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| **Wild Oysters Lesson Plan – Scotland Pre site-visit classroom workshop (Part 1 of multi-visit) Ages 11-14** |
| **Audience** | Chart, sunburst chart  Description automatically generatedAges 11-14Scotland:Second/Third Level P7-S2 |
| **Group size** | Up to 35 students |
| **Location** | In school |
| **Delivered by** | Local Project Officer/Project Assistant/Class Teacher |
| **Duration** | 2 hours |
| **High-level Project Objectives/****Messages** | **Learning Objectives**Students will:1. Develop knowledge and understanding of UK native oysters, including ecosystem services
2. Have a greater knowledge and understanding of marine habitats in the UK and the marine environment = increased ocean literacy.
3. Have increased awareness and understanding of their local Wild Oysters project.
4. Be inspired to care for the marine environment and become marine stewards.

**Key project communication messages****Importance:**1. The health of our marine habitats, such as native oyster reefs, is of crucial importance for wildlife heath & people.

**Problem:**1. Currently our UK marine habitats are degraded.
2. When Oyster reefs are restored, their ecosystem services and function is also restored, which helps towards keeping our ocean healthy and resilient.

**Solution:**1. Everyone has a role to play in keeping our oceans healthy, we need to work together in order to achieve success.
2. We want the general public – Act on doorstep towards helping environment
3. The marine industry and sea users need to be proactive by making space for nature in marinas and reducing pollution.
4. We want our government to promote and fund the active restoration of marine habitats.
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| **Intended Learning Outcomes** | Focus Topic(s): **Interdependence, food webs, adaptations**, life cycles, **human impact**, **environmental issues, work of scientists** and public institutions.**Students will be able to:**(All)  * State two amazing facts about oysters
* State one reason why oysters have declined
* Name two reasons why the oceans are important to them

 (Many)  * Explain what an ecosystem is, using the terms habitat, community
* Explain how losing oysters has a knock-on effect on other species
* State two ways that oysters directly benefit other wildlife
* Describe what the Wild Oyster Project is aiming to achieve
* State two things they can do to help the marine environment

  (Some)  * Explain how the oyster reef provides a habitat for other animals
* Explain what an ecosystem service is
* Plan what data they will record when they visit the site
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| **Curriculum Links** | **Scotland:****Second/Third Level Science*****Planet Earth – Biodiversity and Interdependence**** SCN 2-01a (I can identify and classify examples of living things, past and present, to help me appreciate their diversity. I can relate physical and behavioural characteristics to their survival or extinction)
* SCN 2-02a (I can use my knowledge of the interactions and energy flow between plants and animals in ecosystems, food chains and webs. I have contributed to the design or conservation of a wildlife area.)

***Biological Systems - Inheritance*** * SCN 2-14a (By investigating the lifecycles of plants and animals, I can recognise the different stages of their development)
* SCN 3-14a (I can sample and identify living things from different habitats to compare their biodiversity and can suggest reasons for their distribution)
* SCN 4-01a (I understand how animal and plant species depend on each other and how living things are adapted for survival. I can predict the impact of population growth and natural hazards on biodiversity.)

***Topical Science**** SCN 3-20a (I have collaborated with others to find and present information on how scientists from Scotland and beyond have contributed to innovative research and development.)

**Second/Third Level Social Studies*****People, place and environment**** SOC 2-08a (I can discuss the environmental impact of human activity and suggest ways in which we can live in a more environmentally-responsible way.)
* SOC 3-08a (I can identify the possible consequences of an environmental issue and make informed suggestions about ways to manage the impact.)
* SOC 3-10a (I can investigate the climate, physical features and living things of a natural environment different from my own and explain their interrelationship.)

