Supporting Information for an Application for Derogation under Regulation 54 & 54A of the European Communities (Birds and Natural Habitats) Regulations 2011 to test whether Slender Naiad (*Najas flexilis*) can be germinated ex-situ from lake sediment seed bank, Lough Leane, Killarney National Park

NPWS

An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra
National Parks and Wildlife Service

1. Contents

2. Introduction

(a) The aim of the project to test whether Slender naiad (*Najas flexilis*) can be germinated ex-situ from lake sediment seed bank collected from Lough Leane, Killarney National Park.

It is a first step in investigating the feasibility of supporting the conservation of *N.flexilis* through seed bank propagation methods.

Aine O'Connor, NPWS Lake Ecologist, proposed to Mary Sheehan, DCO for Killarney National Park, a pilot project to test whether *N.flexilis* can be germinated from lake sediment seed bank collected in Lough Leane, Killarney NP. The rationale behind the project is to safeguard future *N.flexilis* populations, given that since 2013, the species has seen a dramatic decline in abundance and distribution, despite Lough Leane being cited as once possibly having the largest population in Europe (See Section 3.2).

(b) Shonagh Gray will lead the proposed pilot project with the assistance of the district conservation officer and Killarney National Park Conservation Rangers. Shonagh's main role will be to collect the lake sediment, to carry out the germination trials ex-situ and to report on findings. Supporting rangers and DCO may assist where necessary, for example when collecting the sediment, as at least two staff are required on the vessel or monitoring weekly when Shonagh is on leave for a period of a week of a week or more

Shonagh Gray is a Conservation Ranger working in Killarney National Park since 2023. She has a degree in Zoology (BSc. Hons) from UCC & several years' experience in conducting ecological surveys as both a student, as Field Studies Instructor in Killarney National Park Education Centre and as Conservation Ranger. Shonagh has completed an Aquatic Plant ID skills course with BSBI. She is familiar with biosecurity protocols and has practical experience operating a lake boat being competent in their safe use for ecological fieldwork, including navigation and positioning

(c) Other staff that may assist in the project are;

Mary Sheehan is a District Conservation Officer (DCO) for Killarney National Park. She has completed an Aquatic Plant ID skills course with BSBI and has worked previously on aquatic plant monitoring projects in Killarney National Park and provided reports on notifiable actions concerning Lough Leane to Regional Management and Divisional Ecologist. She has also undertaken eDNA sampling. Prior to joining the NPWS, Mary worked in the Environmental Protection Agency for over 11 years both as an inspector and writing licences on installations requiring an IPPC or waste management licence which involved assessing Environmental Impact Assessments and Appropriate Assessment and Natura Impact Statements and has taken water samples during investigations of non-compliances in her role as inspector.

Tim Cahalane is a Conservation Ranger working in Killarney National Park

Jessica Burkitt is a Conservation Ranger working in Killarney National Park.

Tricia Beecher is a Conservation Ranger working in Killarney National Park.

Calum Sweeney is a Conservation Ranger working in Killarney National Park.

Micheal Mc Sweeney is a Conservation Ranger working in Killarney National Park.

Conor Rowlands is a Conservation Ranger working in Killarney National Park.

3. Background to proposed activity

3.1 Site Background

Killarney National Park forms part of the Killarney National Park, Macgillycuddy's Reeks & Caragh River Catchment SAC (000365) and is also designated as an SPA, Killarney National Park SPA (004038).

Killarney National Park is state owned and managed by National Parks and Wildlife Service (NPWS), with conservation objectives aimed at maintaining or restoring the favourable conservation condition of qualifying interests

Lough Leane is the largest of the Killarney lakes, with a surface area of approximately 19km^2 (Fig 1)

Lough Leane is categorised as Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130]. Within Lough Leane, key qualifying interests include Slender naiad (*Najas flexilis*), Killarney Shad (*Alosa killarnesis*), Atlantic salmon (*Salmo salar*), lamprey species (*Lampetra planeri, Lampetra fluviatilis*, *Petromyzon marinus*) and otter (*Lutra lutra*)

3.2 Slender Naiad (*Najas flexilis*)[1833]

The Overall Conservation Status of *N.flexilis* is assessed as Bad with a deteriorating trend, which is a change in status from Inadequate with a declining trend in 2019. The deterioration in status is due to habitat degradation and population decline (Article 17 Report, NPWS, 2025)

Evidence indicates the population of *N.flexilis* in Lough Leane, once likely to have been the largest in Ireland and, possibly, Europe, has collapsed in recent years (Roden et al., 2021; Roden and O Connor 2024). A survey in 2019 only recorded five plants at a single location at Tomies point, Lough Leane. This is in stark contrast to 2013 surveys, which recorded *N.flexilis* at nine stations throughout Lough Leane. It is thought the introduction of the non-native macrophyte *Nympoides peltata* has contributed to the decline in *N.flexilils*.

