



Sea Buckthorn Survey of the County Meath Coastline from Drogheda to Delvin Bridge



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Cover photo: Sea Buckthorn near Mornington Beach in January 2022.

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1. INTRODUCTION

At the request of Meath County Council (MCC), INVAS Biosecurity Ltd. (INVAS) was commissioned to carry out a survey for Sea Buckthorn (*Hippophae rhamnoides*) along the County Meath coastline, from the mouth of the River Boyne to the mouth of the Delvin River.



Plate 1.1: A general view of the mouth of the Delvin River entering the Irish Sea near Delvin rail Bridge in January 2022.

1.1. Project Background

MCC will use the information provided by this survey to aid in the development of a long-term Management Plan for Sea Buckthorn and other Invasive Alien Plant Species (IAPS) detected. To date, localised general maintenance has been responsible for weed and IAPS control along the Meath coastline, with many areas left unmanaged. To the north of the survey area lie the Boyne Coast and Estuary SAC (IE001957) and the Boyne Estuary SPA (IE004080). Towards the mid and southern end of the survey area lie the River Nanny Estuary and Shore SPA (IE004158).

1.2. Objectives

The aim of the survey was to identify all infestations of Sea Buckthorn and note any other IAPS along the Meath coastline from the Boyne to the Delvin River (Plate 1.1), in particular invasive species that are restricted under Irish legislation (S.I. 477/2011) and those listed as being of Union concern in the EU IAS Regulations (1143/2014). The survey would further generate an accurate distribution map for infestations of Sea Buckthorn, as well as GIS shapefiles containing individual infestation data for each species.

2. INTRODUCTION

2.1. National and European legislation concerning invasive alien species

Globally, IAS are regarded as one of the biggest causes of biodiversity loss next to climate change. The environmental impact of IAS was discussed at the ground-breaking international Convention on Biological Diversity in 1992 and, since that time, targeted legislation to prevent introduction and spread of these harmful species has been introduced at a national and European level. The most relevant legislation that takes IAS into account in Ireland is summarised in Table 2.1.

Sea-buckthorn is subject to restrictions under Regulations 49 and 50 (the latter not currently commenced) of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI No. 477), being listed in the Third Schedule (Part 1) of this legislative Act.

Table 2.1: National and European legislation concerning invasive alien species.

<p>Republic of Ireland: European Union (Birds and Natural Habitats) Regulations 2011, S.I. 477</p> <p>http://www.irishstatutebook.ie/eli/2011/si/477/made/en/print</p>	<p>Regulation 49 on the ‘Prohibition on introduction and dispersal of certain species’ makes it an offence to knowingly disperse or allow to escape species that are listed in the Third Schedule, which is the list of high impact IAS that are subject to restrictions under the Regulations.</p>
<p>Republic of Ireland: River Basin Management Plan for Ireland 2022 – 2027</p> <p>(Water Framework Directive)</p> <p>https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf</p>	<p>For the first time invasive species have been explicitly mentioned in this latest cycle of the River Basin Management Plan (RBMP) for Ireland. A list of Principal Actions on invasive species has been included (e.g. implement the EU (European Union) IAS Regulation, develop Management Plans for IAS, develop national guidelines for biosecurity).</p>
<p>Invasive Alien Species Regulation (EU) 1143/2014</p> <p>http://ec.europa.eu/environment/nature/invasivealien/list/index_en.htm</p>	<p>This EU Regulation entered into force on 1st January, 2015. Central to the legislation is the establishment, and regular updating, of a list of IAPS considered to be of Union concern (‘the Union list’). The placing of a species on the Union list activates a number of obligations on Member States (MS) regarding those species (e.g. “Within 18 months of an IAS being included on the Union list, MS shall have in place effective management measures for those invasive alien species of Union concern...”). The 49 species included on the Union list are subject to restrictions on keeping, importing, selling, breeding and growing. Member States are required to take action on pathways of</p>

	<p>unintentional introduction, take measures for early detection and rapid eradication of these species, and to manage species that are already widely spread in their territory.</p>
<p>Republic of Ireland: Control of the use of pesticides and biocides https://www.nibusinessinfo.co.uk/content/pesticides-and-biocides</p>	<p>A guide to appropriate use of herbicides, pesticides, and other biocides.</p>
<p>Republic of Ireland: Sustainable Use of Pesticides Directive http://www.pcs.agriculture.gov.ie/sud/</p>	<p>The Sustainable Use of Pesticides Directive (SUD) establishes a framework for European Community action to achieve the sustainable use of pesticides by setting minimum rules to reduce the risks to human health and the environment that are associated with pesticide use. It also promotes the use of integrated pest management. The Directive is designed to further enhance the high level of protection achieved through the entire regulatory system for pesticides.</p>

3. SURVEY

3.1. Survey Details

The preliminary survey was completed on the 1st and 2nd of December 2021 by Tom Donovan (INVAS) and a full field survey was conducted on the 21st of January 2022 by Dr William Earle (INVAS). During the second field survey the entire coastline was walked on the vegetation fringe towards the beach and where possible was walked back along other coastal paths, through dune or scrub habitats. Survey points were recorded using a Garmin® GPSmap78 at a height of one metre. Points were recorded at 0.5-metre intervals around the perimeter of IAPS infestations. In some cases, survey points were taken along the extremities of certain infestations due to dangerous terrain, inaccessibility of sites or overgrowth with vegetation. In the case of some difficult sites, Google Maps was used in the field to record additional information regarding the extent of an infestation, using local landmarks as reference points. Records were maintained on printed satellite imagery. A Small Unmanned Aerial Vehicle (SUAV) survey was carried out near the north of the survey area but not to the south due to the presence of Gormanstown Military Camp. Microsoft® Bing™ Maps were used to provide an overview of the distribution for each species within the survey area and for the development of visual aids to assist with future works. Digital photographs were taken of each species as supplementary material to this survey.

3.2. General IAPS distribution

Eight IAPS, two that are listed in the Third Schedule (Part I) of SI 477/2011 and six that are known to be invasive in Irish coastal, riparian and terrestrial habitats, were recorded throughout the survey area (Plate 3.1, Table 3.1). Listed species included Sea Buckthorn (*Hippophae rhamnoides*) and Japanese knotweed (*Reynoutria japonica*). Winter heliotrope (*Petasites pyrenaicus*), Buddleja (*Buddleja davidii*), Old man's beard (*Clematis vitalba*), Cherry laurel (*Prunus laurocerasus*), Crocosmia/Montbretia (*Crocosmia x crocosmiiflora*) and Bamboo (*Pseudosasa cf japonica*) were also recorded. Because of the timing of the surveys, no vegetative Knotweed material was visible, so the infestations may be that of a closely related hybrid Bohemian knotweed. There are three species of Knotweed that are generally referred to by the public and non-specialists as 'Japanese knotweed'. The physical characteristics and ecology of both Japanese and Bohemian knotweed are very similar. Both species are also controlled/managed in the same manner and will be mapped and discussed under the heading of Japanese knotweed throughout this report.



***Plate 3.1:** A satellite image of the survey area from from the mouth of the River Boyne to the mouth of the Delvin River showing the location of all Sea Buckthorn GPS records collected in January 2022.*

Detailed distribution maps for Sea Buckthorn and other IAPS recorded throughout the general survey area are provided (Figure 3.1 – 3.3). Plates 3.1 to 3.8 provide an overview of the distribution for each species within the survey area, with linked images relating to the general distribution of the Sea Buckthorn on the ground.

Table 3.1: The IAPS recorded and a description of their general location on the Meath coastline in December 2021 and January 2022. The colours refer to the polygons represented by each species on the following maps (Figure 3.1-3.6).