**Health and wellbeing*****Planning for choices and changes**** HWB 3-19a (I am developing the skills and attributes which I will need for learning, life and work. I am gaining understanding of the relevance of my current learning to future opportunities. This is helping me to make informed choices about my life and learning.)
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| **Delivery Schedule** | * 2 days of site visits per month (2 classes across 2nd/3rd Level )
* Minimum of ten different classes of students at each site, per year. Depends on the size of the school.
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| **Monitoring and Evaluation** | * Word association activity built into beginning and end of pre site-visit session
* Possibly also pre and post multi-visit questionnaires for pupils
* Feedback form for teacher
* Photos of students’ work
* Reflective notes by LPO/PA
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| **Resources and equipment** | * Access to computer and projector
* PowerPoint presentation (on USB stick if necessary)
* Whiteboard (if possible)
* Pens/pencils
* Scrap paper
* Aerated tank with live oysters
* Real oyster shells
* Laminated oyster fact sheets (one between two)
* Bingo templates (laminated/wipe clean) – sweets as prizes?
* Video of oyster filtration demo (or necessary resources to perform live demo)
* Oyster food web pictures x9 (laminated)
* String pieces x16
* Trophic level labels (laminated)
* Poster paper
* Coloured pens and pencils
* Oyster survey planning worksheet
* Adaptations worksheet
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| **Differentiation** | * Pair share and structured discussion activities to allow all students to participate
* Pair and group work to allow higher achieving pupils to support lower achieving pupils
* Use of open questions to allow for a range of opinions, views and abilities
* Variety of active learning opportunities to support different learning styles
* Opportunity for Q&A with the LPO/PA
* Differentiated content e.g. oyster fact sheets have more detailed information alongside key facts so that children can choose how much information they put into the bingo template
* Higher achieving pupils can be challenged to calculate how much water will one oyster would clean in its lifetime, and therefore the impact of losing one oyster from the ecosystem
* Higher achieving pupils can be challenged to calculate how many km2 of oyster reefs are left after a 95% decline
* Oyster survey planning extension activity available for higher achieving pupils
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| **Engagement opportunities for ASN pupils** | * Real oyster shells to touch
* Real oysters in tank to look at
* Videos and images to support verbal content
* Variety of active learning opportunities to support different learning styles
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**Activity Plan:**

