Comhairle Contae Fhine Gall
Fingal County Council

NatureCubsIreland.ie

Local Biodiversity Action Plan

Appendices

Contents

Appendix I: How to manage a meadow

If an area of grass is allowed to grow long, it is possible that a greater diversity of flora would grow and perhaps even a rare flower might appear. This has happened numerous times over the last few years with businesses, local authorities and schools joining in with the All Ireland Pollinator Plan and not mowing grass:

e.g. A rare Green Winged Orchid bloomed in a Portlaoise housing estate after disappearing for 120 years: https://bsbi.org/wp-content/uploads/dlm_uploads/Does-the-Covid19-lockdown-have-any-silver-linings.pdf

e.g. rare Bee Orchids bloomed in Cork after mowing stopped: . https://www.irishexaminer.com/news/arid-31003408.html

Here are some suggestions to different Meadow Management Methods:

- A meadow can have a 'short cut and lift', that is every 6 weeks. This will keep the grass lower yet allow Clover and Dandelion to bloom. It is often better to start with this method for a couple of years before moving to the Hay Meadow to allow for soil nutrient levels to fall and allow the species richness to develop.
- A Hay Meadow management style calls for one to two cuts and lifts a year, with one Autumn after flowers have seeded and another in early Spring to remove any winter growth. Small to medium sized meadows can be cut with a small tractor, like that used in sports grounds or power scythes and brush cutters. If the latter are used, the hay should be gathered into rows and then piled up to be removed.
- A Spring Bulb Meadow incorporates bulbs thus adding biodiversity value, aesthetic value and a continuous supply of food for wildlife and pollinators.

Figure 1: Power scythe used by Portlaoise Tidy Towns group.
https://www.leinsterexpress.ie/news/portlaoise-/480450/portlaoise-residents-saving-wildlife-and-biodiversity.html

You can enhance the diversity of flora in your meadow by picking wildflower seed elsewhere (Appendix 14) and spreading it here, ideally after the Autumn cut and lift. Spreading Yellow Rattle (*Rhinanthus minor*) seed or planting plugs will help to outcompete with grass.

It is always advised to cut a nice shape on the long grass area so that it looks defined. Cutting a path through the meadow and keeping it cut short invites the public into the space and defines the shape. Also, the erection of signage is necessary to both educate and also to inform. Suitable signage templates are available to downloaded from https://pollinators.ie/resources/ under the 'Signage templates' heading.

Figure 2: Mowing a nice shape creates a defined area of meadow thus creating a feature.

See https://www.biodiversityireland.ie/practical-advice-on-managing-wildflower-meadows/ for guidance on managing meadows.

For a more colourful and flower-filled meadow, guidance can be found at https://pollinators.ie/wordpress/wp-content/uploads/2018/04/How-to-guide-Wildflower-Meadows-2018-WEB.pdf

Appendix II: Wildlife friendly planting

Summary of Pollinator Friendly Plants per Season (non-exhaustive list)

Early Spring:

- Snowdrop (bulb planted in Autumn)
- Crocus (bulb planted in Autumn)
- Muscari (bulb)
- Bluebells (bulb)
- Wallflowers
- Aubretia
- Primrose
- Lungwort
- Dandelion
- Hazel (Hedgerow species)
- Blackthorn (Hedgerow species)
- Willow (Tree)
- Hazel (Tree)
- Elder (Tree
- Whitebeam (Tree)
- Rowan (Tree)
- Juneberry (Tree)
- Barberry (bush)
- Quince (bush)

All Spring:

- Rosemary
- Dandelion
- Willow (Hedgerow)
- Blackthorn (Hedgerow)
- Hawthorn (hedgerow)
- Broom (hedgerow)
- Wild Cherry (hedgerow)
- Mahonia (shrub)
- Pillar Crab (tree)
- Callery Pear (tree)
- Rock Cress
- Thrift
- Aubretia
- Spurge
- Hellebore
- Candytuft
- Lamium
- Heather (shrub)
- Hebe (shrub)

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- Pieris (shrub)
- Blueberry (shrub)
- Forget me not

Late Spring/Early Summer:

- Arabis (Rock Cress)
- Forget me Not
- Evening primrose
- Dandelion
- Willow (hedgerow)
- Blackthorn (hedgerow)
- Hawthorn)
- Broom (hedgerow)
- Wild cherry (hedgerow)
- Wild Privet (hedgerow)
- Crab Apple (tree)

Summer:

- Borage
- Yarrow
- Bistort
- Phlox
- Spearmint
- Cinquefoil
- Loosestrift
- Hyssop
- Chamomile
- Bellflower
- Knapweed
- Clover
- Sunflowers
- Cosmos
- Globe Thistle
- Sweet William
- Night Scented Stock
- Poppy
- Fennel
- Marigold
- Cornflower
- Sweet Alyssum
- Nasturtium
- Dandelion
- Honeysuckle

Please see www.rhs.org.uk for sources of plant images

- Thyme
- Raspberry
- Lavendar (French and English, English hardier)
- Bramble (hedgerow)
- Wild privet (hedgerow)
- Crab apple (hedgerow)
- Elder (hedgerow)
- Rowan (hedgerow)
- Whitebeam (hedgerow)
- Wild rose (hedgerow)
- Guelder Rose (hedgerow)
- Sea Kale
- Cone Flower
- Fleabane
- Globethistle
- Wallflower
- Cranesbill
- Avens
- Mallow
- Scabious

Autumn:

- Yarrow
- Aster
- Marigold
- Cornflower
- Dandelion
- Nasturtium
- Knapweed
- Clover
- Bramble (Hedgerow)
- Ivy (Hedgerow)
- Honeysuckle
- Gorse
- Honeysuckle
- Bugbane
- Michaelmas Daisy
- Trailing bellflower
- Autumn Oxeye
- Autumn Sage

Winter: Gorse, Winter Jasmine, Winter Aconite, Winter Crocus, Hellebore (late Winter), Vibernum shrub

Please see www.rhs.org.uk for sources of plant images

Useful and comprehensive guide to trees/herbs/flowers beneficial to pollinators:

Pollinator-friendly-planting-code-temporary-draft.pdf (biodiversityireland.ie)

Useful booklet on all aspects of Wildlife Gardening:

https://laois.ie/wp-content/uploads/Garden-Wildlife-Booklet-WEB-17MB.pdf

Foods eaten by Red Listed Bee Species in Dublin:

- Large Carder Bee (*Bombus muscorum*):
  - 'Near threatened' conservation status in Red Data Book.
  - Needs food within 100m of nest site (bare soil with some moss/leaves)
  - Listed in latest 2021-2025 All Ireland Pollinator Plan as requiring action
    - Favourite foods:
  - Red clover/White Clover
  - Knapweed
  - Dandelion
  - Kidney Vetch (particularly loves this)
  - Birds Foot Trefoil
  - Lavender
  - Vetch
  - Phacelia

Fig.1: Large Carder Bee (www.sustainableskerries.com)

- Buffish Mining Bee (*Andrena nigroaenia) :*
  - 'Vulnerable' conservation status in Red Data Book.
  - Early flight period from early Spring to
  - Summer and female builds nest in well drained ground (http://www.habitas.org.uk/priority/species.asp?item=9636).
  - Its nest used by cleptoparasite and 'Endangered' Gooden's Nomad Bee (*Nomada goodeniana).*
  - Feeding on *Escallonia* and *Berberis* in Baldoyle Treatment Plant

Fig. 2: Vulnerable Buffish Mining Bee

Fig. 3: Vulnerable Gooden's Nomad Bee (Photos M. Stack)

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Some Honeybee friendly plants:

Rosemary.

- Evergreen. Bushy shrub.
- Flowering starts spring but occurs at different times of year also.
- Full sun
- Exposed or sheltered.

Arabis (Rock Cress):

- Evergreen. Annual or perennial. Mat forming.
- Flowers late spring/early summer with white, pink or purple flowers.
- Full sun. Exposed or sheltered.
- Well drained soil.

Borage:

- Annual or perennial.
- Blue flowers that flower over long period in summer.
- Full sun or partial shade.
- Well drained soil.

Candytuft:

- Annual or perennial evergreen small shrub
- White, pink or purple flowers
- Full sun, exposed or sheltered.
- Well drained soil.

Wallflowers:

- Apricot variety is evergreen perennial.
- Flowers from Spring to summer and sometimes into Winter.
- Full sun.
- Exposed or Sheltered.
- Well drained.

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Some Bumblebee friendly plants:

Bergamot (bee balm):

- Summer to early Autumn flowering
- Can be annuals or clump forming perennials
- Full sun, exposed or sheltered.
- Moist, well drained soil.
- Avoid over-wet in Winter or drying out in Summer

Knapweed:

- Herbaceous perennial
- Purple/pink flower Summer to early Autumn
- Full sun and exposed.
- Well drained soil.

Lungwort:

- Herbaceous or semi-evergreen perennial
- Blue flowers in Spring
- Full shade or partial shade and sheltered.
- Moisture and well drained.

Snapdragon:

- Sunny position
- Any garden soil

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Some plants for Hoverflies (pollinators) and beneficial insects:

Pot Marigold:

- Annuals or perennials that flower in Summer and Autumn
- Full sun or partial shade
- Exposed or sheltered
- Well drained soil

Cornflower:

- Blue flower June to September
- Full sun in sheltered or exposed location
- Well drained soil

Sweet Alyssum (Snowdrift):

- Annuals or perennials
- Low spreading with white flowers in Summer
- Full sun in sheltered or exposed location
- Well drained soil

Coriander:

- Hardy annual that lives in sun or partially shaded location
- Susceptible to slugs so use bio-control
- Sow seed early Summer
- Damp soil but not over-wetting or do not let dry out

Fennel:

- Biennial or short-lived perennial
- Full sun or partial shade in sheltered location
- Moist but well drained soil.

Nasturtium:

- Annual that grows in sun in well drained soil
- Flowers in Summer through Autumn
- Edible petals

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Other flowers that provide nectar and pollen:

Yarrow:

- Perennial that can live in grass, waste areas and roadside locations
- Numerous flowerheads from June to November

Californian Poppy:

- Hardy annuals
- Flowers in Summer
- Sunny location in well drained soil

Lovage:

- Perennial herb

- Sunny or partially shaded location
- Rich, deep, moist soil

Thyme:

- Warm sunny location

- Well drained soil. Will rot in winter if ground too wet.
- Thrives in pots

Fuschia:

- Deciduous and bushy
- Full sun or partial shade
- Sheltered location in well drained, moist soil.

Please see www.rhs.org.uk for sources of plant images

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Food for Butterflies and Moths:

Verbena:

- Full sun, well drained soil
- Flowers June-September
- Tall up to 2m
- Sunny, sheltered, well drained

Aubretia:

- Perennial low growing evergreen
- Forms mat of flowers, good for 'tumbling' over effect
- Hardy and will grow in sun or partial shade
- Well drained soil and drier conditions

Michelmas daisy:

- Perennial in white, blue, purple and pink
- Well drained soil
- Sun or partial shade

Sweet Williams:

- Biennial in pink, white, red and purple
- Sunny or shaded location
- Summer flowers

Night Scented Stock:

- Can be annual, perennial or subshrub
- White, purple or pink flowers in summer
- Full sun and sheltered location
- Moist, well-drained soil

Please see www.rhs.org.uk for sources of plant images

Seed Producing flowers for birds:

Forget-me-Not:

- Annual, perennial or biennial that flowers in Spring and early Summer
- Semi-evergreen and bushy
- Partial shade in exposed or sheltered location
- Moist but well-drained soil

Sunflower:

- Annual that flowers in August
- Small (teddy bear) or tall (American Giant) varieties
- Full sun in well drained soil

Evening Primrose:

- Herbaceous perennial that flowers from late Spring to late Summer
- Likes full sun in sheltered locations on well-drained soil

Cosmos

- Half-hardy annual
- Pink or white petals on flowers in Summer
- Likes full sun in sheltered location on moist but well-drained soil

Globe Thistle:

- Clump-forming perennial
- Blue-grey to blue flowerheads mid to late Summer
- Likes full sun or partial shade in exposed or sheltered areas
- Moist but well-drained soil

Pheasant's Grass (*Stipa arundinacea*)

- Clump forming
- Purple feather flower heads June-Sept
- Full sun/partial shade
- Perennial/evergreen
- Late summer/early Autumn seeds eaten by Finches

Teasel (*Dipsacus fullonum*)

- Can grow to 3m in height
- July purple flowers
- Biennial

Please see www.rhs.org.uk for sources of plant images

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Wildlife friendly bulbs for every season:

Autumn:

Autumn crocus (*Colchicum* species). Flowers September-October.

Single flowered Dahlia (Bishop series) (*Dahlia* 'Bishop of Dover'). Flowers July-November.

Spring:

Armenian grape hyacinth (*Muscari armeniacum*). Flowers March-May.

Bluebell (native, not Spanish) (*Hyacinthoides non scripta).* April - May

Crocus, spring-flowering (*Crocus* species)

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Common star of Bethlehem (*Ornithogalum umbellatum).* Summer flowers.

Summer

Allium species. Flowers June-July.

Single flowered Dahlia (Bishop series) (*Dahlia* 'Bishop of Dover'). Flowers July-November.

Pheasant Grass (*Stipa arundinacea*). Flowers June to Sept. Seeds Autumn. Finches eat seeds.

Please see www.rhs.org.uk for sources of plant images

Winter

Snowdrop (*Galanthus nivalis, Galanthus elwesii).*
Flowers Jan-Feb.

Winter Aconite (*Eranthis hyemalis).*

Flowers Winter-Spring.

Spring Starflower (*Ipheoin* sp.)

Flowers late Winter-Spring (white or purple)

Please see www.rhs.org.uk for sources of plant images

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Wildlife friendly plants suited to being planted around the base of street trees:

Pot Marigold (Calendula officinalis)
Annual
Full sun – Part shade
Edible flower
Blooms all through growing season

Grape hyacinth (*Muscari armeniacum*)
Perennial bulb
Blooms mid Spring
Full sun or partial shade

Forget me Not (*Myosotis sp.)*
Well drained soil
Semi Evergreen
Perennial/annual
Blooms May to October

Evergreen Candytuft
(*Iberis commutata*)
Perennial
Blooms Spring and Summer

Winter Aconite/Hellebore
(*Eranthis hyemalis*)
Perennial
Flowers Feb-March
Deciduous
Full sun/partial shade

Please see www.rhs.org.uk for sources of plant images

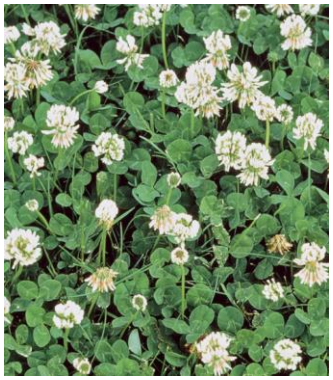
Mouse Ear Chickweed (*Cerastium* sp.)
Perennial
Flowers April – September
Shade or sun
Moist soil
Evergreen
Nice silver coloured leaves when not in flower

Wood Sorrel (*Oxalis sp*.)
Perennial
Flowers April-May
Shade or partial sun
Deciduous

Bugloss/Alkanet (*Pentaglottis sp*.)
Evergreen
Blooms early to late Spring
Shady moist areas

Serbian bellflower (*Campanula poscharskyana)*
Semi evergreen
Perennial
Flowers in Summer and Autumn

Please see www.rhs.org.uk for sources of plant images



White or Pink Clover (*Trifolium repens*)
Perennial
Evergreen
Blooms June to September

Red Clover (Trifolium repens)

Wood anemone (*Anemone nemorosa*)
Perennial
Shady or partial sun
Evergreen
Blooms March to May

Meadow Cranesbill (*Geranium pratense)*
Annual or Perennial
Deciduous
Shade or sunlight
Blooms in Summer

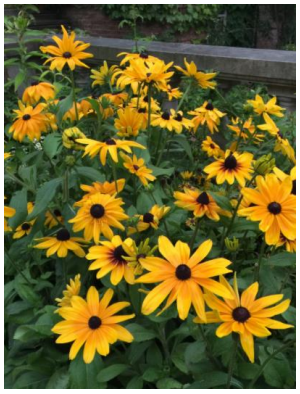
Yarrow (*Achillea millefolium*)
Evergreen feathery leaves
Flowers June to November
Perennial
Partial shade or sunlight

Beacon Silver (*Lamium maculatum*)
Evergreen
Perennial
Blooms April to November
Shade loving but grows anywhere

Please see www.rhs.org.uk for sources of plant images

Creeping phlox (*Phlox subulata*)
Perennial
Flowers Spring to Early Summer
Needs full sun

Stonecrop or Iceplant (*Sedum acre*)
Evergreen
Perennial
Full sun
Blooms early to mid Summer



Rudbeckia sp.
Evergreen
Perennial
Full Sun
Blooms Aug.-Oct.
Seeds feed birds mid-late Autumn

Spring Starflower (*Ipheoin* sp.)
Bulbs/deciduous/perennial
Bloom late Winter/Spring
Sheltered

Common Star of Bethlehem
(*Ornithogalum umbellatum)*
Deciduous/bushy
Perennial; grows from bulbs
Full sun/partial shade
White flowers in early Summer

Snowdrop (*Galanthus* sp.)
Dwarf bulbous perennial
Deciduous
Full sun/partial shade
White flowers January/February

Please see www.rhs.org.uk for sources of plant images

Sea Fleabane (*Erigeron glaucus*)
Perennial, Low growing
Summer flowering lilac pink flowers
Evergreen
Full sun

Columbine or Granny's Bonnet
(*Aquilegia sp.*)
Semi Evergreen/Perennial
Partial shade
Bloom May and June

Mayweed (Wild Chamomile) (*Chamaemelum nobile*)
Mat forming perennial
Daisy like flower in Summer
Deciduous
Full sun or partial shade

Please see www.rhs.org.uk for sources of plant images

Wildlife friendly climbers:

1

2.

3.

Ivy: *Hedera helix* Evergreen Climber. **1**: 'Teardrop'. **2**: 'Maple Leaf'. 3: Birdsfoot.

Honeysuckle. Evergreen climber (different varieties have different colour flowers

Wisteria (various). Deciduous. Flowers Spr./Summ.

Clematis. Deciduous climber. Different varieties have different coloured flower.

Winter Jasmine. Flowers Winter and Spring.

