Further Evidence on the *Scottish Biodiversity Strategy to 2045: tackling the nature emergency* for the Scottish Parliament's Net Zero, Energy and Transport Committee

Submitted by Fidra, 4th January 2024

Thank for you inviting Fidra to the *Scottish Biodiversity Strategy* evidence session of the Net Zero, Energy and Transport Committee on Tuesday 12 December 2023, we welcome the opportunity to provide further information following this session.

While Fidra support the 6 high level objectives of the *Scottish Biodiversity Strategy* we believe the Strategy will only be successful in safeguarding species if it addresses pollution. Despite the UN's Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services recognising pollution as one of the 5 key drivers of species loss[i], the Biodiversity Delivery Plan has no reference to pollution. As outlined in the session and Fidra's written submission (submitted 5th December 2023) plastic and chemical pollution is already impacting our vulnerable species and a comprehensive strategy is needed to prevent further harm.

We welcome the committee's interest in plastic pellet pollution and provide further information below. We have also included further information and potential solutions for addressing another overlooked source of pollution in Scotland, the agricultural use of sewage sludge and other industrial wastes.

Plastic Pellet Pollution and Scottish Biodiversity Strategy and Circular Economy Bill

Plastic pellets, also known as nurdles, when lost to the environment are a threat to biodiversity and a functioning circular economy. Pellet pollution needs to be addressed through both the Scottish Biodiversity Strategy and Circular Economy Bill.

Plastic pellets can be made of fossil fuels, biobased polymers and recycled plastic all of which pose a threat if lost to the environment. As voluntary efforts by the plastic industry have failed to prevent loss at all stages of the plastic pellet supply chain, governments and regulators must take a leading role to ensure:

- Environmental principles are implemented in relation to pellets - namely rectification at source and polluter pays principles
- Monitoring of pellet pollution – to determine scale of pollution and impacts
- Restoration and remediation – with clear guidance to ensure those responsible effectively mitigate damage caused by pellet pollution
- Preparedness for pellet spills - A pellet spill protocol could significantly reduce the impacts on Scottish biodiversity of a pellet spill.
- Legislation and enforcement requiring companies to implement and verify pellet pollution prevention measures across the plastic pellet supply chain and document incidents.

Scotland is a source and sink for pellet pollution which threatens our environment and biodiversity and undermines our circular economy ambitions. The Circular Economy Bill and associated polices and strategies should focus on prevention of pellet pollution and be complemented by a Biodiversity Strategy and Delivery Plan focusing on restoration, mitigation, remediation and environmental monitoring of pellet pollution. For example, Circular Economy approaches could include legislation to prevent pellet loss across the supply chain, supported by effective Biodiversity Strategy and delivery plans which include: environmental monitoring of plastic pellets alongside other pollutants within food chains and specific species; plans and guidance for restoration and remediation of pellet contaminated sites so as to benefit biodiversity and avoid unintended negative impacts on species and habitats; and the development of pellet spills protocols and compensation guidance to enable a swift response to spills. Pellet spill protocols require input from a biodiversity perspective so that in the event of spills, biodiversity impacts can be mitigated in the first instance and assessed so that appropriate compensation is then put in place. As such developing pellet spill protocols should be incorporated the Biodiversity Strategy delivery plan. Alongside actions in the Biodiversity Strategy and delivery plan there also needs to be legislation to ensure that rectification at source and polluter pays principles are implemented and enforced with prevention, clean-up and compensation costs covered by the plastic supply chain.

Pellet pollution in Scotland

Scotland is major plastic pellet producer with Grangemouth responsible for a third of the entire UK plastics production[ii]. Plastic pellets are also used in Scotland to make plastic products with pellets being transported by land and sea, putting communities and the environment across Scotland at risk of pellet pollution from production, manufacturing and transport. Fidra's Great Global Nurdle Hunt (www.nurdelhunt.org.uk) has found that Scotland is home to some of the worst plastic pellet polluted beaches in the world, with consistently high levels of pellet pollution being found in the Firth of Forth over the last 10 years and The Global Plastic Pellet Supply Chain report clearly identified Scotland as a hotspot for chronic pollution from the ongoing loss of pellets[iii]. In addition to ongoing pollution from industry, Scotland is also at risk of large scale shipping disasters due to the scale of pellets being produced and transported in and out of Scotland.