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| **Time** | **LPO activity** | **Key questions/messages** | **Learning/SEAL/skills outcomes** | **School staff support** | **Student activity** | **Resources and equipment** |
| **5 mins** | **Welcome and introduction** – Explain who you are (scientist!) and who you work for. Show photos of you at the project site doing your job. Explain why you have come to visit their school today – you want them to understand how amazing and important oysters are and why we should look after them. | You are a marine scientist who looks after oysters. You want the students to know how amazing and important oysters are. | * Describe what their local Wild Oyster Project Officer’s job involves
 | Introduce LPO/PA to class and set expectations for behaviour | Active listening. Look at images. | PowerPoint slides with images of LPO at project site |
| **5 mins** | **Lead pre-session word association evaluation activity** – Ask students to write down (on scrap paper) the first 3 words that come into their head when they hear the word ‘oyster’. Give students 30 seconds then collect responses. | What do you think of when you hear the word oyster? |  | Help give out scrap paper and collect in responses | Write 3 words associated with the word ‘oyster’ | Pens/pencil and scrap paper. Whiteboard |
| **5 mins** | **Lead discussion on the importance of oceans** - Ask students what the ocean means to them. Show prompt images (these could be modified by the LPO to show images of the local coastline). Encourage children to tell each other their thoughts. Select students to feed back what they discussed to the rest of the classCan add more info if needed:* *I want all of us to take a deep breath, and breath out… now take another breath and breathe out. That second one was provided by the ocean.*
* *Oceans are home to more than 90% of life on the planet and capable of absorbing 1/3 of CO2 emissions - they are our lifeline.*
 | What does the ocean mean to you?Oceans provide us with oxygen and are home to 90% of life on the planet.Healthy oceans can also absorb 1/3 of our CO2 emissions. | * Name two reasons why the oceans are important to them
 | If time tally evaluation responses on a whiteboard.Encourage students to discuss and share ideas. | Look at images.Pair share – discuss in pairs/small groups and share ideas with the class | PowerPoint slides with images of oceans/coastline/marine species from UK and around world.Whiteboard. |
| **Lead discussion about what is happening to the oceans** - Show prompt images (can again be modified to show images of local areas to make more relevant). Encourage students to discuss the question and select students to share their ideas with the class.Children may suggest answers such as (over)fishing, plastic, chemicals, pollution, sewage, eating fish, habitat destructionCan add anything they don’t suggest e.g. ocean acidification (due to climate change), deep sea mining. | What is happening to our oceans?Humans are harming them through overfishing, pollution, climate change, and habitat destruction. | * State one reason why oysters have declined
 | Encourage students to discuss and share ideas | Look at images.Pair share – discuss in pairs/small groups and share ideas with the class | PowerPoint slides with images of pollution, fish in nets, built-up coastlines etc |
| **10 mins** | **Introduce oysters and explain that they are important for the health of the oceans** – “*This is where oysters come in!* *Oysters are amazing animals and can help keep our oceans healthy. And they are right on your doorstep, here in xxxx!”**Does anyone know anything about oysters?* Take one or two answers.*“Oysters are molluscs, like snails, but we call them bivalve molluscs as they have two shells instead of one. They live around the coast rather than in the deep sea and live in large groups that form reefs, a bit like coral reefs! In the UK there is only one species of oyster that is native to our shorelines- the European Native Oyster (Ostrea edulis). Native Oysters form complex, biodiverse reefs. Our UK equivalent to coral reefs!”* | Oysters are amazing and help keep our oceans healthy. They live in the sea around the UK and form reefs like corals. | * State two amazing adaptations of oysters
 | Help pass around oyster shells | Active listening and participation in discussion.Observe real oysters in tank and look at/handle real oyster shells | PowerPoint slides with images of oysters and oyster reefs.Aerated tank with live oystersReal oyster shells. |
| **Show images of oysters around the world** (incl. ZSL project in Mozambique) – *“Different types (species) of oyster are found globally. In many places they are a source of food and money, as well as being part of the local culture. In the UK they have been eaten since Roman times and in Whitstable in England there is still an oyster festival every year – these people are the Oyster King and Queen! In Mozambique women collect oysters from the sea shore as a social activity and sell them at market – they are easy to collect as they don’t even need boats to reach them. In other parts of the world oysters make pearls, which can be collected and used for making jewellery. In France oysters are considered a delicacy.”*Ask students if they have any knowledge or memories of oysters, or if their families do. | Oysters are also found all over the world, for example in Mozambique | * State two ways that oysters directly benefit other wildlife, incl. people
 | Support students to take part in the discussion | Active listening. Look at images.Share own experiences of oysters if they have them. | PowerPoint slides with historical images of oyster and oyster projects in other parts of the world. |