Common	Scientific name	Location	Map Colour
Species included in S.I. 477			
Sea Buckthorn	<i>Hippophae rhamnoides</i>	Infestations primarily found in the north of the survey area from Mornington to Bettystown.	Yellow
Japanese knotweed	<i>Reynoutria japonica</i>	Infestations generally confined to unmanaged coastal areas and private property in the vicinity of Gormanstown MX Track.	Red
Species not yet included in any regulations or legislation			
Winter heliotrope	<i>Petasites pyrenaicus</i>	Along coastal areas near Gormanstown MX Track and Scoil an Spioraid Naoimh. Also found dominating several stretches of roadside verges away from the coast particularly in the south. Dominating the riparian zone of the Delvin River.	Green
Buddleja	<i>Buddleja davidii</i>	Small infestations near Gormanstown MX Track, the stream at Mosney village and Seaview estate, Mornington.	Pink
Old man's beard	<i>Clematis vitalba</i>	One infestation recorded on the road between the R132 and Gormanstown MX Track	Blue
Cherry laurel	<i>Prunus laurocerasus</i>	Observed as hedging primarily in residential areas and other private properties.	N/A
Montbretia	<i>Crocsmia x crocosmiiflora</i>	Observed primarily on roadside verges, in residential areas and other private properties.	N/A
Bamboo	<i>Pseudosasa c.f. japonica</i>	Observed primarily in residential areas and other private properties.	N/A

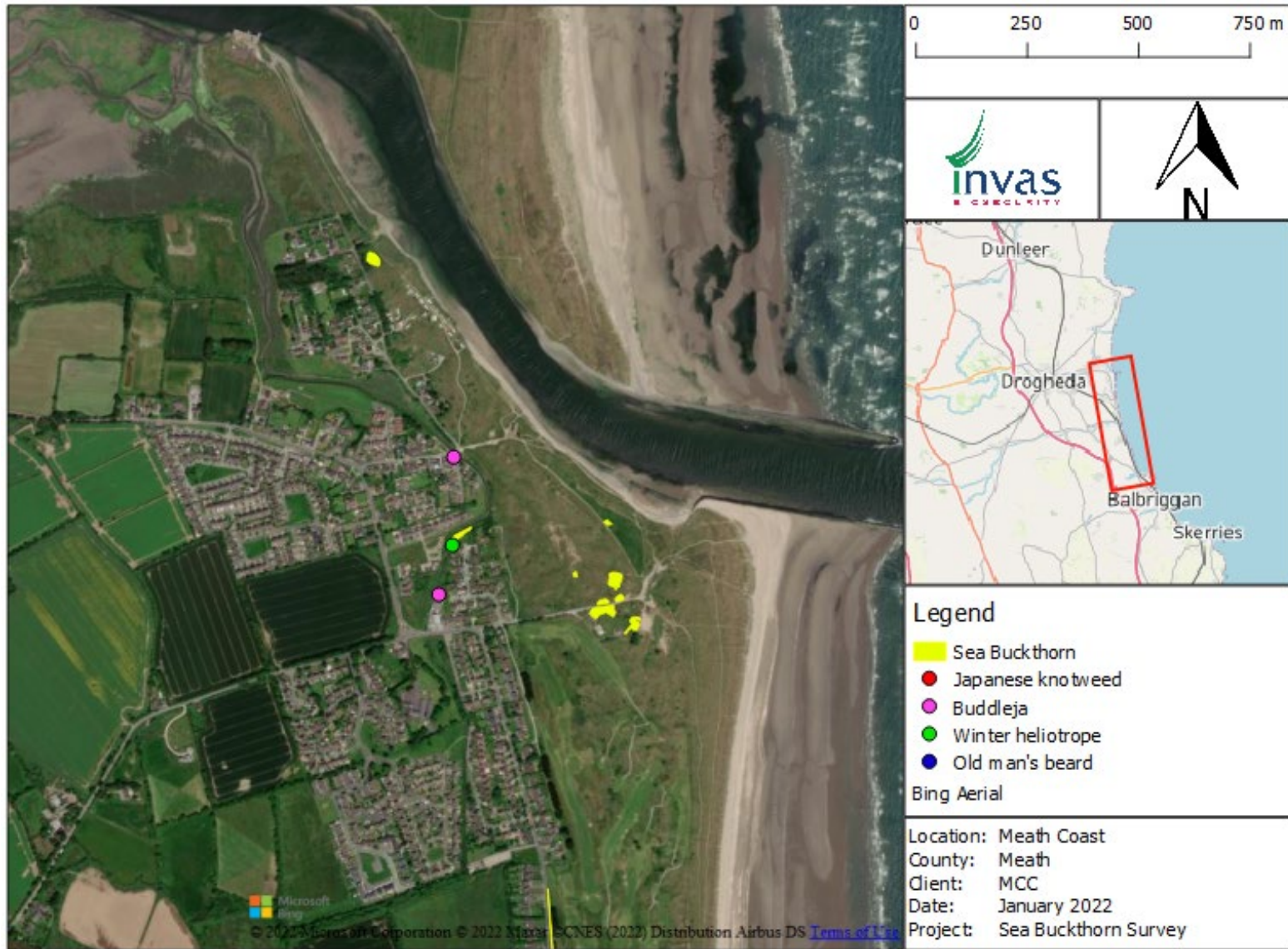


Figure 3.1: The Boyne River estuary with Sea Buckthorn (yellow), Buddleja (pink) and Winter heliotrope (green) recorded in January 2022.



Figure 3.2: Adjacent to Laytown and Bettystown Links Golf Club with Sea Buckthorn (yellow) recorded in January 2022.



Figure 3.3: Bettystown and Laytown with one infestation of Sea Buckthorn (yellow) and Winter heliotrope (green) recorded in January 2022.



Figure 3.4: The Nanny River estuary to Mosney Village with Buddleja (pink) and Winter heliotrope (green) recorded in January 2022.



Figure 3.5: Mosney Village to Gormanstown MX track with Japanese knotweed (red), Buddleja (pink) and Winter heliotrope (green) recorded in January 2022.



Figure 3.6: Gormanstown MX track to the Delvin River estuary with Japanese knotweed (red), Buddleja (pink), Winter heliotrope (green) and Old man's beard (blue) recorded in January 2022.



Plate 3.2: An aerial image of the survey area near Mornington looking towards the Boyne River (a) with photographs showing Sea Buckthorn growing on site in January 2022 (b & c).



Plate 3.3: An aerial image of the survey area near Mornington looking towards the Golf Club (a) with photographs showing Sea Buckthorn growing on site in January 2022 (b & c).



Plate 3.4: Sea Buckthorn along the western (a) and southern (b & c) boundaries of the Laytown and Bettystown Links Golf Club in January 2022.



Plate 3.5: An isolated infestation of Sea Buckthorn on Church Road, Laytown, in January 2022.



Plate 3.6: Japanese knotweed infestations near Station Road train station (a) and Gormanstown MX track (b) in January 2022.



Plate 3.7: Buddleja infestations near Station Road train station in January 2022.



Plate 3.8: Winter heliotrope infestations near Gormanstown MX track (a) and at a junction near Gormanstown (b) in January 2022.



Plate 3.9: A flailed Old man's beard infestation between the R132 and Gormanstown MX track in January 2022.

4. SPECIES, GENERAL LOCATIONS, DESCRIPTIONS AND LEGISLATION FOR IAPS RECORDED ALONG THE DODDER RIVER

The following sections contain information relating to Sea Buckthorn and other IAPS recorded throughout the survey area, in January 2022. For each species maps are provided that detail the specific distribution of that species within the survey area (see Section 3). These maps are supported by photographic images of the infestations. There follows a Table that provides a description of the individual invasive species, to include their general ecology, impacts and dispersal mechanisms. This Table also identifies any national or European legislation relating to the keeping, propagation and dispersal of this species.



Plates 4.1: Sea Buckthorn (a) and Buddleja (b) in the survey area in January 2022.

