Atlantic Salmon Trust

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Response to Loch Kemp Pumped Storage Hydro Site Proposal

Introduction

Climate change is one of the most significant challenges facing the world, its people and its wildlife, and transitioning to greener forms of energy is important, however new power-generation schemes must not come at the expense of endangered wild Atlantic salmon (*Salmo salar).*

It is the view of the Atlantic Salmon Trust that the proposal known as 'Loch Kemp Storage', which proposes to build and operate a new 600 MW pumped storage scheme utilising Loch Kemp as the upper storage reservoir and Loch Ness as the lower reservoir, has not adequately taken into account the development's impact on endangered wild Atlantic salmon which are already under considerable pressure in the Ness catchment, and therefore should not go ahead in its current form.

Background - The Status of Wild Atlantic Salmon

In December 2023 the IUCN (International Union for the Conservation of Nature) assessed wild Atlantic salmon in most of Great Britain, including within the Ness catchment, as 'endangered' as a result of a 30-50% decline in British populations since 2006 and a 50-80% projected decline between 2010-2025. Among the threats to the species highlighted by IUCN are 'natural system modifications', including dams and water management/use, and other ecosystem modifications.

The Scottish Government's Wild Salmon Strategy also highlights natural system modifications among the dangers posed to this endangered species in the 'Water Quantity' subsection of its 'Pressures on wild Atlantic salmon' chapter, where it states *'Salmon prefer specific water flow characteristics, including depth and velocity, that vary across life stages. Too little water can reduce the availability and suitability of river habitat, causing increased*

mortality. Too much water can affect feeding success or in extreme circumstances displace fish from habitats.'

In the Wild Salmon Strategy's 'Priority themes for action', the responsibilities of the Scottish Environment Protection Agency (SEPA) for *'delivering many of the objectives set out in Scotland's River Basin Management Plans (RBMPs)'* are highlighted. The Wild Salmon Strategy states that *'SEPA has a key role to play in ensuring that no further deterioration in our water environment occurs, and in requiring or indeed taking action to improve the water environment.'*

Endangered Wild Atlantic Salmon in the Ness Catchment

More specifically for the Ness catchment, the Regional and national assessment of the pressures acting on Atlantic salmon in Scotland, 2021, published by Marine Scotland Science and Fisheries Management Scotland identifies significant existing issues associated with natural system modifications in the Ness system. For example, it indicates that between 51-80% of salmon production within the Ness catchment is already lost due to barriers to downstream fish passage. It also identifies *'Abstraction & Flow Regulation'* as a *'Chronic'* pressure in the catchment (present for more than 50% of the calendar year) and makes this assessment with a *'High'* degree of confidence, indicating that this assessment is based on robust evidence.

For endangered wild Atlantic salmon within the Ness catchment to be under this amount of existing pressure, adding further pressure on top of this must not be permitted. The proposed development therefore puts at considerable risk SEPA's responsibility under the RBMPs to prevent further deterioration to the water environment.

The Ness catchment also includes the Moriston Designated Special Area of Conservation (Moriston SAC), for which wild Atlantic salmon are a qualifying feature. At the time of its most recent assessment, the Moriston SAC was found to be in 'unfavourable' condition for wild Atlantic salmon.

The Atlantic Salmon Trust's own data also add to the evidence base which demonstrates the Ness catchment's wild Atlantic salmon are already under considerable pressure. Between 2019-2022 the Trust and its local partners at Fishery Boards and Trusts carried out the Moray Firth Tracking Project. This was a sophisticated fish telemetry programme whereby wild Atlantic salmon smolts (juvenile salmon on their downstream migration to sea) were acoustically tagged across 7 rivers (Spey, Deveron, Findhorn, Ness, Oykel, Shin and Cassely) draining into the Moray Firth to learn more about smolt losses in freshwater during their downstream migration. This study aimed to quantify the proportion of smolts successfully making it to sea. A river catchment's smolt output is directly linked to the number of mature adult salmon returning to spawn, and therefore the ability of the species to sustain its population.

While the detailed data analysis from the Moray Firth Tracking Project is still ongoing, preliminary results show that in the three field study years (2019, 2021 and 2022), the Ness demonstrated the lowest average level of smolt escapement out of all rivers in the study. It experienced just 9% of tagged smolts successfully making it to sea in 2019, 20% in 2021 and 25% in 2022 for an average escapement rate of just 18% across the three study years. This is considerably lower than the average of 47% across the other river systems in the study.

