Together Against Sizewell C

Comments on written submissions responding to ISH7 [REP6-002]

Dr. P. A. Henderson for Together Against Sizewell C (TASC) IP # 20026424

Thursday, 02 September 2021

This note comments on marine ecology aspects of the written submission REP6-002 pages 17-25 paras 1.15-1.19 submitted by CEFAS on behalf of EDF.

Biofouling

1. Dr Henderson argued that because chlorination for biofouling control would only occur after the cooling water had passed across the travelling filter screens and after the fish return system feed-off point, the screens, the station forebays, 3.5 km long intake culverts and fish return system would all be vulnerable to biofouling. He also noted that a similar arrangement had been tried at Marchwood power station and because of fouling of the screens, they have had to introduce chlorination in front of the travelling filter screens. The response in 1.15 does not address the above concerns, it does not address or refute in any way Dr Henderson’s concern that the cooling water system and fish return system will biofoul. I briefly summarise below why this is extremely import.

Fish return system

2. If the fish return system biofouls it will stop working efficiently and may even fail to work altogether. The result will be that the claimed reduction in fish deaths will not occur. If chlorination is introduced in front of the screens and before the fish return system, this would control biofouling; however the fish passing through the fish return system would be harmed by chlorination and again the claimed gains in fish survival will be lost. CEFAS and EDF need to explain why the fish return system will not biofoul and if it does biofoul what they will do about it.

Travelling filter screens and intake forebays

3. Dr Henderson believes that the travelling screens and the forebays and culverts in front of the screens will foul with mussels, barnacles, tunicates, limpets, tube worms and starfish. In areas where there is sufficient light, seaweed will grow. CEFAS and EDF have in their response not refuted that this will occur. Fouling will impair the functioning and life expectancy of the travelling screens and in a worst case situation cause screen blockage and failure of the cooling water flow. If this cannot occur we need to know why not.

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The 3.5 km long culverts and intake structure

4. The response in 1.15 did not discuss concerns about fouling of the main intake culverts from the sea to the plant. There is no available operating experience of such long culverts and no plant in an environment where biofouling is a well-established risk has been operated in the UK to my knowledge without biofouling control. Typically, fouling control is established using continuous low-level chlorination. It is proposed to not use chlorination at Hinkley C, however this plant is situated in an environment where fouling levels are low because of the turbidity of the water. Hinkley B did initially use chlorination but this was discontinued and replaced with an annual monitoring survey to check on the growth of mussels. They do grow in the system, but numbers are low and do not impact operation. It is therefore unadvisable to replicate what is planned for Hinkley C at Sizewell C. Sizewell B and Sizewell A, when it was working, both use chlorination to protect the intake culverts. Indeed, the proposed running of Hinkley C without culvert biofouling control is a serious economic risk which is ill advised with a £25 billion project.

5. Fouling by mussel (*Mytilus edulis*) has been a common problem at power stations in Britain. Mussel spat are planktonic and can settle on any solid surface. Once settled, the mussels grow and later die, when shells may break free and pass into the cooling water system. These shells may block condenser tube endplates and jam in condenser tubes. In severe infestations significant blockage of the intake culverts can also occur. This occurred at Marchwood power station in the 1960s because the staff stopped chlorination. The station needed to be closed down and the culverts dug out by hand. A small image showing the huge effort required is shown below.


Clearing hundreds of tonnes of mussels from the blocked intake culverts, Marchwood Power Station.

Thin fish

6. In section 1.16 CEFAS do not challenge the view of Dr Henderson that long, thin fish and small species will pass across the 10 mm screens and have therefore not been included in the impingement sampling undertaken at Sizewell B.

7. It is asserted that small, thin fish will predominately be juveniles and that because of high juvenile mortality the adult equivalent values will be small. This is in many cases incorrect as explained below.

Gobies of the genus Pomatoschistus

8. The sand gobies, *Pomatoschistus minutus* and *lozanoi*, the common goby *Pomatoschistus microps* and the painted goby *Pomatoschistus pictus* all reach sexual maturity at standard lengths of less than 55 mm and therefore even the adults will pass across a 10 mm screen. The result is that the highly abundant and ecologically important members of this genus have not been sampled adequately as adults. We simply do not know how many individuals will be killed by Sizewell C if constructed and to argue it is insignificant from a position of ignorance is unacceptable. It cannot be claimed that adult equivalent arguments would render the number killed of no ecological significance because the animals entrained are adult.

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Planktonic gobies

9. The transparent goby *Aphia minuta* is a particularly small, delicate and thin fish and all life stages including the adults will pass across the 10 mm screens. There is therefore no adult equivalent argument that can be made and no estimates of the number of this species and the similar crystal goby that will be entrained and killed have been presented.