4.1. Sea Buckthorn

Sea Buckthorn infestations were primarily found in the north of the survey area from Mornington to Bettystown. Infestations in the Mornington area are centred around the Drogheda East Lighthouse. The densest infestations were recorded on either side of the road from the R151 to the beach car park (Plate 3.3). There are dense thickets on both sides of the road with sprawling infestations dispersed through the adjacent dune systems (Plate 4.1 a). Outlier infestations were recorded in an area where green waste dumping appears to occur on the Crook Road (Plate 3.2 c), in the riparian zone on the bankside opposite Beacon View (Plate 3.2 b) and in private property on Church Road in Laytown (Plate 3.5). A managed hedge of Sea Buckthorn borders the entire western boundary of the Laytown and Bettystown Links Golf Club (Plate 3.4 a) with unmanaged infestations all along the southern boundary (Plate 3.4 b & c). Management Options for Sea Buckthorn have been presented by INVAS in the preliminary survey document.

Table 4.1: Species description and legislation relating to Japanese knotweed.

Distinguishing features	Sea buckthorn (<i>Hippophae rhamnoides</i>) is a dense and thorny deciduous woody shrub. It can grow up from 2 to 4 metres tall. It has small, petalless flowers each having 4 stamens and a 2-lobed calyx. Flowers bloom from March to April, with male and female flowers appearing on separate plants. Leaves are narrow, lanceolate and alternate and are covered with tiny silvery scales giving them a greyish appearance. The bush has stout spines and in autumn bright orange-yellow berries (7mm across) are borne on the female plants.
Habitat	Sea-shores and cliffs, but also thrives in dry disturbed ground.
Ecology	Dioecous, wind pollinated, flowers in winter and fruits in autumn (Preston, 2002), it also spreads by suckering (shoots which grow from a bud at the base of the shrub) (Reynolds, 2002).
Impact	Because of the dense vegetation that the species produces, it can easily outcompete native species and become dominant. Sea buckthorn has a significant adverse impact on native floral (and associated faunal) biodiversity, as well as soil nutrient status.
Dispersal	Although wildlife may carry and distribute viable seed, the primary source of this species in coastal habitats was deliberate plantings. This species has been planted in the past in an effort to stabilise coastal land. Further dispersal now occurs through rhizome growth and layering.

Legislation	Sea buckthorn is subject to restrictions under Regulations 49 and 50 (the latter not currently commenced) of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI No. 477), being listed in the Third Schedule (Part 1) of this legislative Act. The law relating to Sea buckthorn is primarily contained in Regulation 49 (2), which states that it is an offence to ‘allow or cause to disperse’ plants listed in the Third Schedule, of which Sea buckthorn is one. As such, any Sea buckthorn plant material or contaminated soil that is to be removed from an infested site can only be done so under a licence issued by the National Parks and Wildlife Service (NPWS).
What to do if you find this species	Do not touch or interfere with this plant unless wearing suitable PPE.
Control options	Significant control can be achieved through the implementation of an annual combined mechanical/chemical management plan.

4.2. Japanese knotweed

Japanese knotweed was recorded in three locations in Gormanstown MX Track and in unmanaged coastal areas nearby (Figures 3.5-3.6, Plate 3.6).

Table 4.2: Species description and legislation relating to Japanese knotweed.

Distinguishing features	<p>Japanese knotweed (<i>Reynoutria japonica</i>) (and the closely related Bohemian knotweed (<i>Reynoutria x bohemica</i>)) is a robust, vigorous herbaceous perennial that grows in dense and often continuous stands. It has branched, hollow, red or purple mottled bamboo-like shoots that grow to 3m tall (Bohemian knotweed grows to 4m and Giant knotweed grows to 5m tall). In winter, stems remain on site as the tall, dry, red or straw-coloured hollow canes. All the leaves of Japanese knotweed plants are flattened (truncate) at the base. (The leaves of Bohemian knotweed are larger and more variable than those of Japanese knotweed, supporting both heart-shaped (indented/cordate at the base) and flattened (truncate at the base) forms, the former being more prominent lower down the stem.) Leaves are arranged in a zig-zag pattern on an arching stem.</p> <p>Flowers are small, creamy-white and hang in clusters from leaf axils; the clusters are longer than leaves in Japanese knotweed, while they are roughly the same length as the subtending leaf for Bohemian knotweed.</p> <p>Japanese knotweed has deeply penetrating, woody rhizomes – to 2m deep and 7m laterally from the last visible plant.</p>
Habitat	Knotweeds are species of waste ground, roadsides, rail corridors and riparian habitats - alongside lakes, rivers, canals, ponds and ditches in rich to poor soil types.

<p>Ecology</p>	<p>Knotweeds are non-native (and invasive) species (native to East Asia in Japan, China and Korea) and widespread in Ireland.</p> <p>Bohemian knotweed is a hybrid between the smaller Japanese and the larger Giant knotweed species.</p>
<p>Impact</p>	<p>Knotweeds can impact on biodiversity by outcompeting native plants. Riparian habitats invaded by knotweeds have lower invertebrate abundance, species richness and biomass, and lower plant species richness compared to uninvaded sites, which is likely to impact on local fauna that use riparian habitats.</p> <p>Following dieback in winter, the ground surrounding infestations is left vulnerable to soil erosion and bankside subsidence due to the absence of a root weft that is normally produced by native grasses and herbs to bind the soils against winter floods.</p> <p>The presence of knotweed leaf litter in streams has also been shown to have adverse effects on the species composition of affected streams. #</p> <p>The robust and extensive woody rhizomes of knotweed species are capable of penetrating asphalt, cracked foundations, walls, land drainage works and other built structures, causing significant structural damage.</p>
<p>Dispersal</p>	<p>The rhizomes are highly regenerative and even small rhizome fragments can produce new plants. Rhizome material can remain dormant in the soil for up to 20 years. Cut or discarded stems with nodes can also root and produce new plant stands. As only female plants have been recorded in Ireland, no viable seeds are produced.</p>
<p>Legislation</p>	<p>Japanese and Bohemian knotweed are subject to restrictions under Regulations 49 and 50 (the latter not currently commenced) of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI No. 477), being listed in the Third Schedule (Part 1) of this legislative Act. Soil taken from a place that is infested with knotweed (vector material) is also restricted under Part 3 of this Third Schedule. The law relating to knotweed is primarily contained in Regulation 49 (2), which states that it is an offence to ‘allow or cause to disperse’ plants listed in the Third Schedule, of which Japanese and Bohemian knotweed are included. As such, any knotweed plant material or contaminated soil that is to be removed from an infested site can only be done so under a licence issued by the National Parks and Wildlife Service (NPWS).</p>

4.3. Winter Heliotrope

Winter heliotrope was recorded in coastal areas near Gormanstown MX Track and Scoil an Spioraid Naoimh. Also found dominating several stretches of roadside verges away from the coast, particularly in the south, and along the riparian zone of the Delvin River (Figure 3.1-3.6, Plate 3.8).

Table 4.3: Species description and legislation for Winter heliotrope.

