

Hinkley Point C WDA Permit application to remove AFD

Environment Agency *Draft HPC HRA for consultation alone assessment, addressing removal of AFD and assessment of effect of discharge via FRR*

NRW Comments

The following documents were provided for comment in relation to EA's draft Stage 2 assessment:

- **Draft HRA record document:** *Draft HPC HRA for consultation alone assessment*, addressing removal of AFD and assessment of effect of discharge via FRR
- **Draft HRA record document Annexes:**
 - *HRA Annex 1 - Plans of Natura 2000 sites - Option B - Relevant N2Ks only*
 - *Annex 2 Relevant site details;*
 - *Annex 3 Ecological narrative of the designated features;*
 - *Annex_4_Appendix_1_fish species selection;*
 - *Annex_5_LSE_Screening;*
- **FIATs:** *Twaite Shad v3; Allis Shad v3; Salmon v3; eel v3; River Lamprey v5; Sea Lamprey v7;*
- **FIAT:** *Marine Fish Assemblage v17; FAS-D Fish Assemblage Selection Definition Report - v3; FAS-D Appendix 1_v3 – Copy; FAS-D Appendix 2 – Copy*
- **Technical Briefs:**
 - TB08 draft 5 + supporting Calculations;
 - TB10 draft 5 + supporting Calculations;
 - TB13;
 - TB18
 - TB20
 - *Quantitative Impact Assessment Input Parameters - V5*
 - (other TB documents: indicated no change since June version)

Caveats on NRW comments provided here

The above documents have been provided as drafts. Within the timescales we have not commented on all aspects, but have focussed on the HRA conclusions and the supporting argument made. As with our previous comments we have left the QIA calculations to EA and we have relied on the output predictions/uncertainty analysis outputs. Similarly, we have not attempted to replicate literature reviews EA have undertaken as part of the assessment. We have, however, previously advised on the principles & approach for various parts of EA's QIA and qualitative assessment and are satisfied that EA's assessment addresses the matters we raised. We have aimed in our comments here to identify any substantive issue where changes appear to us appropriate to support robust conclusions, focussing on Welsh designated SAC/Ramsar/SAC Sites/Features. We have not specifically cross-checked the HRA with the FIATs/TBs and leave that to EA. So, we may raise matters on the HRA or FIAT or vice versa, which EA should consider and cross-check on both.

1. Conclusions on features where Adverse Effect on Site Integrity (AEOSI) can or cannot be ruled out

EA's HRA document conclusions on SAC/Ramsar/SPA features where AEOSI are, or are not ruled out, appear appropriate and supportable by NRW, but we consider some strengthening of the arguments could usefully be made and we offer the comments and advice below.

2. River Lamprey / Sea Lamprey

Whilst we consider that No AEOSI can be concluded, we advise that the cases currently made have some inconsistencies and are not as robust as they could be. We advise that EA consider making

amendments to strengthen the cases provided in its documents. We have discussed this matter with Natural England and attach as Appendix 1 the reasoning why NRW consider that NO AEOSI can be concluded for both River and Sea Lamprey.

3. Homing diadromous species and single river assessment scenario

Atlantic salmon FIAT (Shad FIATs)

The approach taken for Atlantic salmon states that applying all fish to a single SAC river and then using the 99th percentile proportional loss for this river is overly precautionary, the scenario being already a conservative assessment of the potential impact on the river concerned. However, this is the approach that has been adopted for the assessment of shad species in the rivers. It would seem appropriate to take a consistent approach on all natal homing diadromous species, as on the single river assessments the same conservative scenario is being considered.

4. Allis Shad

Allis shad FIAT

The populations of Allis shad from the River Wye and River Severn would be the nearest spawning population to Carmarthen Bay and Estuaries SAC and Pembrokeshire Marine SAC. Therefore, individuals from these sites may be present in Carmarthen Bay and Estuaries SAC and Pembrokeshire Marine SAC, which is not discussed. Also, the mixed stock nature of the marine SAC populations is not discussed which we raised as a substantive issue in July, supporting the case for No AEOSI. It is advised the justification for concluding no AEOSI on Carmarthen Bay and Estuaries SAC is revised to take account of these matters.

5. European Eel

TB018

It is advised that further justification is provided on why it is appropriate to consider other pressures (fishery and barriers) when setting the population estimate for European eels, to ensure the approach does not conflict with that being used to set the population estimates for other species.

It is advised that further clarity is provided on why the full South West RBD population has been used for the population estimate for impingement comparisons, but the Parrett Estuary proportion of the South West RBD only has been used for the population estimate for entrainment comparisons.

