A Practitioners Guide to Managing *Spartina Anglica*

Cromarty Firth SPA—EU LIFE 100% for Nature

Introduction

The aim of this leaflet is to give land managers a practical introduction to the effective management of small-medium sized populations of *Spartina anglica* in the United Kingdom and in neighbouring European countries. *Spartina anglica* was reclassified as *Sporobolus anglicus* after a taxonomic revision in 2014, but its previous name is still in common usage. The methods described in this document have been used to achieve a 98% reduction in *Spartina anglica* coverage within the Cromarty Firth as part of the EU LIFE 100% For Nature project. This document will not cover all aspects of ecology and identification, as this information is available elsewhere.

A mature *Spartina* stand

What is *Spartina*?

Spartina anglica, (referred to simply as *Spartina* in rest of this document) is a vigorous perennial grass of intertidal saltmarshes and mudflats. It is a fertile hybrid of *S. maritima* and *S. alterniflora*. Until recently it was classed as an invasive non-native species in the UK, but the plant is now considered to be native in some regions. However, it has been intentionally introduced outside of its native range where it has become an invasive species. Healthy stands of *Spartina* can reach 0.8-1m in height, as plants grow, they send out rhizomes, allowing the plant to form circular clumps that expand each growing season. *Spartina* produces fertile seed in the UK, it has a better germination rate in warmer regions.

Impact of Spartina on the Environment: The Case for Management.

Stands of *Spartina* expand into ever widening circles as they grow. As they encroach on to new saltmarsh habitat they can outcompete and exclude native saltmarsh vegetation. In mudflat habitats *Spartina* can outcompete native vegetation such as Seagrasses (*Zostera* spp.). Where present in large areas, it can make areas of saltmarsh unsuitable for roosting or feeding waders due the dense cover it creates in previously open areas.

Udale Bay, part of the Cromarty Firth SPA which supports internationally important populations of waterfowl.

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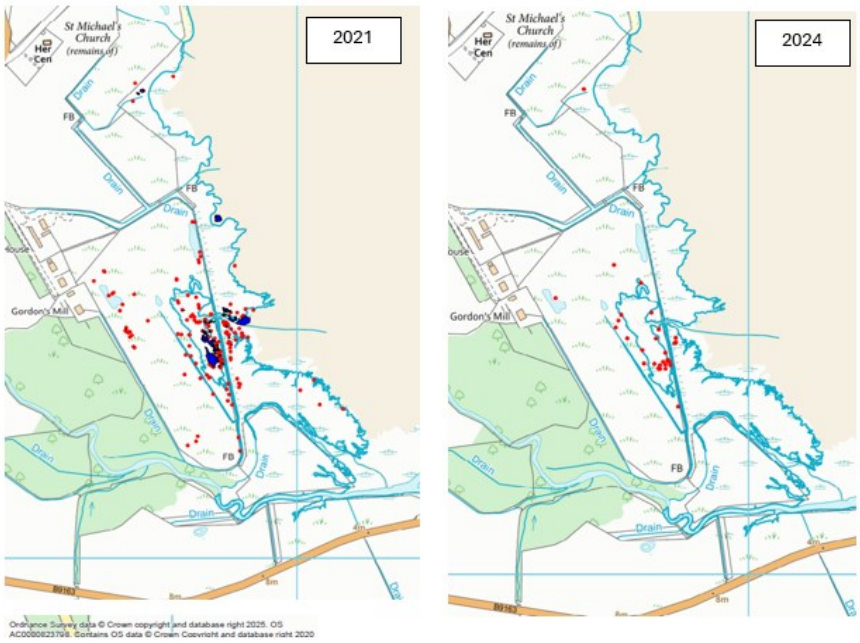
Mapping the Extent of a *Spartina* Population

Before attempting management, it is essential that the full extent of *Spartina* is mapped. Collecting information on the complete distribution, the size of stands and the habitat it is growing on will be critical to management decisions and predicting the resource needed for effective management.

