



OSNEY LOCK HYDRO



The Fish Pass Lesson 3



This project was funded by the National Lottery Heritage Fund

This guide is designed to accompany and complement:

- PowerPoint presentation: **The Fish Pass**
- Single page lesson plan: **The Fish Pass**
- Worksheet: **The Fish Pass** (including activities and possible extension tasks or homework)

The guide goes into greater detail than the single page lesson plan and includes suggested resources and elaborates on each slide in the PowerPoint.

Presentation Tips:

- When opening the PDF presentation, you can select how it is displayed. If you wish to **click through** as opposed to scrolling (which gives you more control as you progress and is more like a conventional ppt) it is best to show it in **'full screen mode'** (press 'escape' to exit).
- All associated documents are attached to the presentation. To find these, click on the **paperclip icon** in the left-hand toolbar.
- When viewing the presentation, presenter notes from this delivery guide are also available for reference if you hover the cursor over the small orange callout icon in the top left corner. **Fig.1**

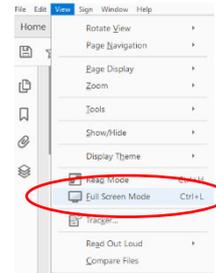


Fig.1



Fig.2

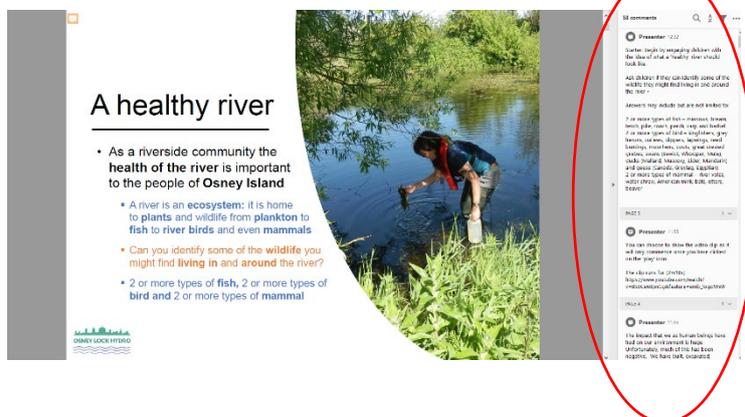


Fig.3

- If you **right click** on that icon it will open a small window showing presenter notes in the top right of the page. **Fig.2** If you right click and scroll down, you can also choose to click **'show comment app'** which opens a panel on the right of the page showing all the presenter notes as you scroll through. **Fig.3**

20 minutes to fill?

You might like to use slide 2 to prompt children to reflect on what makes a biodiverse ecosystem, encouraging them to identify some of the wildlife they may have seen or imagine they might find living in and around the river. In what ways do these contribute to the health of a river?

Slide 2

Slide number	This presentation is designed to allow the presenter/teacher to pitch it as appropriate to KS2 - KS3 age children. Questions that are on the slides have been differentiated by colour in this guide, with red being most challenging. 🏆 Those marked with this icon may not appear on the ppt slide and are optional, higher level questions. 🌀 Points marked with this icon can be used as a starting point for a personal investigation activity and for extension where appropriate. Advisory! All videos are linked to external players (usually YouTube) these have been chosen to complement and reinforce learning and have been chosen carefully. However, we would advise that you watch them yourself prior to showing them to ensure that you are happy that the content is right for your children or class.	Suggested resources	OLH resources
2	<p>Starter: Begin by engaging children with the idea of what a 'healthy' river should look like.</p> <ul style="list-style-type: none">• Ask children if they can identify some of the wildlife they might find living in and around the river - Answers may include but are not limited to: <p>2 or more types of fish – minnows, bream, tench, pike, roach, perch, carp and barbel</p> <p>2 or more types of bird – kingfishers, grey herons, curlews, dippers, lapwings, reed buntings, moorhens, coots, great crested grebes, swans (Bewick, Whooper, Mute), ducks (Mallard, Muscovy, Eider, Mandarin) and geese (Canada, Greylag, Egyptian)</p> <p>2 or more types of mammal – river voles, water shrew, American mink, bats, otters, beaver</p>		PPT presentation, worksheet and lesson plan