Considering that this further evidence is now coming to light, endangered wild Atlantic salmon within the Ness system must not have additional pressures placed upon them, particularly those which may cause disruption, delays, or obstacles to downstream smolt migration.

In addition to physical barriers, disruption to a catchment's natural flow regime is known to be the most important factor influencing downstream smolt migration success.

What happens in Loch Ness in terms of water management and natural system modifications cannot be viewed in isolation. Loch Ness is not an isolated body of water, but is part of a network of waterways and rivers including the Moriston SAC and River Ness whose endangered wild Atlantic salmon populations are already under demonstrable strain, with one of, if not the main pressure, being natural system modification. Adding a further level of natural system modification to the catchment represents an unacceptable further risk to endangered wild Atlantic salmon.

Risk to endangered wild Atlantic salmon identified in the Loch Kemp proposal

The Applicant's proposal highlights a number of concerning risks to endangered wild Atlantic salmon in the Ness catchment. Given the background outlined in this response, relating in particular to smolt migration, the following areas are of particular concern:

- *'Identified impacts, potentially causing adverse significant effects include: noise and vibration during cofferdam construction (Loch Ness), attraction of adult salmon and lamprey to outlet during generation (Loch Ness), attraction of (downstream migrating) salmon and sea trout smolts to the intake during abstraction (Loch Ness)'*

- *'Identified cumulative impacts, potentially causing adverse significant cumulative effects include: downstream migrating salmon and sea trout smolts becoming attracted to multiple sources of water abstraction and upstream migrating adult salmon becoming attracted to multiple sources of water generation.'*

- *'Due to the programme of works, there are instances where instream works cannot be avoided during sensitive spawning and migration periods for fish'*

- *'Atlantic salmon and sea trout smolts are more sensitive to underwater noise than adult fish as they are smaller and are also known to passively migrate so may be less*

likely to emit a behavioural response of avoidance than adult fish. This would make them more prone to sub-lethal or lethal effects. The significance of effect for Atlantic salmon smolts prior to mitigation is considered to be Major (Significant). The significance of this effect for sea trout smolts prior to mitigation is considered to be Moderate (Significant).'

- *'Downstream migrating Atlantic salmon and sea trout smolts, which are attracted to outflows whilst migrating through loch systems, may be impacted by the Loch Ness intake by attraction to the draw of water from the intake resulting in entrainment. Fish screens of maximum mesh size 12.5 mm would be present at the intake. The best practice guide for screening for intakes and outfalls recommend screens dimensions of ≤12.5 mm to protect migratory salmonids from hydro scheme infrastructure27. Attraction towards the screen during abstraction however could present a delay to migration and is also likely to make smolts more vulnerable to predation from mammalian, avian and aquatic predators (otter, goosander, cormorant, pike and ferox trout). Any delays to migration caused by anthropogenic effects can also have a negative impact on these species on the timing of their migration to sea as they have evolved to time their downstream migration to reach the sea at the optimum time (Ness DSFB, 2022). The sustained swimming speed of Atlantic salmon for 0.15m body length is 0.54 m/s28 and the predicted maximum velocity approaching the intake is less than 0.3 m/s, therefore smolts would have the ability to overcome the draw of the intake velocity voluntarily preventing any injury / mortality associated with impingement on the screens. In the absence of baseline data on smolt migration pathways within Loch Ness, the impacts on smolts are considered using the precautionary principle. The significance of this effect for Atlantic salmon smolts prior to mitigation is considered to be Major (Significant). The significance of this effect for sea trout smolts prior to mitigation is considered to be Moderate (Significant).'*

Our response will make comment on the inadequacies of some of the mitigation measures proposed in relation to the above later in this document.

