

LIFE & WORK IN OUR SEAS

Marine wildlife, archaeology
and the marine aggregate industry



**Marine
Aggregate Levy
Sustainability Fund
MALSF**



**Hampshire &
Isle of Wight**

Funded through the Aggregate Levy Sustainability Fund (ALSF)

The Hampshire and Wight Trust for Maritime Archaeology

The Hampshire and Wight Trust for Maritime Archaeology (HWTMA) investigates maritime archaeology in Great Britain with most activities concentrated in Hampshire, the Isle of Wight and nearby coastal areas. Archaeologists, volunteers and students are all encouraged to join in with fieldwork and research. The Trust then shares any information with the general public through educational initiatives such as activity days, workshops, school resources, books and talks.



Hampshire and Isle of Wight Wildlife Trust

Hampshire and Isle of Wight Wildlife Trust (HI WWT) is the only charity dedicated to conserving, protecting and enhancing your local wildlife, whatever it is and wherever in the two counties it may be. From otters to orchids, from butterflies to bitterns, from dormice to daisies and from seahorses to sundews, HI WWT believe that wildlife matters. So on land, under the sea, on coasts, in rivers or even in the boggy bits, HI WWT use scientific knowledge, influence, expertise and enthusiasm to create a better future for your local natural heritage. But they are not alone. HI WWT staff are supported by hundreds of volunteers and thousands of members and supporters. Together they are creating two wildlife-rich counties for future generations to enjoy.



The Aggregates Levy Sustainability Fund

The government imposes a levy on the sales of primary aggregate. Some of the money is used to provide a source of funding for research looking at environments where aggregates are extracted. This includes helping biologists and archaeologists find out more about the biodiversity and archaeology of these environments. The Marine Environment Protection Fund (MEPF) is administered by the Centre for Environment, Fisheries & Aquaculture Science (CEFAS) who manage a portion of the ALSF tax and decide which projects should be funded. There have been many great projects funded through the ALSF that have helped biologists and archaeologists undertake research and share their results and information with everyone.

For further information see: <http://www.alsf-mepf.org.uk>



A world beneath the waves

As an island nation, our seas are very important in many ways. They provide food, jobs, resources, energy, sporting venues and a place to have fun. Our seas also provide a home for the many weird and wonderful creatures that live in them.

What you may not realise is that our seas also provide us with vast quantities of much needed building materials in the form of aggregate. This booklet is about marine aggregate: why we need it, how we get it and who/what else lives and works in it.

Sand and gravel

'Aggregate' is the name given to small pieces of rock, gravel and sand that we use for building homes, schools, hospitals, in fact, any type of building you can think of! It is also used for beach replenishment (to replace sand and gravel that has been eroded away by natural processes).

Aggregate can be found on land, where it is extracted from large quarries (<http://www.virtualquarry.co.uk/index.htm>) but it can also be found beneath the sea in ancient rivers called palaeochannels.

The aggregate industry forms an important part of our economy. As well as much needed building materials, the aggregate industry provides some 20,000 jobs directly and **supports a similar number indirectly through the industry's spending on services.** Many of these jobs are in rural areas where other employment opportunities can be scarce.

INTERESTING FACT
Every year, a typical family indirectly requires a full lorry load of aggregate!

Sand and gravel from the sea

Demand for aggregates is around 270 million tonnes a year in Great Britain. 21% of the sand and gravel requirements of England and Wales now comes from the sea. Sand and gravel is dredged from the seabed by special ships that work 24-hours-a-day, 365-days-a-year.

Licensed dredging areas lie about six miles offshore and in water typically more than 15 metres deep, so avoiding any possibility of contributing to coastal erosion.

It is recognised however, that aggregate dredging does have environmental and archaeological implications. The industry works hard to try and minimise the impact of this essential extraction activity, for example by trying to reduce the need for primary aggregates by investing heavily in the use of recycled and secondary aggregates. 70 million tonnes (25%) of aggregate used each year is recycled or secondary.



Who else is working in our seas?

People in the marine aggregate industry often need to work closely with people from other disciplines, who also work in the seas. These include:

Marine Biologists

Marine biology is the scientific study of living organisms in the ocean or other marine or brackish (mix of fresh and salt water) bodies of water.

The oceans cover about 71% of the Earth's surface and a large number of the many species living in the oceans are yet to be discovered. It is understood that organisms living under and above the surface are linked to each other and even the smallest changes can affect the whole ecosystem. Many species are also economically important for humans.

Marine biologists are trying to understand how marine organisms develop, relate to one another, adapt to their environment and interact with it. With more knowledge of how these plants and animals live today, we can start to understand how marine ecosystems will cope with changes in the future. Such changes will be brought about by factors such as global warming, pollution, pressure from fisheries and even damage caused by tourism and other human activities.

Maritime Archaeologists

Archaeologists study 'things'. They call them 'artefacts' but they're basically things that were made and/or used by humans in the past. It's the people of the past that archaeologists are really interested in but they learn about them by studying the things they made and used and the changes people made to their environment and surroundings. Archaeologists who work on land are called 'terrestrial' archaeologists. Those who work in damp or wet places (including under water) are called 'maritime' archaeologists.

Archaeology is a huge subject that covers all periods from the origins of humans (millions of years ago) to the remains of 20th century technology and warfare. Contrary to popular belief, maritime archaeology is much more than a study of shipwrecks - it is also concerned with foreshore archaeology and the archaeology of ancient landscapes where humans lived before sea-levels rose to cover them in water.