3	<p>You can choose to show the video clip as it will only commence once you have clicked on the ‘play’ icon</p> <p>The clip runs for [2m18s] and explores the importance of the river ecosystem</p>	<p>https://www.youtube.com/watch?v=BS8Ce68pnCg&feature=emb_log_oWWF [2m18s]</p>	Embedded clip in ppt
4	<p>The impact that we as human beings have had on our environment is huge. Unfortunately, much of this has been negative.</p> <p>We have built, excavated, developed etc all in the name of progress.</p> <ul style="list-style-type: none"> • Ask children what type of changes to the landscape they you think would affect river ecosystems – Construction of homes, offices or industrial buildings near or on the riverbank, removal of trees and plant life, farming, landfill etc <p>We live in a time where we benefit from much cleaner rivers and canals than we had just 50 years ago.</p>		
5	<p>This is a good opportunity to demonstrate and discuss how our actions can still have repercussions 100s of years into the future.</p> <ul style="list-style-type: none"> • Ask children what we call this period of time (1760 – 1840) – The Industrial revolution • Ask children why they think factories were often sited near waterways and what impact they think that had on the rivers – rivers were the motorways of the era and allowed easy access to resources and deliveries however, many factories also had waste outlets pumping straight into the waterway and they also produced air pollution which had a negative impact on biodiversity 	<p>Industrial revolution https://www.youtube.com/watch?v=vizSn5_uZNq [4m38s]</p>	

Hand out Worksheet Hydropower

6	<p>Task 1 This slide can be used alone or in conjunction with the differentiated worksheet where pupils can write their answers in the table provided for recorded formative assessment</p> <ul style="list-style-type: none"> • Ask pupils to use the words in the list to fill in the gaps in the sentences – once you have gone through the task, the answers will appear one by one on the click of the mouse 		Worksheet The Fish Pass
7	<p>You can choose to show the video clip as it will only commence once you have clicked on the ‘play’ icon</p> <p>The clip runs for [0m30s] and highlights some of the species that live in the Thames.</p>	https://www.youtube.com/watch?v=fi0qqr_aD4A [0m30s]	Embedded clip in ppt
8	<p>This is a wonderful topic to discuss, especially at a time when we are actively re-introducing indigenous species into our rivers and waterways.</p> <p>This may also be a good link to English literature for example The Wind in the Willow by Kenneth Grahame</p> <ul style="list-style-type: none"> • Ask children how they you think beavers positively affect the river environment - beavers gnaw down trees and build dams. By doing this they open up the woodland around them which allows new plants to get the light they need to grow. Beaver dams slow the flow of rivers and streams by flooding small areas and these areas allow new wetland habitats to form 	https://www.youtube.com/watch?v=qtX9ycjUj0E [1h13m12s] The Wind in the Willows 1995 version	
9	<p>Children can probably name the birdlife they have seen at the river or on lakes and ponds. It is interesting to discuss migration – why do birds migrate, what might make the stop in the UK etc</p> <p>https://www.rspb.org.uk/birds-and-wildlife/natures-home-magazine/birds-and-wildlife-articles/migration/ RSPB</p> <p>(Alluding back to the starter slide 2)...</p> <ul style="list-style-type: none"> • Ask children what other birdlife they can we hope to see on and around UK rivers and canals - kingfishers, grey herons, curlews, dippers, lapwings, reed buntings, moorhens, coots, great crested grebes, swans (Bewick, Whooper, Mute), ducks (Mallard, Muscovy, Eider, Mandarin) and geese (Canada, Greylag, Egyptian) etc 	https://www.youtube.com/watch?v=9COPv9C16bI [2m24s]	

10	<p>It is important that we don't overlook other animals that really benefit from a healthy river.</p> <ul style="list-style-type: none"> Ask children what role dragonflies play in the food chain within the river ecosystem – when they hatch, dragonfly nymphs eat harmful aquatic organisms like mosquito larvae. They can continue to do this for 1-5 years before becoming an adult. Dragonflies also provide food for birds, frogs etc <p><i>🔗</i> This can be a great link to Science. There are some nice resources for a pond dipping activity here https://www.tes.com/teaching-resource/science-at-home-pond-dipping-12329285</p>	https://www.bbc.co.uk/bitesize/clips/z3vs34j [1m01s] BBC Bitesize KS2 Science	
11	<p>Whilst we hope that they are there, we may not all have been fortunate to see fish swimming in a river. We are more likely to have seen fishermen and women!</p> <ul style="list-style-type: none"> In the last century certain species have declined in number and some species have even been lost entirely. Ask children why they think this may be – structural changes like locks and weirs have prevented certain fish species moving upriver, the water quality has been affected by pollution including chemical runoff from industry and farming, riverside habitats have been removed or changed reducing fishes' prey species 		
12	<p>Introduce the fact that, like birds, fish also migrate. It is also interesting to discuss the fact that some fish, like salmon, may move from fresh to saltwater habitats.</p> <ul style="list-style-type: none"> Ask children what type of manmade structures might get in the way of migratory journeys – this harks back to the previous question and highlights the fact that locks and weirs can inhibit fish movement upstream 		
13	<ul style="list-style-type: none"> Ask children if they can research and find out how many locks are there on the non-tidal River Thames between Kemble and Teddington - 44 (+ 1 on tributary to River Kennet between Caversham and Sonning) <p>The resource link on the right is a nice interactive map of the Thames onto which you can add selected features from the map key on the left.</p>	https://www.ukwaterwaysguide.co.uk/map/river-thames/main-channel	