Inadequate consideration to protect wild Atlantic salmon in Moriston SAC

It is the view of the Atlantic Salmon Trust that the Applicant has failed to adequately consider potential impacts on wild Atlantic salmon and the species' status as a qualifying feature for the Moriston SAC. The Applicant's shadow Habitats Regulation Assessment (HRA) appears to consider wild Atlantic salmon solely within the context of the species' relationship with freshwater pearl mussel (*Margaritifera margaritifera),* rather than appropriately assessing impacts on wild Atlantic salmon as a species in its own right, as it is required to do so. In relation to the SAC, the Joint Nature Conservation Committee (JNCC) states, *'When undertaking an assessment of impacts at a site, all features of European importance (both primary and non-primary) need to be considered.'*

As an example of this framing of wild Atlantic salmon, the HRA states that, *'It is also recognised that salmon comprise one of two potential salmonid host species for mussels in Loch Ness, with trout (Salmo trutta) also widely abundant in Loch Ness and the River Moriston. Consequently, a complete absence of salmon as a host species is not indicative of a total lack of host species for mussels.'*

Whilst presenting no evidence to demonstrate that freshwater pearl mussel in the Moriston SAC exhibit a host preference for trout rather than wild Atlantic salmon, the Applicant's HRA ignores the duty to protect wild Atlantic salmon as an independent qualifying feature of the SAC. Indeed, recent preliminary unpublished results from genetic research have placed the Moriston freshwater pearl mussel population in the grouping associated with Atlantic salmon as a host species.

The proposal also states that brown trout do not migrate out of the Moriston SAC while presenting no evidence to support this claim. Tracking projects on other rivers have demonstrated that brown trout will migrate the full length of a river system, including sea-run variants (sea trout) which are an important population component in brown trout systems.

We are therefore greatly concerned that the independent impacts on wild Atlantic salmon, a qualifying feature of the Moriston SAC, do not appear to have been properly assessed and this seriously undermines the validity of the Applicant's Environmental Impact Assessment.

Cumulative effects of adding an additional PSH to the system not adequately considered

While a selection of the already identified risks to endangered wild Atlantic salmon from the construction and operation of the proposed development are quoted earlier in this document, the Applicant does not appear to have adequately considered the cumulative effects of introducing another Pump Storage Hydro (PSH) scheme to the catchment and how the effects of its construction and operation will interact with the already existing PSH sites in the catchment.

Given the importance of flow, temperature and water levels to migrating endangered wild Atlantic salmon, more information is required from the Applicant on the cumulative effects of adding another PSH site, not only its effect on water levels in Loch Ness and interaction with the smolt chute at the Ness Weir entrance for the Caledonian Canal, but also how it will impact on other natural processes which may affect wild Atlantic salmon migration through changes to the littoral zone, including through food availability, habitat availability, and predator interactions.

We do not therefore consider that the Applicant has adequately assessment potential cumulative impacts on other natural processes affecting endangered wild Atlantic salmon migration.

Comments on the Applicant's Proposed Mitigation Measures

Water management in Loch Ness:

Mitigation appears to be based on maintaining the upper and lower 'hands off' flows in existence for the Foyers and Red John PSH sites. The modelling technical note states that there will be a change in the lower levels of Loch Ness, considered by the Applicant to not be significant, however there is no information on the potential effect on either the fish pass or smolt chute on Ness Weir. The note states that *'our assessment concludes that PSH operation means that the minimum level in Loch Ness will be approached more often.'*

Critically, the Applicant fails to communicate how often this minimum level will or may be reached, and also what the effect of this could be on endangered wild Atlantic salmon. It is essential that this is communicated.

For fish ascending or descending the weir, this could make a significant difference to their ability to move across the barrier which will could cause an impact directly from fatigue or impact from poaching or predation. None of these issues appear to have been adequately assessed.

We also consider it likely that delays may occur in communicating that the 'hands off' level has been reached and therefore a risk that water levels would drop below this level. The Applicant should therefore detail how this warning will be communicated between PSH sites to avoid the lower level being breached, what the reporting mechanism will be, and also the likelihood of this scenario occurring.

In the shadow HRA, the impacts of the fluctuation of water levels (and any associated impacts) were screened out without any logical associated assessment of the impacts of the timing and duration of the levels on the existing fish pass and smolt chute. No detailed assessment appears to have been undertaken and the proposal is relying on operational levels for existing PSH schemes being accepted and not reviewed. The issue of the impacts on levels and the operational efficiencies of the fish pass are highlighted in the Scottish Government's Pressures tool, to which the proposal makes no reference. It is not therefore possible for the proposal to make any assumptions without assessment of the efficiencies of the pass.

A statement is also made in that there is no evidence that the Foyers PSH has contributed to the decline of salmon, while providing no evidence that it hasn't. This must be addressed and backed up by sound evidence.