As a major producer, user and transporter of pellets Scotland also contributes to plastic pellet pollution around the world with annual estimates of pellet loss to the environment globally as high as 445,970 tonnes[iv].

Biodiversity impacts of pellet pollution

Pellet pollution in Scotland is widespread with high levels of pellet pollution being found in sensitive areas (Figure 1) including Sites of Special Scientific Interest and nature reserves (such as Kinneil Local Nature Reserve, West Lothian).

Pellets are mistaken by wildlife for food, leading to organ damage and starvation when ingested, while toxic chemicals and plastics can enter the food chain[v] [vi]. Plastic pellets can also adsorb and transport toxic chemicals[vii] and pathogens such as E. Coli[viii], documented on pellets in Scotland. The ongoing loss of pellets as well as acute spills (such as those from shipping, rail and road incidents) can have catastrophic impacts on wildlife and communities. Should a shipping disaster (such as those seen off the coast of Sri Lanka in 2021 and Brittany in 2023) occur in the Firth of Forth, globally important seabird colonies and marine life would be devastated.

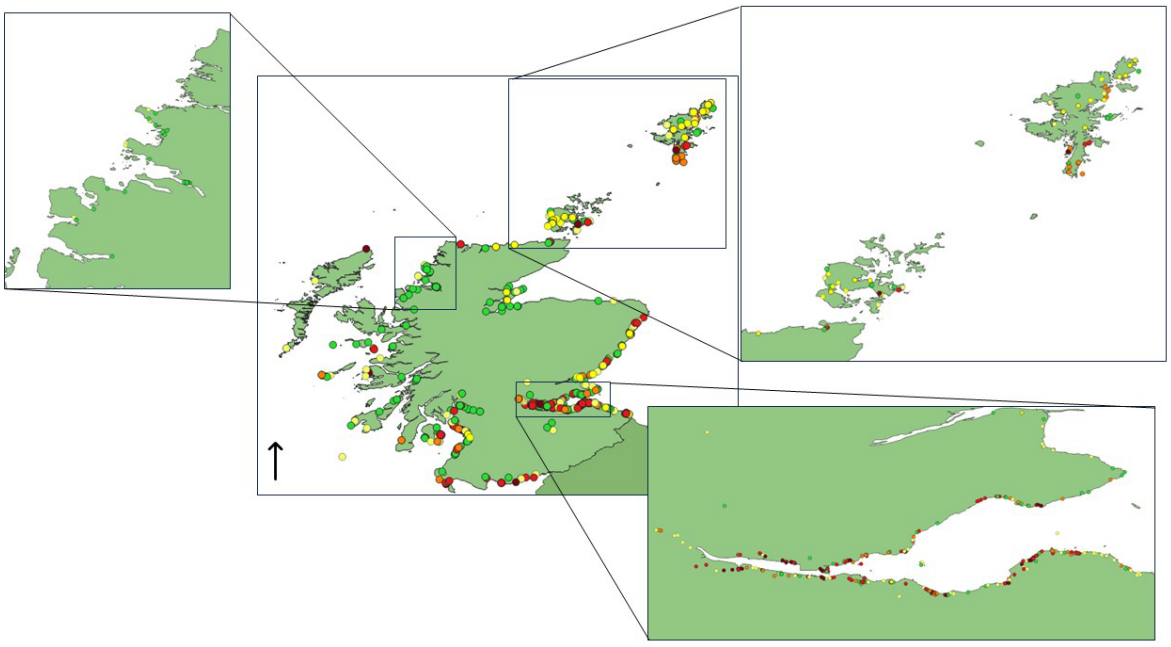

Figure 1. A map of Scotland Nurdle Hunt Data between 2013-2023. Insert maps (Left – right): North Highlands; Orkney and Shetland Islands; and Firth of Forth. Where, no nurdles found is represented in green, 1-30 nurdles found is represented in yellow, 31-100 nurdles found is represented in orange, 101-1000 nurdles found is represented in red and greater than 1000 nurdles is represented in dark red.

Circular economy and pellet loss

The loss of pellets is not just an important pollution issue, it also represents a loss of resources. Pellets in the environment cannot be easily recovered or recycled. Pellet pollution must be prevented at source. Pellets can be lost at every stage of the pellet supply chain as such action needs to be taken to prevent pellet loss at every stage.