Distinguishing features	<p>Winter heliotrope (<i>Petasites pyrenaicus</i>) is a perennial, rhizomatous species that can form very dense and continuous stands. The rounded-kidney shaped leaves of this species can be present throughout the year and grow to 25cm in diameter, with large lobes where the leaf stalks attach. They have a conspicuous, regular toothed margin with dull downy hair beneath that rubs off easily.</p> <p>The rhizome network is extensive, but it is usually quite shallow (to 30cm deep). Winter heliotrope flowers produce an inflorescence up to 15mm across in short, loose, cone-like racemes. Individual florets are pink/lilac and tubular with sweet vanilla-scented flowers. Flowering stems are erect, D-shaped (don't roll freely between fingers), pinkish and covered with scale-like bracts.</p>
Habitat	<p>Riparian species on fertile soil adjacent to rivers and canals, but also in disturbed terrestrial habitats such as ditches, roadsides, railway embankments and waste places.</p>
Ecology	<p>Non-native species (native to Mediterranean region) and widespread in Ireland. It is one of few plants that actively grow throughout winter, flowering from November to February. This species readily forms monocultures in suitable habitats.</p> <p>Winter heliotrope may be confused with native Butterbur (<i>Petasites hybridus</i>) and Coltsfoot (<i>Tussilago farfara</i>). To date, only male plants have been recorded in Ireland. This plant is favoured by beekeepers as it provides a rare source of nectar during the winter months. Is becoming particularly prevalent along river and canal banks in Ireland.</p>
Impact	<p>Because of the dense vegetation that the species produces it can easily outcompete native species and become locally dominant.</p>
Dispersal	<p>It is dispersed by rhizome expansion and fragments. Rhizomes are often transported accidentally during ground works <i>via</i> machinery, equipment and soil movement.</p>
Legislation	<p>Not yet contained in any legislative lists.</p>

4.4. Buddleja

Buddleja was found sporadically as small infestations near Gormanstown MX Track, the stream at Mosney village and Seaview estate, Mornington (Figures 3.1-3.6, Plates 3.7 & 4.2b).

Table 4.4: Species description and legislation for Buddleja.

Distinguishing features	<p>Buddleia (<i>Buddleja davidii</i>) is a perennial shrub that can grow to up 4 metres tall. Leaves are grey-green, lanceolate and oppositely arranged. Stems are light brown, with a cracked appearance. This species has an extensive network of large and fine roots.</p> <p>Scented lilac flowers are borne on a long conical spike. Each plant produces large numbers of small seeds that can persist for up to four years in the soil.</p>
Habitat	In waste ground, roadsides, rail corridors and along lakes, rivers, canals, ponds and ditches in rich to poor soil types.
Ecology	Introduced from China as an ornamental and butterfly attractant, Buddleja has now become widespread in urban environments throughout Ireland. This species is highly adaptable and tolerant of disturbed conditions.
Impact	The penetrating roots can cause damage to buildings and hard structures, while the profusion of above-ground growth produced each growing season can have a very adverse impact on native biodiversity.
Dispersal	Buddleja reproduces by seeds that are spread primarily by wind. It can also reproduce asexually <i>via</i> stem and root cuttings.
Legislation	Not yet contained in any legislative lists.

4.5. Old man's beard

Old man's beard was recorded at one location on the road between the R132 and Gormanstown MX Track (Figure 3.6, Plate 3.9).

Table 4.5: Species description and legislation for Old man's beard.

Distinguishing features	Old man's beard/Traveller's joy (<i>Clematis vitalba</i>) is a fast-growing vine with climbing woody stems that can extend its vertical or horizontal range by up to 10m in one season. The plant can live for up to 40 years and has woody stems that can grow to 20m long. This species is a deciduous, perennial plant and the leaves are pinnately compound (leaflets in opposite pairs with one terminal leaflet), consisting of usually 5 leaflets. Flowers are white and about 2cm in diameter. Seeds are produced in autumn and often remain on the vines late into winter. Individual plants can produce up to 100,000 seeds per season. Where the plant produces dense canopy vegetation, it can produce up to 17,000 viable seeds per 0.5m ² . It rapidly forms dense vegetative canopies over host plants or structures, often totally obscuring them from view.
Habitat	Grows in hedgerows, roadsides, rail corridors, riverbanks and forest edges. Seedling growth is restricted in closed canopy woodlands.
Ecology	The growth form of the species is such that it uses its vines to climb over trees, shrubs, along fence lines and any other support structure that it can avail of. Old man's beard can self-pollinate or be pollinated by wind or insects. Plants in their third year of growth can produce viable seeds. Seeds can remain viable in the soil for up to 5 years and soil disturbance creates opportunities for germination from the soil seed reserve.
Impact	The blanketing growth of this species can smother and even collapse large trees, while the dense canopy it produces restricts light to plants beneath, thus effectively suppressing them. Old man's beard can impede wind passage through this dense blanketing vegetation and cause the collapse of manmade structures or already weakened trees. Old man's beard has a significant adverse impact on native floral (and associated faunal) biodiversity. Because of the large biomass of vegetation that the weed produces, it can readily impede access in infested locations to humans and animals. This reduced access can also make it difficult to implement control measures. Reputedly, sap from Old man's beard plants can cause blistering to human skin.
Dispersal	This species is primarily dispersed by seed through the action of wind (roads/rail corridors), water (rivers), human and animal interaction. Hanging vines will set root at any node that touches the ground and produce new plants. Old man's beard can spread by fragmentation, where cut or detached stems (with nodes) come into contact with the ground.
Legislation	Not yet contained in any legislative lists.

4.6. Cherry laurel

Observed as hedging primarily in residential areas and other private properties.

Table 4.6: Species description and legislation for Cherry laurel.

Distinguishing features	Cherry laurel (<i>Prunus lauroceracus</i>) is a fast-growing evergreen shrub that can grow to 15m tall and is tolerant of a wide range of habitat conditions and soil types. Its leaves are hairless, dark green and glossy above, with a paler underside. Leaves are arranged alternately on the stems, ending with a single leaf. Flowering occurs in spring and summer with white flowers being produced on racemes (upright spikes). Seeds are produced in black berries.
Habitat	Cherry laurel is well adapted to the understory of forestry and woodlands. It also thrives in areas of rocky banks and hillsides, gardens and riparian zones.
Ecology	It is a non-native species (originally South-West Asia) that has become widespread in forestry and estates throughout Ireland. Cherry laurel is hardy and is tolerant of drought and shade. It has become highly invasive in Ireland. It's rapid growth rate and the toxicity of its leaves give it a competitive advantage over native species. This aids in the creation of dense thickets that can cover large areas. These thickets can reduce access and make it difficult to implement control measures.
Impact	Because of the dense vegetation that the weed produces it can easily outcompete native species and becomes abundant. Cherry laurel has a significant adverse impact on native floral (and associated faunal) biodiversity. The leaves contain toxins (cyanide) that result in herbivore avoidance and suppresses regeneration of native understorey species
Dispersal	Spreads by suckers and seeds.
Legislation	Not yet contained in any legislative lists.

4.7. Montbretia

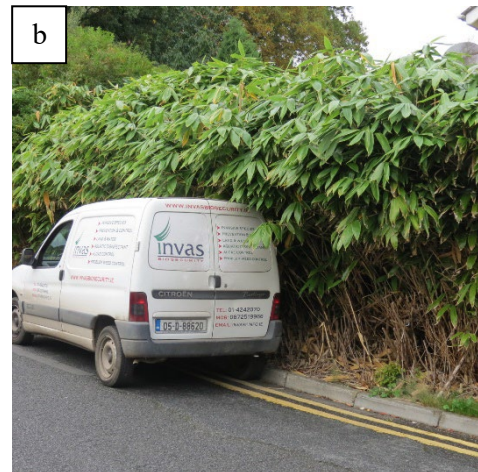
Observed primarily on roadside verges, in residential areas and other private properties.

Table 4.7: Species description and legislation for Montbretia.

