impact of water injection batch dredges are limited compared to other bottom towed gear types.

1. Physical Change

- Deep furrows can be created by dredging, **increasing relief.** At the same time, flattening of small-scale topography causes a **decrease in habitat complexity**.
- Fine sediment is **suspended**, which can cause a shift in sediment type towards a **larger grain size.**

2. Biological Change

- Dredging **removes, damages and smothers** target and non-target species.
- **Sessile species** with upright body forms are especially susceptible to damage by dredges.
- Areas of high dredge frequency may see a shift to a different ecological community, towards **fast-growing, highly fecund species.**
- Overall, highly dredged areas **decrease in biodiversity.**

KEIFCA have been working closely with **Natural England** to ensure that Manila clam harvesting **does not damage** MPA features in the Thames. To mitigate seabed impacts, **Remote Electronic Monitoring (REM)** will be used, **fishing activity limited** spatially and temporally, and areas of seabed closed to fishing to act as **nursery areas.**

GLOBAL MANILA CLAM FISHERIES

Manila clams are one of the most harvested shellfish in the world, and in 2020 made up **24% of global bivalve production**. This is primarily driven by aquaculture, making up 90% of Manila clam production.

Manila Clam Aquaculture

Country	Tonnage	Year	Notes
China	> 3 million	2016	World's largest producer of Manila clams.
Italy	24,377	2020	Dredges used to harvest clams from farmed beds.
Korea	20,000	2014	Juveniles are imported to seed aquaculture beds.
Japan	5,000	2020s	Major stock declines from the 1980s to the 2000s.
USA	4,500	2013	Heavily mechanised production on intertidal mudflats.
Spain	1,703	2013	Smaller scale than wild-caught operations in Spain.
Canada	1,500	2018	Primarily produced in British Columbia.

China is easily the largest producer of Manila clams, responsible for **98% of annual global output**.

- Clam farming occurs in both **onshore tanks, intertidal mudflats, and in the subtidal, as deep as 10m.**
- Traditionally, clam seed is sown in spring, farmed for 15 months, and then harvested either by **hand**, or using a **dredge**. More recently, seed has been matured in onshore tanks, then out-planted during the following spring to **reduce the impact of cool, winter waters on growth**.
- **Seed production** is a major component of the Manila clam industry in China, with juveniles produced in onshore tanks to be used in Chinese aquaculture, or sold to **Japan and Korea.**

Fang and Lin, 2016

Manila clam harvest methods are widely variable by country:

Suhrbier et al.

United States: highly mechanised Manila clam aquaculture, including laying anti-predator nets and continual algal clearing.

ABC—Alvaro Barrientos

Spain: clam beds are harvested by hand and rake, generally by women.

From Farming to Fishing to Farming Again

Most Manila clam fisheries started as **aquacultural operations**, however, as naturalised populations were established, wild-caught fisheries began. **Stock collapse** of wild-caught fisheries has caused several wild-caught fisheries to return to their farming beginnings.

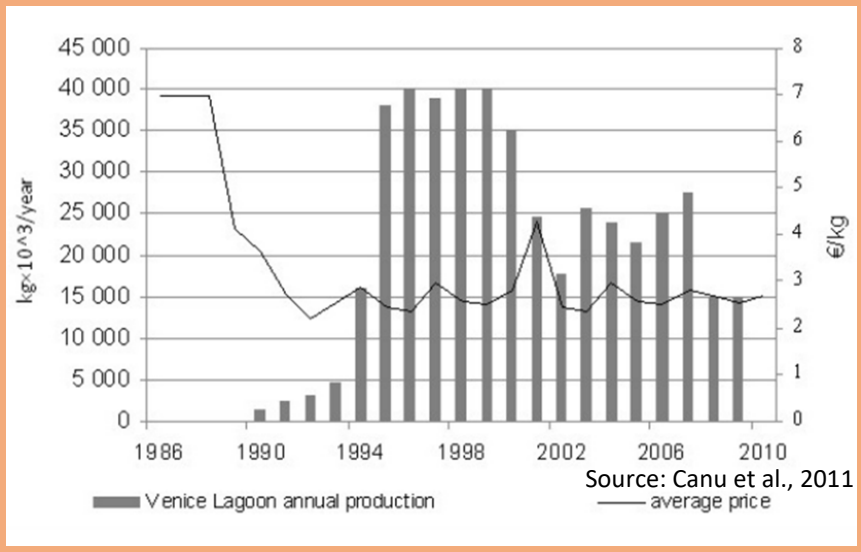
- This can be seen particularly clearly in **Italy**.