14	<p>You can choose to show the video clip as it will only commence once you have clicked on the ‘play’ icon</p> <p>The clip runs for [2m29s] and is an ITV report on the building and opening of a fish pass in County Durham</p>	https://www.youtube.com/watch?v=17c3JUA McQU [2m29s]	Embedded clip in ppt
15	<p>When introducing fish passes it is quite likely that many children will not have heard of them so they will probably have lots of questions.</p> <p>Hopefully, these will be answered in the forthcoming slides.</p> <ul style="list-style-type: none"> • In some situations, ‘fish lifts/elevators’ are installed. Ask children in what situations they think these might be more helpful (than passes or ladders) – When there are a large number of fish needing to pass (particularly during known migration periods) and when the change in level is great (for example in the case of a dam) 		
16	<p>The different types of ladder and pass may be confusing however their names are helpful in describing how they work. The key thing is that children get a feel for how they work, what situations they are suited to and what benefits they offer.</p> <ul style="list-style-type: none"> • Ask children what type of fish they think a pool and weir pass would be suited to and why - a pool and weir pass is best suited to fish that can jump for example, Salmon 		
17	<p>Vertical slot ladders are often more industrial looking and frequently constructed from concrete.</p> <ul style="list-style-type: none"> • Ask children how they think this particular design might make fishes’ passage easier – the walls contain the water, forming pools which allow the fish to rest as they progress upwards 		

18	<p>There are several different types of fish pass and a variety of materials may be used in their construction, from natural materials like rocks and timber to concrete and steel.</p> <ul style="list-style-type: none"> • Ask children what type of situation might be suited to a baffle fish pass – these are suited to smaller waterways (narrower rivers or streams) where the height of the rise is not extreme (e.g. only a few metres) and space is limited, for example at some weirs or locks <p> It might be interesting for children to explore further what monitoring a fish ladder may allow us to understand – fish health, fish numbers etc</p> <p>The video clip (right) shows how fish can be counted.</p>	<p>https://www.youtube.com/watch?v=iaWvYTLbcUH8+%5B2m24s%5D [2m24s]</p>	
19	<p>Task 2 This slide can be used alone or in conjunction with the differentiated worksheet for recorded formative assessment.</p> <ul style="list-style-type: none"> • Ask children to look at the 4 site descriptions shown and defined and see if they can match them with type of fish pass that you think would be best suited – fish arrows will appear one by one on the click of the mouse! 		Worksheet The Fish Pass
20	<p>Some children may rightly be concerned about how turbines can affect fish and whether they cause damage. There has been a lot of research and development done to ensure that they don't including making sure the leading edge of the screw turbine is shaped so as not to cut.</p> <p>The clip (right) simulates how a fish can enter a turbine safely.</p> <ul style="list-style-type: none"> • Ask children if they think that the Archimedean screw completely solves the problems of migrating fish – no, it doesn't as it does not allow passage up-stream, only limited passage downstream 	<p>https://www.youtube.com/watch?v=nlHCNqzW00c [0m21s]</p>	
21	<p>Instead of just leaving the situation as it was, a key objective of OLH was to improve passage for fish and so they undertook to build a pass adjacent to the hydro.</p> <ul style="list-style-type: none"> • At OLH the pass is around 27m long and 1.6m wide, ask children why they think it need to be so long – the rise is 1.8m high so by making the pass 27m long they create a much gentler slope enabling fish to swim up more easily 		