3.3 Project Rationale

The proposed project aims to support the conservation and safeguarding *of N.flexilis* given its recorded population collapse. The species is known to have specific habitat requirements and can be sensitive to environmental change, making populations vulnerable

It is a first step in investigating the feasibility of supporting the conservation of *N.flexilis* through seed bank propagation methods.

The collection of sediment to facilitate ex-situ propagation trials will improve understanding of germination requirements and support the development of conservation measures

Ex-situ propagation provides a means of safeguarding genetic material and supporting potential future restoration or reinforcement of populations, if required

The project therefore contributes directly to the conservation management of *N.flexilis* and supports conservation objectives within the SAC.

4. Full details of proposed activity to be covered by the derogation

4.1 Sediment Collection Strategy

Location:

Lough Leane, Killarney National Park (Fig 1)

Areas with highest likelihood of viable seeds were chosen based on;

- Most recent records of adult plants
- Greatest abundance of adult plants

The areas identified for sediment collection are (Fig 1):

- Ross Bay at depths <3 m (species was found by Roden and Murphy to be widespread and abundant here in 2013)
- Castlelough Bay at depths <3 m (seen at low abundance along southern shore by EPA in 2011 and on south-eastern shore by Roden and Murphy in 2013)
- Victoria Bay (recorded here, as Rare, by KNP staff in 2018)
- Tomies (last locality where adult plants were recorded by Roden and Murphy in 2019)

Collection method

Timing:

Sediment may be collected in the time period from April 2026 to end of May 2026, depending on weather conditions. The project is timed so collection of sediment is before the germination time of *N.flexilis* in June. This avoids disturbing ant *N.flexilis* plants which may grow on site.

Equipment

- LaMotte Bottom Sampling Dredge (stainless steel) designed for collecting a sample of bottom sediment and is suitable for mud, sand and gravel substrates. The dredge has a volume of 1098 cubic centimetres (67 cubic inches) and weighs 3.2kg
- Sealed buckets/tubs
- Waterproof marker
- Recording sheets
- Virkon Aquatic
- Disposable gloves

Method

1. A Whaley Boat with an outboard engine will be used to access locations. The boat is NPWS owned and permanently stationed in Ross Dock, which is attached to Lough Leane
2. All equipment and materials will be clean, checked and dry prior to deployment
3. Upper sediment layer will be scooped using bottom sampling dredge
4. Compaction of the sediment will be avoided
5. Sediment will be kept wetted at all times
6. Stones and macro debris to be removed from sediment and placed back in lake
7. Samples to be transferred to a bucket
8. Five dredge samples will be taken at each site – moving a few metres between each deployment of the grab. This represents 5 litres of sediment at each location with the samples combined into a single composite sample
9. Each composite sample will be transported in a labelled sealed bucket containers filled with some lake water
10. The dredge sampler will be cleaned and sanitized between each sampling site

4.2 Germination

Each sample will be transferred to a fenced area within Killarney National Park in sealed containers. The samples will be placed in suitable transparent containers and covered with some lake water to mimic lake conditions. Some containers will be placed inside a poly tunnel, whilst other will remain outdoors. Each container will be monitored weekly, and will require topping up from time to time. Records, including photographs, will be kept and a report will written at the end of the project

4.3 Disposal of sediment and lake water

Following completion of the project, sediment and any germinated plant material will be retained in a contained area on dry land and allowed to dry prior to disposal. Any remaining lake water used in propagation will be disposed of away from natural watercourses on vegetated ground and will not be returned to the lake. These measures eliminate pathways for species transfer and contamination.

4.4 Other relevant information

A request for screening has been submitted to the EAU for consideration.

A section 21 licence will be applied for in addition to the derogation licence

Figure 1 - Lough Leane showing the four proposed locations for collecting sediment

5. Tests for Derogation

Test 1 - Reason for Derogation:

The reason for the derogation falls into reason 2D “for the purpose of research and education, of re-populating and re-introducing these species and for the breeding operations necessary for these purposes, including artificial propagation of plants.”

Test 2 - Absence of Alternative Solutions

Alternative scenario: Do Nothing

Under this option, no sediment or potential viable seeds would be collected and no ex-situ germination trial would be undertaken. While this approach would avoid collection of its seeds in the sediment, it would not fulfil the purpose of the proposed activity, which is to support research relating to the species’ propagation and conservation.

As previously, stated *N.flexilis* has experienced a documented decline in recent years (Article 17 report NPWS, 2025, Roden & O’Connor, 2024). There is currently limited understanding of the viability of its sediment seed bank and its potential role conservation and restoration. In the absence of this preliminary research, opportunities to inform evidence-based conservation action may be constrained. The do-nothing approach would fail to contribute to scientific knowledge and understanding of the species.