Maritime archaeological sites can include shipwreck remains, submerged landscapes and settlements, aircraft, harbours, fish-traps and minute traces of tiny organisms. Because waterlogged sites often result in much better survival of old and fragile materials (particularly organic ones), maritime sites can produce examples of exceptional preservation and finds that are seldom found on land sites. This can lead to preserved evidence for migration, communication, trade, warfare, travel, ancient technology and lifestyles, surviving beneath the sea.

For more information about maritime archaeologists and how they work with the marine aggregate industry, see *'Dive into History, Dig into Dredging'* available from www.hwtma.org.uk

Wildlife and Aggregate

Marine wildlife and the aggregate industry

Biodiversity- which means the variation of life forms within an ecosystem - is a very important and sensitive process where the many and varied life forms are useful to each other. It is very important to preserve and protect wildlife for our future as all creatures play an important part in the global ecology. It is also essential to know that what we do to our seas affects living creatures both above and below the surface.

When digging up sand and gravel from a marine environment, the aggregate industry follows strict guidelines to avoid damaging wildlife and archaeology. Before dredging can begin, a survey of the seabed must be carried out. If the survey shows that the environmental and archaeological impact of dredging is within acceptable levels, permission to dredge may be granted.

If the survey finds something rare or important the aggregate industry will try to avoid dredging in that area so that the wildlife and archaeology can be protected.

Photo courtesy British Marine Aggregate Producers Association



Eelgrass grows on sandy sea beds.

Government policy

The government policy for aggregate extraction states:

Dredging may cause disturbance to fisheries and damage the marine environment

In areas of special sensitivity the industry must provide a convincing case before they can get a licence to dredge

A proposal to dredge has to include full consideration of the impact on the marine environment, sea fisheries and the coastline.

The environmental and coastal impact has to be satisfactorily resolved before extraction can take place.

(MPG6 1994)

ACTIVITY 1: Sorting aggregate
Can you find examples of the
different types of aggregate?

See page 11



Marine life in sand and gravel

At first it might look as if nothing is living in marine aggregate but if you look closer it becomes clear that many creatures (large and small) have adjusted to a life in sand or gravel.

Sand-dominated habitats

Sand particles are small and light, so sand is moved around easily by tide and water movements. If creatures live on the surface they risk being swept away. In order to survive some creatures bury themselves into the sand. Others are able to swim with the current or have their own protective houses. Examples of species that live in the sand-dominated habitats are:

Sea mouse

Despite its name the sea mouse, is actually a hairy worm. It has bristles, like small hairs around its edges that protect the silky shining fringe of glowing green, yellow and blue. The creature can grow up to 20 cm long. It burrows itself under the surface of the sand like a mole does on land. The sea mouse hunts out smaller worms which it catches with extendable jaws that shoot out to grab them. It then swallows its prey whole, head first.



Ross worm

The Ross worm builds a tube using sand and shell to protect itself from potential predators. When there are lots of worms together, these tubes form a living worm reef which provides a new habitat in which other species can live.



Masked crab

Another creature that hides in the sand is the masked crab. This crab burrows itself completely into the sand, moving backwards. Once hidden in the sand it uses its long hairy antenna as a snorkel which it pokes above the sandy seabed to breathe. The colour of the crab is reddish brown to yellow. Sometimes the colour forms a pattern similar to a **face on the crab's shell**.



ACTIVITY 2
Slugs, Worms, Crabs
Who is the strongest?
See page 12

Teacher's Note

This consolidates what pupils have learnt from this booklet while providing an excellent physical and entertaining activity.

Gravel-dominated habitats

Gravel is much heavier than sand and the particles are much larger. This means:

- ◆ It does not move around as easily as sand.
- ◆ It is harder for creatures to burrow into it.

Instead of burrowing into gravel, creatures can attach themselves to the larger pebbles to avoid being swept away. Some examples of species that live in gravel-dominated habitats are:

Slipper limpet

The Slipper limpet is a snail that was accidentally introduced into UK waters from America in the late 19th century. They live in chains of up to 12 animals where the top one is male, the bottom one female and the ones in between are neither male or female!

A Slipper limpet can live for several years. To begin with, all slipper limpets start off as males and attach themselves to the top of a slipper limpet chain. During their lives they gradually change into females. The limpet at the bottom of a chain is always a female. When the bottom female dies and drops off, the limpet that was above her in the chain, takes her place. If that particular Slipper limpet is not already completely female, it quickly changes to become a full female.



Sea anemones

Sea anemones, such as these dahlia anemones are typically found in gravel beds. They attach to the gravel in areas with strong currents. They can grow up to 20cm across. Anemones are predators, like their relatives the corals and jellyfish. Each tentacle is armed with thousands of stinging cells and **they all contain a tiny 'harpoon', almost like a poisoned dart on the end of a fine thread.** When the anemone feels movement in the water its harpoon shoots out and penetrates the flesh of its prey, paralysing them and making them a helpless and therefore easy catch.



Gravel-dominated habitats continued

Sea squirts

Another animal that attaches to gravel is the sea squirt. Although they look extremely primitive, sea squirts represent **the 'missing link' between animals without backbones** (invertebrates) like worms and anemones and those with backbones (vertebrates) - like fish and us humans. When they are young they have a brain and a backbone, but when they get older they attach themselves to gravel and rock and digest their own brains because they do not need them anymore! Sea squirts feed by filtering water to catch plankton and other organic substances that are floating around.