Please see www.rhs.org.uk for sources of plant images

Coastal Wildlife Friendly Plants:

Examples of coastal plants are:

- Sea Campion (*Silene uniflora*) (White, perennial, summer flowering, bee friendly, shingle and sand dunes)
- Sea Thrift (*Armeria maritima*) (pink, coastal, pollinator friendly, native Irish, sandy, dry, exposed)
- Sea Fleabane (*Erigeron glaucus*) (low growing carpeting perennial, evergreen, lilac pink flowers Summer, full sun).
- Sea Lavender (*Limonium bellidifolium*) (compact, woody, evergreen perennial, tiny purple and white flowers in summer, sand or soil).
- Sea Holly (*Eryngium maritimum*) (blue, summertime, native Irish, pollinator friendly, shingle or sandy)
- Stone Crop (Sedum sp.) (evergreen mat forming perennial, colours vary, full sun)
- Sea Kale (*Crambe maritima*)Near Threatened Species in Ireland's Red List (white flowers May-July, native Irish, pollinator friendly, shingle and sandy)
- Kidney Vetch (*Anthyllis antheraria*) (Preferred food of Large Carder Bee, yellow, sandy, native Irish)
- Stonecrop (Sedum spp.) (white flowers summer, coastal/harsh environments, sandy, pollinator friendly).
- Heather (*Calluna vulgaris*) (could be considered coastal, is bee friendly, found on nearby Howth Head)

Sea thrift | Kidney vetch | Sea Holly | Sea Campion | Sea Kale | **Sea Lavender**

Sea fleabane | **Stonecrop (not blooming and in bloom)**

Figure 1: Some coastal wildlife friendly plants

Please see www.rhs.org.uk for sources of plant images

If a sand dune look is required, some of the following look like sea grasses:

2

3

4

Fig. 2: Japanese Sedge (*Carex marrowei)* Fig. 3: Ponytail grass (*Stipa teniussima*)Fig. 4: Morning light (*Miscanthus sinensis*)

Plant above plants and grasses on gravel to replicate a 'shingle' habitat.

Some images of coastal themed gardens:

Figure 5: Some coastal themed gardens

Please see www.rhs.org.uk for sources of plant images

Rockery Wildlife Plants:

A rockery has many advantages. The rocks help to fill out the area and look well even in Winter. The rocks are also 'basking locations' for butterflies in summer that need resting places when flying in search of food. The rocks are also winter hibernations sites for frogs, common lizard and insects that burrow down under rocks for Winter.

Figure 1: A rockery designed by M. Stack

Examples of plants suited to rockeries include:

• Cosmos	•Sweet William
• Verbena	• Phlox
• Lavender	•Sea Kale
• Heather	•Sea Campion
• Thrift	•Sea Holly
• Saxifrage	•Pot Marigold
• Nepeta	•Winter Aconite
• Wallflowers	•Bellflower
• Candytuft	•Alkanet
• Sweet Alyssum	•Lamium
• Forget me Not	•Stonecrop
• Pheasant's Grass	•Rudbeckia
• Michelmas Daisy	

If the rockery is built on a sloped soil base, it is very beneficial to mining Solitary Bees. Our most common bee type in Ireland is the Solitary Bee family. There are 77 Solitary Bee species in Ireland compared to 22 Bumblebee species. One third of our bees are facing extinction due to lack of food and habitat. Solitary bees live on their own, not in hives, hence their name. Solitary mining bees mine into the soil in south and east facing soil banks to lay their eggs in early Summer. These overwinter in the soil over the winter and emerge in Spring. There must be a food source within 300m of Solitary Bees due to their tiny size. Thus a sloped soil rockery is excellent for solitary mining bees for nesting and for food.

Please see www.rhs.org.uk for sources of plant images

Shade tolerant wildlife plants:

Figure 1 Some woodland wildlife friendly flowers:

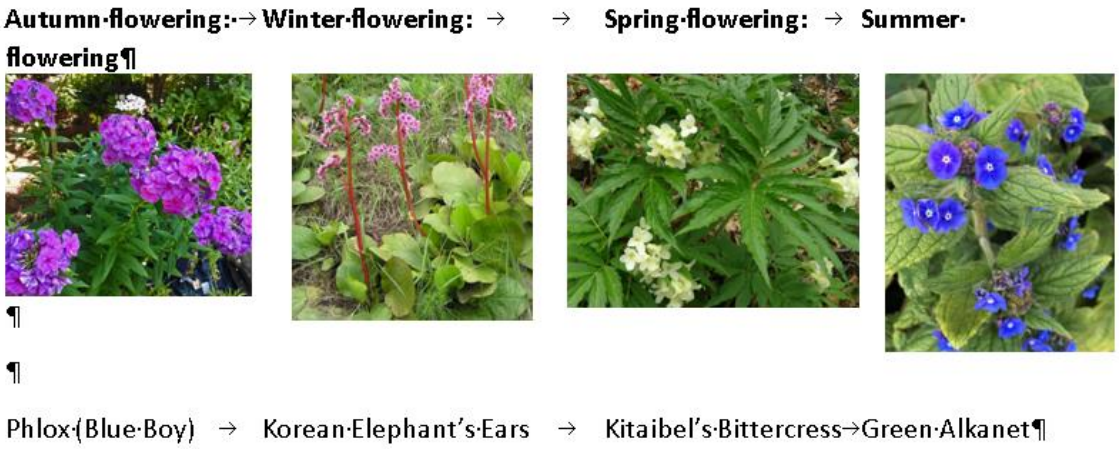


Figure 2: Some shade tolerant wildlife friendly flowers

Please see www.rhs.org.uk for sources of plant images

Some shade tolerant shrubs include:

Viburnum: Evergreen. Spring/Summer flowers.

Vinca: Evergreen. Spring/Summer flower

Sweet box: Evergreen. White flower Winter.

Cherry Laurel: Evergreen, White flower Spring, Red berry Autumn.

Lomaria leaved Mahonia: Evergreen. Yellow flower Winter. Blue or black fruit Winter.

Firethorn: Evergreen. White flower Summ, Orange berries Autumn.

Figure 3: Some shade tolerant wildlife friendly shrubs

Please see www.rhs.org.uk for sources of plant images

Autumn flowering shade tolerant plants:

- Cyclamen species (*Cyclamen* sp.): Perennial, Autumn pink or purple flowers, 0.5m (not particularly wildlife friendly but is nice addition to a shaded space)
- Heuchera Zipper: Perennial evergreen, pink flowers and white flowers in Autumn, 0.5m
- Japanese anemone September Charm *(Anemone X hybrida* September Charm): Spreads easily, perennial, pink flower in Summer and Winter, 1m.
- Rudbeckia (Summerina series): Perennial, orange flowers and yellow flowers in Autumn and Summer, shade variety, 1m.
- Hyssop species (e.g. *Hysopus officinalis*):Semi evergreen, perennial, blue flower in Autumn and Summer, 0.5m
- Phlox 'Blue Boy' (*Phlox paniculata* 'Blue Boy'): Perennial, purple or white flowers in Summer and Autumn ,1m.

Winter flowering shade tolerant plants:

- Oriental Hellebore (*Helleborus orientalis*): Evergreen perennial, white flower late winter/early Spring0.5m
- Korean elephant's ears (*Bergenia crassifolia*): Evergreen perennial, pink flowers and purple flowers in Winter and Spring, 0.5m
- Sweet Box small shrub (*Sarcococca hookeriana*): Evergreen shrub with white flowers in Winter or Spring and followed by red, purple or black berries so good for birds also. 1.5m.
- Laurustinus large shrub (*Viburnum laurustinus*): Evergreen, white flower in Winter and Spring, black or blue fruit in Autumn or Winter so good for birds, 4m.

Please see www.rhs.org.uk for sources of plant images

Spring flowering shade tolerant plants:

- Aquilegia species (e.g. *Aquilegia canadensis):* May/June red and yellow Flowers, Perennial, 0.5m
- Bleeding heart species (*Dicentra sp*.): Late Spring/early Summer, Perennial, pink flowers, 0.5m
- Elephant's ears species (e.g. *Bergenia crassifolia*): Evergreen perennial, pink flowers and purple flowers in Winter and Spring, 0.5m
- Kitaibel's bittercress (*Cardamine kitaibelli*): Perennial, white flowers and yellow flowers in Spring, 0.5m
- Bugloss species (*Brunnera* sp.): Spring blue flowers (like forget me not), perennial, 0.5m
- Virginia bluebell (*Mertensia pulmonarioides): Blue flower in Spring, perennial, 0.5m*
- Cranesbill species e.g. Langthorn's Blue (*Geranium* species): Blue flower in Spring, perennial, 1m
- Oriental Hellebore (*Helleborus orientalis*): Evergreen perennial, white flower late winter/early Spring0.5m
- Solomen's Seal (e.g. *Polygonaturm multiflorum*):Perennial, white flower in Spring, 1.5m
- Bailey's Himalayan Blue Poppy (*Meconopsis baileyi): Blue flower late Spring/Early Summer, Perennial, 1.5m, striking when en masse*
- Heuchera various species e.g. *H. zipper* (Summer and Autumn white flowers); H. guacamole (creamy white flowers Spring and Summer); H. Red Lightening (white flowers in Spring and Summer); H. Silver Gumdrop (red to pink flowers late Spring to early Summer); H. Isla (pinky red flowers very attractive to bees from early Summer).
- Green Alkanet (*Pentaglottis sempervirens*): Evergreen perennial, blue flowers in Spring and Summer, 1m.
- Narrow leaved Lungwort (*Pulmonaria longifolia*): Semi evergreen perennial, blue flowers in Spring, 0.5m.
- Bugle (*Ajuga* species): Evergreen perennial, spreading and mat forming, white flower in Spring and Summer, 0.5m
- Avens (*Geum* species): Perennial, red/orange flower in Spring and Summer, 0.5m
- Spurge species (*Euphorbia* species): Evergreen perennial, yellow flowers in Spring and Summer, 1m.
- Monk's Hood Anglicum Group (*Aconitum napellus*): Perennial, purple flower in Spring and Summer, 1.5m

Please see www.rhs.org.uk for sources of plant images

Summer flowering shade tolerant plants:

- Foxglove (*Digitalis purpurea*): Purple/pink flower June, semi evergreen, 0.5-1m
- Aquilegia (e.g. *Aquilegia canadensis*): May/June red and yellow flowers, Perennial, 0.5m
- Bleeding heart species (*Dicentra sp*.): Late Spring/early Summer, Perennial, pink flowers, 0.5m
- Astrantia (*Astrantia* sp.): Perennial, pink flowers and white flowers in Summer, 1m
- Astilbe (e.g.*Astilbe superba* sp.). Perennial, pink or purple flowers in Summer, 1.5m
- Bailey's Himalayan Blue Poppy (*Meconopsis baileyi): Blue flower late Spring/Early Summer, Perennial, 1.5m, striking when en masse*
- Heuchera various species e.g. *H. zipper* (Summer and Autumn white flowers); H. guacamole (creamy white flowers Spring and Summer); H. Red Lightening (white flowers in Spring and Summer); H. Silver Gumdrop (red to pink flowers late Spring to early Summer); H. Isla (pinky red flowers very attractive to bees from early Summer).
- Chinese Meadow Rue (*Thalictrum delavayi*): not particularly good for wildlife but nice border shaded space plant, pink flowers in Spring and Summer, upright perennial, 1.5m
- Rudbeckia (Summerina series): Perennial, orange flowers and yellow flowers in Autumn and Summer, shade variety, 1m.
- Hyssop species (e.g. *Hysopus officinalis*):Semi evergreen, perennial, blue flower in Autumn and Summer, 0.5m
- Green Alkanet (*Pentaglottis sempervirens*): Evergreen perennial, blue flowers in Spring and Summer, 1m.
- Bugle (*Ajuga* species): Evergreen perennial, spreading and mat forming, white flower in Spring and Summer, 0.5m
- Avens (*Geum* species): Perennial, red/orange flower in Spring and Summer, 0.5m
- Spurge species (*Euphorbia* species): Evergreen perennial, yellow flowers in Spring and Summer, 1m.
- Monk's Hood Anglicum Group (*Aconitum napellus*): Perennial, purple flower in Spring and Summer, 1.5m

See rhs.org.uk for images and growing information on the above flowers

Please see www.rhs.org.uk for sources of plant images

Extensive list of shade tolerant pollinator friendly flowers:

P: Partial shade **F: Full Shade**

Alum root 'pear crisp' *(Heuchera* Pear Crisp): Perennial, clump forming, 0.1-0.5m, evergreen, white flower Summer**.(P) (F)**

Alum root 'Zipper' (*Heuchera* 'Zipper'): Perennial, clump forming, 0.1-0.5m, evergreen, white flower Autumn and Summer, cream/orange/yellow leaves **(P) (F)**

Alum Root (*Heuchera*) species various.

Autumn Sage (*Salvia greggii* Emperor): perennial, bushy, semi evergreen, 0.5-1m, purple flower Autumn and Summer

Bugle 'Braunherz' (*Ajuga reptans* 'Braunhertz'): Perennial, evergreen, mat forming, 0.1-0.5m tall/0.51m wide, dark blue flower Spring and Summer, purple foliage (**P) (F)**

Bugle various species.

Chaenomeles rose (*Chaemomeles speciosa* 'Yukigotan'): Spreading/branched, 1.5-2m, white flower Spring, yellow berry Autumn **(F)**

Cranesbill (*Geranium cantabrigiense*). Herbaceous Perennial. Evergreen. 0.1-0.5m. Pink flower Summer. Red, orange and green foliage in Autumn and Winter. **(F)**

Cranesbill 'big root' (*Geranium macrorrhizum*): herbaceous perennial, semi evergreen, 0.1-0.5m, pink flower Spring and Summer, red/orange/green foliage **(P) (F)**

Dwarf Ivy (*Hedera helix congesta*): non climbing dwarf shrub, 0.1-0.5m tall/wide, evergreen **(F)**

Elephant's Ears 'Bressingham salmon' (*Bergenia* Bressingham Salmon): Clump forming perennial, 0.1-0.5m tall/wide, evergreen, pink flowers Spring, orange and green foliage Winter **(F)**

Elephant's Ears (*Bergenia*) various species. **(P)**

Foxglove 'Pam's Choice' (*Digitalis purpurea* Pam's Choice): Bienniel, semi evergreen, 1-1.5m, purple flower Summer. **(P)**

Foxglove various species**. (P).**

Hellebore (stinking): (*Helleborus foetidus*): Perennial, evergreen, bushy, 0.5-1m, yellow flower Spring and Winter, sheltered. (**P) (F)**

Hellebore various species.

Heucherella 'Pink whispers' (*Heucherella* 'pink whispers'): Perennial, evergreen, compact herbaceous, 0.1-0.5m tall/wide, pink flower Summer, green and red foliage **(P) (F)**

Hydrangea (*Hydrangea anomala*): Climber to 12m, deciduous, cream/pink/red flowers Summer **(F)**

Ivy Congesta (*Hedera helix congesta*): non climbing dwarf shrub, 0.1-0.5m, bushy, green **(F)**

Kitaibel's Bittercress (Cardamine kitaibelii): 0.1-0.5m tall, deciduous, yellow flower Spring **(F)**

Please see www.rhs.org.uk for sources of plant images

Korean Elephant's Ears (*Bergenia crassifolia var*.): 0.1-0.5m tall/wide, evergreen, pink and purple flowers Spring and Winter **(F)**

Lungwort (narrow leaved) (*Pulmonaria longifolia*): Perennial, semi evergreen, 0.1-0.5m, blue flower Spring, silver and green foliage (**P)(F)**

Lungwort (David Ward) (*Pulmonaria rubra* David Ward): Perennial, semi evergreen, 0.1-0.5m, coral red flowers late Winter, early Spring. **(P) (F)**

Lungwort various species.

Mrs. Robb's Bonnet (*Euphorbia amygdaloides* var *robbiae*): Perennial, evergreen, spreading, 0.1-0.5m tall/1-1.5m wide, suckering, yellow flower Spring and Summer **(P) (F)**

Mrs. Robb's Bonnet various.

Oenothera 'white dove' (*Oenothera lindtheimeri* 'white dove'):perennial, deciduous, upright, clump forming, 0.5-1m, white flower Autumn and Summer **(P)**

Oleaster Gilt Edge (*Eleagnus x submacrophylla* 'Gilt edge'): shrub, 2.5m-4m tall/wide, evergreen, white flower Autumn, orange berries Winter **(F)**

Oregon grape hybrid (*Mahonia x media*): shrub: 2.5-4m tall/wide, evergreen, yellow flower Autumn and Winter **(F)**

Penstemon 'heavenly blue' (*Penstemon heterophyllus*): Perennial, semi evergreen, 0.1-0.5m, blue flower Autumn and Summer, sheltered. **(P)**

Penstemon 'thorn' (*Penstemon* 'thorn'):perennial, semi evergreen, 0.5-1m, pink and white flowers Autumn and Summer **(P)**

Penstamon species variety: Many. **(P)**

Sage (*Salvia officinalis*): 0.5-1m, evergreen, bushy, blue flower Summer, silver/yellow/green foliage all year **(F)**

Salvia species variety. Many. **(P).**

Skimmia (*Skimmia japonica*): Bush 0.5-1m tall/wide, evergreen, white flower Spring **(F)**

Spotted deadnettle (*Lamium maculatum* 'Brightstone pearl'):Perennial, mat forming, evergreen, 10cm tall/0.1-0.5m wide, pink flower Summer, sheltered. **(P) (F)**

Spotted dead nettle (*Lamium*) species various.

Tellima Forest Frost (*Tellima grandiflora*): Perennial, semi evergreen, mound forming, 0.1-0.5m tall/wide, pink and white flowers Spring and Summer, silver and green foliage **(P) (F)**

Viburnum (*Viburnum tinus Variegatum*): shrub, 1.5-2.5m tall/wide, evergreen, white flower Winter/Spring **(F)**

Go to www.rhs.org.uk for further plant information and photos

Please see www.rhs.org.uk for sources of plant images

Sensory and Edible wildlife Plants:

Sight:

Love in a Mist (*Nigella damascena)*

- Bushy annual
- Blue flower in Summer
- Bright blue
- Full sun
- Butterflies and Bees

Heuchera (various e.g. Berry Smoothie, Gold Strike, Pear Crisp).