| **Show historical images of oysters in UK –** *“Oysters used to be common around UK (and in people’s diets!), and were a big part of everyday life. This drawing is from Oyster day in 1835- the arrival of the first oysters of the season at Billingsgate fish market. Oysters were a staple part of their diet as they were so cheap – around 4 for 1 penny. However, oysters have now practically disappeared due to the same problems that are affecting the seas and oceans generally - overharvesting, pollution and habitat loss. In the 1800s more than 200 million native oysters were sold annually on the London market, even though there were far fewer people living in London back then. This map from 1883 shows that there were huge oyster reefs around the UK coastline, in the English Channel and North sea. Scientists think that there used to be around 20,000 km2 of oyster reefs around the UK at one point, but 95% of this has now been lost. Over time people have forgotten about oysters and how amazing and important they are.”* Extension: students can calculate how many km are remaining. | Oysters used to be common in the UK, but have now almost disappeared due to humans | * State one reason why oysters have declined
 | Support students to take part in the discussion | Active listening.Look at images. Suggest reasons why oysters have disappeared. | PowerPoint slides with images of fishermen, fish markets, fishing boats, pollution, habitat destruction |
| **15 mins** | **Lead oyster adaptations bingo activity** – *“Let’s find out some amazing adaptations of oysters.”* Give out fact sheets and bingo templates to students. Read out a selection of facts and adaptations, then give students time to read through the sheets and fill out the bingo templates with nine facts of their choice. When students have completed their sheets, read out a selection of facts and play bingo. The first person to cross off all their facts is the winner. If time they can complete the additional questions on the worksheet. | Oysters have lots of amazing adaptations, which help them survive in the marine environment.Some of these adaptations also benefit other living things, including humans. | * State two amazing adaptations of oysters
 | Help hand out resources.Support students to read fact sheets and write down facts into their bingo template | Read through the fact sheets and fill out bingo templates. Cross off facts on bingo sheets as they are read out. | Oyster fact sheets – one between two.Bingo template sheets – one each.Prize for winners – e.g. stickers? |
| **5 mins** | **Explain that oysters create ecosystems** – “*Another job that oysters do is to provide other animals with shelter and a place to live. Oyster reefs are made up of lots of oysters all living on top of one another, with spaces in between, which makes a really good home for other animals.”*Demonstrate the 3D structure of an oyster reef using empty oyster shells. Go through definitions of habitats, communities, and ecosystems with students.*“Native Oysters form complex, biodiverse reefs. Our UK equivalent to coral reefs!**Not many people realise that we have such amazing marine habitats in the UK. Often people think you have to travel abroad to see amazing wildlife but we have incredible marine habitats (such as oyster reefs, seagrass beds, kelp forests and saltmarshes) that are home to some of our favourite species- such as seals, seahorses, fish and crabs. Some of these are like underwater rainforests as they are home to so many species!”*Show video of oyster nursery with other species living between shells. | What is a habitat?What is an ecosystem?How are they different?Oyster reefs create ecosystems by providing habitats for many different animals and plants. | * State two ways that oysters directly benefit other wildlife, incl. people
* Explain what an ecosystem is, using the terms habitat, community, biotic and abiotic
* Explain how the oyster reef provides a habitat for other species
 | Help students build reef using oyster shells | Active listening and participation in discussion.Look at images/demonstration and answer questions. | Oyster shells.PowerPoint slides with definitions of habitat, ecosystem, biotic and abiotic.Video of oyster nursery. |
| **5 mins** | **Demonstrate how oysters keep our oceans clean** – “*One of the most amazing things about oysters is that they can clean up the oceans. Just one small oyster can filter 200 litres of water in just one day – that’s a the same as a bathtub filled all the way to the top. Imagine how much water a whole reef could clean up in a day!* “Show video of/demonstrate oyster filtration. Ask students to guess how long it will take for the oysters to clean the tank, then get them to watch the clock to see if they are right. Higher achieving pupils can be challenged to calculate how much water will one oyster would clean in its lifetime, and therefore the impact of losing one oyster from the ecosystem. | Oysters are filter feeders. They clean up our oceans by filtering particles out of the water.  | * State two ways that oysters directly benefit other wildlife, incl. people
 | Support students to take part in the activity | Active listening.Watch video/demonstration.Count how many seconds it takes for the oyster to filter the tank. | Video of oyster filtration demo(Or equipment to carry out demo in classroom) |
| **15 mins** | **Lead math challenge activity:**Can split pupils into groups and have them compete to get the answer the fastest. How much water can one oyster would clean in its lifetime?**Extra challenge:** How many oysters would it take to filter 10 Olympic sized pools? | Working out the two math challenge questions.  | * Emphasising how much water oyster can clean in our oceans.
 | Students to take part in activity. | Completing the maths questions on paper or show me boards. | PowerPoint maths questions. |
| **5 mins** | **Explain how oysters help humans** – Ask for one extra volunteer come up to represent humans in the food web. Discuss with the class how humans might be connected to the ecosystem and ask a volunteer to come up and join the human to the rest of the ecosystem using string. Discuss/model how it would affect humans if oysters disappeared from the ecosystem.Talk through any additional benefits oysters provide if have not been discussed yet:* They support fisheries through the nursery habitats they create
* One Oyster can filter 200L of water per day- Improving water quality & clarity
* They also absorb carbon into their shells providing a sink during this climate crisis!
* Denitrification - Oysters can remove excess nutrients from water – particularly nitrogen, which at high levels can promote harmful algal blooms and fish death.
* They improve biodiversity, creating reef habitats with shelter and feeding grounds for other marine life and wildlife such as birds.
* They have also been an important food source – enjoyed by us since Roman times.