ACTIVITY 3: TopSlugs
Try and see how much you know about sea creatures by playing TopSlugs with your friends
See page 13–16



Teacher's Note

In Activity 3 pupils will learn the names and characteristics of the most common types of sand and gravel species.

What are the effects of dredging on marine life?

Good stewardship of the marine environment relies heavily on knowledge. The Marine Aggregate Levy Sustainability Fund (MALSF) supports projects which undertake research into improving understanding about the biology, geology and archaeology of the seabed. This work, along with studies carried out by the industry, allows decisions about the marine environment to be science based; taking into consideration potential environmental impacts and society's need for natural resources.

Identifying and understanding impact

- Dredging affects individual species directly when they are removed from the seafloor.
- Removal of sea life not only affects the removed species but also disturbs their balance with other species.
- The time it takes for flora and animals to come back to a dredged area can be up to several years. In deep waters the long lived species can take up to 20 years to recover from any disturbance.
- The effects on fishes, marine mammals and seabirds are harder to detect, because they move from area to area.
- Adding or removing sediment from the sea can cause indirect effects on creatures living on the seabed or those floating in the water (known as plankton) as the sediment on the seafloor changes.
- Loss of sea life can also have knock-on effects higher up the food chain. If prey is harmed/relocated there is less food for their predators.



A dredger at work

Reducing impact

The aggregate industry helps protect delicate marine life by:

- Using recycled and secondary aggregate to minimise the need for marine dredging.
- Reducing the footprint of impact by dredging the smallest area necessary.
- Handing back areas of licensed seabed once dredging is complete to allow recovery.

ACTIVITY 4: Group Project Case Study
Imagine what it would be like to work in the marine aggregate industry or as a marine biologist or maritime archaeologist!

See page 17–22

Teacher's Note

In Activity 4 pupils will combine all the information they have learned so far and practise their research and presentation skills.

Ninja Turtle deflector

In many places around the world sea turtles are in danger as they get caught in trawling nets and hurt by dredgers. A group of engineers in the U.S. Army came up with the brilliant idea to put a sea turtle deflector on the front of a dredger. The new device nicknamed *Ninja Turtle deflector* has proven to be up to 80% successful. The huge eyes and large teeth on the dredge head scare **the turtles away, so they don't get sucked up by the dredger. Sea turtles are not that common in UK waters** so this approach has not been adopted here but it shows how continual research and development can help protect marine wildlife.



Green Sea turtle resting on the sea floor

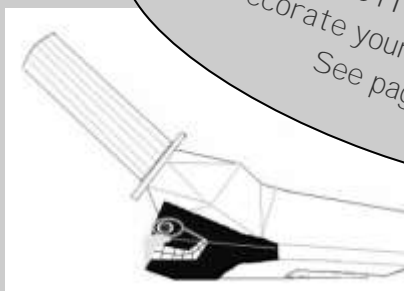


Illustration showing a dredger head with The Ninja Turtle deflector

ACTIVITY 5
Decorate your own dredger!
See page 22

Shipwrecks and biodiversity



Henry Petherick-Brian

HMS Scylla being deliberately sunk off Whitsand Bay, Cornwall. 27 March 2004.

A shipwreck provides an excellent habitat for marine life. As soon as a ship comes to rest on the seabed, creatures start to inhabit it. The structure of the wreck acts as a reef and will provide shelter from water and seabed movements.

Eventually this ecosystem will become varied and prolific, with an astounding number of different species often inhabiting a small area. These often permanent artificial reefs become homes for sea life that would not normally live there. Around the world many old ships, which are no longer being used, have been deliberately sunk to create an artificial reef and increase biodiversity.

For example *HMS Scylla*, a frigate built in 1968 was deliberately sunk outside Plymouth, UK in 2004. She is now a home for many fish and other marine species. 10

Shipwreck as marine habitat case study: The *Fenna*

The Fenna was a Dutch Schooner which sank 3 miles to the west of the Isle of Wight in 1881. The ship was carrying a mixed cargo of items such as railway tracks, sheets of glass and barrels of cement. Much of the cargo can still be seen on the seabed but the lower hull of the wreck is buried in the sand and gravel seabed. The wreck of the *Fenna* has become an excellent marine habitat. Despite the dynamic nature of the local environment, numerous marine species use the *Fenna* as their home.



Common Lobster. (*Homarus gammarus*)

The cargo of railway tracks, sheet glass and solidified concrete provide excellent hiding places for lobsters. Lobsters are dark blue in colour, with pale yellow markings and red antennae. At night they can be found wandering the seabed around the wreck searching for food. Lobsters will eat almost anything organic found on the seabed, dead or alive, and are even known to eat their own kind.

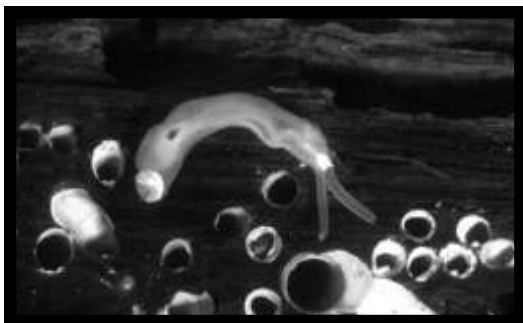
Fish - Bib (*Trisopterus luscus*).

A common sight around the *Fenna* is a fish called bib. They are members of the cod family, but they are much smaller than cod. The adults grow to around 40 cm in length. The body of the bib has a coppery colour with four or five distinctive colour bands. On their chin they have a single barb which, combined with their colouring, makes the bib an easily identifiable fish.