- Lots of colour varieties
- Evergreen
- White/cream flower in Summer
- Bees

Sunflower 'Teddy Bear' short variety (*Helianthus annus* 'Teddy Bear')

- Low growing
- Flowers July-September
- Good for 'companion planting' with food plants
- Attracts aphids (ladybird food) and pollinators
- Edible petals (dried and sprinkled on food)

Bowles Mauve Wallflower (*Erysimum* species)

- Purple Winter/Spring/Summer flowering
- Silver and green foliage all year
- Evergreen perennial
- Bees, Moths and Butterflies

Please see www.rhs.org.uk for sources of plant images

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Smell:

Heart leaved Houttuynia (*Houttuynia cordata* 'Chameleon')

- Pungent orange scent
- Wide spreading (spreads easily so needs cutting back)
- Herbaceous perennial
- Multicoloured foliage
- Yellow flowers, white flowers in Spring
- Butterflies and Bees

Lemon Balm (*Melissa officinalis*)

- Herbaceous perennial
- Creamy white/pale purple flowers Summer
- Leaves with lemon scent
- Bees
- Good companion plant to repel flies

Chocolate cosmos (*Cosmos atrosanguineus*)

- Spreading perennial
- Chocolate scented
- Red flower in Summer
- Pollinators, birds, beneficial insects, butterflies/moths

Curry Plant (*Helichrysum italicum*)

- Evergreen perennial
- Yellow flower summer
- Smell/Visual
- Not edible (bitter)
- Butterflies and moths

Please see www.rhs.org.uk for sources of plant images

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NatureCubsIreland.ie

Taste:

Many of the herbs/leaf vegetables are pollinator friendly as require pollinators to breed

Strawberry (many varieties e.g. *Fragaria ananassa*)

- Semi evergreen
- Perennial
- White or Pink flowers in Summer
- Bees

Mint e.g. *Mentha pulegium*

- Herbaceous perennial
- Not to be eaten by pregnant women
- Purple flower in Autumn and Summer
- Mint smell and taste/visual
- Bees and other pollinators

Rosemary (*Salvia rosemarinus/Rosmarinus officinalis*)

- Smell/taste/visual
- Evergreen
- Flowers pale blue/violet/white
- Flowers Spring and again in other times of year
- Pollinators

Nasturtium (*Tropaeolum majus*)

- Annual climber
- Orange/Yellow/Red flowers in Summer and Autumn
- Taste and visual
- Bees

Please see www.rhs.org.uk for sources of plant images

Touch:

Lamb's Ears (*Stachys byzantina*)

- Carpeting
- Evergreen perennial
- Soft leaves and 'woolly stems'
- Purple flower Summer
- Bees and butterflies

Silver Sage (*Salvia argentea*)

- Semi Evergreen
- White flower summer
- Silvery 'woolly' leaves
- Bees

Jerusalem sage (*Phlomis fruticosa*)

- Evergreen
- Herbaceous perennial
- Small spreading shrub
- Yellow flower Summer
- Bees

Mullein (*Verbascum* species)

- Semi evergreen
- Flower purple/red/white Spring, Summer and Autumn
- Fuzzy leaves with silvery sheen
- Foodplant of Mullein Moth (Regionally Extinct in Ireland)

Please see www.rhs.org.uk for sources of plant images

Sound:

Quaking Grass (S*tipa arundinacea)*

- Clump forming
- Purple feather flower heads June-Sept.
- Full sun/partial shade
- Perennial/evergreen
- Late summer/early Autumn seeds eaten by Finches

Please see www.rhs.org.uk for sources of plant images

More Edible plants beneficial for wildlife include:

Spring flowering edible plants:

- Blackcurrant
- Redcurrant
- Blueberry
- Clover
- Dill
- Wallflower (*Dianthus*)
- Catmint (*Nepeta*)

Summer flowering edible plants:

- Sea kale
- Catmint (*Nepeta*)
- Runner bean
- Coriander
- Fennel
- Nasturtium
- Broad bean
- Asparagus
- Spearmint
- Strawberry
- Thyme
- Rosemary
- Angelica
- Chives
- Sage
- Wallflower
- Bergamot
- Hollyhock
- Clover
- Lavender
- Pot marigold
- Sunflower
- Borage
- Basil
- Courgette

Please see www.rhs.org.uk for sources of plant images

Autumn flowering edible plants:

- Chrysanthemum
- Pot marigold
- Courgette

Winter flowering edible plants:

- Chickweed (evergreen)
- Mullein (evergreen)

Please see www.rhs.org.uk for sources of plant images

Wildlife plants suited to growing in Planters and Containers:

- Perennial sage (*Salvia nemorosa*)
- Cosmos (*Cosmos bipinnatus*)
- Catmint (*Nepeta*)
- Cranesbill (*Geranium*)
- Coneflower (*Echinacea purpurea*)
- Shasta daisy (*Leucanthemum* x *superbum*)
- Gayfeather (*Liatris spicata*)
- Hyssop (*Agastache*)
- Lamb's ears (*Stachys byzantina*)
- Marjoram (*Origanum vulgare*)
- Low growing Apollo Cosmos
- Dahlia Happy Single Flame
- *Ersymum* Bowle's Mauve
- Easter Bonnet (*Lobularia maritima)*
- Valley valentine (*Pieris japonica)* (perfect in shade) (bush)
- *Rudbeckia hirta* 'Toto'
- *Sarcococca* 'Dragon Gate' (bush) (evergreen) (amazing scent)
- Michaelmas Daisy 'Coombe fishacre'
- Verbena (*Verbena rigida)*

Figure 1: Wildlife friendly flowers suited to growing in Planters or Containers

Please see www.rhs.org.uk for sources of plant images

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Fingal County Council

Some Evergreen (E) and Semi Evergreen (SE) Wildlife Friendly Shrubs that suit containers:

Autumn flowering:

Camelia (*Camellia sasanqua* 'Kenko') (E)

'Army Nurse' Fuschia (SE, hardy)
(Autumn and Winter flowering)

Winter flowering:

Camelia (*Camellia sasanqua* 'Kenko') (E)
(Autumn and Winter flowering)

Viburnum (E) White flowers, blue berries. Winter and Spring flowering.

Spring flowering:

Skimmia (E) White flowers, red berries.

Viburnum (E) White flowers, blue Berries. Winter and Spring flowering.

Summer flowering:

Temu (*Luma apiculata*) (E) White flower Purple fruit Autumn. Summer & Autumn flowering.

Hebe 'Sapphire' (E): Purple flower Summer.

Please see www.rhs.org.uk for sources of plant images

Wildlife friendly shrubs and fruit trees

Autumn flowering:

Ebbinge's silverberry

Californian fuschia

Winter flowering:

Sweet Box

Viburnum

Spring flowering:

Photinia

Pieris

Summer flowering:

Lavender

Golden privet

Figure 1: Some wildlife friendly shrubs and fruit trees

Please see www.rhs.org.uk for sources of plant images

Autumn flowering wildlife friendly shrubs and fruit trees:

Bupleurum fruticosum (Shrubby hare's ear): Full sun, 1.5-2m tall/wide, evergreen, yellow flowers Autumn and Summer, blue and green foliage all year, sheltered.

Elaeagnus x ebbingei (Ebbinge's silverberry): Full sun/partial shade, 2.5-4m tall, 2.5-4m wide, Evergreen, white flower

Elaeagnus pungens (Silverthorn): full sun/partial shade, 1.5-2m tall, 1.5-2m wide, Evergreen, white flower, red berry winter

Erica vagans sp. (Cornish heath): Full sun, 0.1-0.5m tall, 0.5-1m widel, evergreen, pink and white flowers Autumn, pink flower Summer

Fatsia japonica (Japanese aralia) : Full sun/partial shade, 1.5-2m tall, 1.5-2m wide, Evergreen, white flower

Fatshedera lizei (Tree ivy): Full sun/partial shade, 0.5-1m tall/wide, Evergreen, white flower, sheltered.

Hebe sp.(Hebe): Full sun/partial shade, 0.1-0.5m tall/wide, evergreen, sheltered, blue flower Autumn/Summer

Hydrangea paniculata (Paniculate hydrangea (cultivars with many fertile flowers e.g. 'kyushu', 'big ben', 'floribunda','brussels lace')): Full sun/partial shade, 4-8m tall, 1.5-2.5m wide, deciduous, white and cream/mauve flowers in Summer and Autumn

Hyssopus officinalis (Hyssop): Full sun/partial shade, 0.1-0.5m tall, 0.5-1m wide, semi evergreen, blue flower Summer and Autumn

Mahonia sp. (Oregon grape): Full sun/partial shade, 2.5-4m tall/wide, Evergreen, yellow flower in Autumn/Winter

Salix hastata 'Wehrhahnii' (Halberd willow 'wehrhahnii'): Full sun/partial shade, 1-1.5m tall, 0.5-1m wide, deciduous, yellow and yellow flowers Autumn

Tamarix ramosissima (Tamarisk): Full sun, 4-8m tall/wide, deciduous, pink flowers Autumn and Summer

Zauschneria californica (Californian fuchsia): Full sun/partial shade, 0.3-0.45m tall/wide, evergreen, scarlet flowers late Summer/Early Autumn

Please see www.rhs.org.uk for sources of plant images

Winter flowering wildlife friendly shrubs and fruit trees:

Cornus mas Golden Glory (Cornelian cherry): Full sun/partial shade, 2.5-4m tall/wide, deciduous, yellow flower Winter, red fruit Autumn

Erica carnea (Alpine heath): Full sun, 0.1-0.5m tall/wide, evergreen, pink flower Spring/winter, orange and back foliage all year

Erica × darleyensis (Darley dale heath): Full sun, 0.1-0.5m tall, 0.5-1m wide, evergreen, purple and pink flowers Spring/Winter

Erysimum 'Bowles's Mauve' (Wallflower 'bowles's mauve'): Full sun, 0.5-1m tall/wide, evergreen, purple flowers Spring, Summer and Winter, silver and green foliage all year

Lonicera × purpusii (Purpus honeysuckle): Full sun/partial shade, 1.5-2.5m tall/wide, semi evergreen, white flower in Spring and Winter, pink berry in Summer

Mahonia sp. (Oregon grape): Full sun/partial shade, 2.5-4m tall/wide, Evergreen, yellow flower in Autumn/Winter

Perovskia atriplicifolia (Salvia/Russian sage): Full sun, 1-1.5m tall, 0.5-1m wide, deciduous, purple flowers end Summer/early Autumn

Salix aegyptiaca (Musk willow): Full sun, 4-8m tall/wide, deciduous, yellow flower Spring/Winter

Sarcococca confusa (Sweet box): Full sun/partial shade, 1.5-2.5m tall/wide, evergreen, white flower Winter, sheltered.

Stachyurus praecox (Stachyurus) : Full sun/partial shade, 2.5-4m tall, 1.5-2.5m wide, deciduous, yellow flower Winter

Viburnum tinus (Laurustinus): Full shade/partial/full sun, 2.5-4m tall/wide, evergreen, white flower Spring/Winter, blue/black fruit Winter

Spring flowering wildlife friendly shrubs and fruit trees:

Berberis darwinii (Darwin's barberry): Full sun/partial shade, 1.5-2m tall/high, evergreen, orange/red flower Spring, blue/black fruit Summer

Chaenomeles species (Japanese quince): Full sun/partial shade, 1-1.5m tall/wide, deciduous, orange flower Spring, yellow fruit Autumn

Enkianthus campanulatus (Redvein enkianthus):Full sun/partial shade, 2.5-4m tall/wide, deciduous, sheltered, red and white flowers Spring/Summer, orange/red/yellow foliage Autumn

Erica × darleyensis (Darley dale heath): Full sun, 0.1-0.5m tall, 0.5-1m wide, evergreen, purple and pink flowers Spring/Winter

Erica carnea (Alpine heath): Full sun, 0.1-0.5m tall/wide, evergreen, pink flower Spring/winter, orange and back foliage all year

Kalmia latifolia sp. (Mountain laurel): Full sun/partial shade, 0.5-1m tall/wide, evergreen, white and red flowers Spring/Summer

Lavandula stoechas subsp. (French lavender): Full sun, 0.5-1m tall/wide, evergreen, purple/blue flowers Spring/Summer, silver/green foliage all year

Please see www.rhs.org.uk for sources of plant images

Mahonia gracilipes (Oregon grape Spring Blush):

Photinia davidiana (Stranvaesia): Full sun/partial shade, 4-8m tall, 2.5-4m wide, evergreen, white flower Spring, red and green foliage Autumn

Pieris formosa (Lily-of-the-valley bush): Full sun/partial shade, evergreen, 4-8m tall, 2.5-4m wide, sheltered, white flower Spring

Pieris japonica sp. (Lily-of-the-valley bush): Full sun/partial shade, evergreen, 0.5-1m tall/wide, sheltered, pink and white flowers in Spring

Prunus incisa 'Kojo-no-mai' (Cherry 'kojo-no-mai'): Full sun, 1.5m-2.5m tall/wide, deciduous, pink and white flowers in Spring

Prunus tenella (Dwarf russian almond): Full sun/partial shade, 1-1.5m tall/wide, deciduous, pink flowers Spring

Pyracantha sp.(Firethorn): Full sun/partial shade, 2.5-4m tall, 1.5-2.5m wide, evergreen, white and purple flowers Spring, white flower Summer, orange berries Winter and Autumn

Ribes nigrum sp. (Blackcurrant): Full sun, 1-1.5m tall/wide, deciduous, sheltered, green flower Spring

Ribes rubrum sp. (Redcurrant): Full sun/partial shade, 1-1.5m tall/wide, deciduous, green flower Spring, red fruit Summer, sheltered.

Rosmarinus officinalis (Rosemary): Full sun, 1.5-2.5m tall/wide, evergreen, purple flowers Spring.

Salix lanata (Woolly willow (male form only)): Full sun/partial shade, 1-1.5m tall/wide, deciduous, yellow flower Spring

Skimmia japonica (Skimmia) : Full sun/partia shade, 1.5-2.5m tall, 1-1.5m wide, evergreen, white flower Spring, red berry Summer/Autumn/Winter

Stachyurus chinensis (Stachyurus) : Partial shade, 1.5-2.5m tall, 2.5-4m wide, deciduous, yellow flower Spring and Winter, red foliage Autumn, sheltered

Vaccinium corymbosum (Blueberry): Full sun/partial shade, 1.5-2.5m tall/wide, deciduous, pink and white flowers Spring, sheltered.

Viburnum lantana (Common wayfaring tree): Full sun/partial shade, 2.5-4m tall/wide, deciduous, white flowers Spring and Summer, red berries Autumn

Weigela florida sp. (Weigelia): Full sun/partial shade, 1.5-2.5m tall/wide, deciduous, pink and red flowers Spring and Summer, multi coloured foliage all year

Please see www.rhs.org.uk for sources of plant images

Fruit trees:

- Raspberry (*Rubus* species)
- Apple (*Mallus* species)
- Pear (*Pyrus* species*)*
- Cherry (*Prunus* species; some are self fertilising so don't need pollinators e.g. Sweetheart, Stella)
- Plum *(Prunus* species)

Thrush love eating fruit and omnivores like foxes and badgers will eat any fallen fruit.

Figure 2: Some fruit bearing bushes

Please see www.rhs.org.uk for sources of plant images

Appendix III: Brent Geese feeding sites in Study Areas

Brent Geese are protected in Dublin Bay under the EU Birds Directive (Directive 2009/147/EC) and under the Irish Wildlife Act (as amended). North Bull Island SPA (4006), Baldoyle Bay SPA (4016) and Malahide Estuary SPA (4025) are designated in part due to Internationally Important numbers of Brent Geese that visit the site to feed each Winter.

The Brent Geese (*Branta bernicla hrota*) flocks that visit Dublin Bay annually come from the Canadian High Arctic. They come here to feed and stay usually from October to April before returning to their breeding ground. After Strangford Lough and Lough Foyle, Dublin Bay is the next most important site for Brent Geese in Ireland. Anecdotally, it was noted that the Brent Geese were feeding more and more in inland grass swards. A number of papers have since been written providing scientific data to support this. The most recent is Benson in 2009. The selection of terrestrial grasses over intertidal plants, is a possible factor in the increased population of Brent Geese (Benson, 2009).

This Appendix provides information on areas within the study area that are used now and were historically used by Brent Geese. Information is provided from Personal Communication in September 2021 with Cian Merne and Pat Watson of the Irish Brent Goose Research Group and I-WeBS Recorders.

Baldoyle:

A. Baldoyle Racecourse north. A small site north of the Red Arches Rd. The geese will often move onto this site if disturbed on the main racecourse site south of the road. There are currently allotments located along the south side of this site and wild flower beds have been established alongside some of the pathways
B. Baldoyle Racecourse south. A large site with flocks of >1,000 birds regularly feeding here. The site is primarily football pitches which is ideal for the geese.
C. Seagrange Park. Another important site with >1,000 birds regularly using it. Many of these birds also use the Baldoyle racecourse sites. The flocks will move between sites to avoid human/dog disturbance. The east side of the site is overgrown and marshy. The remainder of the site is football pitches which again is ideal for the geese. Also of note, this site can hold flocks of >800 Black-tailed Godwits during the Winter months.
D. Seagrange Road Green. A small 'spillover'site which some birds will use if there is a high level of disturbance on the main Baldoyle sites.

Figure 1: Brent Geese feeding sites on public land in Baldoyle. Cian Merne, *pers. comm*. 2021.

Malahide:

The Robswalls Estate site is the entirely enclosed area closest to the sea. The geese using this site are a separate flock from the Baldoyle Bay flock that use the other two sites. Ring reading records by C. Merne indicate that this site was used by flocks of up to 300 geese up until 2012/13 , making it a site of High Importance but is now not used due to high vegetation and cattle grazing (C. Merne, *pers. comm.* IBGRG and I-WeBS Recorder).

2008/09	Av. 192
2009/10	Av. 261
2010/11	Av. 217
2011/12	Av. 200
2012/13	Av. 335
2013/14	-
2014/15	-
2015/16	Av. 90
2016/17	Av. 127

Figure 2: Brent Goose ring recorder data from IBGRG 2008-2017. C. Merne pers. comm., 2021.

Anecdotally, 2013 to 2015 was the start of the meadow creation programme at this site. There are no geese noted here on those years.

The peak number was a flock of c.750 on 5/2/2010, recorded by Graham McElwaine and Pat Watson.

The yellow outline in Figure 2 shows the entire area where Brent Geese have been sighted. The exact areas used by the geese changes from year to year depending on the condition of the green sward.

Note the area adjacent to Seamount Rd with a '?' It is not known definitively if the geese have used this area. The currently most utilized sites within the area are outlined in red and notes are provided.

A. Robswalls Estate. This site was an important feeding area with flock sizes of up to c.750 birds recorded (average flock size c.250) due to it being totally enclosed with no disturbance from humans/dogs. In recent years it has become overgrown and used to graze Highland Cattle, making it unsuitable for the geese. IBGRG would like to see this site returned to short green sward for Brent Geese.

B. Robswalls Coast Rd. Regular sightings of geese feeding in this area when the grass has been maintained in a suitably short condition.

C. Portmarnock AFC. Football pitches suitable for feeding. Possible conflict with users.

D. St Silvester's GAA. Pitches suitable for feeding. Possible conflict with users.

E. Malahide Utd. These pitches have been astro-turfed and are no longer a site for geese. It emphasises the importance of providing alternative feeding sites.