When and where to map *Spartina*

Initial mapping of *Spartina* should be done in July or August. This is because plants will likely be at the peak of their growth at this time and will be most visible. Once initial mapping has been completed, repeat mapping can be carried out between May and September, the purpose of repeat mapping will be explained below. When mapping *Spartina*, all saltmarsh and saltmarsh/ mudflat fringe habitat between the strandline and mid-shore region should be surveyed. In complex saltmarsh systems, care should be taken to survey all creeks and low areas towards the back of the saltmarsh. *Spartina* can remain undetected for years in these small low-lying areas and will steadily release seed into the wider area. Areas of rocky shore or shingle deposits are unlikely to harbour *Spartina* unless saltmarsh exists within these areas. If resources are limited, the initial search area should focus on land within 1km of any known *Spartina* plants.



Udale Bay *Spartina* pre-spray mapping 2021 and 2024. Blue areas represent large *Spartina* patches (≥1 m^2), red dots are small *Spartina* patches (≤1 m^2).

How to Map *Spartina*

Prior to mapping an area, it is worthwhile studying maps and aerial imagery of the target areas, this will enable you to identify potential areas of saltmarsh that might otherwise be missed. Any saltmarsh habitat that is below the strandline should be included in the search area. To record the position of *Spartina*, as a minimum a GPS handset should be used. Alternatively, you may wish to use a mobile app, for example during the EU LIFE 100% for Nature project, a recording app was developed based on the Quick Capture platform. This reduces the time taken to transfer data from a GPS unit to a mapping program.

It is essential that all *Spartina* stands are mapped rather than simply mapping areas of saltmarsh that contain *Spartina*. It is worthwhile mapping stands that cover more than 1m^2 as a polygon by mapping the perimeter of the stand, stands covering less than 1m^2 can be mapped as a point. This makes it simpler to measure the area of *Spartina* present on site, should this information be useful. When searching, you should aim to get within 10 metres of suitable habitat. For this reason, it is worth recruiting 3-5 people to help with the survey as it allows large tracts of saltmarsh to be covered efficiently. In this case it was essential to physically mark all *Spartina* patches during mapping, usually this is done with a brightly coloured cane.

Marking a *Spartina* stand

Controlling *Spartina*

There are four key aspects to consider as part of a successful *Spartina* control strategy, they are as follows.

Reduce year-to-year survival – limiting the number of plants that survive from one year to the next will reduce the number of plants capable of producing seed the following year.

Reduce recruitment – preventing the release of viable seed or rhizome fragments is key to preventing the population from expanding.

Accuracy and consistency - control will not be successful unless all plants are detected and treated during each and every year of management.

Biosecurity – control efforts will be wasted if viable plant material is unknowingly spread around and between sites by people carrying out management or mapping.

There are three main methods that the EU LIFE 100% for Nature project has successfully used to control *Spartina*. They are herbicide treatment, covering plants with sheeting and flower stripping. These methods work well when used together in an integrative approach.

Herbicide Treatment

Herbicide treatment is effective at controlling small and large *Spartina* stands. Herbicides used in the control of *Spartina* must be approved for use in and around intertidal environments by DEFRA. In the UK the only herbicide with this approval is glyphosate, such as Roundup Provantage. We have found that treatment is only successful when the adjuvant Topfilm is used in combination with glyphosate. Topfilm is also approved for use in intertidal environments. The adjuvant makes the herbicide 'stick' to the plant, which is essential when treating a plant in the intertidal zone where the tide will cover plants several hours after treatment. Both the herbicide and Topfilm should be applied at the maximum permissible dose rate according to the product label. The application method used will likely depend on the size of the *Spartina* population being treated. With large populations 15-20 litre knapsack sprayers will be appropriate and with small populations small handheld sprayers may be more appropriate, such as the Cooper Pegler CP5. Equipment used should be calibrated for each user and after any nozzle changes, this will ensure operators do not exceed the maximum permissible dose rate. For small populations handheld weedwiper applicators such as the Micron Microwipe can be used, one advantage of these applicators is that they can be used in conditions that are too windy for spraying herbicide with a knapsack sprayer.

A large *Spartina* stand before application of herbicide (left) and the same area after three treatments within 1 year (right).