Mitigation for fish

We make the following comments to various mitigation proposals listed by the Applicant:

'F2 – Sensitive Spawning and Migration Periods – Instream works would be avoided, where practical, during sensitive spawning and migration periods for fish. Sensitive periods are October – June to cover salmonid spawning, egg development in gravels, hatching and also the migration of salmon and sea trout smolts between mid-March – end June. Due to the programme of works, there are instances where instream works cannot be avoided during sensitive spawning and migration periods for fish and appropriate additional mitigation would be provided where this is the case.'

The mitigation does not cover all sensitive periods and should be based on appropriate assessments. The timings stated are not accurate and should be assessed on a case by case basis. Although our terms of reference relate to wild Atlantic salmon, the mitigations proposed do not cover all fish species' sensitive timings and as such we do not consider that the mitigation stated is robust enough to protect them.

It is important that worst case scenarios are modelled in the event that mitigations fail, and the management actions stipulated to avoid these failures from happening.

'F3 - attraction/entrainment/impingement of fish – The approach velocity of water across the intake screen during abstraction / pumping mode would be <0.3m/s This would ensure that most fish species would be able to overcome the effect of entrainment / impingement at the screens. Outflow would be diffused using vane structures on the outlets to spread the flow over a wider area to reduce the potential for attraction / entrainment / impingement of upstream migrating fish. Appropriately designed vertical bar screens of maximum 12.5 mm mesh aperture to cover the intake/outlet would be implemented to prevent fish from entering into the underground waterway system at Loch Ness and Loch Kemp. This would prevent the risks of fish entrapment, injury and mortality or translocation. The screens would require daily inspection and maintenance or a self-cleaning mechanism to prevent blockage / damage from foliage and debris.'

Whilst velocities might not result in impingement, the energy and time which it might take a fish to avoid these issues may still have a negative impact. We do not consider that the mitigation itself negates the impact on fish. We would recommend that no pumping takes place at sensitive times for all fish species passing the screens unless it can be demonstrated that the outflows and intakes would not slow down, delay or otherwise disrupt the passage of fish.

12.5mm will not exclude glass or yellow eels, or lamprey - discharge would need to be at least 0.7-0.8ms-1 (p95 EA manual) currently proposed to <0.3m/s. This manual states *'Screening against up-migrating elvers has not traditionally been practiced but must now be considered, in the light of the current declining status of eel stocks.'*

The best practice also says – '*5.3 Fish Behaviour in Front of Screens: A screen or trash rack represents an obstacle in the flow-path and fish approaching the screen generally turn to face upstream upon meeting it. However, their behaviour in front of the screen depends on*

the velocity conditions. This effect has been described by various authors (Rainey, 1985; Pavlov, 1989; Turnpenny et al., 1998).'

The Applicant should therefore demonstrate by practical example that the screen and flow from the site will not delay or disrupt wild Atlantic salmon or any other fish.

As a reference point, recommendations from Natural Resources Wales state that for the protection of salmon fry the screen should be 6mm. Given that the damage of juvenile salmon is an offence in the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act, the screens need to protect salmon and trout at *all* life stages, including fry, parr and smolts. Therefore, we do not consider the use of screens up to 12.5mm to represent acceptable mitigation.

There are examples of screening being effectively used in similar installations and we therefore do not consider the Applicant has considered mitigation to an appropriate level. Examples exist where much smaller screen slot sizes have been used to protect migratory salmonids, such as Bella Vista Water District Wintu Pumping Plant in the USA where the site was required to install 1.75mm slot size wedge wire screens with a 0.33 feet per second (10 cm/s) or less approach velocity to meet state and federal fish screen criteria for protected anadromous salmonids on the Sacramento River. We ask the Applicant to communicate why a similar level of fish protection cannot be implemented at its proposed site.

We note from the Red John PSH application that 2mm screens were proposed and we would consider this to be a more appropriate size.

'F9 – Attraction of fish to outlet during generation (Loch Ness). An appropriately designed fish deterrent system would be installed which will deter fish from the outlet, prevent entrainment/impingement at the screens, delays to migration and reducing predation impacts.'

The Applicant has provided no information as to how this is to be monitored for success with no baseline information on fish movements. It is essential that this information is clearly communicated.

'F10 Poaching - CCTV would be in operation at the outlet to deter and monitor instances of poaching.'

The Applicant does not provide any evidence to support whether this type of installation is effective in preventing poaching. It would be preferable not to create a poaching risk in the first place which, considering the proposed mitigation is to *'monitor instances of poaching'*, it appears that the Applicant is accepting that a poaching pressure will be introduced. This is not acceptable.