Essentially, they keep our oceans healthy and resilient and for those reasons we like to think of them as our SuperheroesExplain that these benefits to people are known as ecosystem services. | Humans are part of the ecosystem.Oysters do jobs that help humans, such as filtering water.These are called ecosystem services. | * State two ways that oysters directly benefit other wildlife, incl. people
* Explain how losing oysters has a knock-on effect on other species
* Explain what an ecosystem service is
 | Assist with giving out pictures and string.Provide help and encouragement to students if needed, to take part in the activity. | Active listening and participation in discussion.Volunteers help model how humans connect to the food web. | ‘Human’ picture x1.Pieces of string x3 |
| **OPTIONAL****15 mins** | **Lead oyster food web game** – “*does anyone know what a food web is?* *A food web shows how all the living things (organisms) in an ecosystem are connected (interdependent). It’s like a tangled web made of lots of different food chains. Let’s make one together for an oyster reef ecosystem.”*Talk through/get the class to think about the relationships between the elements in the food web.*“Now let’s see what happens when we remove one element from the food web”*Discuss how this would have a knock-on effect on the other elements of the system. Remove oysters and discuss as a class what would happen.  | Food webs show how all the elements of an ecosystem are interconnected.Many different species depend on oysters for survival (oysters are ecosystem engineers). | * State two ways that oysters directly benefit other wildlife, incl. people
* Explain how losing oysters has a knock-on effect on other species
 | Support students to take part in the discussion | Active listening and participation in discussion. | PowerPoint slides with image of oyster food chains/web and the different species found in an oyster reef ecosystem. |
| **5 mins** | **Explain how projects like Wild Oysters are helping to put oysters back** – *“When Oyster reefs are put back, so are their ecosystem services, which helps towards keeping our ocean healthy. How cool is it that we have a species that when restored, it naturally helps us to tidy up our oceans… a bit like a Brita water filter/ hoover, giving us a helping hand! However, oyster numbers have dropped so dramatically that they will only be saved if we give them a helping hand, otherwise they will become extinct in the wild.**“Marine scientists like the me are helping to put oysters back in different areas of the UK, including right here in xxxx. I work for a conservation project called Wild Oysters, and we are creating new oyster beds and restoring the marine ecosystems in 3 different places in England, Scotland and Wales.”* Show photos and videos of marine scientists in the field (including themselves if possible) doing their job/working to restore oysters. Ask students if they can guess what they might be doing in the images/videos and why.Talk through the different activities/roles they have to do for their job. | The Wild Oysters project is helping to put back oysters in the local area and other parts of the UK.New reefs are being created by putting old shells on the sea bed, and mother oysters under pontoons where they release their larvae onto the bed below. | * Describe what their local Wild Oyster Project Officer’s job involves
 | Support students to take part in the discussion | Active listening and participation in discussion. | PowerPoint slides with images and video clips of marine scientists working to restore oysters in the field. |
| **5 mins** | **Lead discussion about how they can help** – Ask children what they could do to help. Encourage them to think back to the beginning when they discussed how humans are causing harm to the oceans and oysters to disappear (show prompt images).Encourage children to discuss the question and select students to share their ideas with the class.Comment on the ideas and suggest other actions that they could take to help out:* Get involved and volunteer at local Wild Oysters project
* Share fascinating facts about oysters and how important they are with others
* Help clean up your local area
* Work together – this could be recycling with your family at home, or organising a beach clean-up with your school
* Reduce waste - especially plastic waste – so that it doesn’t end up in the environment (click on the image to expand the infographic)
 | There are lots of things that the students/school can do to help oysters too. | * State one thing they can do to help the marine environment
 | Encourage students to discuss and share ideas | Look at images.Pair share – discuss in pairs/small groups and share ideas with the class | PowerPoint slides with images of problems and solutions for oysters, and suggested actions. |
| **25 mins** | **[OPTIONAL EXTENSION]** **Lead poster activity –** Ask students to work in groups to create/draw a persuasive poster showing the benefits of restoring oyster reefs, to persuade a millionaire to give them funding for a new oyster restoration project somewhere else in the country.Support the students to complete the activity and encourage them to use their learning from the session to add appropriate information to the poster information e.g. food web diagrams.During the activity organise the students to take turns in their groups to come up and look at the oysters in their tank more closely.If time allows, groups can take it in turns to present their posters. Ask the teacher to take on the role of the millionaire and decide which team should receive the funding.If they don’t finish they can continue at another time. | Oysters are amazing and important to humans, and there are lots of ways to help them.Why should your team receive funding to restore osier reefs in the UK? | * State two amazing facts about oysters
* State two ways that oysters directly benefit other wildlife, incl. people
* State one thing they can do to help the marine environment
 | Support students to take part in the activity. | In groups create posters using the information they have learnt in the session.In groups look at real oysters in a tank. | PowerPoint slides with images of oyster food chains/web and the different species found in an oyster reef ecosystem.Oyster fact sheets.Poster paper.Coloured pens or pencils. |
| **5 mins** | **Explain that they will be coming to visit the local project site** - Talk through what they will be doing when they come to visit the site. Show images and timetable.Explain that as part of the project it is important to collect information/data about the oyster reef which will help the scientists understand what is going on.  | The students will get to be marine scientists for a day!They will be helping to collect important data about the oysters and the ecosystem. |  |  | Active listening | PowerPoint slides with images of the marina and children taking part in activities.Slide of Timetable for the day. |
| **5 mins** | **Q and A** – Spend a few minutes answering any questions the children may have about oysters, the project, your job/career, the site visit, or any other aspect of the session so far.Encourage students to work in pairs to come up with questions and then select students to ask their questions. | Any questions? |  | Support students to come up with and ask questions. | In pairs, students think of one or two questions they would like to ask the LPO.Ask their questions when prompted. |  |
| **5 mins** | **Lead post-session word association evaluation activity** – Ask students to write down (on scrap paper) the first 3 words that come into their head when they hear the word ‘oyster’. Collect responses. | What do you think of when you hear the word oyster? |  | Help give out scrap paper and collect in responses.Help tally responses | Write 3 words associated with the word ‘oyster’ | Pens/pencil and paper. Whiteboard |
| **END** | **Thanks and goodbye** |  |  |  |  |  |

Total – **95 mins** (including optional activities **135mins**)