Distinguishing features	<p>Montbretia (<i>Crocsmia x crocosmiiflora</i>) is an erect, emergent, perennial plant. It is stoloniferous (often called runners), with characteristic strings of flattened corms (swollen underground stem). The leaves are up to 2cm wide, strap-shaped, with a conspicuously raised midrib and pointed tip. Leaves are flattened at the base like an Iris.</p> <p>Stems will grow up to 90cm long and are erect, cylindrical and unbranched (except in the inflorescence). Flowers grow as an inflorescence and are up to 40mm long with six deep orange to red petals. These appear as a funnel-like tube, arranged on one side of an arching, branched spike. Fruit appear within a capsule that is 7mm long and 9mm wide; the seeds can be viable.</p>
Habitat	<p>Montbretia is a species that thrives in mild, damp conditions in disturbed, lowland habitats, along roadsides and river banks.</p>
Ecology	<p>Non-native (originally from South Africa) and widespread in Ireland, particularly in the south-west, west and north-west. This is a horticultural hybrid that was developed in the 1880s in France for ornamental purposes. It has naturalised in many parts of Ireland and in aggressively invading roadside and riparian habitats throughout the country. In these habitats, Montbretia can form dense monocultural stands and become locally dominant.</p>
Impact	<p>Because of the dense covering of vegetation that the weed produces it can easily outcompete native species and become locally abundant. Montbretia has a significant adverse impact on native floral (and associated faunal) biodiversity.</p>
Dispersal	<p>Dispersed vegetatively by underground corms and stolon fragments, and occasionally by seeds.</p>
Legislation	<p>Not yet contained in any legislative lists.</p>

4.8. Other species

Bamboo (*Pseudosasa cf. japonica*) was observed primarily in residential areas and other private properties. This species is not contained on any legislative lists but can crowd out native plants through vegetative reproduction, rapid growth, and leaves forming a thick suppressing litter layer. Bamboo can be difficult to control once introduced and established.



Plates 4.2: Montbretia seen here causing damage to the riparian zone in the west of Ireland (a). Bamboo in the north of Ireland dominating a roadside verge (b). Both species are medium impact IAPS (NBDC).

5. LONG_TERM MANAGEMENT PLAN

A comprehensive long-term Management Plan for the Meath coastline should consider prioritising certain species and areas in the catchment for control and treatment. This should be started in Spring 2022 with an initial focus on Sea Buckthorn and Knotweed infestations to prevent their further spread beyond their currently limited distribution. Because of the very limited distribution of Buddleja and Old man's beard in the survey area, it would be prudent to prioritise control efforts against these species, as this could result in their total eradication from these areas, at minimal cost. The placement of signage adjacent to these IAPS that informs the public of the presence of invasive species and the risks each poses may help to raise awareness and reduce the inadvertent spread of these species.

6. BIOSECURITY

For the purposes of this document, biosecurity refers to all practical measures used to manage and prevent the introduction and spread of IAS.

A number of high impact aquatic and riparian invasive alien species (IAPS) are currently present in Ireland, and most are continuing to spread aggressively. Prominent among the terrestrial IAPS are: Japanese knotweed (*Reynoutria japonica*), Giant knotweed (*Reynoutria sachalinensis*), Bohemian knotweed (*Reynoutria x bohemica*), Giant hogweed (*Heracleum mantegazzianum*) and Himalayan balsam (*Impatiens glandulifera*). The above species are listed in the Third Schedule (Part 1) of the Habitats Directive (S.I. 477/2011) and some are included among the list of 66 EU IAS of Union Concern (http://ec.europa.eu/environment/nature/pdf/IAS_brochure_species.pdf) in the EU Invasive Alien Species Regulations (1143/2014).

The ecological effects of IAPS are often irreversible and, once established, they are extremely difficult and costly to control and eradicate; hence, the urgent need to prevent their introduction and spread. Prevention is clearly more cost-effective and less environmentally damaging than long-term containment, control or eradication. The most effective measure to reduce introductions and halt spread of IAS in aquatic situations is to promote and implement good biosecurity practice.

6.1. Biosecurity Standard Operating Procedure for Personnel and Equipment

This Biosecurity SOP applies to all equipment (hand tools and PPE) that are used during the control of IAPS. The purpose of this SOP is to provide standardised practical methods for cleaning and disinfecting all equipment that comes into contact with IAS while carrying out control works. This Biosecurity SOP will enhance existing biosecurity activity to deliver an improved biosecurity system that will help stop the introduction and spread of IAPS during ongoing maintenance operations.

All staff that are involved in the maintenance and management of flora within this river system should have access to disinfection facilities that include but is not limited to:

- detailed guide to proper cleaning and disinfection procedure and instructions for making the correct disinfection concentration;
- a solution of clean water and Virkon Aquatic tablets or powder for the disinfection of equipment and PPE;

- hard-bristle brushes;
- disposable non-latex gloves for equipment and PPE; and
- plastic bags and cable ties (for disposing of IAS material removed from equipment).

[* Disinfectants must be used with care and in strict accordance with the manufacturer's instructions. Disposable gloves should be worn when using the disinfectant solution.]

Before commencing operations, a 1% Virkon Aquatic disinfection solution (10g Virkon Aquatic powder in 1 litre of clean water) should be prepared for staff working in infested areas. The disinfectant solution will remain pink in colour while it is still active. Additional clean water should be readily available for further disinfectant solution is required.

Best biosecurity practice will be achieved by ensuring that the following guidelines are adhered to when planning plant or weed maintenance activities.

- Where possible, schedule operations so that uncontaminated sites can be accessed before sites that are known or suspected to support IAS.
- Clean and disinfect all equipment prior to the commencement of activities.
- Clean and disinfect all equipment when moving between sites.
- Report suspected IAPS to personnel responsible for river maintenance, accompanied by the location (grid reference) and good quality photographs.

It is important that all PPE and equipment used are cleaned and disinfected according to the procedures below. These biosecurity measures should be conducted before leaving each site.

- Put on disposable gloves before cleaning and disinfecting the equipment.
- Visually inspect all equipment that has come into contact with water for evidence of attached IAPS material, or adherent mud or debris. Remove any such material before cleaning and disinfecting the equipment and leaving the site.
- Dispose of any IAPS material taken from the equipment using the plastic bags provided.
- Spray equipment with the disinfection solution to the point of run-off. Do not rinse in clean water for at least 15 minutes.



- Use the hard-bristle brush to remove all mud and debris from boots and equipment. Then spray with the prepared disinfectant solution onto the cleaned surfaces to the point of run-off. During inspection and cleaning, pay particular attention to places where IAPS could be accidentally trapped, such as the treads of boots and attachment points on equipment.
- Visually inspect all PPE that has been in contact with vector material and remove any attached IAPS material, or adherent mud or debris. Wipe down this PPE with an absorbent cloth soaked in the prepared disinfectant solution.
- Where time permits and it is practical, it is good biosecurity practice to air dry equipment following cleaning and disinfection.
- Remove disposable gloves and dispose of safely.

Appendices

Appendix 1: Survey details for the Meath coastline in January 2021.

Contact name	INVAS Biosecurity Ltd.
Surveyor name	Tom Donovan and William Earle
Survey date/time	21 st of January
County	Meath
Area	Boyne estuary to Delvin River
Site ID	SBU_MeathCoast_MeathCoCo
Risk assessment (Potential hazards)	Slips/trips/falls particularly in dense undergrowth, working in isolation, rivers, sea, tides, wildlife.
Health and safety (PPE required)	Hi viz, Safety boots
Regulated species recorded	SBU, JKO
GPS details	Throughout survey area
Area located	Throughout survey area
Site details	The Meath coastline, public recreational area with footpath/road access, bridges and roads.
Pervious treatment/Interference	General maintenance
Infestation beyond fence line	Yes, several species crossing boundaries to private property and agricultural land.
Notes	No
Photos	Throughout survey area
Is the site within or proximate to an ecologically sensitive area (SAC/SPA)	Boyne Coast and Estuary SAC (IE001957) and the Boyne Estuary SPA (IE004080). River Nanny Estuary and Shore SPA (IE004158).
Other invasive species observed	BUD, CLE, WHO, CRO, CHL

Appendix 2: Schedule of activities for the Dodder river.