Shipworm and Gribble

Most of the wooden structure on the *Fenna* that is not buried under sand and gravel has eroded or been eaten away by shipworm and gribble. The gribble is an ordinary wood louse that lives and feeds on unprotected timber. They leave a hollow cylindrical borehole in the wood. The shipworm is a mollusc with a worm-like body. The worm bores into wood to protect itself, as only a small part of its body is covered by a shell. The boring and feeding action of these two species weakens timbers, and damages wooden structures under water.



ACTIVITY 1: Sorting aggregate

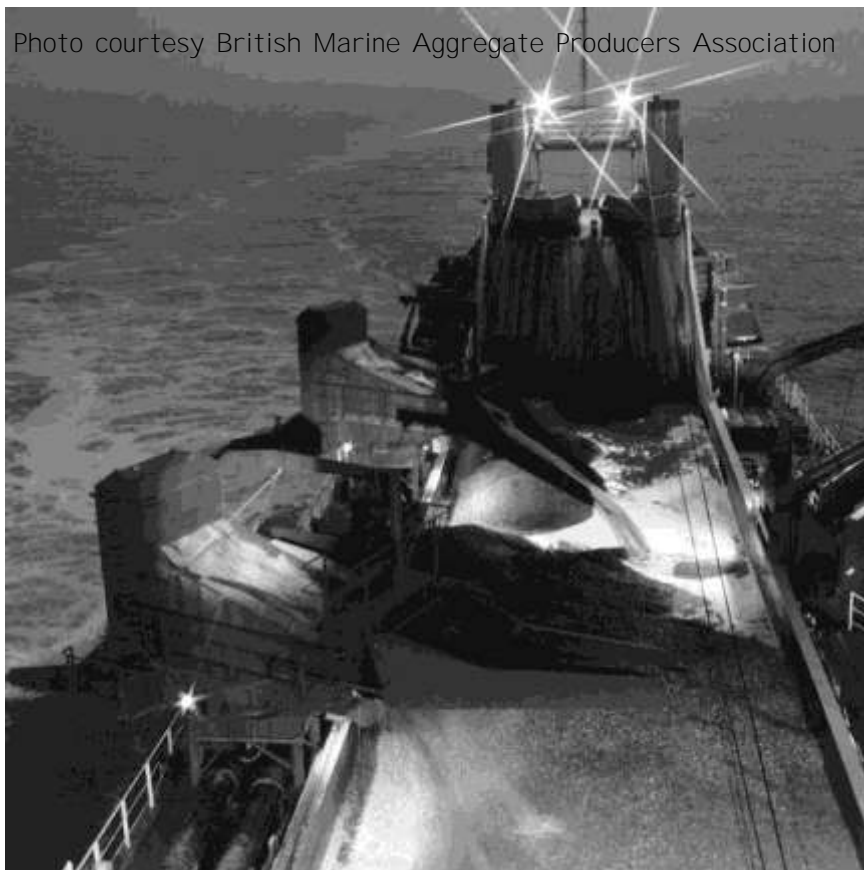
Aggregate is fragments of rock, including sand and gravel. It is used to build roads, bridges, homes, schools and even pavements.

Aggregate comes in all different shapes and sizes. People have tried to give different sizes of aggregate different names. Here are some examples:

- Boulder More than 25cm in diameter
- Cobble From 6cm to 25cm in diameter
- Pebble From 4mm to 6cm in diameter
- Granule From 2mm to 4mm in diameter
- Grain From 1mm to 2mm in diameter

Try to find sand, gravel and stones in different sizes and use the above list to see what type of aggregate you have managed to find.

You could also look at colours, roundedness, shape, texture etc...



An aggregate dredger at work

ACTIVITY 2: Slugs, Worms, Crabs

For the teacher

Learning Objective:

This game is a fun way to get a group physically and mentally alert. Pupils will use the knowledge gained from this booklet in a creative and amusing way. The activity does not require a great amount of time and is recommended as a break after a long day of indoor learning by offering physical exercise and fresh air.

What you'll need

Resources:

A large space (20-40 metres wide)

Two "safe zones" for example two trees or large stones
etc.

Activity

"Slugs, Worms, Crabs" is a more physical variation of Stone, Paper, Scissors. Each player makes up their own movements (or uses those suggested below). Divide into two teams, the *Sand dominated species* and the *Gravel dominated species* **each group must identify a "safe zones"** within the designated play area.

Suggested movements for each species:

- ◆ Slugs - Move by slowly swinging soft boneless bodies back and forth.
- ◆ Worms - By stretching arms above head, make the worm as long as possible.
- ◆ Crabs - **Walk in a bow legged manner, with elbows close to the body and hands miming a crab's claws.**

The Slugs win by 'sliming' the Crabs
The Worms win by 'hugging' the Slugs
The Crabs win by 'pinching' the Worms
Identical characters are a draw

Each team will decide (in secret) who is going to be which creature. Thereafter the two teams will face up against each other, separated by about 1-2 metres and a fair distance from the two safe zones. The Game leader will announce "1....2.....3.....", and the teams must reveal their identity!

Immediately the winning characters (explained above) have to chase the losing characters and tag as many of them as possible. The losing characters have to try and reach their safe zone without being captured. The tagged sea creatures must go over to the winning team.

The teams then line up again and decide on a new sea creature and the game continues until one team entirely consumes the other.