Figure 2: Red boxes outline most used sites by Brent Geese at Robswalls, Malahide. C. Merne *pers comm*., 2021.

Portmarnock:

Portmarnock Public Park and Portmarnock Leisure Centre are considered of Major Importance (flock sizes 401 to 1450 using the sites regularly). To put this into context, each of these sites is/was used by >1% of the international flyway population of *Branta bernicla hrota* (Benson, 2009).

The football pitch at Portmarnock Community School is now being very heavily used by Brent Geese. A flock of about 500 birds was recorded feeding there on Dec 27th 2019. The IBGRG suggests that the increased use of this football pitch by Brent Geese has been caused by the now long grass at Portmarnock Public Park and the unsuitable feeding condition of most of the large grass site at Portmarnock Leisure Centre.

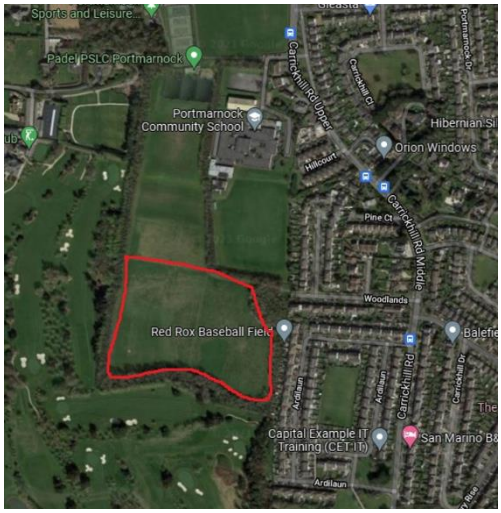


Figure 3: Brent Goose feeding area in Portmarnock Leisure Centre. C. Merne, *pers. comm.,* 2021.

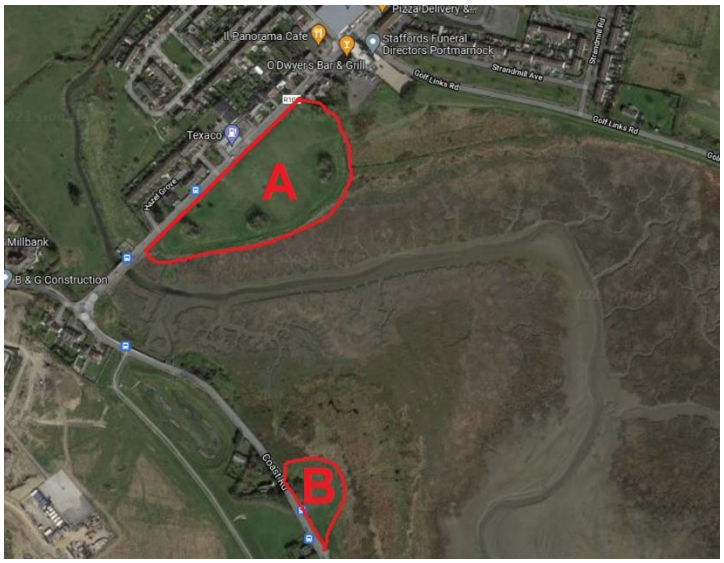


Figure 4: Brent Goose feeding area at Portmarnock Public Park (A).
'B' was left as a feeding area for Brent Geese but is not used. It could be reverted to Meadow habitat.
C. Merne *pers. comm.,* 2021.

Sutton:

The main area used by Brent Geese is the green space in Santa Sabina Manor housing estate. The coastal grassy areas across the road, while used occasionally by the geese, are a very high disturbance area.

Figure 5: Brent Goose feeding site in Sutton. C. Merne, *pers. comm*., 2021.

Grass preferences of Brent Geese:

A number of references were used here to determine the preferred amenity grass type of Brent Geese.

A study by Vickery *et al.* (1994) found that a significant factor affecting grass choice by Brent Geese was that significantly higher densities fed on fertilized and cut areas, compared to unfertilized areas, but only at high levels of fertilizer application (50 kg N/ha used: 28-30 droppings/m^2 for fertilized areas vs 23-28 droppings/m^2 for controls, 18 kg N/ha used: 30-35 droppings/m^2 for fertilized areas vs 25-35 droppings/m^2 for control areas). There were no differences between trials using organic and inorganic fertilizer.

There was no significant difference between sheep grazed plots, cut and grazed plots, and cut only plots. There was no significant difference between sheep and cattle grazed plots. The frequency of grass cutting also appeared to have no effect on geese grazing (between 2 and 5 times a year).

Hassell *et al.* (2001) found that, on fertilized plots the geese preferred swards longer than 6 cm with no indication of a decrease in preference up to the maximum height investigated of 16 cm.

Therefore it can be surmised that Brent Geese feeding on amenity grassland will prefer cut fertilised grass with a height of 6-16cm.

References:

Benson, L. 2009. Use of inland feeding sites by Light-bellied Brent Geese in Dublin 2008-2009: a new Conservation Concern?. *Irish Birds* (8).

Hassall, Mark & Riddington, Roger & Helden, Alvin. 2001. Foraging behaviour of Brent Geese, *Branta b. bernicla*, on grasslands: effects of sward length and nitrogen content. *Oecologia*. 127. 97-104.

Vickery J.A., Sutherland W.J. & Lane S.J. 1994. The management of grass pastures for brent geese. *Journal of Applied Ecology*, 31, 283-290.

Appendix IV: Potential for Biodiverse Roofs

Flat roofs provide excellent biodiversity potential especially in urban and suburban settings where there is a large human population, loss of biodiverse brownfield sites and disturbance to ground nesting birds. Flat roofs can accommodate Green Roofs, Living Roofs or Biodiverse Brown Roofs. This Local Biodiversity Action Plan recommends Biodiverse Brown Roofs as the most suitable Living Roof option.

Biodiverse Brown Roofs are flat roofs with a waterproof membrane underneath gravel of different sizes and depths. A 'Biodiverse Brown Roof' replicates a brownfield site, or derelict built land, which has been shown to have high biodiversity value.

Studies have found that leaving gravel of different sizes and depths on roofs results in increases in rare invertebrate species, are habitats for rare species of bird and invertebrate and have been colonised by rare flora:

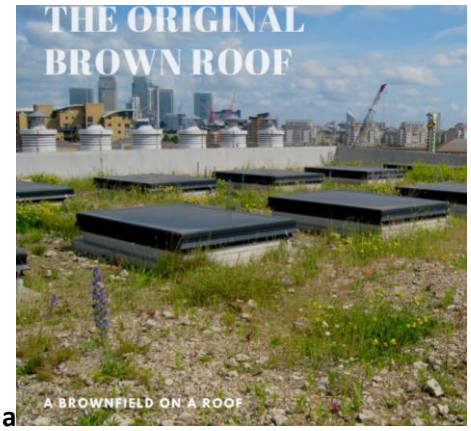
(https://livingroofs.org/wp-content/uploads/2019/04/LONDON-LIVING-ROOFS-WALLS-REPORT-2019.pdf)

http://www.urbanhabitats.org/v04n01/invertebrates_pdf.pdf

https://livingroofs.org/biodiversity-and-wildlife/

http://www.urbanhabitats.org/v04n01/invertebrates_pdf.

https://academic.oup.com/jue/article/6/1/juz024/5718118

a 

b 

Figures a and b:Biodiverse brown roofs (Livingroofs.org)

The proposed locations for Biodiverse Brown roofs as part of this project are appropriate as Dublin Bay is an International Bird Area and adjacent the LBAP sites is the North Bull Island Special Protection Area (SPA) for birds. Each winter Dublin Bay welcomes Arctic, Common and Little Tern and also hosts other ground nesting birds e.g. Ringed Plover. These birds are susceptible to egg loss and nest destruction from predators and humans and therefore a Biodiverse Brown Roof is a suitable and safe location for their nests.

a

As part of the production of the Tidy Towns Local Biodiversity Action Plans for Fingal towns by this Author, a number of flat roofs were identified by local groups as possible suitable locations for retrofitting to biodiverse brown roofs.

These are:

- Mens' Shed and Community Centre flat roof at Baldoyle Community Centre
- Irish Rail flat roof buildings at Baldoyle train station
- Bayside Senior N.S. Caretaker's building
- Howth promenade toilet block
- Bayside Train Station flat roofs
- Sutton Train Station flat roof

c  d  e 

Fig. c: Baldoyle Mens' Shed **Fig. d:Community Centre flat roof at Baldoyle Community Centre**

Fig.e: Figure e: Bayside Senior N.S. Caretaker's building

f  g 

Fig. f: Bayside Train Station flat roof **Fig. h: Sutton Train Station flat roof**

Retrofitting a flat roof as a biodiverse brown roof is the least expensive and least involved retrofit for living roofs. It requires the addition of a thin gravel substrate to the roof and erecting side hoarding to prevent ground nesting chicks from falling off the edge if attracting ground nesting birds is an objective. An engineer would be required to assess the condition of the building and ensure it has the capacity to withstand a 'dead load' (P.J. Brett, Engineer *pers. comm*.).

Biodiverse brown roofs can provide a habitat for rare and vulnerable ground nesting birds that are losing natural nesting habitat on shingle beaches due to human and dog disturbance, e.g. Arctic Tern, Ringed Plover. Common Terns come from Africa every year and Arctic Terns from Antarctica.

Figure h: Newly hatched Tern chick on gravel substrate on Dublin Port platform (Photo H. Boland, 2019)

A flat roof with a thin layer of gravel could attract ground nesting Tern bird species to the roofs which would fit in well with Dublin Bay Biosphere objectives (https://www.dublinbaybiosphere.ie/). Common Terns and Arctic Terns are ground nesting and Dublin Port has built special platforms in Dublin Bay for these birds to nest. In 2018, Tern nests were recorded at these sites.

The enhancements to the flat floating platforms in Dublin Port would be the same as used on Fingal Biodiverse Brown Roofs; gravel or shingle substrate, barriers around the edge to prevent chicks from falling over and the flat surface divided into wooden compartments.

Protection for chicks from avian predators and inclement weather is necessary and this is provided by simple wooden 'roofing' or plastic tubes, as are used at Dublin Port.

The compartments prevent chicks scattering too far.

Figure i: Wooden edging and wooden 'roofs' and plastic tubes for shelter for Terns and their chicks at Dublin Port specially constructed platform.

Existing living roofs in study area:

There are already a couple of small living roofs in the study area. The same landscape contractor (Ecobloom) designed and built these two small living roofs in Howth and in Baldoyle.

One of these is The Harbour Bar which has a living roof over its bin shed. This fits in with a sustainable theme for the exterior of the pub where they also have upcycled used wine bottles as a design feature in the wooden boundary wall. The same landscape contractor also designed and built the living roof on the bin shed at Baldoyle Community Garden (no photo available).

Figure j: Living Roof and upcycled bottles at The Harbour Bar in Howth

Fingal County Development Plan (2017-2023) Green Roof Objectives

- SW06: *Encourage the use of Green Roofs, particularly on apartment, commercial, leisure and educational buildings.*
- Objective GI16: *Set targets in the Green Infrastructure Strategy for the provision of different green infrastructure elements in urban areas, such as trees in urban areas and green roofs in town centres, so that a net gain in green infrastructure is achieved over the lifetime of this Development Plan*
- Objective GI19: *Set targets for the provision of green infrastructure elements such as trees and green roofs as part of the preparation of Local Area Plans.*
- Objective GI33: *Seek the provision of green roofs and green walls as an integrated part of Sustainable Drainage Systems (SuDS) and which provide benefits for biodiversity, wherever possible.*
- Objective DMS16: *Promote and encourage the use of green walls and roofs for new developments that demonstrate benefits in terms of SuDS as part of an integrated approach to green infrastructure provision.*
- Objective DMS17: *Promote and encourage the use of green walls and roofs as part of an integrated approach to green infrastructure provision.*
- Objective DMS72: *Encourage the use of green roofs as amenity space*

Comhairle Contae Fhine Gall
Fingal County Council

NatureCubsIreland.ie

Appendix V: Native Irish Hedgerow trees and Management for wildlife

Some suitable low to medium sized native hedgerow trees

Common Name	Latin Name	Height (m)	Deciduous	Flower Colour	Flower Season	Berry Colour	Berry Season	Foliage Colour Autumn	FS/PS	Note
Hawthorn	*Crataegus monogyna*	9	Yes	White	Late Spring	Red	Autumn		FS	
Blackthorn	*Prunus spinosa*	4	Yes	White	Early Spring	Blue/Black	Autumn		FS	
Elder	*Sambucus nigra*	6	Yes	Cream	Summer	Purple	Autumn	Yellow	FS/PS	
Willow	*Salix fragilis*	6	Yes	Yellow	Spring			Yellow	FS	
Hazel	*Corylus avellana*	6	Yes	Yellow	Spring	Brown	Autumn	Yellow/Green	FS/PS	
Alder Buckthorn	*Frangula alnus*	4	Yes	Yellow	Spring	Black	Autumn	Yellow/Green	FS/PS	
Burnet Rose	*Rosa spinossisima*	1	Yes	White	Summer	Black	Autumn		FS/PS	
Privet	*Ligustrum vulgare*	4	Semi evergreen	Cream	Summer	Black	Autumn		FS/PS	Limestone soil
Juniper	*Juniperus communis*	4	Evergreen	Yellow	Summer	Blue/Black	Autumn		FS/PS	Limestone soil

FS: Full Sun

PS: Partial Sun

Resource on the Pollinators.ie website advising how to manage hedgerows for maximum pollinator (and other wildlife) potential. This is available at https://pollinators.ie/wordpress/wp-content/uploads/2018/04/How-to-guide-Hedgerows-2018-WEB.pdf

Other excellent native Irish and wildlife friendly tree information at:

conserving_enhancing_wildlife_guide_2005_480kb.pdf (heritagecouncil.ie)

Comhairle Contae Fhine Gall
Fingal County Council

NatureCubsIreland.ie

Managing hedgerows for wildlife and pollinators:

Cut between November and January to have disruption to pollinators. Try not to cut every year.

See https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Pollinator-How-to-Guide-3-FINAL-1.pdf for best practice methods of managing hedgerows for pollinators.

Best practice methods of filling gaps in hedgerows:

Many hedgerows have gaps due to years of being untended and undermanaged. There are a number of ways of filling these gaps:

a) New native Irish hedgerow trees can be planted. This is an expensive approach however and does not conserve the genetic provenance of the existing hedgerow trees. If this approach is used then only native Irish species should be used. Examples of some native Irish hedgerow trees are on the next page. See the following links for lists of native Irish trees and information on each:

conserving_enhancing_wildlife_guide_2005_480kb.pdf (heritagecouncil.ie) and Pollinator-friendly-planting-code-temporary-draft.pdf (biodiversityireland.ie)

b) Coppicing. This involves cutting the trees down to a stump so they can regenerate. It does not fill gaps but it creates space in which new trees can be planted, as well as regenerating the old trees.

c) Hedge laying: This is a traditional method of hedge regeneration and should be done here, at least in places. It involves a deep cut in the base of the trunk and then bending the trunk over, thus encouraging new growth up and out of this bent trunk. This could be done as an educational workshop, perhaps inviting other Tidy Towns groups to watch and learn about this practice. Contractors can be hired to 'lay' a hedgerow. See https://hedgelaying.ie/ for The Hedge Laying Association of Ireland information and a list of contractors.

Please see https://www.teagasc.ie/news--events/daily/environment/how-to-coppice-a-hedge-.php for further information on hedge coppicing and hedge laying in Ireland.

a  b 

Fig. a: A hedge that has been recently 'laid'

Fig. b: The same hedge that has regenerated

(Photos courtesy F. Wilson.)

Appendix VI: Control of unwanted and Invasive Plant Species

Information on what is listed as an Invasive Species in Ireland and further information on same is found at https://invasivespeciesireland.com/ The Local Authority should be informed of the presence of listed Invasive Species. Community Groups should not attempt to remove listed Invasive Species themselves.

For guidelines on controlling listed Invasive Species, go to field_guide_to_invasive_species_in_ireland_booklet_2ndedition_updated_May_2018-3.pdf (invasivespeciesireland.com)

Here follows some guidance on removal of unwanted (not Invasive Species) which can be attempted by Community Groups:

Winter heliotrope (*Petasites fragrans*):

This plan is a particular nuisance plant in the study area. It is not officially listed as invasive in Ireland but when it appears, it quickly spreads and takes over. It's large kidney shaped leaves keep out sunlight from the layers below thus preventing any other flora from germinating.

Figure 1: Winter heliotrope. Photo M. Stack

Winter heliotrope cannot stand efficient cultivation so thorough and repeated digging, rotovating or deep hoeing will eliminate it. Improving drainage will also reduce the weed's vigour.

Where cultivation is not possible consider covering the affected areas with a weed membrane or thick, light-excluding bark mulch for at least 6 months.

Repeated strimming or mowing will eliminate the weed from empty ground.

Vigilance is needed to remove any seedlings as they appear.

See: https://www.rhs.org.uk/advice/profile?PID=987

Alexanders (*Smyrnium olusatrum*):

Alexanders is accepted now as a native Irish plant, having been introduced prior to 1500 (http://www.wildflowersofireland.net/plant_detail.php?id_flower=11&Wildflower=Alexanders). However, it can spread and prevent other flora from germinating. It is salt tolerant so does very well along the coast. It has a lime coloured flower therefore can be distinguished from other similar plants such as Cow Parsley which have a white or cream coloured flower.

Figure 2: Alexanders (Photo M. Stack)

Once established, "*the species may become dominant; its persistence and vigour allow its survival"* (Randall, 2003). The Journal of Ecology publication (Randall, 2003) states that "*late cutting, although leading to rapid regrowth, does not usually result in viable seed production".* There are numerous anecdotal accounts of issues occurring regarding the spread of Alexanders. Alexanders has tuberous taproots and the stems grow woody as it matures. It spreads by means of seed dispersal therefore it needs to be dug out before it goes to seed. Therefore start of Summer or earlier is advised to prevent seeds from spreading.

This is an early flowering pollinator plant therefore is very beneficial to early emerging Queen Bumblebees. However, its spread can inhibit the growth of other wild flora. Kew Gardens in England had to bring in a team of volunteers to control its spread (https://www.theguardian.com/environment/2005/apr/15/environment.sciencenews)

Alexanders is becoming a problem species in many coastal areas.

Mare's Tail (*Equisetum arvense*):

Although not considered an official Invasive Species according to Invasive Species Ireland (https://invasivespeciesireland.com/) , the Royal Horticultural Society states on its website that '*an invasive, deep rooted perennial weed that will spread quickly to spread a dense carpet of foliage, crowding out less vigorous plants'* (Horsetail / RHS Gardening).

Figure 3: Mare's Tail. (Photo M. Stack.)