European eel FIAT

No comments

6. Marine Fish Assemblage

Marine assemblage FIAT

It is advised that clarity is provided as to whether changes to the populations of brown shrimp or conger eel are predicted in this FIAT, so the effect upon the assemblage can be evaluated further. There seem to be differing levels of concern on conger eel in the FIAT and HRA document.

It is advised that the effect of loss of higher trophic level, piscivorous fish, upon the fish assemblage is discussed further, where possible, to clarify why the losses represent an adverse effect upon the feature.

The HRA in its conclusions refers to the potential structural effects:

Due to concerns over predicted losses on individual marine species, and the potential for these losses to impact the structure of the assemblage we are unable to conclude that there will be no impacts upon marine species or estuarine species within the assemblage of fish species.

This seems appropriate to NRW and EA may want to add to the Marine Assemblage FIAT Discussion section to tie in better to this potential structural change.

7. Use of Conservation Objectives

The Conservation Objective framework for the assessment is complicated by having more than one set of Conservation Objectives in England and on some sites that are shared between England and Wales.

There are instances where Welsh Conservation objectives have not been cited/used and need to be. There are also examples in the HRA document (& FIATs) where COs appear to be used in an inappropriate way, or at least need better explanation on the view arrived at. We attach a spreadsheet of “anomalies” in the use of COs with NRW advice, based on a read through the AFD section of the HRA, but we advise that EA should check all and cross check with FIATs.

We cannot advise on the use of Conservation Objectives that only apply to England, where advice from NE should be considered.

8. Functional Linkage

Arguments based on “functional Linkage” are used throughout the HRA.

The definition of “functional linkage” used is from:

Natural England commissioned report (Chapman & Tyldesley, 2016), on functional linkage. Within the report, the term ‘functional linkage’ refers to *the role or ‘function’ that land or sea beyond the boundary of a European site might fulfil in terms of ecologically supporting the populations for which the site was designated or classified. Such land is therefore ‘linked’ to the European site in question because it provides an important role in maintaining or restoring the population of qualifying species at favourable conservation status.*

Therefore the distinction being considered is between land/sea that may play an important role in supporting the population and that which does not, with a focus in EA’s assessments often being on distance from designated sites to Hinkley C. Whilst the foraging ranges of the piscivorous designated feature species are considered, the assessments have not addressed the geographical range over which marine fish prey stocks may be affected. (Migratory fish species as prey have been considered in some assessment e.g. for otter).

TB011 considers which ICEs areas the Severn estuary fish populations are most likely to be associated with at a Stock level, for certain species, and the QIA and Fish Assemblage FIAT considers the species where changes in abundance cannot be ruled out (whiting, cod, bass, herring, salmon, allis shad, twaite shad or eel). We therefore recommend that this information is used and considered against the diet and ranges of the piscivorous species, to strengthen the argument and conclusions.

We also advise that EA should consider if the wording used in relation to functional linkage can be adjusted to read better. As an example (from the section on Gannet HRA pg 96):

*So although the maximum foraging ranges of the gannet could bring them within the vicinity of HPC, it is considered that the area doesn't provide **an ecological support** for the populations for the Grassholm SPA and as a result the more distant Saltee Islands SPA for which these species are designated. It is therefore considered that **there are no 'linkage'** to these SPAs as they do not provide an important role in maintaining or restoring the population of qualifying species at favourable conservation status*

We embolden and underline above two phrases typical of these sections. Would the 1st read better as "significant ecological support" and the 2nd "there is no 'functional linkage'".

9. Other

TB020

Our comment of 6th July has not been addressed:

Page 16, Bullet point 5

All the fish species assessed are protected under the Habitats Directive, either as part of the marine fish assemblage feature/sub-feature, migratory fish assemblage feature, or as individually qualifying Annex 2 species features. We advise therefore that the justification for use of different confidence intervals for different species, in relation to the features and sub-features is clarified. However, we do not see that the percentiles used in the assessment are inappropriate, when the form of the COs for the marine fish assemblage is compared with those for the individually qualifying fish species and the Ramsar migratory fish assemblage. But please see our comment on use of percentiles for the natal homing diadromous species where an assessment is carried out for all impingement against a single river, which is a conservative scenario in itself.

Table 3 & 4 page 16 – riverine SAC Annex 2 species list does not include lamprey species.

Table 3 & 4, page 19 & 20 – See comment on Atlantic salmon FIAT. From these tables it appears that the total loss of salmon has been applied to total Severn Estuary population and to Wye & Usk rivers individually, whilst using the 99th percentile.