For the teacher

Plenary

The pupils will in this quite simple game take a break from indoor learning. Through physical activity they will increase their interest in different types of the sea life and become more familiar with their characteristics and habitats in which they live.

ACTIVITY 3: TopSlugs

For the teacher

Learning Objective:

The pupils will by use a card game learn about the different species that live in sand and gravel. The concept is based on a familiar card game where every character has a range of qualities scored against their ability to deal with various situations. Every card included in the game also contains brief facts about the animals and plants and how they live in the sea. The pupils will, by playing the game or just studying the cards, learn the names and the characteristics of the most common types of sand and gravel species .

What you'll need

Resources:

This booklet includes 18 cards which can be photocopied, cut out and distributed between the pupils. Printing and laminating the cards will improve their durability and life.

Activity

The aim of the game is to end up with all the cards by winning them from the other players. The starting player selects a category from his or her topmost card and reads out its value. The next player then reads out the value for the same category from his or her card. The highest value wins and the player takes the cards and places them at the bottom of his or her pile. The winner then looks at their new topmost card and chooses the category for the next round. The game can be played one against one or involve several people.

Differentiation

Another, more time consuming alternative is for people to make their own cards and play them against each other. You can choose your own sea creatures and find out more about them through research.

TopSlugs



Red Gurnard
(*Aspitrigla cuculus*)

Red Gurnard is a member of the scorpionfish family, they feed mainly on worms and small crustaceans. When caught, they make a croaking noise similar to a frog.

Survival	7
Camouflage	3
Productivity	3
Team work	3



Brittle star
(*Ophiothrix fragilis*)

Brittle stars link their arms together to avoid being swept away by the current. The spare arms are used for gathering food.

Survival	5
Camouflage	3
Productivity	4
Team work	10




Candy Striped flatworm
(*Prostheceraeus vittatus*)

The Candy Striped Flatworm can grow up to 5 centimetres long. It feeds on small, sedentary organisms and has an amazing ability to repair itself.

Survival	6
Camouflage	3
Productivity	6
Team work	5

Photocopy this page and cut out the cards to play TopSlugs



Conger Eel
(*Conger conger*)

Conger Eels have extremely sharp teeth and strong jaws. They are more active at night when they hunt for crabs, cuttlefish and squid. They are found in holes, crevices and wrecks.


Survival	7
Camouflage	3
Productivity	6
Team work	1



Dahlia Anemone
(*Urticina felina*)

Anemones anchor on the stones and shells that are buried beneath the sand. They have tentacles filled with stinging cells that paralyze predators with miniature harpoons.

Survival	6
Camouflage	5
Productivity	5
Team work	3



Eelgrass
(*Zostera marina*)

Eelgrass grows in shallow sheltered areas on sandy sea beds. They form huge meadows, creating a new rich habitat for a variety of creatures.

Survival	4
Camouflage	1
Productivity	10
Team work	8

TopSlugs



Plaice
(*Pleuronectes platessa*)

Plaice spend most of their time lying quietly on the sea floor, they can change their colour to match the sandy bottom but the orange spots often give them away.


Survival	6
Camouflage	8
Productivity	5
Team work	1



Red Mullet
(*Mullus surmuletus*)

The Red Mullet has two whiskers called the "barbells" which are used to search the sediment for worms and other food.

Survival	6
Camouflage	3
Productivity	5
Team work	4




Ross Worm
(*Sabellaria spinulosa*)

The Ross worm lives in colonies and stabilizes the sand movements by constructing a protective tubes, after generations this creates a new habitat for other marine life to colonize.

Survival	6
Camouflage	4
Productivity	9
Team work	9


Photocopy this page and cut out the cards to play TopSlugs



Scallop
(*Pecten maximus*)

Scallops swim by rapidly clapping their shell together and leaping along the sea bottom. They also have lots of blinking blue eyes along the edge of their shell.


Survival	8
Camouflage	5
Productivity	7
Team work	3



Sea Mouse
(*Aphrodita aculeata*)

The Sea Mouse is a sand dwelling worm with jaws that shoot out to grab smaller animals to munch on. Their bodies are covered with a dense mat of hairs that under water seem to shimmer.

Survival	8
Camouflage	8
Productivity	4
Team work	1




Slipper Limpet
(*Crepidula fornicata*)

These snails were introduced into our waters in the late 19th century by accident from America. They live in chains of up to 12 animals. The top one is male, the bottom one female and the others have no gender.

Survival	9
Camouflage	3
Productivity	2
Team work	10

TopSlugs



Hermit Crab
(*Pagurus bernhardi*)

The hermit crab carries an 'empty' snail shell on their back for protection, when they grow bigger they have to find a larger shell.

Survival	7
Camouflage	5
Productivity	6
Team work	5



Lesser Sand Eel
(*Ammodytes tobianus*)

The Sand Eel is one of the most abundant fish in UK waters. It lives off plankton that it finds buried in the sand. The colour of the eel can shift from greenish yellow to brilliant silver.

Survival	6
Camouflage	7
Productivity	6
Team work	8



Lesser spotted dogfish
(*Scyliorhinus canicula*)

The Lesser spotted dog fish is a member of the shark family, they attach their 'mermaid purses' containing their eggs to seaweed.

Survival	8
Camouflage	4
Productivity	5
Team work	3


Photocopy this page and cut out the cards to play TopSlugs



Long Spined Sea Scorpion
(*Taurulus bubalis*)

This fish is a 'sit and wait predator' with large eyes and a huge mouth. Its colour is variable and they have a great ability to match their background.