Mare's Tail has fast growing rhizomes that send up dense stands of foliage. The creeping rhizomes can go down as far as 2m into the ground, making them hard to remove. Shallow occasional weeding is not effective as any pieces left behind can grow again. However, removing shoots as soon as they appear above ground can be effective. Although weedkiller is not to be endorsed in any biodiversity plan, sometimes, it is the only option available to remove spreading plants. This should only be done with care and following proper instruction to reduce impact on adjacent plants.

3 Corner Garlic (*Allium triquetrum)*:

This garden form of garlic is edible and smells of garlic. It is not the native Garlic or Ramsons (*Allium ursinum*). It spreads mainly by seed but the white bulbs can also spread by vegetative propagation. It can be a nuisance plant as it spreads easily and forms dense clumps. It can be removed by digging out the bulbs from the soils ensuring all small bulbs are removed. November or late January are good times to 'cultivate' the soil, that is, break it up and remove the bulbs as the bulbs are growing at this time and most susceptible to disturbance. This will weaken them and may prevent flowering. Do not dig from August to early October when the bulbs are dormant as this may just spread them around (RHS, 2021).

Figure 4: 3 Cornered Garlic. (Photo by M. Stack.)

Snowberry (*Symphoricarpos albus)*:

This is a deciduous shrub reaching up to about 2m in height. It suckers vigorously and spreads to form dense thickets which outcompete with other plants. It is a native of North America but is very common now in Ireland. It is a flowering plant which produces many fruits, each with two seeds. It also produces numerous suckers which are its main means of spread, as opposed to its seeds. Any prunings should be destroyed by incineration or shredding into small fragments. Another method of removal is spraying with a glyphosphate based herbicide when the plant is in full leaf (herbicide use is not proposed by this report).

Figure 5: Snowberry. (Photo M. Stack.)

Sea Buckthorn (*Hippophae rhamnoides*):

This is listed on 3rd Schedule of S.I. 47/2011: European Communities (Birds and Natural Habitats) Regulations 2011 which lists non-native species subject to restrictions . However, community groups have played an important role in its management along the Dublin coastline.

A research paper published by Dublin City Council (2014) describes how Sea Buckthorn is removed from North Bull Island. This includes:

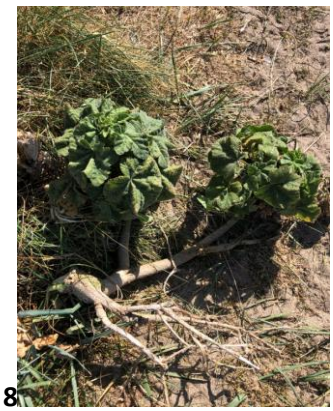
- Cutting with a strimmer with a blade attachment
- Leaving the branches *in-situ* to avoid spread of any berries.
- The cover of the decomposing plant limits shoot re-growth
- Injection into the base of the plant with herbicide (glyphosate). (Herbicide use is not suggested in this Biodiversity Plan)
- Allow plant to die off completely to avoid risk of spreading the plant
- Remove plant off site when the plant is no longer viable.
- Removal of leaf litter is important to avoid nutrient enrichment.
- These methods have been trialled in cooperation with Fingal County Council at their nearby dunes complexes in north Dublin

Figure 6: Sea Buckthorn. (Photo by M. Stack.)

Sycamore whips:

Sycamore is non-native and can be invasive (Irish Wildflowers website, 2021). It comes into leaf early so shades and prevents growth of possible Spring flowers. Its leaf litter rots slowly so does not create a good soil medium. It is not native and therefore supports a lower diversity of insects. The best way to remove young Sycamore whips is to remove the whole tree including the root. If they are cut, Sycamore regrows vigorously from the remaining stump. Sycamore also is a prolific 'seeder' so the whole tree needs to be removed to prevent seed spread (Collins *et al,* 2010).

Figure 7: Sycamore whip. (Photo M. Stack.)



8 Tree Mallow Saplings

9 Sea Buckthorn

10 Sycamore saplings (Photos M. Stack)

Figures 8-10: Above are photos of Sand Dune unwanted saplings to be pulled or dug out and carefully disposed of.

Appendix VII: Actions to help wildlife

Actions to help Birds:

Ideally have a range of nest boxes to suit different species of birds. Bird boxes can have different sized openings to suit different birds e.g. Blackbirds like open fronted boxes, Finches like small openings etc.

Bird Boxes should be made following best practice design:

[Build a Nest Box for Birds and Biodiversity in Your Garden This Spring - BirdWatch Ireland]

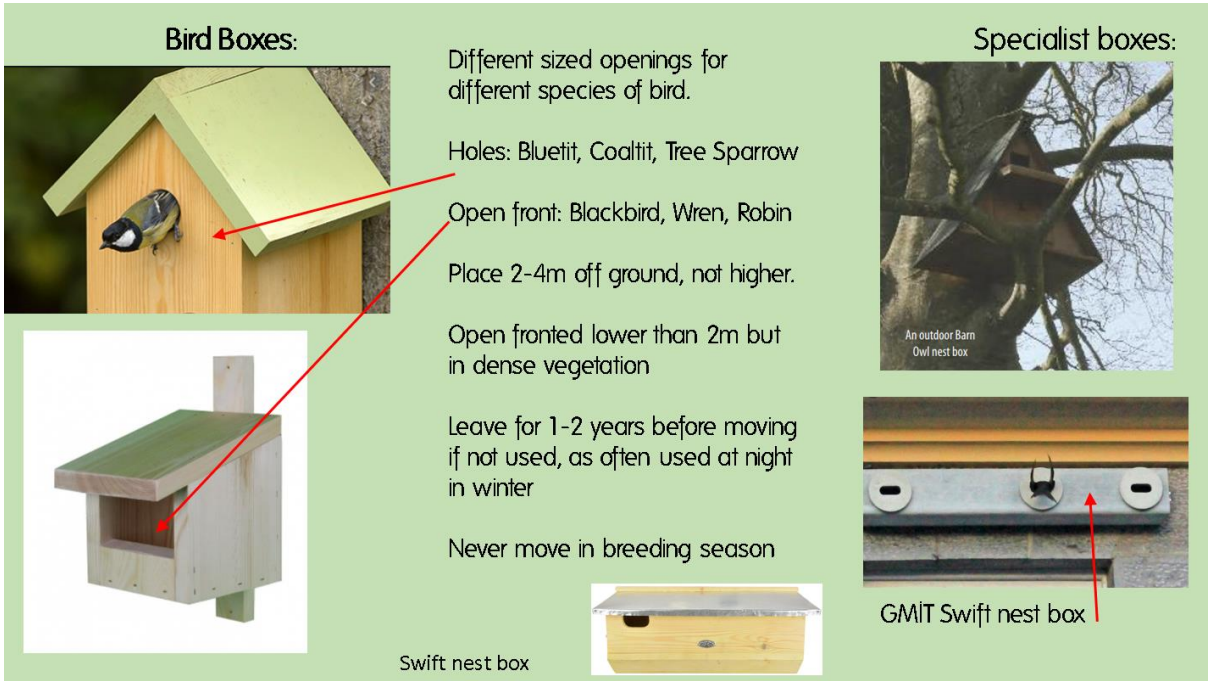


Figure 1: Extract on bird boxes from presentation given by M. Stack

Swift Nesting Boxes:

Swifts are 'Birds of Conservation Concern' Red Listed species in Ireland (Birds of Conservation Concern in Ireland - BirdWatch Ireland). This means that they have High Conservation Concern. Our Irish bird species are declining at an alarming rate, with a 46% increase in Red listed species (Irish Birds 2008 (birdwatchireland.ie)). Swifts travel from Africa to Ireland in April and remain until September to breed. They hatch their chicks in small recesses of old buildings. They are very nest faithful and often they return to Ireland to find their old building renovated or knocked down and they are without a nest site. They remain on the wing to feed and even sleep! They do not perch on wires as their claws can only perch vertically.

There is a concerted effort to help these declining birds in Ireland by putting in Swift nest boxes on buildings. These can either be added outside an existing building or 'swift bricks' can be incorporated into the building (https://birdwatchireland.ie/publications/saving-swifts-guide/)

It is advisable to put up about 6 nests at a time (BirdWatch Ireland, *pers. comm*.). Ideally use woodcrete or plastic designs as wooden boxes deteriorate and these are very nest faithful birds thus may not adapt to a replacement box. T

Groups can participate in the All Ireland Swift Survey and submit records:

https://birdwatchireland.ie/our-work/surveys-research/research-surveys/swift-surveys/

http://www.swiftconservation.ie/wp-content/uploads/2019/03/Survey-Guidelines-2019.pdf

Figure 2: Swift nest box placed on outside of building under eaves

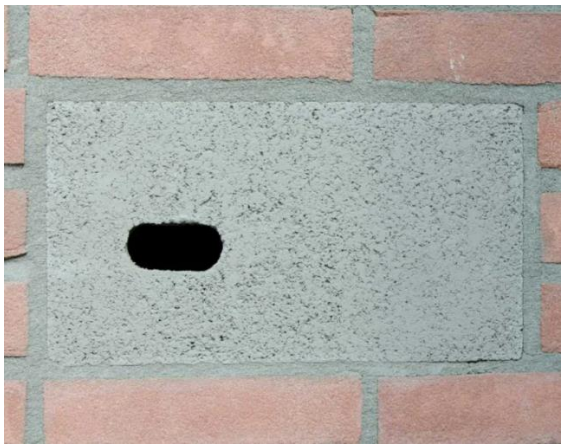


Figure 3: An integrated Swift nesting box in a building

Figure 4: Integrating a Swift nest box into a building

House Martin Nests:

The House Martin constructs a nest out of mud under the eaves of buildings. It catches insects in flight. It raises 2 to 3 broods of chicks a year, sometimes as late as October. It arrives from Africa in mid-March and departs again in late September. The House Martin returns to the same nest every year therefore it is advisable that they are made from a durable design. The House Martin is Amber listed on the Birds of Conservation Concern Ireland list, that means it has medium conservation concern.

Figure 5: House martin nests under eaves of house.

It is very difficult to make house martin nests that do not disintegrate therefore it is advisable that these are bought from a reputable source e.g. https://birdwatchireland.ie/product/house-martin-double-nestbox/

Bird Feeders:

Erect bird feeders using different kinds of food to attract different kinds of birds e.g. Niger Seed attracts Goldfinches, Sunflower Hearts attract finches and Bluetits, Peanuts are good for all, Fat is enjoyed by Wood Dove.

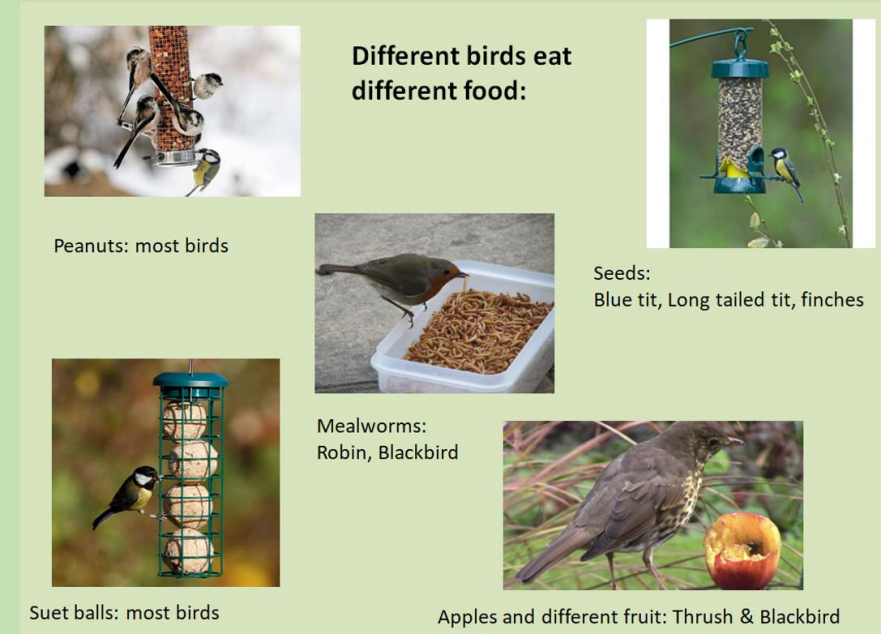
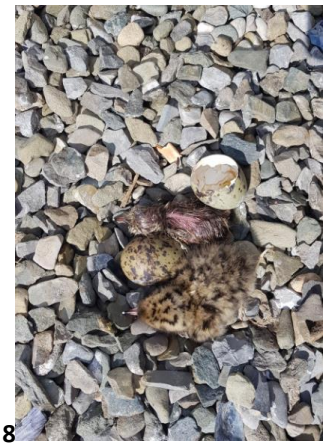


Figure 6: Extract from presentation on Actions for Birds by M. Stack

Ground nesting birds:

You can try to create habitat for ground nesting birds e.g. Ringed Plover, Arctic or Common Tern. Dublin Bay historically had ground nesting birds nesting on its beaches but due to increased disturbance, these are now mostly restricted to protected reserves of protected nest sites.

7



8

Fig. 7:Ringed Plover eggs on beach (Photo V. Synnot,)

Fig. 8: Newly hatched Tern chick on gravel substrate on Dublin Port platform (Photo H. Boland, 2019)

Due to possibilities of disturbance by dogs, humans, rats and foxes, it is best to recreate this shingle ground nesting habitat up high.

Creating a Biodiverse Brown Roofs offer one possibility for this.

This is a flat roof with a thin layer of gravel. It could attract ground nesting Tern bird species to the roof which would fit in well with Dublin Bay Biosphere objectives (https://www.dublinbaybiosphere.ie/). Common Terns and Arctic Terns are ground nesting and Dublin Port has built special platforms in Dublin Bay for these birds to nest. In 2018, Tern nests were recorded at these sites.

The Dublin Port tern nesting platform uses wooden structures that allow cover for chicks from both predators and inclement weather. The same could be installed on a flat roof.

Common Terns come from Africa every year and Arctic Terns from Antarctica. The enhancements to the flat floating platforms in Dublin Port would be the same as used on any Biodiverse Brown Roof; that is; gravel or shingle substrate, barriers around the edge to prevent chicks from falling over and the flat surface divided into wooden compartments.

Small plastic tubes nailed to the dividing boards can also provide protection to the chicks.

9

10

Figures 9 and 10: Wooden edging and wooden 'roofs' and plastic tubes for shelter for Terns and their chicks at Dublin Port

Actions to help Bats:

There are 9 resident bat species in Ireland, of which 8 are found in Dublin. These are:

Soprano and Common Pipistrelle Bats, Nathusius Pipistrelle, Brown Long Eared Bat, Leisler's Bat, Daubenton's Bat (Water bat), Natterer's Bat and Whiskered Bat. Our Irish bats are insectivores, they are tiny and one little bat will eat 3000 insects in a night so they are fantastic pest controllers. Each species occupies a slightly different niche therefore can live side by side e.g. Daubenton's Bat feeds off insects over a water body; Leisler's Bats take insects off open grass areas and Pipistrelles feed around trees.

Figure 11: Irish Soprano Pipistrelle bat (www.batconservationireland.com)

Bat Boxes:

If erecting bat boxes, certain heights and orientation are required. See https://www.rspb.org.uk/get-involved/activities/give-nature-a-home-in-your-garden/garden-activities/buildabatbox/ Or

https://birdwatchireland.ie/app/uploads/2021/01/5362-BirdWatchIreland-BatBox_leaflet_HR.pdf.

Figure 12: Extract from presentation given by M. Stack on bats and bat boxes

Integrated design in new buildings:

A new publication by Sullivan and Lusby (2021) outlines the Irish wildlife that use buildings and legislation protecting them as well as mitigation measures that can be taken to protect this wildlife. This publication is in two parts:

https://birdwatchireland.ie/app/uploads/2021/02/Wildlife-in-Buildings_ENG_LR_Part1.pdf

https://birdwatchireland.ie/app/uploads/2021/02/Wildlife-in-Buildings_ENG_LR_Part2.pdf

A 2014 publication by Bat Conservation Ireland also outlines mitigation for developers:

https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIrelandGuidelines_Building.pdf

Figure 13: An integrated bat box in a building

Wildlife planting for bats:

If you can attract moths, you will help to attract Bats. Some plants are better than others for attracting moths.

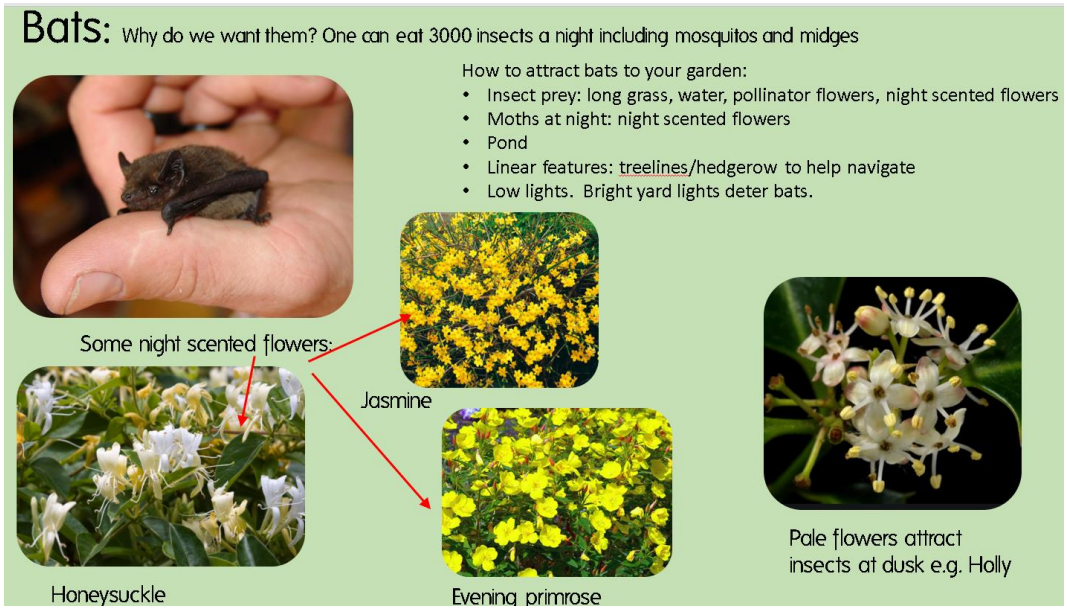


Figure 14: Extract from presentation on bats given by M. Stack

Bat surveys:

In order to conserve bats, we need to know if they are there. It's not always possible to see them but we can 'hear' them by using 'bat detectors'.