Pipefish

10. Pipefish of a number of species are known to occur and get entrained at Sizewell B. Nilsson's pipefish, *Syngnathus rostellatus,* is particularly abundant. All life stages including the adults will penetrate the 10 mm screens so again the adult equivalent argument cannot be used because large numbers of adults are certainly caught. We know this because they are caught in impingement samples entangled in weed. Pipefish are important members of the local ecosystem and the entrainment/impingement losses they will sustain have not been quantified. Indeed, in 1.16 they are not even mentioned.

Lamprey

11. In 1.16.9 we get the extraordinary statement: "Based on morphological data collection records (held by CEFAS) a 200 mm total length (TL) sea lamprey would already be at a size where **impingement** is unlikely…." The emphasis is mine. This is clearly rubbish because section 1.16.9 would only make sense as an argument if the writer actually meant entrainment. But, perhaps the writer is asserting that large lamprey are not sucked into the power station and impinged? If so, that is also incorrect. Assuming the argument is that a lamprey of 200 mm TL would to be correctly orientated to pass across the 10 mm mesh, this is certainly true. In fact, like eels, lamprey fight to pass across the mesh and push through head first so surprisingly large lamprey will orientate themselves to push through the 10 mm mesh. I know this from personal experience having watched lamprey push through a mesh.

12. Much is made of the fact that the majority of lamprey impinged at Sizewell are above 130 mm TL and 82% in excess of 200 mm. This is exactly what would be expected if the smaller individuals pass across the 10 mm mesh as individuals in the 130 to 200 mm TL size range will do. Further, they note that lamprey 65- 95 mm TL are caught on the screens suggesting that many small lamprey are entering the system and getting entrained. The vast majority of lamprey between 65 and 150 mm TL will pass across the 10 mm screens and not be quantified in the impingement samples.

13. The implication of the CEFAS summary of the facts is clear: an unknown number of small lamprey pass across the 10 mm screens and have not been quantified. We therefore do not know how many lamprey will be killed by the operation of Sizewell C. An attempt is made to dismiss the presence of small lamprey by claiming they are river washout (1.16.11) and the implication, not stated, is that they are not viable. I have seen many small lamprey at Sizewell A and B screens over the years and they seemed healthy and were alive and vigorous. Because of the conservation status of both marine and river lamprey it is essential that the number that would be impinged and entrained at the proposed Sizewell C station must be quantified and properly assessed.

Eel

14. As in the case of lamprey surprisingly long eels can penetrate a 10 mm screen. In section 1.16.13 the focus is only on the youngest stage, the glass eels. It is noted that the

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larger yellow eels are recorded in the impingement samples. However, we are given no information on the size range of the yellow eels and if smaller individuals are present that can penetrate a 10 mm mesh. Eels will fight to pass across a mesh if trapped so it is likely that impingement sampling has not adequately sampled yellow eels. CEFAS need to supply a full analysis of the size range of yellow eels caught on the screens and an assessment as to whether the small size classes are being under sampled.

15. Adequately sampling glass eel is a problem, especially when numbers are low. Targeted glass eel sampling was only undertaken for two months in 2015. This is clearly insufficient to quantify the number present. The fact that glass eel have been observed in the impingement samples, where almost all would be expected to pass across the 10 mm mesh indicates that they are present. This is a species in considerable population distress and it is essential that adequate quantitative estimates of impingement and entrainment are presented. It is simply not sufficient to say the numbers are low so it is no problem. The fallacy of this argument is easily exposed. If glass eel were present at a density of 1 per hundred cubic meters of water almost none would be captured given the sampling effort previously expended. Yet this would represent 1.25 entrained per second in a 125 cumec intake flow = 75 per minute = 4500 per hour = 108,000 per day. Would anyone feel comfortable with an intake killing more than one hundred thousand small eel per day?

Sandeel

16. In section 1.16.17 it is argued that sand eel make up a small proportion of the fish impinged. This is unsurprising as the vast majority will pass across a 10 mm mesh. The problem as expressed by Dr Henderson is that a pump sampler used for entrainment sampling will not catch actively swimming sand eel so the number passing through the power station has not been quantified.

17. We are informed that beam trawl and MIK net sampling indicated low densities in the vicinity of Sizewell. While densities may be low, we should still be presented with an estimate of the number of sand eel that would enter and be killed by Sizewell C. As was argued above, because of the huge cooling water flows proposed for Sizewell C, a low density translates into a huge number killed per day. A density of 1 sand eel per 10 cubic meters, which would seem insignificant, is an entrainment in a 125 cumec system of 12.5 per second = 750 per minute = 45,000 per hour = 1,080,000 per day.

18. A final point is that this section has only covered a small selection of small fish which will be under-sampled by a 10 mm mesh. Other species would include butterfish, stickleback, dragonette, rocklings, viviparous blenny, to name but a few.

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