Survival	5
Camouflage	9
Productivity	7
Team work	4



Naval Shipworm
(*Teredo navalis*)

The body of a *Teredo navalis* is long and wormlike. The mollusc is a serious threat to archaeology as it feeds directly on submerged wood, such as wooden shipwrecks and other archaeological artefacts made of wood.

Survival	8
Camouflage	4
Productivity	5
Team work	9



Netted Dog Whelk
(*Nassarius reticulatus*)

The Netted Dog Whelk moves over a sandy surface without sinking. The 'netted' (criss-crossed and spiral) pattern on their shell provides perfect camouflage.

Survival	6
Camouflage	8
Productivity	4
Team work	2

ACTIVITY 4: Group project case study

For the teacher

Learning Objective:

In this activity pupils will learn to appreciate the different viewpoints of the aggregate industry, marine biologists and maritime archaeologists.

They will also develop an understanding of how different professions work together and affect each other. Focus during the project will be on the differences between industries and how to consider and overcome potential problems within a multidisciplinary project. This activity will probably cover at least three lessons. Pupils will furthermore experience and develop research techniques and skills related to group work, creative presentation and group presentations.

- This simulation aims to involve pupils in local issues and how they are affected by industrial and commercial development.
- Pupils will gain experience of working together in a democratic group where everyone has their own role.
- Pupils will need to use all the information available in the Aggregate to Outreach Resource Pack ([see www.hwtma.org.uk](http://www.hwtma.org.uk)) as well as conducting their own research using libraries and the internet.
- Pupils will need to develop a broad understanding of their subject and use common sense and creativity to present the information in a clear and understandable way to the rest of the class.

What you'll need

Resources:

This activity includes one case study focused on the English South coast. A great deal of supplementary information is included in the Solent Aggregates to Outreach Resource Pack ([see www.hwtma.org.uk](http://www.hwtma.org.uk)).

Another option is to focus on your local area and research equivalent case studies accordingly. In addition to the Solent versions, Aggregate to Outreach Resource Packs exist for the Thames, South West and Humber regions, contact HWTMA for more information (www.hwtma.org.uk).

For the poster activity & presentation, you may need:

- Poster sized paper
- Colour pens
- Scissors
- Glue
- Access to Internet and printers
- Powerpoint & projector



Separate packs exist for the Thames, South West & Humber regions

ACTIVITY 4: Group project case study



Working individually or in a group, design and produce a poster. The poster should contain written information about the area in question, as well as additional information such as maps, graphs and images.

The poster should represent the information, from the viewpoint of each group (see below). This is a hypothetical scenario comprising the types of issues that are regularly addressed in reality.

Individuals and groups can also present their work in front of the whole group (10-15 min) and a short discussion of the different viewpoints should be encouraged.

Aggregate extractors

We use around 200 million tons of aggregate every year, mostly for building. 21% of the sand, gravel and crushed rock needed in England and Wales comes from the sea. Aggregate extractors must undertake an environmental survey and produce a report before any dredging can take place.

The aim for this group is to present environmental information for the area, looking at what method of survey would be appropriate and the costs involved. They should also look at how much aggregate can be extracted and in what kind of construction activity it can be used. It is also important to investigate how aggregate extraction contributes to the development of the local infrastructure.

Marine biodiversity group

To protect the environment and wildlife in a specific area a great deal of research is required to develop an understanding of the nature and biodiversity of each area.

This group should look closely at the nature of the area, is it sand, gravel, mud or bedrock? They should then focus on the species that can be found in this type of habitat and how they would respond to large changes in temperature, water flow, disturbance, noise and other factors.

Maritime Archaeology group

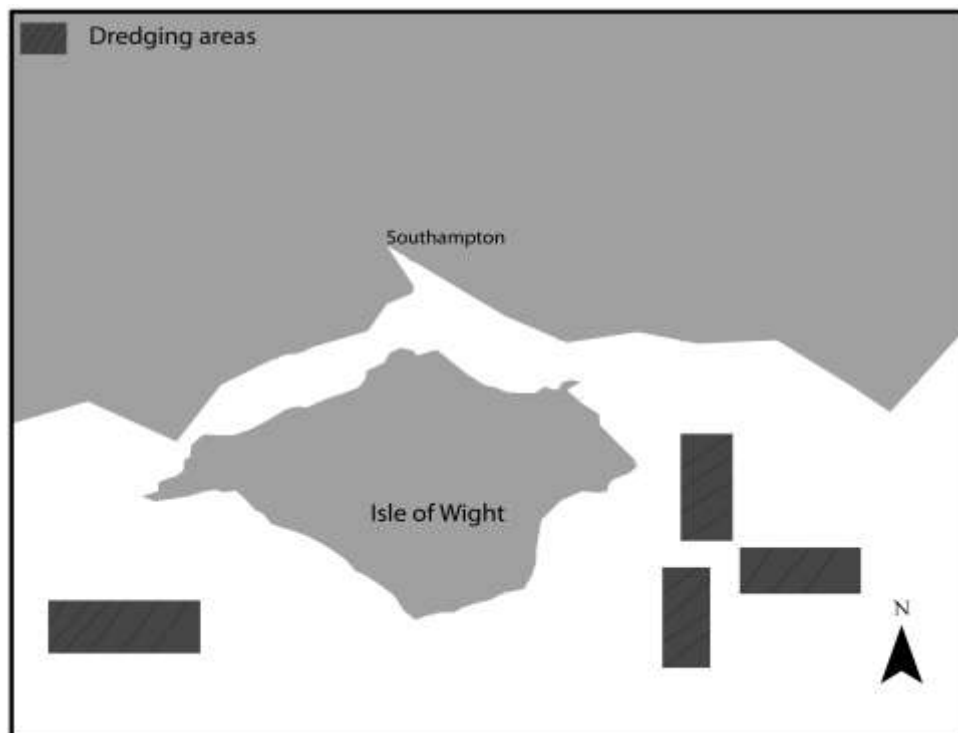
More often than not maritime archaeologists do not need to enter the water to look for archaeology.