 Schedule of Activities 			
Site ID	MGMT_MeathCoast_MeathCoCo		
Project details	SBU and other IAPS Management		
Biosecurity supervisor			
Date	January 2022		
	Phase	Date	Additional comments
Site survey and development of Management Plan	1	January 2022	
Establish and implement biosecurity protocol	2		
Toolbox talks to appropriate staff	3		
Implementation of Management Plan	4		
Decontamination of vehicles and equipment	5		
Sign off	6		

Appendix 3: Non-native invasive plant species regulated by the European Union (Birds and Natural Habitats) Regulations 2011 to 2015.

Common name	Scientific name	Geographical application
American skunk-cabbage	<i>Lysichiton americanus</i>	Throughout the State
A red alga	<i>Grateloupia doryphora</i>	Throughout the State
Brazilian giant-rhubarb	<i>Gunnera manicata</i>	Throughout the State
Broad-leaved rush	<i>Juncus planifolius</i>	Throughout the State
Cape pondweed	<i>Aponogeton distachyos</i>	Throughout the State
Cord-grasses	<i>Spartina</i> (all species and hybrids)	Throughout the State
Curly waterweed	<i>Lagarosiphon major</i>	Throughout the State
Dwarf eel-grass	<i>Zostera japonica</i>	Throughout the State
Fanwort	<i>Cabomba caroliniana</i>	Throughout the State
Floating pennywort	<i>Hydrocotyle ranunculoides</i>	Throughout the State
Fringed water-lily	<i>Nymphoides peltata</i>	Throughout the State
Giant hogweed	<i>Heracleum mantegazzianum</i>	Throughout the State
Giant knotweed	<i>Fallopia sachalinensis</i>	Throughout the State
Giant-rhubarb	<i>Gunnera tinctoria</i>	Throughout the State
Giant salvinia	<i>Salvinia molesta</i>	Throughout the State
Himalayan balsam	<i>Impatiens glandulifera</i>	Throughout the State
Himalayan knotweed	<i>Persicaria wallichii</i>	Throughout the State
Hottentot-fig	<i>Carpobrotus edulis</i>	Throughout the State
Japanese knotweed	<i>Fallopia japonica</i>	Throughout the State
Large-flowered waterweed	<i>Egeria densa</i>	Throughout the State
Mile-a-minute weed	<i>Persicaria perfoliata</i>	Throughout the State
New Zealand pigmy weed	<i>Crassula helmsii</i>	Throughout the State
Parrot's feather	<i>Myriophyllum aquaticum</i>	Throughout the State

Common name	Scientific name	Geographical application
Rhododendron	<i>Rhododendron ponticum</i>	Throughout the State
Salmonberry	<i>Rubus spectabilis</i>	Throughout the State
Sea-buckthorn	<i>Hippophae rhamnoides</i>	Throughout the State
Spanish bluebell	<i>Hyacinthoides hispanica</i>	Throughout the State
Three-cornered leek	<i>Allium triquetrum</i>	Throughout the State
Wakame	<i>Undaria pinnatifida</i>	Throughout the State
Water chestnut	<i>Trapa natans</i>	Throughout the State
Water fern	<i>Azolla filiculoides</i>	Throughout the State
Water lettuce	<i>Pistia stratiotes</i>	Throughout the State
Water-primrose	<i>Ludwigia</i> (all species)	Throughout the State
Waterweeds	<i>Elodea</i> (all species)	Throughout the State
Wireweed	<i>Sargassum muticum</i>	Throughout the State

Part 3: Vector Materials

Vector material	Species referred to	Geographical application
Blue mussel (<i>Mytilus edulis</i>) seed for aquaculture taken from places (including places outside the State) where there are established populations of the slipper limpet (<i>Crepidula fornicata</i>) or from places within 50 km. of such places	Mussel (<i>Mytilus edulis</i>) Slipper limpet (<i>Crepidula fornicata</i>)	Throughout the State
Soil or spoil taken from places infested with Japanese knotweed (<i>Fallopia japonica</i>), giant knotweed (<i>Fallopia sachalinensis</i>) or their hybrid Bohemian knotweed (<i>Fallopia x bohemica</i>)	Japanese knotweed (<i>Fallopia japonica</i>) Giant knotweed (<i>Fallopia sachalinensis</i>) Bohemian knotweed (<i>Fallopia x bohemica</i>)	Throughout the State

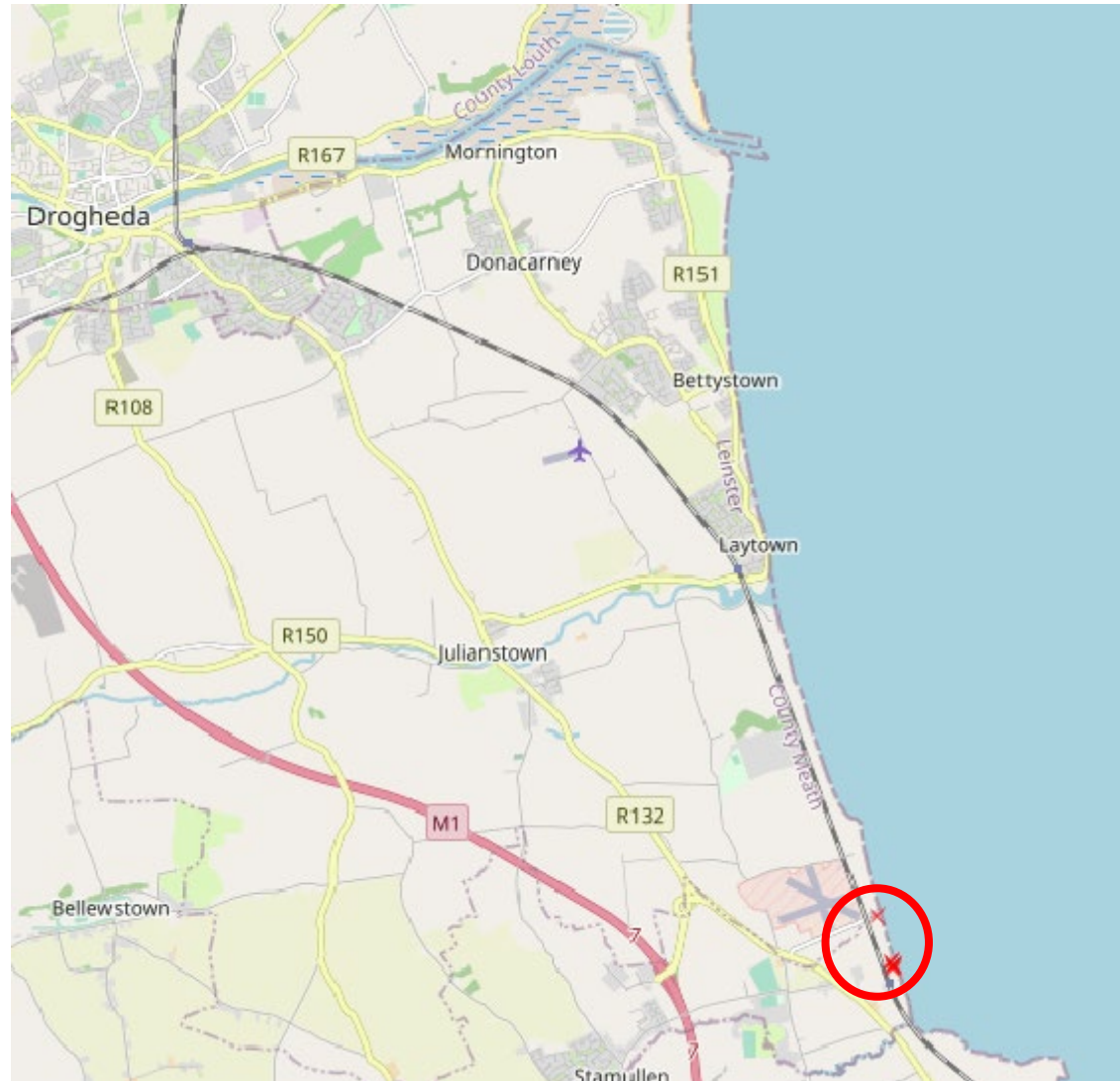
Appendix 4 Non-native Invasive Plant species of European Concern