1. Farming

Like many other European Manila clam fisheries, **seed clams** were first bought to Italy for aquaculture. Spat was introduced to several estuaries, and while farming occurred, **natural populations quickly became established.**

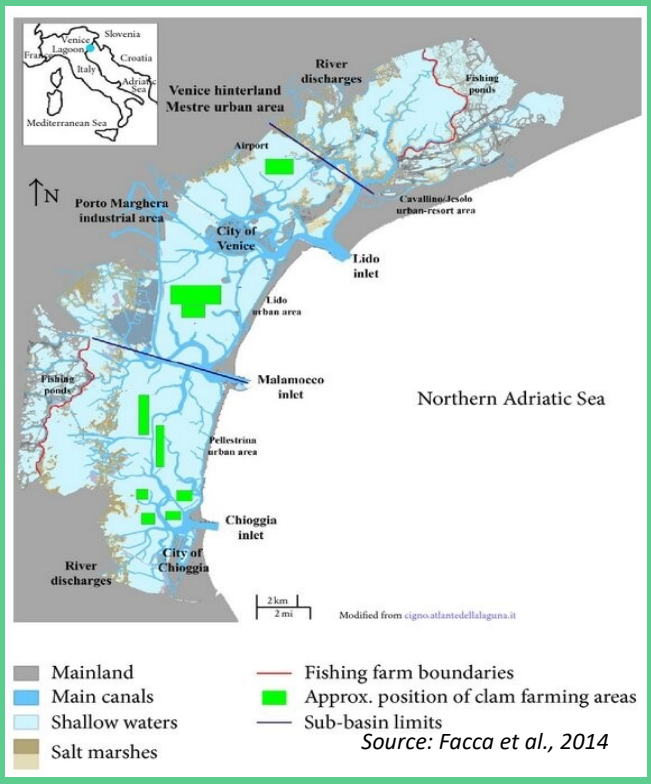
2. Fishing

Once populations became established, wild-caught clam fisheries began. From the 1980s to the 2000s, there was a **rapid increase in Manila clam harvest**. Lack of regulation and subsequent overfishing caused stocks to **crash in the 2000s.** This saw a major shift in the way that clam beds were managed.



Source: Canu et al., 2011

3. Farming



Source: Facca et al., 2014

Now, particularly in the Venice Lagoon and Sacca di Goro Estuary, Manila clam stocks are **managed as individual farming plots**. Plots are owned, maintained, and harvested by individual fishermen. The exploitation of these plots is closely managed by **regional fisheries authorities.**

The farmed plots **rely heavily on seed clams**, and so closed nursery areas aiming to ensure production of juvenile clams are a staple of Italian Manila clam management.

Some Manila clam beds have been set aside for a wild-caught fishery, but these are heavily restricted.

Wild-caught fisheries

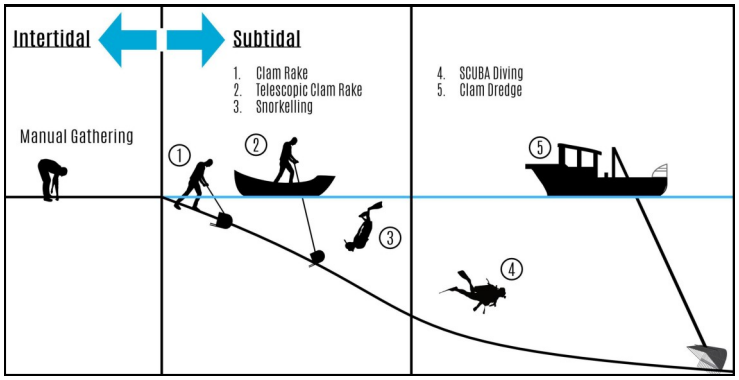
Strictly wild-caught Manila clam fisheries are **not as prevalent** as cultured beds, but are present across Europe and the UK.

Country	Tonnage	Year	Notes
Portugal	17,000	2016	A large proportion of catch landed is illegal harvest.
Spain	3659	2013	Takes place primarily on north and south-west coasts.
France	2900	2025	Wild beds are often seeded to maintain catch rates.
England	474.7	2023	All production comes from Poole Harbour and the Solent.