The group of maritime archaeologists are expected to do a small *Desk Based Assessment* over the area. They will look at historical records, national monument records, potential shipwrecks etc. Their outcome should focus on the question; is aggregate extraction, or any kind of development advisable in the area, if not, why? If it is, where are the closest protected sites and how might they be affected by extraction activity nearby?

Hypothetical case study: South Coast

This case study provides some general information about the area along the English South Coast. The recommendation is to focus on your local area and through a quick search online provide pupils with similar local information. Another option is to pick one of the areas marked on the map below and get the pupils to do a more detailed study of that area .

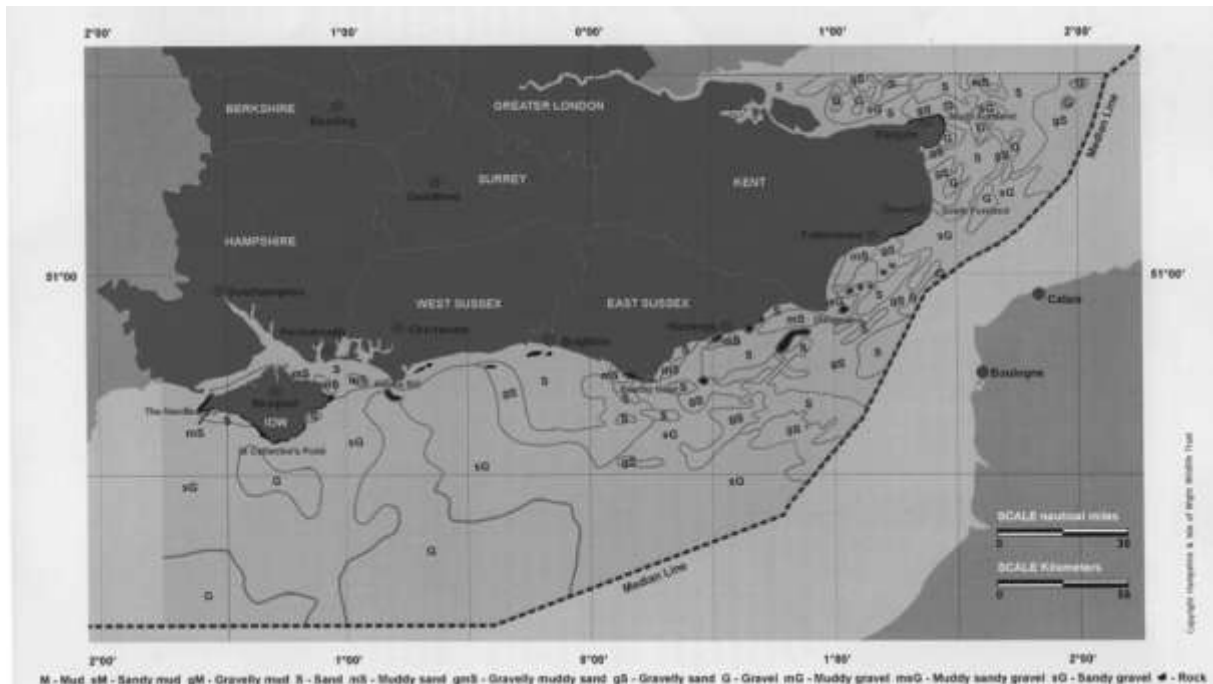
Aggregate extraction on the South coast



Dredging areas on the South Coast

- ◆ This is a highly active area for the aggregate industry.
- ◆ The area off the east coast of the Isle of Wight, and in Christchurch Bay is used for the extraction of aggregates.
- ◆ Aggregates are landed in Newport, Southampton, Portsmouth, Poole and on the Isle of Wight via wharves at Cowes.
- ◆ The marine aggregate is used in the construction industry such as in housing and road building.
- ◆ The marine aggregate can also be used to provide coastal protection.
- ◆ The Crown Estate is the landowner; they have the right to all the minerals on the seabed to the edge of the UK continental shelf.
- ◆ The British Marine Aggregate Producers Association (BMAPA) is the representative trade body for the British marine aggregate industry.

Biodiversity in Eastern English channel



Map of seabed sediment

(Copyright Hampshire & Isle of Wight Wildlife Trust)

- ◆ The Biodiversity in this area is varied and rich.
- ◆ It encompasses the whole range of mammals, birds, fish, insects and other invertebrates, plants, fungi and micro-organisms such as bacteria and viruses.
- ◆ The coastal and marine habitats and species in the Solent area are covered by the following action plans:
 - The Hampshire Coast Biodiversity Action Plan (BAP)
 - The West Sussex Coastal BAP
 - Isle of Wight Local Biodiversity Action Plan
 - Hampshire Shorebirds Species Action Plan (SAP)
- ◆ The South coast is a diverse coast, which includes intertidal and marine habitats, sea cliffs, salt marshes, mudflats, sand flats, rocky shores, and lagoons.