River lamprey FIAT

See Comments under Section 2 above. In addition:

Our comment of 6th July has not been assessed:

Page 19, Severn Estuary Mor Hafren SAC Conservation Objectives November 2018 table

The structure and function (including typical species) of qualifying natural habitats has been assessed as relevant for allis shad so it is not clear why it is not considered to be relevant for river lamprey. We advise that the FIATs are made consistent in this regard.

Sea lamprey FIAT - See Comments under Section 2 above

Sea trout FIAT - Not provided for review

TB008; TB010; TB13 - No comments

Appendix 1

Review of evidence for HPC impacts on river and sea lamprey

Both species of lamprey are Annex II species features of the Severn Estuary SAC and the River Wye SAC and River Usk SAC. In addition, both species of lamprey are part of the migratory assemblage feature of Severn Estuary RAMSAR, as well as of the wider RAMSAR marine fish assemblage. Finally, both species of lamprey comprise part of the marine fish sub-feature of the Severn Estuary SAC and Ramsar Estuary habitat feature

River lamprey;

There is a high degree of uncertainty associated with the assessment of the impacts to river lamprey because;

Entrapment data:

River lamprey are recorded at HPB in both the RIMP and CIMP data sets, with a total of 11 fish, all recorded as being sub-adults.

The intake screen size of at HPB of 10mm means that in theory all river lamprey transformers are likely to be entrained and can be assumed to suffer a 100% mortality. It is therefore not possible to estimate how many river lamprey transformers are lost through entrapment (impingement +entrainment) at HPB.

The scaling up to HPC for river lamprey loss of 20 fish (assumed EAV of 1) therefore has a high degree of uncertainty around it and is likely to be an underestimate. Despite the smaller mesh size of 5mm proposed for HPC it is likely that most transformers will still become entrained, although a small proportion of larger transformers will be impinged and pass through the FRR system.

Population estimates:

The population estimate for the river lamprey population of the Severn Estuary is based on the Apem model developed for the Severn Barrage feasibility study (2010) and is based on population in the rivers Usk and Wye alone. NRW supports the use of the Apem model as being the best available. It should be recognised however, that this is likely to be an underestimate as other rivers, including the Severn, Paret and Avon will contribute to the Severn Estuary population.

Some survey information on river lamprey populations is only available from the rivers Usk and Wye. Reporting for cycle 3 (2018) for the Wye, suggests that although the target population densities met conservation objectives, the river failed on spatial extent, leading to an overall fail, but with low confidence. The most recent reports on river lamprey on the Usk (Cycle 2 in 2013) suggests that although the population passed on spatial extent and age structure, the target densities for ammocoetes were not met leading to an overall fail, although with low confidence.

NRW note the argument being made regarding the low fecundity of river lamprey which could make them vulnerable to local extinction.

Despite the uncertainty and the points made above NRW is of the opinion that a conclusion of no adverse effects on site integrity for river lamprey at both the riverine SACs and the Severn Estuary migratory fish feature, can be supported because;

1. River lamprey are believed from by-catch records to have limited range from the river/estuary where they were spawned. Bahr (1952), cited in Maitland (1980), suggests that this species tends to stay in coastal waters and especially in areas of low salinity. Heesen et al. (2015) note that catch rates peaked in the 20-30m band width with captures from 15-40m depth range. Considering the individual river SAC populations of river lamprey (River Wye and River Usk), any entrapped lamprey originated from the Usk and Wye populations are therefore likely to be individuals straying to the further edge of the range, and more likely to return to spawn in a more local river. They would therefore not have subsequently contributed to the protected populations of the SAC rivers.
2. Considering the estuary SAC population, the estimate of the population for the Severn Estuary feature is based solely on the production from the rivers Wye and Usk. River lamprey do not home to a natal river and therefore the population of the Severn Estuary will be made up of river lamprey produced in all the rivers which discharge into the Estuary, including rivers Severn, the Avon or the Parrett. There is no or little information on the contribution these rivers make to the Severn Estuary stock, but it is likely to be considerable given the size of the available catchments.
3. Finally, all impinged lampreys have been given an EAV of 1, although they are classed as sub-adults. Although it is not possible to estimate the likely mortality from sub-adult to spawning adult this adds precaution into the modelled losses.

Conclusion: There are large uncertainties in the assessment, however given the conservative population estimates for the Severn Estuary population the projected loss of 0.02% is not considered likely to undermine the conservation objectives for the Severn Estuary designation. Furthermore, given that individuals entrapped at HPC would be more likely to return to more local rivers to spawn, then the projected loss is not considered likely to undermine the conservation objectives at the river SACs.