Bats use echolocation to locate their prey. That is, they call and their calls bounce off objects in front of them, the 'bounce' is heard by the bat and recognized as whatever object it bounced off e.g. insect, tree, house. We cannot hear those calls as they are at a frequency too high for our hearing to detect. A bat detector translates those high frequency calls into sounds we can hear and it truly opens up a world of nocturnal wildlife wonder

Figure 15: Simple hand held bat detector

Bats should only be surveyed at certain times of year. A survey must be undertaken in the Summer and ideally, again at another time of year. See https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIrelandGuidelines_Building.pdf for information on bat surveying.

Actions to help Hedgehogs:

Logpile Hibernaculum:

A 'hibernaculum' is a place where an animal hibernates. Log piles with a dug out space underneath provide hibernation space for hedgehogs, insects, the Common lizard, frogs and are a source of insects to feed bats and birds.

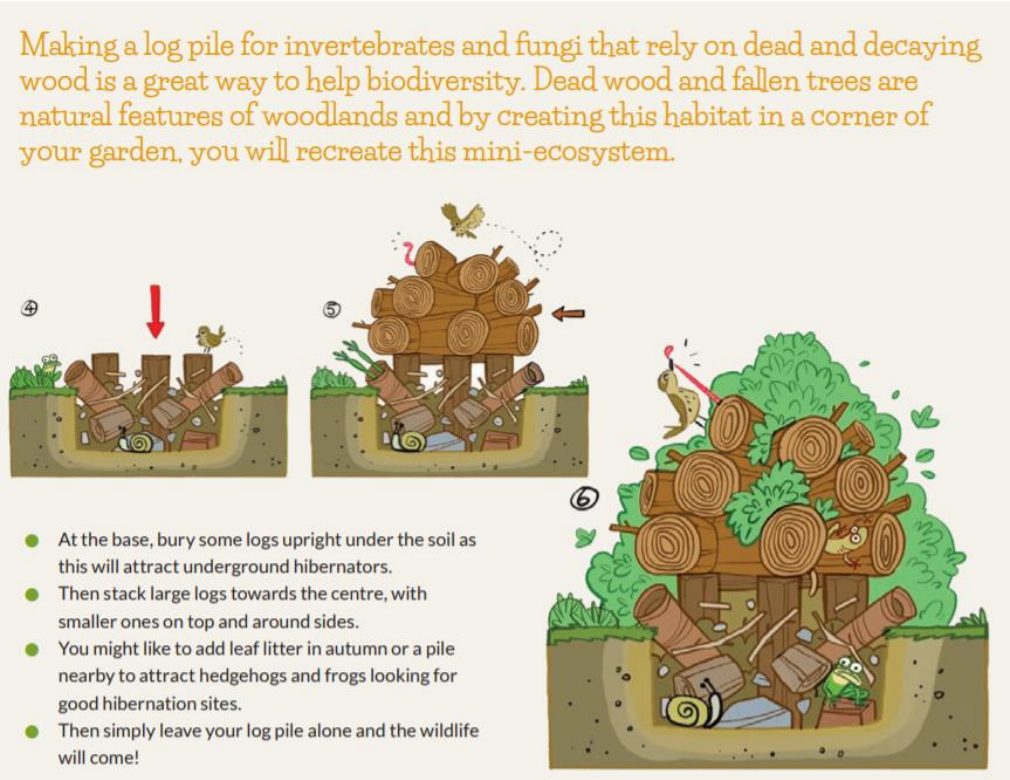


Figure 16: Logpile and/or hedgehog hibernaculum. Extract from https://laois.ie/wp-content/uploads/Garden-Wildlife-Booklet-WEB-17MB.pdf

It is useful to place one of these log hibernacula in a compost corner as hedgehogs also love to hibernate under piles of leaves and compost piles. Generally compost corners are removed from footfall and near a boundary fence or wall so are ideal for hedgehogs.

Hedgehogs love to hibernate under compost. A small entrance 'door' at the base of a compost bin can be cut out to allow hedgehogs to enter and exit. Exercise caution when digging out compost to ensure that hidden hedgehogs are not harmed.

Figure 17: Compost pile in Bayside with a proposed 'hedgehog door' illustrated. (Photo M. Stack.)

Figure 18: Example of a wire compost bin to hold leaves. Cut hole at bottom to let hedgehogs in and out. Leaves break down over time as you can see in picture.

The Irish Hedgehog Survey commenced in 2021 and is being co-ordinated by NUIG. It would be great for the garden users to link in with other local groups also participating in the Local Biodiversity Action Plan to complete a hedgehog survey. See https://www.irishhedgehogsurvey.com/ for further information.

Creating Solitary Bee Nesting Sites:

Solitary bees represent the greatest number of bees in Ireland with 77 species of Solitary Bee and only 20 species of Bumble Bee. Many of these bees are in decline due to lack of food plants, suitable areas to have their nest and due to pesticide and herbicide use. Mining Solitary Bees mine into soil in south and east facing slopes and lay their eggs in these 'burrows'. Thus sloped soil banks facing east or south are very important habitats. The reason these solitary bees require a south or east facing slope is because they have very small bodies that need to warm up before emerging from their nest before they can fly. Their food source plants must be within 300m of their nest as they are too small to fly farther for food. Thus a wooden block with drilled holes for Solitary Bees should be within 300m of pollinator flowers.

Cavity living Solitary Bees lay their eggs in cavities formed by beetles, in holes in rock walls, in hollow stems, in crevices and any ready and suitable hole that is south or south east facing. The reason they require this orientation is because they are so small and in order to fly, they need to heat up before the emerge from the nest. Their small size also means they cannot fly far so the nest site needs to be within 300m of their food source.

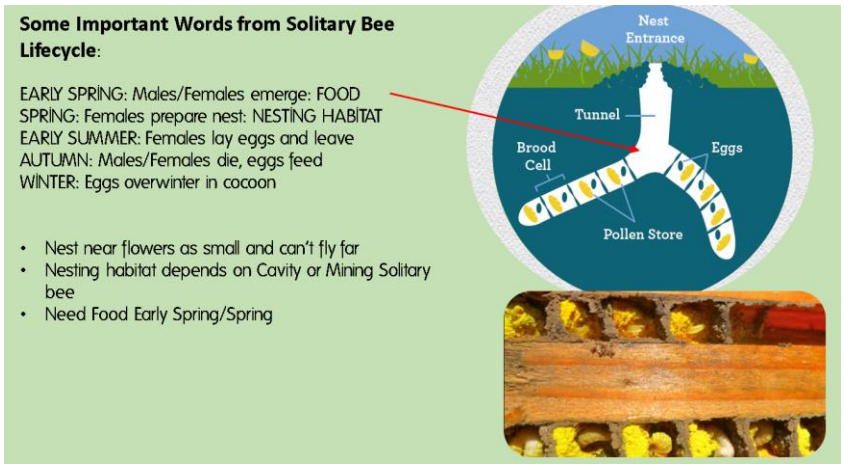


Figure 19: Information about Solitary Bees (extract from presentation by M. Stack)

There are certain requirements to making solitary bee nesting 'holes' in wooden blocks, such as length and depth of holes and height off the ground. Please use the following guide to follow best practice: https://pollinators.ie/wordpress/wp-content/uploads/2018/04/How-to-guide-Nesting-2018-WEB.pdf

Figure 20: Best practice guide to making solitary bee wooden post nests (extract from https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Pollinator-How-to-Guide-1-FINAL.pdf

Appendix XIII: How to collect and store wildflower seed

Wild seed should be collected from local wildflowers. Local genetic provenance is very important and although many packets of seed say they are 'Irish', they may have a different genetic composition.

If an area of grass is allowed to grow long, it is possible that a greater diversity of flora would grow and perhaps even a rare flower might appear. This has happened numerous times over the last few years with businesses, local authorities and schools joining in with the All Ireland Pollinator Plan and not mowing grass:

e.g. A rare Green Winged Orchid bloomed in a Portlaoise housing estate after disappearing for 120 years: https://bsbi.org/wp-content/uploads/dlm_uploads/Does-the-Covid19-lockdown-have-any-silver-linings.pdf

e.g. rare Bee Orchids bloomed in Cork after mowing stopped: . https://www.irishexaminer.com/news/arid-31003408.html

The 'Don't Mow, Let it Grow' campaign is an excellent example of a communications campaign asking the public not to mow their grass to see what wildflowers grow.

To boost the variety of wildflowers in your uncut grass, you can harvest wildseed and transplant them locally into uncut areas. The National Biodiversity Data Centre has provided good guidance on collecting, storing and planting wild seed.

https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Pollinator-How-to-Guide-2-Seeds_FINAL.pdf

A good series of videos to demonstrate how to collect, store and then make plugs from seeds is found at:

1) video: collecting wild seed: https://youtu.be/MTzPmZjMxYA

2) video: drying and storing wild seed: https://youtu.be/2RS6kaOFulA

3) video: making plugs from collected wildflower seed: https://youtu.be/qJ-C-xONiM0

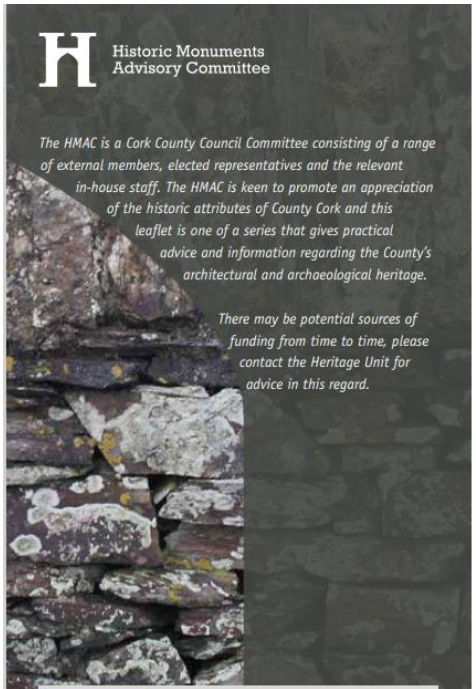
4) video: planting out plugs made from collecting and dried wildflower seed: https://youtu.be/u51j0jyWZHQ

Appendix IX: Best practice care of old stone walls

Historic Monuments Advisory Committee

The HMAC is a Cork County Council Committee consisting of a range of external members, elected representatives and the relevant in-house staff. The HMAC is keen to promote an appreciation of the historic attributes of County Cork and this leaflet is one of a series that gives practical advice and information regarding the County's architectural and archaeological heritage.

There may be potential sources of funding from time to time, please contact the Heritage Unit for advice in this regard.



Useful Contacts

Heritage Unit 021 427 6891	Cork County Council, Floor 3, County Hall, Cork https://www.corkcoco.ie/arts-heritage
National Monuments Service 01 888 2169	Department of Culture, Heritage and the Gaeltacht, Customs House, Dublin 1. www.archaeology.ie
The Heritage Council 056 777 0777	Church Lane, Kilkenny. www.heritagecouncil.ie

design: www.kunnerta.ndseney.com

Where repointing is deemed to be a priority the following should be observed:

- The area to be repointed should be clearly defined.
- Joints should be raked out to remove friable material. Any large voids within the wall should be packed with mortar and packing stones.
- The joints should be brushed out, then dampened using several applications of a fine mist of water.
- An appropriate lime-mortar should be applied to the joints using proper pointing tools.
- Keep mortar off the surface of the face stones.
- Pinning stones can be inserted in the wider joints at this stage.
- Pointing mortar should be finished slightly proud of the stone surface and later brushed/tapped back using a stiff brush.
- Pointing mortar needs to be protected against extremes of weather conditions. This ensures slow consolidation of the mortar rather than a rapid set.

Repair Where the wall is leaning or structurally damaged it should be assessed by a suitably-experienced conservation expert and depending on the degree of damage a conservation engineering report may be required. A leaning or collapsed free-standing wall can often be the result of damaged or disturbed foundations or wash out of the lime mortar.

Re-building The features of historic masonry walls should be understood and respected when re-building. This is done by careful observation of the original masonry style and its appearance. The correct stone type (preferably reuse of the original stone from a collapsed or dismantled section at least for face stones), appropriate horizontal bedding, packing of wall core, lime mortar, pinning where appropriate, coping and suitable finish technique are all key to effecting successful masonry wall repairs. Mix new stones with old. Seek quotations from an experienced stonemason.

Legal Status

Some walls are part of an archaeological monument (see ww.archaeology.ie) which are subject to statutory protection under the National Monuments (Amendment) Act 1994. Under this legislation any works, outside of routine maintenance, requires two months notification to the Minister of Culture, Heritage and the Gaeltacht. The wall could also be within the curtilage of a Protected Structure, these are buildings of special interest identified by the Local Authority in the County Development Plan. For any works associated with either, please contact the Heritage Unit for advice and guidance.

Do

- > Get permission from the owner prior to works.
- > Gather information on the wall's form, fabric, function, legal status and date.
- > Make a photographic record of the wall.
- > Prepare a long-term plan in accordance with best practice and outline the programme of works to achieve the plan.
- > Repair to match existing original masonry wall.
- > Retain wall-friendly flora and fauna - minimal intervention is best practice.
- > Nip in the bud – only remove tiny saplings/light vegetation that will cause problems if left unchecked.
- > Get expert conservation advice where necessary.

Do Not

- > Do not use concrete.
- > Do not place face stones vertically.
- > Do not pull ivy/vegetation off masonry walls.
- > Do not clean moss/lichen/ferns from wall joints unless joints need repointing.
- > Do not carry out conservation works on masonry walls without seeking advice from a conservation specialist/contractor and permission from owner.

Planning

It is strongly recommended that a plan is prepared prior to commencement of works. The plan should include:

- Location
- Legal status
- Survey of the wall form, fabric, function and date
- Provide information on the historical context which should include a review of historical sources, historical maps and local information
- Photographic record
- Seek professional advice where necessary
- Determine a program of works according to best practice:
  - > *Plan of wall identifying proposed works*
  - > *Tools and material to be used*
  - > *Method*
  - > *Time frame*
  - > *Team Members*

CORK COUNTY COUNCIL
Heritage Guide

Historic Monuments Advisory Committee

Care of Historic Stone Walls

Cork County Council
Comhairle Contae Chorcaí

Introduction

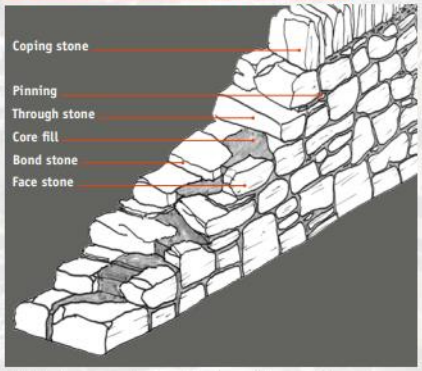
Old stone walls are an integral part of the built heritage of County Cork. Though often taken for granted, these features are testimony to the skilled craftsmen who built them and are an important link to the past. Traditional stone walls were built for a variety of reasons. These include boundaries to old farm yards and graveyards, lining the roadside and forming entrances into towns and villages. Where possible, such walls should be retained and conserved. However, many old stone walls are in varying states of preservation and some have been subjected to inappropriate repairs which has had a detrimental impact on both their visual appearance and physical condition.

Many local community groups have recognised the importance of stone walls and have taken an interest in their repair and maintenance. This leaflet has been prepared by the **Historic Monuments Advisory Committee** of Cork County Council to raise awareness of the heritage value of these stone walls and to provide practical advice and best practice for their ongoing maintenance and repair.

Stone Walls

There are many varieties of stone walls ranging from dry-stone rubble walls to formal coursed ashlar (blocks of cut stone) usually seen on more formal buildings. There are many regional differences that give a distinctive character to an area. In Cork, the most typical boundary wall is of random rubble construction. These are built of uncut or roughly shaped stones bonded by lime mortar. It is this type of vernacular wall that is the subject of this leaflet though the same principles apply to all lime-bonded walls.

Key features of a traditional random rubble stone wall



Rubble stone:	uncut or roughly shaped stones with rough vertical outer face
Face stones:	stones forming outer face of wall, laid horizontally on its natural bedding plane
Core:	small stones used in the centre of the wall as filling, also called hearthing
Joints:	gap between two adjacent stones on wall face
Through stone:	a stone that reaches through full width of wall to tie wall together
Bond stone:	a stone that goes in at least two-thirds of the wall
Coping:	stones along top of wall to protect the wall
Pinning:	small stones inserted between larger stones in wall face
Lime mortar:	material to bed stones in, made primarily of lime, water and sand

The most common traditional building stones used within the County derive from the predominant naturally occurring stone types of the region. There are three main types:

- **Sandstone/Mudstone**
- **Limestone**
- **Shale**

The wall, built by a skilled craftsman who carefully selected rubble stones, laid them horizontally with an outer vertical facing on both side and a rubble core. The stones were bedded in lime mortar. Most walls were laid in a series of horizontal courses (lifts) and each course was allowed to dry before the next lift was laid. A horizontal line often shows the height of each lift. Once reaching the desired height the wall was topped by a coping course. This usually consisted of vertically set stones designed to protect the wall from excessive water ingress preventing mortar being washed out through the joints. Most stone walls built in this fashion in the 18th and 19th centuries have a thickness of two feet (c. 61cm); a much thicker wall is likely to be medieval in date. Some walls such as those associated with farmsteads were given added protection with whitewash or plaster.

Lime Mortar

Lime mortar has been used in wall construction for over 1,000 years in Ireland. It is used to bed the stone and not necessarily to hold the wall together. In fact, many old vernacular buildings use mud as a mortar with the external joints protected with lime mortar or simple lime wash. Lime mortar is an ideal bonding material for stone walls as it is flexible, porous, permeable and durable. The advantage of this is that it allows the wall to breath by allowing moisture to move through the thickness of the wall. In addition, the inherent flexibility of lime mortars allows minor movements in the wall to be absorbed through the network of joints. To make the mortar, lime is mixed with water and an aggregate (usually sand) is added to control shrinkage.

The three main types of lime recommended to make lime mortar are:

1. Lime putty or 'fat lime'
2. Natural hydraulic lime (NHL) – a lime that sets through the reintroduction of carbon dioxide
3. Quick lime (hot lime) – traditional lime produced by burning limestone

The use of cement mortar to repair or re-point stone walls has the opposite effect to lime mortar. Cement-based mortars are water-impermeable, and much stronger, harder and more brittle than lime mortars. The use of cement traps water within the wall leading to dampness, and its hard brittle properties cause structural stress with shearing and cracking of individual stones.

MAINTENANCE

Many rubble walls have stood in good condition for over a hundred years and in numerous cases for much longer. Whilst some old walls require maintenance to prolong their lifespan, intervention is often unnecessary and can create more problems than it solves.