Archaeology in the Solent

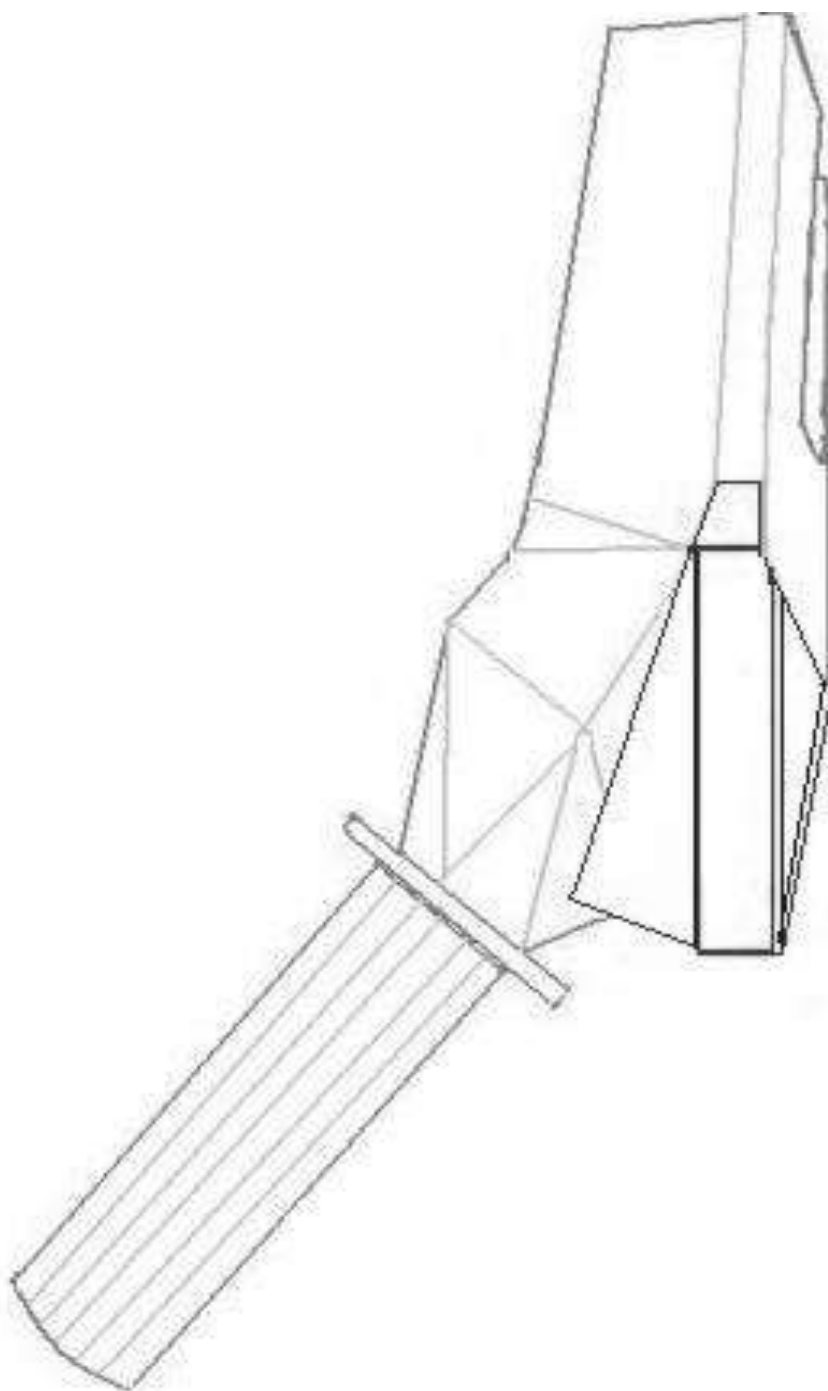


Density of shipwreck sites in the Solent

- The Solent is a unique, nationally important focus for maritime heritage and archaeology.
- 9 protected wrecks out of a total of 61 UK sites (2009) lie within the Solent.
- Over 800 archaeological sites are currently recorded in the Solent and Isle of Wight waters.
- The Solent contains:
 - The highest concentration of coastal defence heritage features within the UK.
 - Important sites associated with the history of commercial activity and coastal settlement.

ACTIVITY 5 Decorate your own Dredger!

On page 9 you can read about the Ninja Turtle Deflector that protects sea turtles from getting hurt by dredgers. The deflector they used was decorated as a happy eagle, but how would you decorate your own dredger head, and which sea creature would you like to protect?



Find out more

About aggregate

www.bmapa.org/

British Marine Aggregate Producers Association. A very informative site with everything you need to know about marine aggregate

www.virtualquarry.co.uk/index.htm

An interactive online educational resource for children and teachers produced through ALSF funding.

www.nationalstonecentre.org.uk

An educational centre focusing on rocks! The site includes a link to 'the educational uses of aggregate'

About marine wildlife

www.hwt.org.uk/pages/south-east-marine-programme.html

South East Marine Programme, a partnership promoting marine conservation in South East England. The programme is supported by the Wildlife Trusts in the South East and The Wildlife Trusts (UK Office).

<http://www.mba.ac.uk/>

A society advancing marine science through research, communication and education.

About maritime archaeology

www.hwtma.org.uk/

The Hampshire & Wight Trust for Maritime Archaeology. For information and activities relating to maritime archaeology.

www.english-heritage.org.uk/server/show/nav.1276

English Heritage's maritime department.

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