Sea lamprey;

There is a high degree of uncertainty associated with the assessment of the impacts to sea lamprey because;

Entrapment data:

Sea lamprey are recorded at HPB in both the RIMP and CIMP data sets, with a total of six fish, of which three described as juveniles and three are adults.

The intake screen size of at HPB of 10mm means that most sea lamprey transformers are likely to be entrained and can be assumed to suffer a 100% mortality. It is not possible to estimate how many sea lamprey transformers will be entrapped at HPC, however with the change to a 5mm screen it is likely that nearly all sea lamprey transformers are likely to become impinged and will be subject to a 20% mortality through the FRR system.

The scaling up to HPC for sea lamprey loss of 50 fish (assumed EAV of 1) is only based on impingement therefore has a high degree of uncertainty around it.

Population estimates:

The population estimate for the sea lamprey population of the Severn Estuary is based on the Apem model developed for the Severn Barrage feasibility study (2010) and is based on population in the rivers Usk and Wye alone. NRW supports the use of the Apem model as being the best available although it should be recognised that as review by Nunn *et al* (2017) of the same survey date concluded that it the densities used in the model were too high and consequently the population is over-estimated. We note however, that an estimate based solely on the Wye and Usk will be an underestimate as other rivers within the Bristol Channel will contribute to the Severn Estuary population due to the wider range of sea lamprey.

Survey information on sea lamprey populations is only available from the rivers Usk and Wye. Only limited recent surveys have been carried out but on both rivers the surveys suggest that the conservation objectives are not being met, although no formal classification has been possible.

Despite the uncertainty and the points made above NRW is of the opinion that a conclusion of no adverse effects on site integrity for sea lamprey at both the riverine SACs and the Severn Estuary migratory fish feature, can be supported because;

1. As sea lampreys are understood not to show natal homing behaviour, the sea lamprey populations within the Severn Estuary are likely to form part of a wider marine population of lampreys within the Bristol Channel. The available habitat for sea lampreys in the Wye and the Usk is 2,128ha, whereas the total available habitat for lampreys in the Bristol Channel is much larger when considering other rivers with documented sea lamprey populations discharging to the Bristol channel.
2. It is understood that sea lamprey has a wider home range than river lamprey. From the UK and international trawl surveys, as shown in Table 1, sea lampreys have been recorded in deeper waters and farther from the coast than river lampreys.

Table 1: Data on the depth and distance from coast of records of sea lamprey and river lamprey from UK and international trawl surveys

Species	Depth of capture (m)			Distance from coast of capture (km)		
	Mean	Maximum	Minimum	Mean	Maximum	Minimum
Sea lamprey (n=63)	88	295	24	13.7	97.4	0.00
River lamprey (n=44)	26	56	13	3.9	40.4	0.00

A depth profile of the seabed on a transect from Lands End, Cornwall, to Ramsey Island is shown in Figure 4. The deepest section of the entrance to the Bristol Channel is only ~90m, and therefore with a mean capture depth of 88m, sea lampreys may be present through the marine waters of the Bristol Channel.



Figure 4: Depth profile of the Bristol Channel between Lands End, Cornwall and Ramsey Island, Pembrokeshire.

A 100km range from the mouth of the River Usk estuary would extend to the Gower Peninsula or Ilfracombe, though acknowledging that the data presented in Table 1 is distance from the nearest coastline, not distance from home river. The farthest distance from their nearest river for a recorded sea lamprey may be much farther as an individual was recorded to the north west of the Isle of Lewis and Harris, Outer Hebrides, and there are no records of sea lamprey populations on this island, with the nearest records being over 300km away on Kintyre (Hume, 2017).

3. All impinged lampreys have been given an EAV of 1, although they were half juveniles and half adults. This adds precaution into the assessment as there will be some mortality losses from juvenile to spawning adult.
4. Although no estimate can be made of the entrained number of sea lamprey transformers at HPB, the likely losses from entrainment at HPC will be less due to the change in mesh size. In theory, if HPB entrained 100 sea lamprey transformers which are assumed to have a 100% mortality, despite around four times as many sea lamprey transformers being entrapped at HPC, these will be impinged rather than entrained and only incur a 20% mortality through the FRR system, leading to a loss of only 80 individuals.

Conclusion: There are large uncertainties in the assessment of sea lamprey losses and the population status on the Usk and Wye are currently classed as unfavourable. It is however considered that the projected loss of 50 fish is likely to come from a much wider mixed stock from rivers across the Severn Estuary and inner Bristol Channel. The projected loss of 0.3% of the Severn Estuary population is therefore considered to be very conservative and not likely to undermine the conservation objectives at either river SAC or the Severn Estuary sites.