Wild-caught fisheries have an inherently **high compliance risk**. Manila clams are often in **accessible locations**, such as intertidal flats where high investment equipment (like a vessel) aren't required. Manila clams are also **high value**, incentivising illegal harvesting. This is of particular concern in the **Tagus Estuary, Portugal,** where illegal Manila clam harvest is prevalent.

- Manila clams arrived in Portugal in the 1980s, **colonising estuaries on all coasts**.
- Clams thrived in the Tagus Estuary, rapidly **increasing in abundance** and then exploitation.
- Non-fishers began harvesting Manila clams, and existing fishermen **transitioned to the clam fishery**.

- Manila clam harvest in the Tagus Estuary is undertaken by hand gathering, raking, SCUBA diving, snorkelling, and using a dredge.
- Manila clams in the Tagus Estuary colonised shallow mudflats, making the resource **vulnerable to illegal fishing.**



- To fish for Manila clams in the Tagus Estuary, a licence is required that permits **80kg of catch per day**.
- More than **1,700 harvesters** are estimated to be active in the estuary, however, **less than 200 licences** were issued, the rest illegally harvesting Manila clams.
- This not only raises concerns for the stock, but presents **significant public health risks**, with purification required to make clams from the Tagus fit for human consumption.

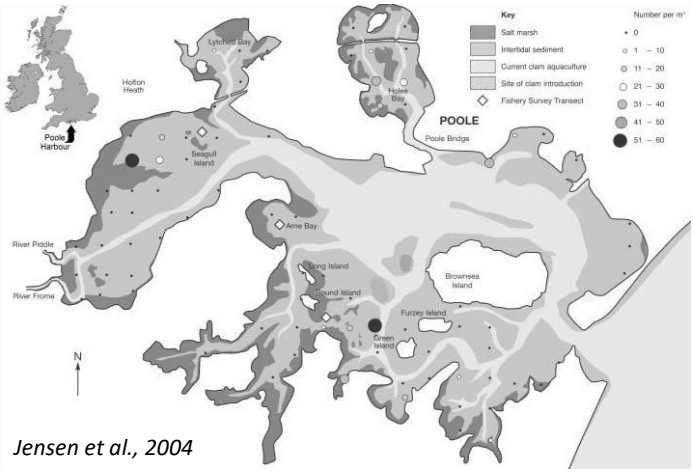
A suggested solution is to create **private, cultured beds** (much like in Italy), in combination with a free access area that is co-managed, in hopes of **generating stewardship of clam beds** by local fishermen.

Nearest neighbours

There are clam fisheries (both wild-caught and cultured) throughout the United Kingdom and Ireland. The closest and most comparable Manila clam fishery to the Thames is the **Poole Harbour** and the **Solent** fisheries in Dorset, England.

- They are both located on the **south coast of England**, and are managed as wild-caught fisheries.

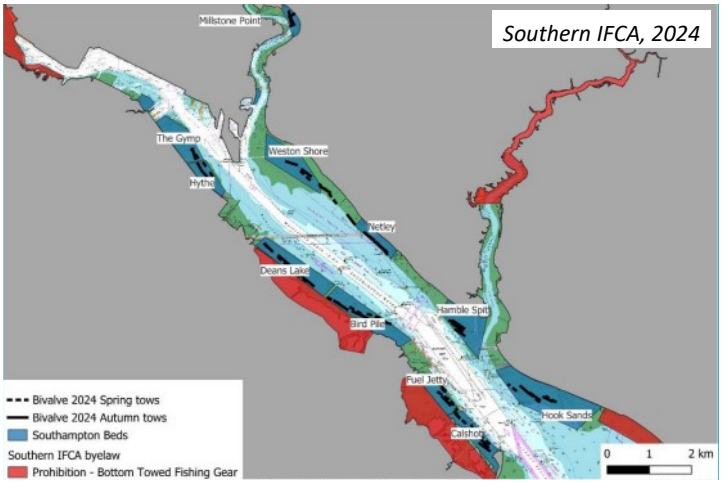
Poole Harbour Dredge Fishery



Jensen et al., 2004

- The **Poole Harbour Dredge Permit Byelaw** covers both cockles and Manila clams through managing the use of a **pump scoop dredge** in the area.
- Permits to use a pump scoop dredge are issued annually. Currently **45 permits are allocated** per year. All vessels awarded a permit must be **less than 9m** in length.
- The Poole Harbour dredge fishery **opens** on the 25th of May, and closes on the 23rd of December.
- Commercial pump scoop dredges are used to conduct tows that inform **annual stock assessments**.
- This fishery is certified by the **Marine Stewardship Council**, which provides access to more and higher value markets.
- Manila clam stocks in Poole Harbour **overlap with MPAs,** and so an environmental assessment is required. To mitigate impacts of dredging on bird populations, key **roosting and overwintering areas are closed to fishing** (both seasonally and year-round).