Scotland has led the way through the development of British Standard Institute PAS 510:2021[ix] the first standard that aims prevent pellet pollution, however it has not yet been adopted by the entire plastic supply chain. Robust standards should become the basis of a legislated and independently audited supply chain approach, lesigaltion would ensure sector wide uptake and prevent further pellet loss. Prevention measures such as those outline in PAS 510:2021 could reduce plastic pellet loss by 95%[i], but current efforts to

address this major source of microplastic pollution have been voluntary, of limited scope and insufficient to address the issue. Current industry led voluntary schemes have had limited take up and therefore are not fit for purpose.

Solutions to pellet pollution

Scottish beaches are suffering ongoing chronic pellet pollution (legacy and current) and local communities report seeing little action from authorities or industry to prevent pollution or support clean up (see our volunteer case study for more details). Plastic pellets are industrial pollutants lost across the plastic supply chain. Councils focus on litter management rather than the clean-up of heavily polluted beaches while SEPA has not operationalised the polluters pay principle for plastic pellets. This is due in part to a lack of legislation specific to pellets and the current approach to enforcing polluters pays through attributing pollution to specific companies rather than taking a sector wide approach.

A legislated supply chain approach would require all actors in the plastic pellet supply chain to implement pellet loss prevention measures, these would be verified against robust standards through independent audits, with a public register to ensure all actors meet the requirements and only work with others that maintain these standards. The European Union is proposing legislation to require companies to have prevent loss prevention measures which, if strengthen to include all actors, could drive change in the sector. In the UK Defra are launching a microplastics study to explore options. Scotland has the opportunity to build on the success of British Standards Institute PAS 510:2021 and ensure Scottish businesses lead the way in preventing pellet pollution through a legislated supply chain approach.

The adoption of the supply chain approach should be supported by spill response protocols as well as restoration, remediation and compensation schemes. While the responsibilities and costs for these protections should be borne by the polluters they must be legislated for and enforced by governments and regulators with appropriate protocols, guidance and policies in place. Scotland must have mechanisms to ensure polluters pay to clean-up historic pollution and is prepared in the event of a large-scale spill on land or sea, including restoration and compensation schemes. This combination of prevention, preparedness and restoration requires domestic policy, resources, enforcement, monitoring and legislation as well as continuing to support international efforts to prevent pollution through mechanisms such as OSPAR, the International Maritime Organisation and UN Global Plastic Treaty. Preventing pellet pollution through a legislated supply chain approach is critical.

Supporting Sewage Free Soils in Scotland

The wastewater from industry, businesses and our homes enters wastewater treatment works where it is filtered and cleaned. Yet, this clean water comes at the expense of an increasingly contaminated 'treated' sewage sludge product (referred to as biosolids) that gets recycled to land. Currently, sewage sludge acts as a sink for persistent contaminants removed from wastewater during treatment and these contaminants are almost impossible to remove from biosolids products.[x] Around 60% of Scotland's treated sewage sludge is applied to agricultural soils.[xi] Scotland’s agricultural soils are a finite resource, essential in

climate regulation and a biodiverse habitat in their own right - one quarter of the world's biodiversity is to be found in soils. Protecting the health of Scotland's soils from complex mixtures of harmful chemical and microplastic contaminants, such as those found in biosolids and other industrial wastes used as fertilisers (e.g. food waste digestates and compost) is crucial.[xii] Once applied to Scotland's land, nutrients, organic matter, and closely associated contaminants can be transported from the soil into rivers and the wider environment, ultimately ending up in the oceans.[xiii]

Circular economy & sewage

The potential value of sewage sludge as a resource and an essential cog in the circular economy wheel is acknowledged. Organic wastes are sources of soil health-enhancing organic matter and essential crop nutrients for agricultural production, reducing the reliance on inorganic fertilisers and extraction of non-renewable mineral and fossil fuel resources. However, the hidden dangers from emerging contaminants remain unregulated and poorly understood, resulting in inadequate and unacceptable levels of environmental protection.

Solutions for sewage sludge: Upstream and Downsteam

Upstream

Society can tackle contamination by reducing the use of harmful chemicals and preventing widespread continued manufacture, use and release of contaminants or disposal of contaminated products. To embrace a safe circular economy for the future, more robust upstream measures need to be put in place to keep harmful chemicals and microplastics out of Scotland's wastewater. Future restrictions, controlling at source and investing in the development of alternative products that are more environmentally sustainable all merit support.