PLANTS

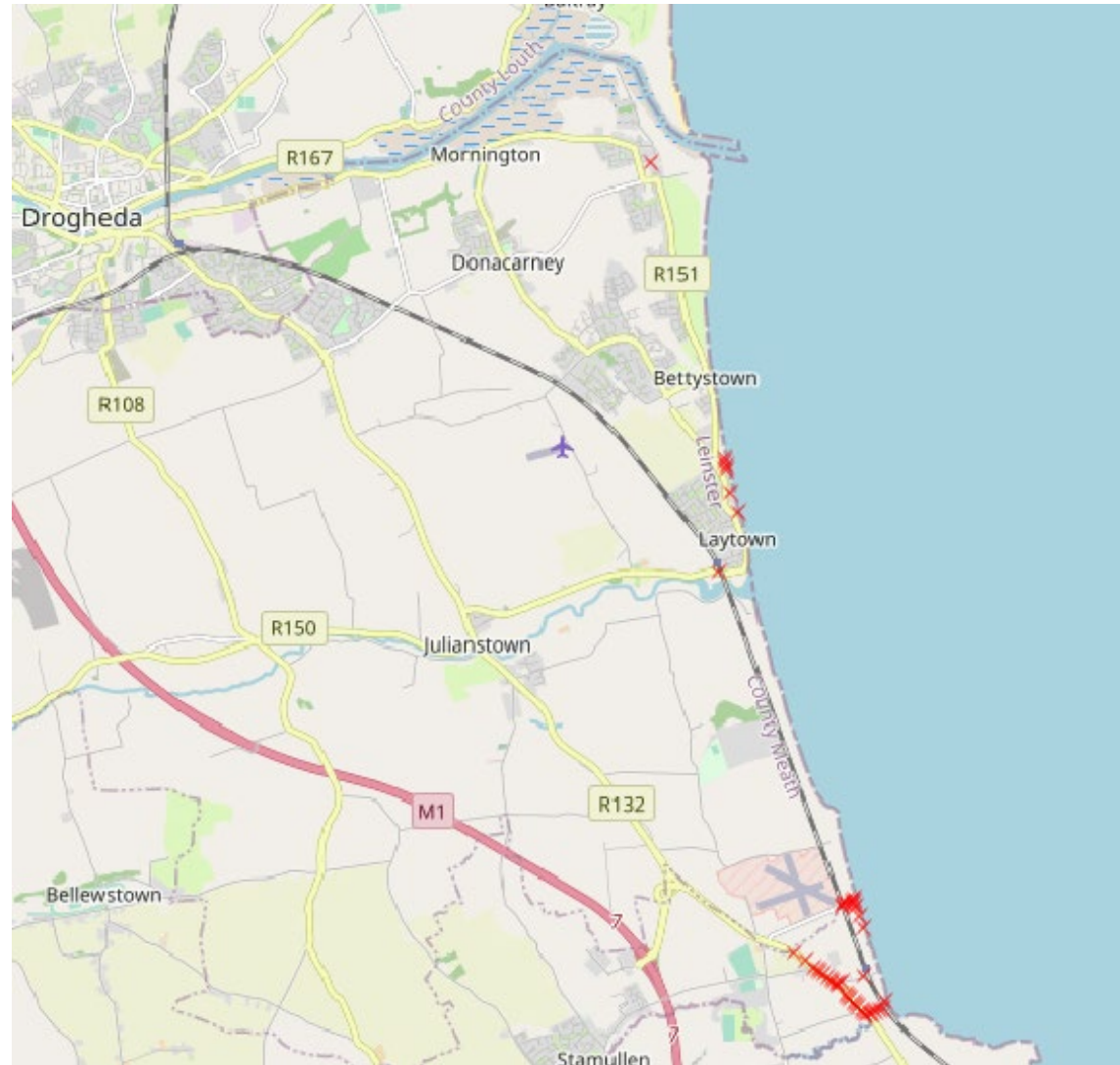
Scientific name	English name	Entry into force
<i>Acacia saligna</i> (<i>Acacia cyanophylla</i>)	Golden wreath wattle	15-Aug-19
<i>Ailanthus altissima</i>	Tree of heaven	15-Aug-19
<i>Alternanthera philoxeroides</i>	Alligator weed	02-Aug-17
<i>Andropogon virginicus</i>	Broomsedge bluestem	15-Aug-19
<i>Asclepias syriaca</i>	Common milkweed	02-Aug-17
<i>Baccharis halimifolia</i>	Eastern baccharis	03-Aug-16
<i>Cabomba caroliniana</i>	Fanwort	03-Aug-16
<i>Cardiospermum grandiflorum</i>	Balloon vine	15-Aug-19
<i>Cortaderia jubata</i>	Purple pampas grass	15-Aug-19
<i>Eichhornia crassipes</i>	Water hyacinth	03-Aug-16
<i>Elodea nuttallii</i>	Nuttall's waterweed	02-Aug-17
<i>Ehrharta calycina</i>	Perennial veldt grass	15-Aug-19
<i>Gunnera tinctoria</i>	Chilean rhubarb	02-Aug-17
<i>Gymnocoronis spilanthoides</i>	Senegal tea plant	15-Aug-19
<i>Heracleum mantegazzianum</i>	Giant hogweed	02-Aug-17
<i>Heracleum persicum</i>	Persian hogweed	03-Aug-16
<i>Heracleum sosnowskyi</i>	Sosnowsky's hogweed	03-Aug-16
<i>Humulus scandens</i>	Japanese hop	15-Aug-19
<i>Hydrocotyle ranunculoides</i>	Floating pennywort	03-Aug-16
<i>Impatiens glandulifera</i>	Himalayan balsam	02-Aug-17
<i>Lagarosiphon major</i>	Curly waterweed	03-Aug-16
<i>Lespedeza cuneata</i> (<i>Lespedeza juncea</i> var. <i>sericea</i>)	Chinese bushclover	15-Aug-19
<i>Ludwigia grandiflora</i>	Water-primrose	03-Aug-16
<i>Ludwigia peploides</i>	Floating primrose-willow	03-Aug-16
<i>Lygodium japonicum</i>	Vine-like fern	15-Aug-19
<i>Lysichiton americanus</i>	American skunk cabbage	03-Aug-16
<i>Microstegium vimineum</i>	Japanese stiltgrass	02-Aug-17
<i>Myriophyllum aquaticum</i>	Parrot's feather	03-Aug-16
<i>Myriophyllum heterophyllum</i>	Broadleaf watermilfoil	02-Aug-17
<i>Parthenium hysterophorus</i>	Whitetop weed	03-Aug-16
<i>Pennisetum setaceum</i>	Crimson fountaingrass	02-Aug-17
<i>Persicaria perfoliata</i>	Asiatic tearthumb	03-Aug-16
<i>Prosopis juliflora</i>	Mesquite	15-Aug-19
<i>Pueraria lobata</i>	Kudzu vine	03-Aug-16
<i>Salvinia molesta</i> (<i>Salvinia adnata</i>)	Salvinia moss	15-Aug-19
<i>Triadica sebifera</i> (<i>Sapium sebiferum</i>)	Chinese tallow	15-Aug-19