Herbicide should be applied during active *Spartina* growth, typically this will be between 1st June and 31st September. Herbicide applications should be made in dry weather and in the hours between high tide and low tide, this is critically important to allow around six hours before the plants are submerged by the tide. You may find it useful to review a tide table for the management season, and identify days on which the tides are suitable for control.

This trial has shown to effectively control *Spartina*, herbicide will need to be applied three times during the growing season. There should be a gap of at least ten days between all applications. Ideally herbicide applications should be well spaced and made in June, July and August. If all three applications are made in quick succession, it is possible to finish all applications by the end of July, but this leaves no opportunity to treat *Spartina* that emerges in August, which often happens. Small one-year old stands are often killed with just two treatments while older more established stands may take up to five or more years to be successfully eradicated, with the largest stands taking the longest time to eradicate.

Licencing – Using herbicide to control *Spartina* in the intertidal environment will almost certainly need to be licenced by the relevant statutory environmental protection agency.

It is important that you engage with the relevant agency well ahead of any planned herbicide application, as licencing may take several months to arrange.

Shading

Using light proof sheeting to shade out *Spartina* can be effective at controlling both small and large stands of Spartina. The EU LIFE 100% for Nature project has effectively used sheeting to control medium sized stands of *Spartina*. Various types of sheeting can be used, providing they block at least 95% of light, including black polythene sheeting, woven plastic membrane and biodegradable membrane. The EU LIFE 100% for Nature project has used Ecotex™ MulchMat, a biodegradable hemp-based membrane made by Hy-Tex, this has the advantage of being biodegradable should it get removed by wind or tide. Sheeting should cover the *Spartina* patch and overlap all edges by at least 40cm. The edges of the sheet should be inserted into the substrate to a depth of at least 10cm, this prevents the plant from sending out lateral rhizomes beyond the edges of the sheet. Once in place, the sheeting should be pinned in place with several ground pegs of at least 15cm in length. Sheeting should be applied in early – mid spring and left in situ for 12 months. Sheets should be checked after the first week and then periodically, typically after any significant storm events. On a designated saltmarsh, this option may require consent from your statutory nature conservation body.

Sheeting in-situ as part of trial management of *Spartina.*

Flower stripping

Spartina will readily flower and produce viable seed in the UK. Plants in Scotland have been observed flowering and producing seed in their first year of growth. The larger and healthier a stand of *Spartina* is, the more flowers they tend to produce. In Scotland, flowers usually appear from mid-July onwards, with seed ripening from early September onwards. Removing flowerheads as soon as they appear can be a useful means of reducing the production and release of viable seeds. *Spartina* seeds are known to persist in the seed bank for less than two years, therefore reducing input of new seed into the seed bank is a viable option to reduce the recruitment of new plants. The EU LIFE 100% for Nature project has done this simply by pulling flowerheads off by hand as soon as they appear.

Spartina flowerhead

Flowerheads should be bagged at the point of collection and burnt on site to ensure that no seed is unknowingly spread. Flower stripping may be too labour intensive when tackling large populations where continuous cover of *Spartina* has developed.

Hand Pulling

Hand pulling of small seedlings can be an effective way of limiting the spread of new plants. This is done by inserting a gloved hand into the mud around a small plant and gently pulling out the plant with the roots attached. This is only feasible in areas of open mud, in vegetated areas it is difficult to isolate the roots of *Spartina*. Seedlings removed in this way must be burnt on site to prevent further spread.

Spartina amongst Sea Plantain.

Timescales and Expectations

In 2020 there were 97 large stands (over $1m^2$) and 297 small stands (less than $1m^2$) of *Spartina* present at the EU LIFE 100% for Nature project sites. By 2024 this had fallen to three large stands and 75 small stands and a 98% reduction in area where *Spartina* was present. In most cases *Spartina* management should be planned for a minimum of five years, if large extensive meadow-like stands are present a timescale of ten years may be more appropriate. During the first two years of management there may be little discernible impact, during this stage management will be weakening established stands and limiting further expansion. The impact of management is likely to be seen in years three to four, during year five the density and distribution of *Spartina* is likely to be much reduced, providing detection rates are very high and management is consistent between years. If management or detection is reduced at any stage in the management process it is quite possible that some previous progress will be lost.

Acknowledgements

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