Downstream

Any wastes containing persistent organic pollutants (POPs), like sewage sludge, should be processed so that the POP content is destroyed or irreversibly transformed. For example, to completely destroy all persistent harmful PFAS, combustion temperatures greater than 1000 ^{o}C are required[xiv]. Therefore, in the absence of adequate upstream control of the chemical contamination of sewage sludge, high-temperature destruction and associated carbon emissions are a regrettable and unacceptable consequence of diverting contaminated wastes from land.

Improved techniques for extracting energy and valuable nutrients and metals from organic wastes like sewage sludge, as well as destroying contaminants, are being developed. For example, advances in anaerobic digestion/biogas production, and digestate residue incineration or pyrolysis and gasification technologies could offer viable solutions.

Current sewage regulations

Potentially toxic elements such as metals in sewage sludge are regulated and pathogens are controlled through voluntary measures, but synthetic chemicals (e.g., PFAS, bisphenols, parabens) and microplastics are not. Therefore, without testing for this complex mixture of chemicals and the existing need to establish viable restrictive limits for all contaminants of concern found in sewage sludge, the precautionary approach is recommended until the levels found within sewage sludge are proven to be safe.[xv] Whilst those involved with the sewage sludge supply chain already adhere to the current

agricultural use of sewage sludge regulations and biosolids assurance scheme,[xvi] these guidelines do not currently reflect the modern-day composition of biosolids and require revisions alongside improved legislation.

Precautionary principle and sewage

The contaminants from treated sludge are being transferred to agricultural soil with unknown impacts. Given that soil is a finite resource vital for long-term food security, the economy and biodiversity in Scotland, the precautionary principle needs to be upheld to avert legacy contamination of soils and the wider environment. Preventative action is necessary and has already been taken in many countries in the EU. Scotland should strive to follow suit to ensure our soils are healthy, biodiverse, and productive for future generations. Application of sewage sludge in its current contaminated form to land is a significant risk and a process that is not environmentally sound.

Recommendations for sewage sludge

Ending the application of contaminated sewage sludge and other industrial wastes to agricultural land until they are proven to be clean and safe resources for an effective circular economy is recommended. Constructive dialogue between sectors and consideration of scientific evidence and practicability is needed to bring improvements. Research innovations and improved or repurposed water industry infrastructure to support the development of contaminant-free sludge (and wastewater) must also be prioritised so that Scotland can adopt promising contaminant and nutrient removal techniques happening elsewhere in the world.

We recommend that Scottish Government strategies consider investing in upgrading and future-proofing their sewage management systems (e.g., utilising nutrient (particularly phosphorus) recovery technologies and upgrading existing energy from waste infrastructure capable of POP destruction). In addition, agricultural use of contaminated wastes should be phased out until such a time that contaminant levels are acceptable and fit for use as beneficial sources of nutrients and organic matter for a safe clean circular economy.

Overall, cleaner biosolids will benefit Scotland's future environment and society as a route to safer nutrient recycling, avoiding the need to prohibit application of wastes due to contamination and ensuring Scotland maintains healthy productive agricultural soils that support biodiversity.

Further Information

In addition to the evidence relating to the Biodiversity Strategy (written evidence submitted by Fidra on 5th December 2023) Fidra have also recently contributed to a joint evidence submission from ScotLink to the Net Zero, Energy and Transport Committee in relation to the Circular Economy Bill session held on 17th November. Please contact [EMAIL REDACTED] or [EMAIL REDACTED] for more information.

About Fidra

Fidra is an environmental charity delivering solutions to environmental issues through working with the governments, industry and the public and by using the best available

science. We tackle threats to the environment from pollution and habitat degradation with projects to reduce the plastic and chemical pollution from packaging, plastic pellets, sewage sludge and furniture. Our previous projects led the change in cotton bud sticks from plastic to paper, reduced the use of harmful chemicals in receipts, supported retailers to move away from forever chemicals in clothing and raised awareness of the environmental impacts of salmon farming. We continue to grow our projects to support sustainable societies and healthy ecosystems. Fidra is a Scottish registered charity and SCIO no.SC043895

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