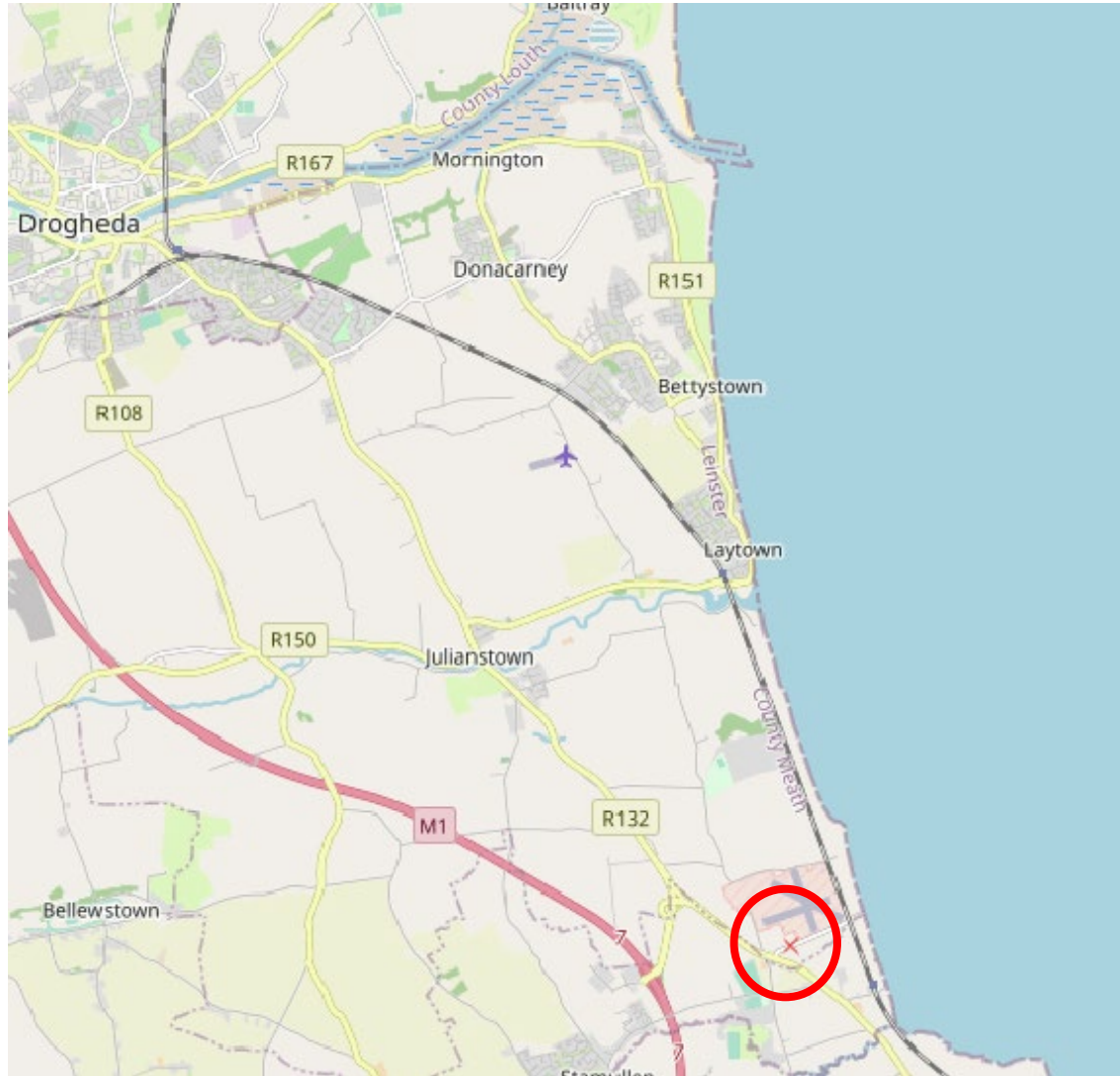
Appendix 5: Sea Buckthorn (red crosses) along the Meath coastline in January 2022.



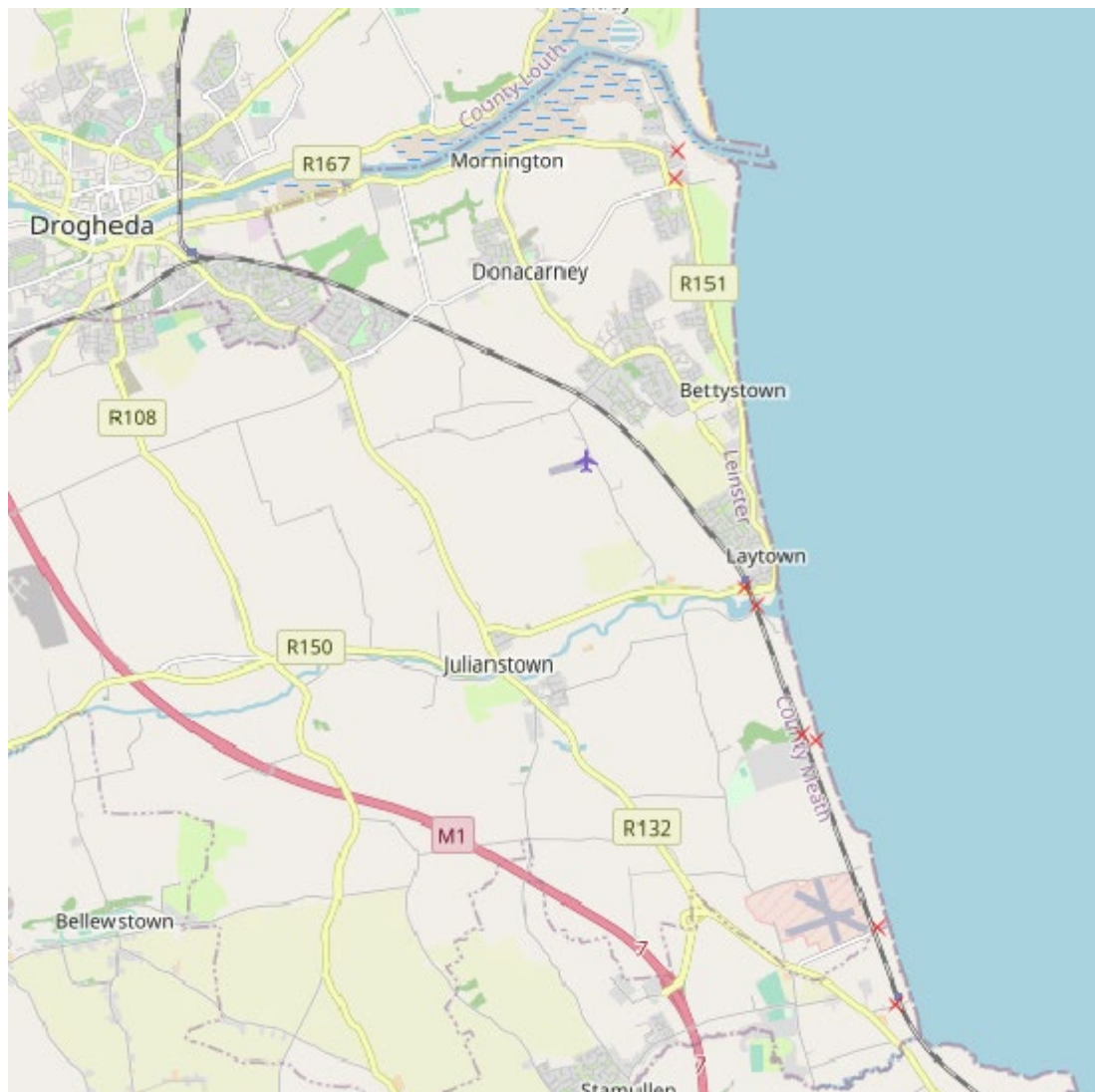
Appendix 5: Japanese knotweed (red crosses) along the Meath coastline in January 2022.



Appendix 5: Winter heliotrope (red crosses) along the Meath coastline in January 2022.



Appendix 5: Old man's beard (red crosses) along the Meath coastline in January 2022.



Appendix 5: Buddleja (red crosses) along the Meath coastline in January 2022.

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