Alterative scenario: Direct Collection of seeds

The direct collection of *Najas flexilis* seeds from plants within the lake was considered as an alternative to sediment sampling. This approach would involve locating and manually collecting seeds from annual plants. *N.flexilis* produces small inconspicuous seeds, making them difficult to detect. Plants may also be difficult to locate due to their declining numbers.

Targeted seed collection may require repeated searching and may result in the disturbance to an already vulnerable plant. In addition, there would be an uncertainty regarding the maturity of seeds collected directly from the plant, which may limit the effectiveness of this approach.

In contrast, the collection of small volumes of surface sediment provides a more efficient and less intrusive method of obtaining seeds. Accordingly, direct seed collection is not considered a satisfactory alternative to sediment sampling

Alternative Scenario: Surveys Only

Conducting a survey would only inform on the distribution and relative abundance of *N.flexilis*. This approach would not allow for the collection of potential seed bank and would not therefore not mot meet the objectives of the pilot

Test 3 - Impact of a derogation on Conservation Status

(i) The current Conservation Status of Slender Naiad (*Najas flexilis)* is Bad – with a deteriorating trend (Article 17 Report, 2025) which is change from status of Inadequate with a declining trend in 2019 (Article 17 Report, 2019)

A survey conducted in Lough Leane 2013 by Roden & Murphy found *N.flexilis* throughout the lake, except in the North East corner. The size of each population varied but was noted as being substantial given the size of the Lough Leane. The survey repeated in 2019 noted a significant decline in distribution and population size of *N.flexils* with only five plants being recorded at a single location, Tomies Point.

By following the recommended methodology and biosecurity protocols, it is unlikely that the sampling will affect population viability, substrate quality, water quality or reproductive capacity of *N.flexilis* within Lough Leane.

(ii) The project has the potential to impact *N.flexilis* by ;

a. Physical disturbance of plants

The collection of samples is due to take place between April and May (the exact date is to be determined and is weather dependant). *N.flexilis* typically germinates in June. By taking samples before the germination period disturbance to *N.flexilis* plants growing in-situ is expected to be avoided.

b. Sediment removal

The sediment sampling is highly localised using a stainless steel bottom-sampling dredge (volume 1098 cubic centimetres). The footprint of the dredge sampler is very small relative to the extent of habitat suitable for *N.flexilis* and is unlikely to have a measurable population impact. The sediment removed for propagation will be small ; five litres per sampling location with one litre per sampling point within each sampling location representing twenty litres of sediment for the entire study. Therefore, sampling is unlikely to alter substrate viability, seedbank function, or habitat suitability.

c. Increased turbidity

During sampling turbidity will be increased. Any change in turbidity will be temporary and short-lived. Sampling will therefore not affect water quality for emerging *N.flexilis* plants in-situ

In summary, the activity represents a limited and localised interaction with the species. The scale of collection is minimal and conducted manually. The activity will not involve the removal of established plants and avoids repeated disturbance.

To avoid the accidental introduction of invasive aquatic species between sampling sites biosecurity measures will be implemented in accordance with recognised national best practice, including the “Check, Clean, Dry” protocol

All equipment, particularly the sediment sampler, will be inspected and cleared of any visible plant material and sediment prior to leaving each site. Equipment will be

disinfected between sampling locations using Virkon Aquatic solution. Gloves will be changed between each sample site

Water associated with sediment samples will be securely contained and labelled during transport and storage

Following the completion of the study, all sediment and plant material will be dried out on dry land in a secure, suitable container before being disposed of accordingly. Water will be disposed of on a green area away from watercourse and drains. No material or will be returned to the sampling locations.

6. Monitoring the impacts of the derogation

The implementation of the proposed derogation will be monitored to ensure activities are carried out in accordance with the approved methodology, and no unintended impacts in *N.flexilis* arise.

Sediment collection will be recorded in the field, including date, location (GPS), volume collected and method used. This will ensure sampling remains within the defined limits (small volumes, shallow surface sediment only) and disturbance in minimal and localised.

During collection, visual checks will be undertaken to ensure that no excessive disturbance to surrounding plants occurs. Sampling will be limited to five discrete points in a sampling site avoiding repeated disturbance within the same area.

All collected material will be clearly labelled and tracked throughout the propagation process. Ex-situ germination trials, including seedling emergence, specie identification (where possible), and growth observations.

Biosecurity measures will be monitored through the cleaning and disinfection of equipment between sampling sites, with procedure documented to ensure compliance.

The outcome of the project will be reviewed to assess whether the objectives have been achieved, including successful collection of seeds and evidence of germination.

In the unlikely event that any unforeseen impacts to *N.flexilis* are observed during sampling, activities will be halted and methodology reviewed

A summary report will be prepared, detailing methodology, monitoring results and outcomes of the propagation trial

7. References

NPWS (2017) Conservation Objectives: Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC 000365. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

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