'F11 Mitigation during operation. A FMP will be implemented to monitor the impacts of the operational scheme on fish.'

The Applicant does not detail whether this process will be independent and whether the results be publicly available. This is essential information which is missing.

Further shortcomings in the Applicant's proposal relating to the provision of new tracking studies into migratory salmonids interactions with PSH

It is of great concern that the Applicant considers requests from the Ness DSFB for additional surveying and research to be *'disproportionate when compared to works undertaken for similar schemes.'* It is also concerning that the Applicant states that *'such research cannot be undertaken in the timeframes of this development project' and 'we do not consider it reasonable to undertake such studies as part of the EIA assessment for the Kemp project, particularly given the timeframes that would be required to obtain meaningful results from such studies, and we note that the completion of such research has not been a requirement for other recently consented PSH schemes.'*

This displays an acute lack of care for potential impacts on endangered wild Atlantic salmon. The Applicant should have factored in performing adequate environmental study and survey into its developmental timeframe? If not, can it explain why?

We also do not consider carrying out such surveys and research as 'disproportionate', given a) the greater scale of this PSH site compared to existing sites, b) the cumulative impact this site will add, c) the already high degree of pressure on wild Atlantic salmon in the Ness catchment, and d) the recent IUCN designation of wild Atlantic salmon as an endangered species.

The Applicant's comments about the time it may take to 'obtain meaningful results' are especially exposing. Meaningful results are the results that matter for an endangered species and for impacts on the Moriston SAC, and therefore no time limit should impede the gathering of these results.

It is therefore entirely reasonable and proportionate for new tracking studies to be undertaken as part of the Kemp EIA Report. Whether or not these took place for other developments does not absolve the Applicant of its own responsibility to protect an endangered species, and the wider environment, from harm.

The Applicant also attempts to argue that further studies would not provide clarity on the proposed site's potential impact on endangered wild Atlantic salmon migration by citing the presence of a range of other migration-influencing factors including: predation, temporal and environmental variation, smolt migration directionality, pathogens, genetics and fish behaviour, while not providing evidence as to why the proposed site would not contribute to, or interact with, these existing factors. The Applicant should provide robust evidence to demonstrate exactly how the proposed site will interact, or not, with these various factors.

Summary

It is clear throughout the Applicant's proposals that this development presents considerable risks to endangered wild Atlantic salmon, which are already in significant unfavourable condition within the Ness catchment and Moriston SAC.

Within the system there are significant negative pressures already impacting downstream smolt migration, as indicated by assessments from Fisheries Management Scotland's Pressures Tool, local observations from the Ness DSFB, and preliminary data from the Moray Firth Tracking Project.

Evidence demonstrates that disruption to natural flow is the most important factor influencing smolt migration success, and this proposed development adds additional flow-related pressures, which have not been adequately assessed by the Applicant, to an already heavily impacted catchment.

What is clear is that the process for assessing impacts from proposed developments such as this, and the mitigation measures suggested to offset them, do not provide adequate guarantees that wild Atlantic salmon, now an internationally-recognised endangered species in this region, will not be negatively impacted. SEPA too has a duty to demonstrate that no further deterioration to the water environment occurs, and such a demonstration has not yet been communicated.

Key to assessing the risks to endangered wild Atlantic salmon from another PSH site in the Ness catchment is how its effects will interact cumulatively with sites already operating and approved. The detail of this cumulative effect has been critically overlooked within the proposal, appearing to be reduced simply to one dynamic – water level fluctuation in Loch Ness on smolt migration. The Applicant must provide much more detailed information on the potential cumulative impacts on other natural processes which may impact smolt migration, such as habitat availability and predator behaviour in the littoral zone, as well as biodiversity more widely.

The Applicant has also critically overlooked the potential impacts on wild Atlantic salmon as one of the Moriston SAC's qualifying features by assessing it in terms of its relationship to freshwater pearl mussel, rather than a species in its own right.

The proposal in its present form therefore presents an unacceptable level of risk to endangered wild Atlantic salmon. Taking on board the points raised in this response and where we see considerable shortcomings and evidence gaps in the Applicant's current proposal, the Applicant should ensure that the appropriate research and monitoring is conducted to fully assess and communicate any potential impacts on endangered wild Atlantic salmon, as well as to maintain the wider biodiversity value of the Ness catchment.