Vegetation Old stone walls are home to a variety of wild plants and animals that do no harm to the wall. However, there are some deep rooted plants which, if left get a hold, can damage the wall and lead to its ultimate collapse. Examples of these are ivy, trees and bushes, and even Valerian. For these plants, regular inspection and removal of small saplings and shoots is critical. If such vegetation has taken hold it should **not** be removed or weed-killed. Instead vegetation should be trimmed back to approximately a hands depth. This will reduce the strength of the plant, lighten the load and allow closer inspection of the wall. The removal of the remainder of the vegetation should only be undertaken once an approved conservation plan is prepared and can be acted upon. This may include repointing, repair of joints and/or rebuilding. These works should only be carried out by or under the supervision of a suitably experienced contractor with proven experience in the repair of historic walls and the use of lime mortars.

Re-pointing This is the process of renewing the mortar in the joints of the masonry on the external face of the wall. Over time, weathering and decay can cause voids in the mortar allowing the undesirable entry of water into the core. This will cause damage through frost weathering and from salt dissolution and deposition. Mortar failure is often confined to discrete areas and comprehensive re-pointing is rarely necessary over the entire surface. Serious mortar joint wash-out is the result of a particular cause which should be identified and addressed before repointing commences.

Appendix X: Citizen Science Surveys

- Flower Insect Timed Count: https://pollinators.ie/record-pollinators/fit-count/
  Video:
  https://www.youtube.com/watch?v=lrKqKm3dRV8&feature=emb_logo

- Bumblebee survey: https://www.biodiversityireland.ie/projects/monitoring-scheme-initiatives/bumblebee-monitoring-scheme/get-involved/

  How to identify Irish bumblebees:
  https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Crash-course-in-bumblebee-identification_2015.pdf

- Backyard Biodiversity Survey:
  https://records.biodiversityireland.ie/record/backyard-biodiversity#7/53.455/-8.016

  20 most common backyard species:
  https://www.biodiversityireland.ie/projects/additional-survey-schemes/backyard-biodiversity/species/

- How to identify and survey wildflowers: :
  https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Plant-Monitoring-Scheme-Booklet.pdf
  This monitoring scheme is not active but the booklet gives a great simple method of how to survey wildflowers in a garden or school or park and an easy to use identification photo guide.

Some others include:

- Irish Hedgehog Survey: Home | Hedgehog Survey (irishhedgehogsurvey.com)
- Ladybird Survey: 2021 - All Ireland Ladybird Survey (fotawildlife.ie)
- BirdWatch Ireland Various: Volunteer Surveys - BirdWatch Ireland
- Daubentons Bat Survey:
  https://www.batconservationireland.org/what-we-do/monitoring-distribution-projects/ireland-daubentons-bat-waterways-survey

Appendix XI: Sand Dune management methods

It should be noted that certain actions and activities cannot take place on sand dunes that designated in EU Habitats Directive Special Area of Conservation. These activities are called Activities Requiring Consent (ARC) and were formerly called Notifiable Actions (NAs). See https://www.npws.ie/farmers-and-landowners/notifiable-actions/listed-habitats-and-species for a list of Notifiable Actions for Sand Dunes and Machair.

A number of methods of sand dune management are outlined in The Conservation Volunteers Handbook of Sand Dune Management (2017) (https://www.conservationhandbooks.com/sand-dunes/dune-profiling-and-stabilisation/.

These include:

- Fencing e.g. brushwood or chestnut paling
- Box system of fencing
- Stone bank using smaller stones
- Gabions
- Timber soldiers

Contouring to fill in blow outs and recontour almost decapitated remnant dune peaks (use of bulldozers is advised but any removal from SAC areas cannot take place without specific permissions).

Devaney *et. al.* conducted a survey of sand dunes in Fingal (Portrane Beach) in 2014 and found the dunes to be in unfavourable conservation status. They proposed dune reprofiling, matting and planting in conjunction with sand trap fencing for areas where significant erosion had taken place.

Figure 1: Undercut sand dunes. (Photo M. Stack)

Planting Sea Grasses as a dune stabilization method:

(Extract from Conservation Volunteers. 2017. *The Handbook of Sand Dune Management*. The Conservation Volunteers, UK.)

Dune grasses may be used to:

a. Trap sand at the eroding windward faces of dunes and so help maintain their positions
b. Reduce the scouring effect of wind in blowouts and at the same time trap sand to help fill them in
c. Consolidate areas of loose sand including blowout deposition areas, embryo dunes, newly contoured dune faces and zones of accretionalong fencelines. Fencing without planting does nothing to stabilise the sand surface.

Other considerations:

a. Transplanting is at present the cheapest and most effective way to establish species of dune-building grasses.
b. Mixed dune grassland species may be transplanted by **turfing** but this must usually be augmented by **sowing**.
c. Transplanting is usually most effective when done in conjunction with fencing or thatching. Transplanting is often benefited by mulching or binding, and in some situations fertilising may help. Thatching should normally be done before or at the same time as planting, rather than afterwards which may damage the plants.
d. Protective fencing is often required around planted areas to prevent public access while the plants become established. It may be possible to limit fencing to the tops or crests of dunes and ridges. People tend to avoid climbing dunes which are vegetated and closed off at the top, provided convenient paths are made available in less vulnerable areas.

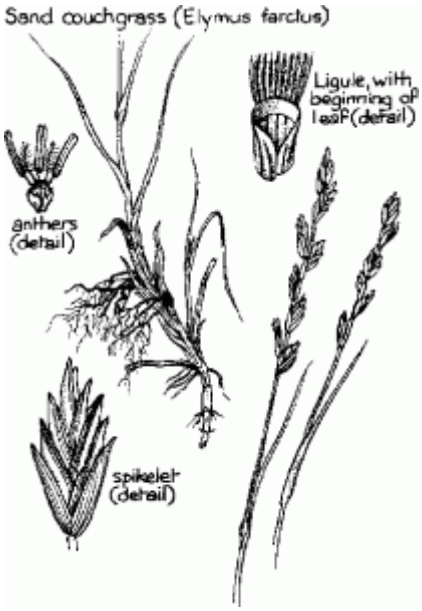
Species:

The most useful species to plant on bare sand and to initiate new dune development are the three natural dune-forming perennial grasses: sand couchgrass, sea lyme grass and marram. Marram is most widely used but the others may be preferable in certain circumstances. All have the ability to slow the wind and trap sand without causing scour. They maintain their effectiveness (within limits) by growing out and up through new deposits.

Sand couchgrass:

Sand couchgrass or sand twitch (*Elymus farctu*s syn. *Agropyron junceiforme*) is almost universal around the coasts of the British Isles wherever there is moderate sand blow. It is the usual pioneer of embryo dunes since even as a seedling it stands salt and can grow within reach of the high spring tides. Its extensive rhizomes creep through the sand and send up new aerial shoots when buried, as long as the annual sand accretion is under about 300mm (1'). If sand blows out from around the plant it continues to grow on the surface, protecting it from further erosion by a network of rootlets and shoots.

The shoots and rhizomes tend to get tangled up when the plant is lifted, which can cause problems when transplanting. Sand couchgrass shoots are bluish-green and form loose clusters. The leaves are 100-350mm (4"-14") long with upper surfaces which have close parallel ribs and many rows of short hairs. The leaves curl inward in dry conditions.

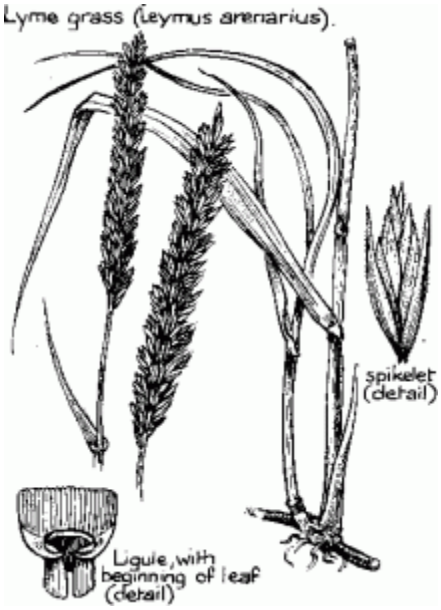


Sand couch rhizomes grow almost without limit horizontally but not vertically. The plant prefers mixed sand and shingle to pure sand. These factors mean that sand couch dunes are characteristically low and broadly domed. Such dunes resist wind erosion well, but where more height is required sea lyme grass or marram must enter the community to continue the dune-building process.

Sea lyme grass:

Sea lyme grass or lyme grass (*Leymus arenarius* syn. *Elymus arenarius*) is widespread around the coasts of Britain but is most common in the North and East, where it may be locally abundant. Elsewhere it is likely to be in short supply compared to the other two dune-forming grasses. This restricts its availability for transplanting, but if sowing methods improve it may be used more widely in the future (see **Sowing**).

Sea lyme has a high salt tolerance. It usually forms a fairly narrow strip above the pioneering couchgrass on the windward side of foredunes. Its tolerance to sand burial is similar to that of sand couch, but it is a much sturdier species in appearance, with stout rhizomes which produce clusters of large, sword-like bluish-green leaves 600mm-1.5m (2'-5') high. The upper leaf surfaces are rough due to slightly raised parallel veins while the under surfaces are smooth. The stems are stiff, upright and smooth.



Sea lyme grass spreads vegetatively via horizontal rhizomes and, like sand couch, it tends to form broad humpbacked dunes. Once established, it can extend itself farther seaward than can marram but it is distinctly wind sensitive and so flourishes mainly in moderately sheltered locations. For this reason, and because in winter it loses its leaves and offers little resistance to the wind, Adriani and Terwindt (1974, p48) recommend that it be planted between other dune-building grasses rather than alone. They also report that it is very prone to rabbit attack (an observation borne out on a number of British sites) and conclude, 'one wonders whether it is in fact suitable for use in coastal management at all'. On the other hand, Ritchie (1975, p2580) says that it has spread spontaneously and rapidly under natural conditions in many parts of Scotland where it seems as disease resistant as marram and more effective at the seaward edge of dunes.

Transplanting experience on the East Lothian coast and on Anglesey bears this out, while in Northumberland it has been found to have a much faster initial growth rate than marram in favourable locations. In view of these mixed results, it is best initially to use sea lyme grass in fairly small quantities, in sheltered places on the seaward side of dunes, preferably interplanted with marram to give some protection from rabbits and to insure some cover if the sea lyme grass fails.

Marram grass:

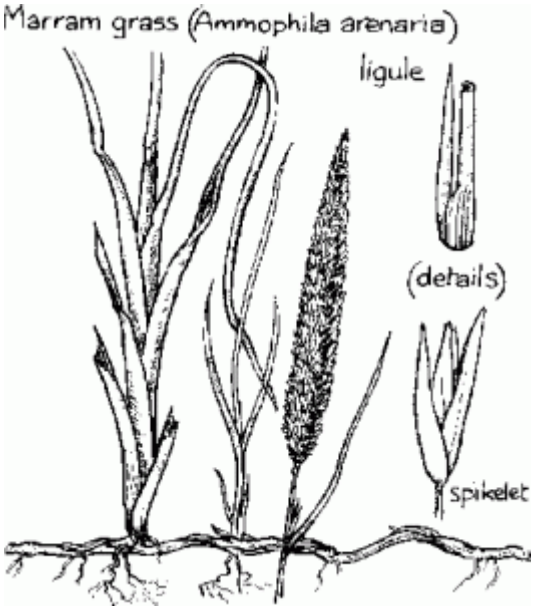
Marram (*Ammophila arenaria*) is the major dune-building plant in Britain, as it or the closely-related *A breviligulata* is throughout the world where conditions are suitable for really high coastal dunes. In certain localities, a hybrid occurs between marram and wood small-reed (bush grass. *Calamagrostis epigejos*). This is Baltic marram grass (*Ammocalam – agrostis baltica*), which is even more vigorous than marram but is completely sterile and so can only be propagated vegetatively. At the present, planting stock are limited, although it was planted extensively on the coast of Norfolk and Suffolk after the 1953 floods (Boorman, 1977).

Another vigorous cultivar. American beachgrass *Ammophila brevigulata* cv Hatteras, has been tried at Newborough Warren, but has not proved superior to native marram, and is susceptible to fungus disease (Ranwell and Boar, 1986).

No other plants have the ability to grow without limit not only horizontally but also upward through blown sand (Ranwell, 1972, p140). In fact, marram positively requires blown sand to thrive. Once it is sheltered from further sand accumulation, it gradually dies back and reduces its flowering. The reasons are not fully understood, but it does seem that marram roots are fairly short-lived so the plants may depend on frequent new root formation to survive (Boorman, 1977, p165). Unlike sand couchgrass, marram prefers to spread its rhizomes in pure sand, sending clusters of roots downward while the young shoots grow straight up. As sand accumulates around the shoots, marram forms adventitious roots at higher and higher levels, thus continuing to dominate the dune and make it higher. Ranwell (1958, p96) reports that at Newborough Warren, marram just withstands burial by up to 900mm (3’) of sand in a year provided its leaves are no more than half buried in any gale period and that there is time for the leaves and growing points to reach the new sand level between gales. On the East Lothian coast, local experience is that marram survives up to 1.2m (4’) burial at any one time. This is clearly a critical factor in its success when transplanted in areas of loose sand. In any case, its density declines rapidly if very high levels of sand blow persist, as is likely on the higher lee slopes of dunes where marram establishment may be more difficult than elsewhere. To some extent the system is self-regulating, as once marram is buried nothing remains to cause further sand accumulation, until the marram starts to grow through again. Marram has parallel-veined, light yellow-green leaves, 600-900mm (2’-3’) long, which remain tightly rolled except in very wet weather.

It can be confused with sand couchgrass when young, or with sea lyme grass when well developed, but unlike these it has a particularly long ligule, 10-30mm (0.5-1.25”) in length, at the inner junction of the leaf-sheath and the blade. This can be seen at all stages of growth.

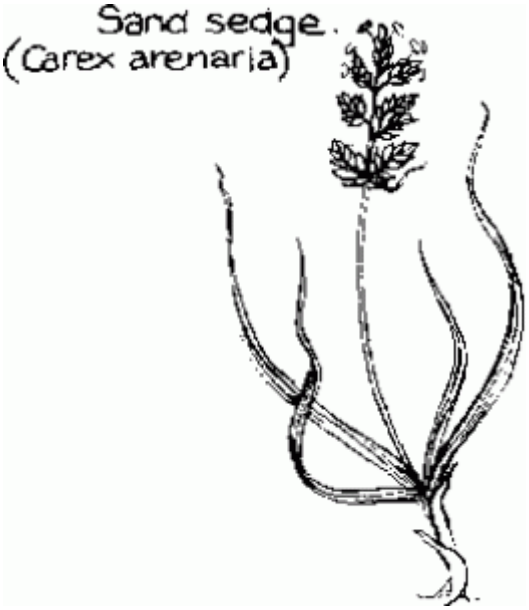
Marram tolerates at most 1% salinity, according to Adriani and Terwindt (1974, p13), so it only grows in areas out of reach of the tides. Once established, it is very drought resistant. In the initial colonising phase of its growth it produces few flower spikes, but when well established, it flowers freely and its clusters may spread until they occupy ten or twenty times the original volume of sand. In favourable conditions, it takes about eight years for the grass clumps to gradually coalesce to form a continuous open sward (Hewett. 1970, p664). In the postoptimal phase, when fresh sand supplies are cut off, it may persist for many years but gradually gives way to other plant species as it dies back.



Marram dunes tend to become steeper and higher than those of sand couchgrass or sea lyme. Where the forward face becomes too steep it may be undercut by the wind so that clumps of grass slide to the bottom of the slope. Often the clumbs re-establish themselves, but meanwhile much loose sand drifts onto the lee slope so that the dune tends to move slowly downwind. This process is accentuated by the fact that individual clumps of marram trap more sand in their lee than among the shoots themselves, and that new shoots grow up most vigorously in this heavily sanded ‘shadow’, so that individual clumps and their minature dunelets also tend to grow downwind. Because of this, marram plantations seldom remain fixed unless fences are used to act as fixed points of sand buildup.

Sand sedge:

Sand sedge (*Carex arenaria*), has a similar growth form to dune grasses, although not a grass itself. In some places, eg Braunton Burrows, Devon, it helps to stabilise very gritty sea-facing eroding slopes where it withstands the battering of blown grit better than marram. Usually, it grows in dry slacks, where it spreads over the surface via straight runners to form a loose network, occasionally colonising the sand slopes to either side. Although it only grows a few inches high, it might prove useful for stabilisation work provided it could be successfully transplanted.



Work season and storage of plants:

Sand-trapping grasses are remarkably tolerant and often survive transplanting even under seemingly adverse conditions. There are a few seasonal considerations which, if followed, allow the greatest success rate:

a. Take and transplant offsets during cool weather. If the average maximum air temperature rises above 55degrees F (15 degrees C) during the first three days after planting, few offsets are likely to survive (Hewett, 1973, p58). If possible, carry out transplanting in the season of relative dormancy. This means, broadly speaking, September to April (November to April in the South West).
   In general, planting is most successful in early March. At this time it is also easy to distinguish the living stems of grass by their green colour, so that these rather than dead stems are gathered.

b. Success in other seasons varies greatly in different parts of the country. depending on rainfall. Planting in summer is not successful ill the dry east or warmer southern locations, but may be possible in the north-west. On stable and sheltered sites, planting is possible from November to February, but is not worth doing where wind erosion, burial by sand or grazing is going to damage the offsets before they have a chance to establish. The following summary is from 'Dune Grass Planting' (CCS, 1985).

c.

The greater number of stars indicates greater success rate.

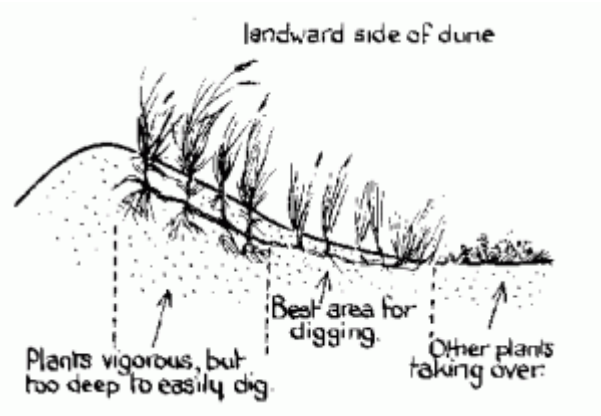
Oct–Jan	***	Avoid if grazing, burial or erosion is likely in winter.
February	****	Conditions often too severe for planting comfort. Avoid frosts.
March	*****	By far the best for all sites.
Apr–May	**	Dependent on cool spring weather.
June–Sept	*	Avoid on east coast; moderate success on north or north-west coasts.

d. Mid-summer planting may succeed given a spell of cool weather, provided that the work is done carefully. The usual advice is to dig and transplant offsets on the same day. If there is any delay, keep the plants covered in moist sand during the interval before setting out and be sure to plant deep enough so that living roots reach moist sand. Try to avoid disturbing the sand more than necessary since this allows it to dry to deeper levels than would otherwise occur. If you thatch the planted area at the same time as transplanting, the brushwood helps shade the plants and reduces drying of the sand in hot summer weather.

e. Experience on the Northumberland coast suggests that marram can be stored up to six months in plastic bags (eg clean fertiliser sacks opened at their narrow end}, and that storage for three months causes the nodes of the plants to swell and develop, resulting in faster growth after planting (Bacon, 1975, p8). Pack the bags loosely and keep them in a cool place, sheltered from the sun, for storage.