22	<p>Polypropylene is a tough but flexible plastic which has good corrosion resistance. Importantly, it is also recyclable!</p> <p>The flexible brushes act like reeds and slow the flow of the water, forming pools.</p> <p>It is good to emphasize the fact that fish are now able to move freely upstream at Osney lock for the first time in 200 years!</p> <ul style="list-style-type: none"> • Ask children what difference they think this could make to the river ecosystem at Osney – it will enable repopulation of certain species and create greater biodiversity leading to a healthier river 		
23	<p>Salmon have not been seen in the upper reaches of the Thames since the early 1800s and reintroduction efforts since then have failed. The hope is that the more passes that are installed along the Thames the more likely we are to see their return.</p> <p>You might like to ask how children would feel about the possibility of this happening in their lifetime!</p> <ul style="list-style-type: none"> • Ask children what other types of wildlife will benefit from the increased movement of fish – A range including birds and river mammals that prey on them 		

<p>24</p>	<p>At Sandford, their pass was designed by German expert Dr Reinhard Hassinger from the University of Kassel. It was the first one of its kind in the UK.</p> <p>Some parts were produced in Germany whilst the channel itself was constructed when Sandford Hydro was being built between late 2016 and late 2017.</p> <ul style="list-style-type: none"> • Looking at the image on the right, ask children what type of fish pass the Sandford fish pass is – it is a baffle brush pass or BBP and combines several features including steel baffles called ‘superactive’ baffles as well as brush baffles which create resting pools <p>The video clip (right) shows the fish pass in action.</p> <p>In terms of current numbers of passes on the River Thames, we contacted a representative from the environment agency who kindly supplied this information:</p> <p>(Currently, February 2021, there are) 33 weirs (on the Thames that) are passable to some degree or another. 13 of the weirs have specific eel passes on them. 6 of the weirs have fish passes with natural sections which also provide additional habitat – and often we find that the fish are living in these rather than just moving through them. We must remember that some lock and weir sites have multiple weir structures so just one fish pass on site isn't always enough. The dream is for every structure to have a multi-species fish and eel pass on it.</p>	<p>https://www.lowcarbonhub.org/wp-content/uploads/2019/12/Sandford-Hydro-Fish-Pass-1pager.pdf</p> <p>https://youtu.be/Z9QY256GPow [0m10s]</p>	
<p>25</p>	<p>Task 3 This slide can be used alone or in conjunction with the differentiated worksheet for recorded formative assessment.</p> <p> The Osney community has been getting creative to celebrate all the wildlife on their waterway. Using this to inspire you, design a poster to explain the benefit of fish passes – whilst there is a space for ideas on the worksheet, children should be encouraged to use that for brainstorming and planning and produce their poster on a separate sheet, this may be done by hand or digitally or a combination of both</p> <p>Children should</p> <ul style="list-style-type: none"> • Make sure they highlight the problems that barriers create for fish • Illustrate how a fish pass helps fish move upstream • Show how fish and other species benefit from the installation of a fish pass 		

26	<p>Plenary Quiz - What have you learnt?</p> <p>This can be done as a quick-fire hands up quiz or pupils can be given time to write down their own answers for formative assessment.</p> <ul style="list-style-type: none"> • 1760 - 1840 saw a new era of innovation and manufacture. What do we call this period? – The Industrial Revolution • What is it called when fish move up and downstream in search of suitable places to spawn, to find food and new territories? - Migration • What type of manmade structures might get in the way of these journeys? – Weirs, locks, dams • Can you name two types of fish pass/ladder? – Pool and weir, vertical slot, baffle, baffle brush, rock ramp • What have been used in the fish pass at OLH that move in a similar way to reeds and slow the stream? – Polypropylene baffle brushes 		
27	<p>All images used are royalty free, 'Creative Commons' and free to use for non-commercial purposes</p> <p>Sources include: https://www.freeimages.com https://pixabay.com https://unsplash.com www.osneylockhydro.org.uk</p> <p>Microsoft online pictures search (Creative Commons only) Further information about self-guided and guided tours of Osney Lock Hydro is available at www.osneylockhydro.org.uk</p> <p>These materials are free to use and reproduce however we respectfully ask that you do not edit them</p> <p>Further resources can be found at: WeSET educational resources https://www.weset.org/ks-2/ WeSET virtual tour https://www.youtube.com/watch?v=af3oOd1LgyE Sandford hydro virtual tour https://www.youtube.com/watch?v=RvyLVKqnPml</p> <p>Osney Lock Hydro Limited is a registered society under the Co-operative & Community Benefit Societies Act 2014, registered in England and Wales, registration no. 31983R, VAT Registration no. 165 3322 22.</p>		