Solent Dredge Fishery



- The **Solent Dredge Permit Byelaw** covers a range of species including scallops and Manila clams, through managing the use of box dredges in "Bivalve Management Areas".
- Permits to use dredges in the Solent are issued annually. All vessels awarded a permit must be **less than 12m** in length.
- The Solent dredge fishery is **closed** between the 1st of March and 31st of October each year.
- A commercial box dredge is used to conduct survey tows as part of the **Solent Bivalve Survey**. This is undertaken **twice a year**, in spring and autumn, to estimate stock levels of both Manila clams and cockles in the Solent.

- Bivalve stocks in the Solent overlap with MPAs, and so an environmental assessment is required. **Sensitive areas of seabed, including seagrass, are closed to dredging year-round.**

Information on managing Manila clam stocks can be sourced from these fisheries. However, **due to the variable nature** of Manila clam stocks, environmental conditions, and seabed type, **local data is important to collect.**

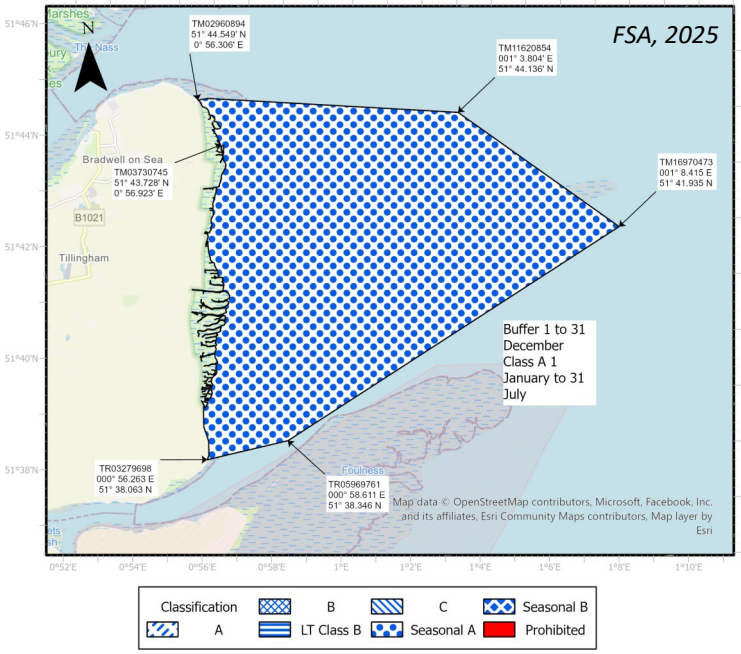
THE MANILA CLAM MARKET

Manila clams are **mainly sold live**, however, there is also a less valuable cooked/canned market. The clam fishery in the Thames will aim to be a **small-scale, high-value** fishery, and as such, sell to the live market.

How are we sure clams are safe to eat?

The **Food Standards Agency** (FSA) is a UK government department responsible for protecting the public from health risks arising from the consumption of food.

- The FSA **test shellfish beds for *Escherichia coli*,** and classify them accordingly.



- To sell shellfish, they must be harvested from **official FSA classified beds.**
- The classification not only determines whether the shellfish are fit for consumption, but outlines any **secondary processing requirements**.

Class	E. coli/100g	Secondary processing required
A	< 230	Harvested for direct consumption.
B	> 4,600	Purification or relaying in Class A waters.
C	> 46,000	Must be relayed.

FSA has classified many areas in the Thames, including the main clam beds which are **"Seasonal A"** - Class A during some parts of the year, and Class B during others. Up-to-date information can be found on the FSA's website: www.food.gov.uk/business-guidance/shellfish-classification.

- Areas can be requested for classification, or the Manila clam classification can be **attached to existing cockle classifications.**

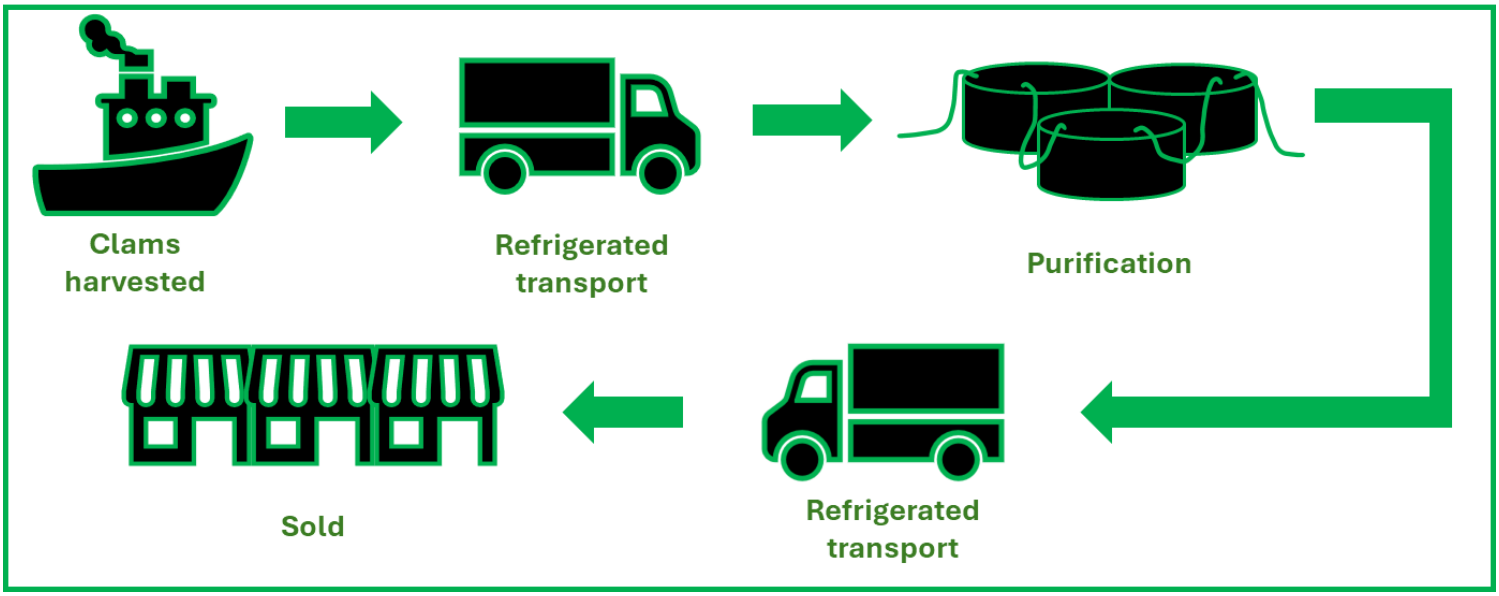
What does secondary processing involve?

- Clams are placed into a series of tanks containing purified water. Clams **clean themselves** by taking in the UV treated water and **expelling their waste products**.
- After **42 hours**, clams are considered fit for selling and consumption. After purification, the price of clams is significantly higher, almost **doubling in value**.
- Tanks can only purify a **certain quantity** of clams at once, and as such, smaller purification centres may encounter **logistical challenges** when dealing with **large volumes of catch**.

The importance of high quality clams

It's essential that **care be taken throughout the entire process**, from seabed to buyer, when selling live Manila clams.

- High care leads to **low damage and ultimately high survival rates**, which is crucial to the financial feasibility of the fishery.
- High quality of produce is necessary to build a good reputation and **maximise the value** of catch.



Where are clams sold?

There is both a domestic and export market for clams in the UK. The **domestic market is relatively small**, and flooding the market is a concern. The **export market is larger**, with much greater volumes not a concern for flooding the market.

- B**oth domestic and export** markets are accessible to clam harvesters in the UK.
- Prices for live catch (pre-purification) are between **£4 and £6 per kg**.

Domestic

- Manila clams are primarily sold to **wet fish shops** or small, local **restaurants**.
- Larger chain restaurants were difficult to access due to the short period of the trial, and a **lack of confidence** in consistent supply.
- Wet fish markets in **London** purchase Manila clams.


Source: Chapman's of Rye

Export

- In the UK, **Europe** is the most accessible export market.
- **Italy, Spain and France** are the largest importers of clams in the European Union.
- Globally, **Asia** (particularly Japan) and the **US** are the leaders in clam imports, but are less accessible to the UK due to location.

The vision for this fishery is built around the markets that it's sold to, focussed primarily on the creation of a small-scale fishery with a reputation for high quality, live catch.

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