Sources of supply:

a. The supply site should be as near as possible to the work area, especially if transport is by hand over the tops of dunes. If transport is by trailer or lorry-load, driving time is as important as distance. Choose an area where plants are abundant so that offsets can be collected efficiently. If you have to find a source away from the planting site, look for areas of accreting duneland in fairly sheltered locations, eg around small estuaries (Bacon, 1974, p2).
b. Do not gather plants from exposed shorelines or windward dune faces, even those which lie well back of the coastline, unless the turf contains other well established plants and the dune-building species are dying back. It is important to maintain the stability of the supply site as well as to improve that of the planting site.
c. The best place to gather marram is on the lee side of a back dune ridge where the stand is still dense and vigorous but where it is entering the postoptimal phase of its development. Such a site is fairly erosion resistant provided that you dig selectively, to thin rather than open up the stand, and that you transport the marram in a way which does not create gullies and other focal points for wind scour. Thinning may even restore the remaining marram to vigour. Where the supply site is sheltered, you can experiment with removing up to 90% of the marram in small areas. This can result in very good new growth, as has been found in East Lothian



d. Other 'donor' sites for marram include postoptimal areas such as fixed dune ridges and dune grassland. The problem here is that extra time and effort may be involved in gathering the more scattered plants and in carrying them to the planting site. Avoid collecting very poor quality plants.
e. Gather sand couchgrass and sea lyme grass from relatively sheltered seafronts where further dune growth is unlikely. Supplies are often limited because these species generally grow in easily eroded foredune situations which should not be disturbed.

f. You can sometimes dig dune-building grasses from the foreshore where they are colonising areas of bare beach sand. Supplies from this source are usually meagre. Be careful not to over-collect since this prevents the formation of new embryo dunes.
g. In Cornwall, it has been found that growth of marram in newly planted fenced plots can be so rapid that it is possible to use the plots as a 'nursery'. Within 12-18 months planted clumps are thinned bv one third, by pulling the new, vigorous growth. This is easy to pull and quick to collect, being in planted rows and concentrated in a small area. Such pulling invigorates the 'mother' plants which keep growing fast. Here, and elsewhere, it is reckoned that any plants which are too old pull are too old to transplant, and that in general, digging is unnecessary (see below).
h. Another situation where plants are usually growing rapidly are alongside any narrow paths which wind through the back of the dunes. Plants can be quickly dug or pulled all the way along the path edge, thus making collection a rapid process. The remaining plants regrow quickly to repair the path edge.

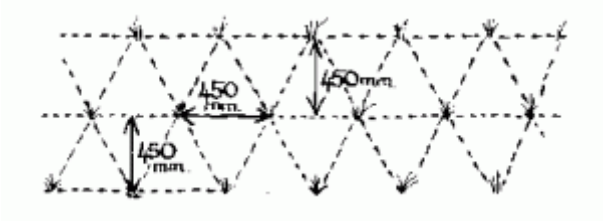
Location and spacing of planting:

Location:

a. Do not plant marram within 2-3m (6'-10') vertical distance of mean high tide level on the seaward face of foredunes. If you plant it lower than this, it may be damaged by salt water. Use sand couchgrass or sea lyme grass on the lowest levels of shifting coastal dunes.
b. Whatever species you use, it is important to plant an entire slope from crest to bottom. If you plant only the upper slope the dune will develop too steep a face and become more prone to erosion.
c. Suitable slopes for planting marram range up to 27degrees (1:2). Although offsets will survive on steeper slopes, the slopes are likely to remain unstable and should, if possible, be contoured to a lesser angle prior to planting.
d. Where you cannot regrade a very steep slope. and erosion appears to be a natural and continuing situation, it may be best to just plant the lee side of the dune crest provided sand buildup is within tolerable limits. As the crest is undercut, marram clumps will tumble onto the forward face and may take root. Meanwhile the planted marram on the lee slope should keep the sand from blowing farther back.
   You can plant steep slopes more easily and with greater success if you thatch or mulch them before planting.
e. Before planting backdunes, check for evidence of adequate sand supply (e.g. natural recolonisation by marram). If there seems to be too little blown sand for the dune-building grasses to thrive, sow mixed grasses instead, using a fertiliser and binder as necessary.

Spacing:

a. Plant offsets in any convenient pattern, normally spaced from 300-900mm (1'-3') apart.
b. Site conditions, the amount of grass available and the area to be covered by the work party in the given period all affect the spacing. Close spacing is best where the surface is actively eroding and likely to suffer further wind blow in the months after planting. Where supplies and labour are plentiful, spacings of as little as 150mm (6") between plants in a row and 225mm (9") between rows have been used with success at Balmedie Beach, Aberdeenshire. Close spacing has also worked well at Lindisfarne, Northumberland. Usually it is better to plant up the entire area at a slightly wider spacing than to leave some of it unplanted and open to erosion. On steep slopes, 300mm (1') between plants and 450mm (1.5') between rows is often easier than closer spacing of rows.
c. The most common pattern is quincunx ('domino 5') with about 450mm (1.5') between plants on average.
   Adriani and Terwindt (1974, p48) recommend planting marram and sand couchgrass in this pattern at 500mm (1'8") spacings with an interplanting of sea lyme grass at 250mm (10") spacings.



d. Plant in staggered rows to limit any problem of wind-scour between the rows and to encourage the even spread of new growth into the intervening spaces. Staggered-row planting also makes it easy to see where you have finished. 'Random' planting may look more 'natural' at first but it can result in uneven coverage. Staggered plantings soon blend with their surroundings as some plants die and others send up new shoots and spread.

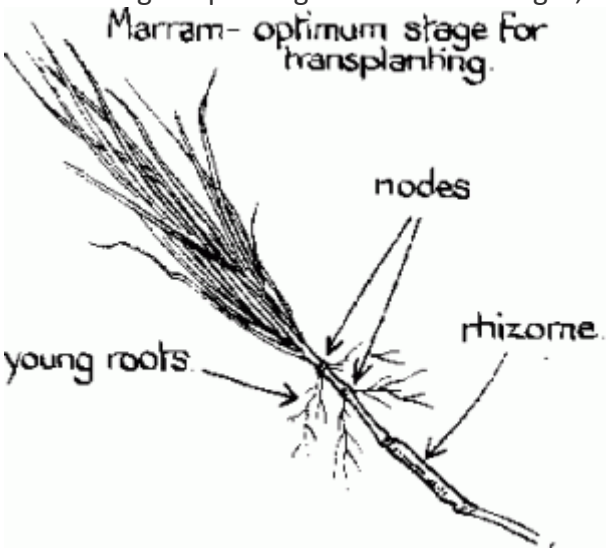
Transplanting methods and work organisation:

Arrange details of work organisation according to the site, size of working party and supply of plants. Aim to supply offsets at a steady rate for planting. In some situations, eg where plants must be transported some distance by road or where a mechanical planter is being used, it may be best to have all volunteers dig until the supply vehicle is loaded, then have the same people plant until supplies are exhausted.

Generally, digging the offsets is quicker than planting them. Where the digging and planting site are within easy walking distance, a typical way to organise the task is to have four people digging and loading the plants into containers, two people carrying them between the digging and planting sites and six people planting. It is often easiest if diggers work in pairs to fill containers, so that four diggers use two containers. Planting can be done singly or by teams depending on the site and the inclination of volunteers.

Digging and transporting:

a. The aim is to extract plants with at least 150mm (6") of healthy root or rhizome, with two or three nodes from which the new roots or shoots will grow. A longer length of rhizome, of 300mm (1') or more, is not necessary for successful establishment, and makes planting more awkward. The usual method is to dig, and then pull on the plant so that enough rhizome breaks away from the tangle of roots deep in the sand. The point at which it breaks will depend on the vigour of the plant, the depth you dig and the depth and dryness of the sand. In damp sand, which anchors the rhizomes, you may need to dig deeper to get a sufficient length, as pulling will break the rhizome off short.



b. When using a spade or fork, cut out a block of turf and lever it up so you can lift the offsets. Where the root mat is dense you may have to cut the block on all four sides to lift it. Otherwise just cut two sides. You can usually do this without shifting your position. Leaving the spade or fork in place to minimise disturbance to the soil, reach down and pull apart bundles of offsets. Shake most of the sand loose from the rhizomes so that it falls back into the hole. This lightens the load when transporting and gives a higher proportion of offsets to sand. Lay the offsets to one side or place them directly into the container. After the block is completely separated and removed, pull out the spade or fork and heel in the remaining sand in the hole.
c. Move a few feet away to dig up another block of grass. Leave plenty of grass in proportion to dug-up ground, to minimise the risk of erosion.

d. Gather the offsets and pack them closely into the transporting container. There should be plenty of living stems with succulent white rhizomes and root hairs but don't bother separating out dead plants unless they form a very high proportion of the total.
   For hand carrying by one or two people, polythene bags (eg old fertiliser sacks) are ideal. These keep the plants moist, but should be kept shaded so that the plants don't overheat. Coil the plants into the bags to minimise tangling. You can also pack plants into old fish boxes or buckets, although these are more cumbersome. For transporting large quantities of grass in a Land Rover or lorry, use old fish nets folded into long thin rectangles. Lay the plants on the folded netting and roll up the nets to form bundles.
e. If you have to store the offsets for more than a few hours, cover them with damp sand and keep this moist. This is especially important when planting in hot dry weather. See also 'Work season and storage of plants', (below).

Pulling:

Experienced workers in Cornwall and Merseyside have found that much the best method of gathering transplants is to pull them. This is not only quick and easy, but it disturbs the sand surface less than digging, and most importantly means that the plants are at just the right stage for transplanting. If plants cannot be pulled, they are too old for rapid establishment. Plants should be less than two years old, with plenty of fibrous root. If the shoots are a pinky-purple colour, the plant is too young. The sheath should be dry and yellowing, with the whole plant forming a 'funnel' shape.

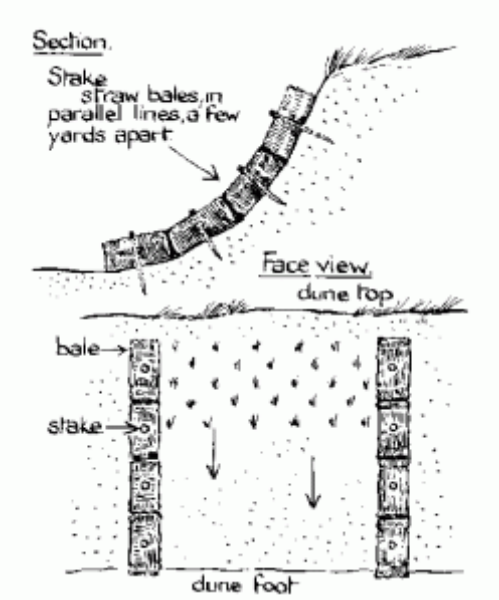
The only problem is that it does require experience to recognize when plants are at just the right stage. Inexperienced workers can waste time and plant material by pulling plants that do not have sufficient roots on them, or damaging plants that are too old. Digging is a safer method in this case, as it ensures that some viable root is obtained from each plant.

Planting by hand:

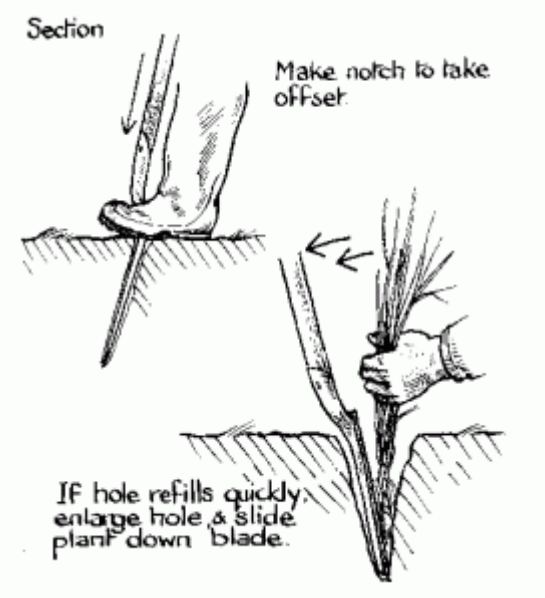
a. It is essential to plant deep enough, so that the active growing point at the leaf base is 50-100mm (2-4") below the sand surface. This normally means planting about 100mm (4") deeper than the plant was when lifted. The reason is that the plant is adapted to increasing in vigour by developing new roots and shoots as it grows upwards through the sand. If the growing point is put at the sand surface, the plant stagnates (CCS, 1985).
   The number of plants put in each planting hole will depend on the size of the plants. Normally, two large, three to four medium or five to six small plants will be needed, making a bundle of about 38mm (1.5") diameter, which can be held with the thumb and forefinger touching. Do not bother separating the live stems from dead litter or other species which may be intermixed. Dead material helps trap sand, and probably protects the live stems and provides a mulch when it breaks down. If other species survive along with the grasses, so much the better.

Overall success rates for transplanted marram are usually in the order of 60-70%, so it is wise to include at least two living stems per hole and as many as can be managed, given the available supply and the time and area to be planted.
Heel in each bundle using the foot or palm of the hand. Check them for firmness. They should withstand a gentle tug.

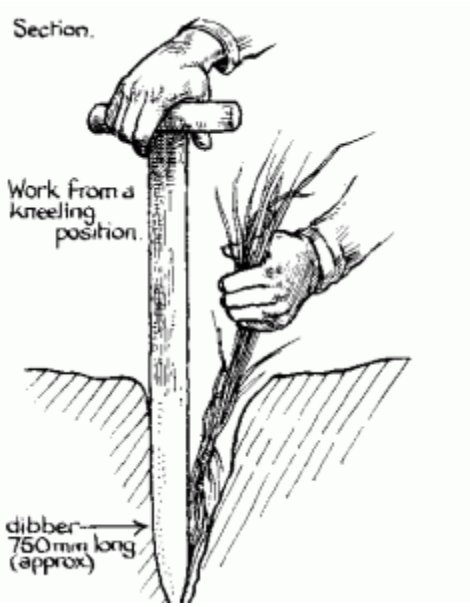
b. When planting a slope or blowout, start at the top and work downward to reduce the amount of trampling as you work.
If thatching is being done, do this as you plant. You can use thorn-free brushwood to stand on as you work. On very steep slopes, stake straw bales in parallel lines from bottom to top, spaced a few metres apart. By using these as access routes, you disturb the slope much less than if you climb on the unprotected sand face. The stakes can be tricky to hammer in, so work with care and stand on brushwood to keep from sliding. Leave the bales in place after use to help trap sand and to gradually break down and form a mulch.
c. You can plant offsets using a spade, a dibber or with your bare hands, depending on soil conditions and personal preference. Many people like to use a garden spade, especially when planting in firm ground. In hard or stony ground, a pointed spade such as a Schlich planting spade or a trenching spade is easiest. Working from a standing position, make a notch to take the offset.



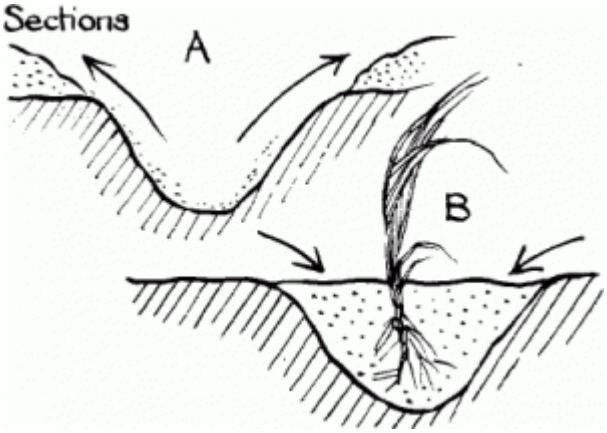
Some people favour using a long, narrow spade held ‘back to front’, as the blade makes a concave face for planting against, and leaves the handle nearer the hand, which is quicker and less tiring.
If the hole tends to fill in too quickly, work the spade around to enlarge it and slide the plant down the blade with the blade in the ground. Push the rhizomes well down in the hole as you lift the spade free. This gets the rhizomes deeper than if you pull the spade out first.



In soft sand you can make a hole with a broken, sharpened spade handle, used like a dibber. Garden dibbers are too short to be effective. In firmer sand use a small crowbar.



In very soft sand you can use your bare hands to scoop out a hole. You have to make it extra large so that it stays open long enough to place the offset.



d. Always start planting up against any boundary, so the planters are not confined as work reaches completion. Normally it is efficient for each pair to work along a line of about 10-15m length so that teams do not get in one another's way, whilst remaining close enough to their own supply point (CCS, 1985).
e. Two-person planting is best done with a spade. One person should stand to make a notch with the spade while the other kneeling, places the offset.
   Where the soil is firm it may be easiest for the person who cuts the notches to work slightly in advance of the planter. He may be able to keep two people busy planting if he works quickly.
f. Transplants may benefit from fertilising at the time of planting (see below).

Planting by machine:

Agricultural planting machinery can be adapted to transplant offsets of marram. This is only worth doing where a large area of relatively flat terrain is to be planted up, but in this situation it is much quicker and less laborious than hand planting.

Nash (1952, p9) says that a root planter pulled by a small crawler tractor improves man-day outputs by five times and reduces costs by 80% compared with a paid labour force. The best system is for a team of five workers to gather offsets all morning and then plant them in the afternoon. When planting, the work party consists of one person driving the tractor, three on the planter and one who keeps the trays on the planter filled with offsets and drives the lorry full of offsets from the digging to the planting site. Where digging and planting are done simultaneously, another five people are needed to keep the lorry supplied.

On the East Lothian coast a tractor-pulled cabbage planter has been used with similar success, but ten people were required to supply it with plants and the marram had to be chopped before being fed through the machine.

Fertilising transplants:

Transplants of dune-building grasses may be fertilised at the time of transplanting. The value of this is variable on exposed or unstable dunes but may improve growth considerably on areas less subject to rapid sand movement. When fertilising transplants, it is best to incorporate the first treatment directly into the planting hole, and follow this by periodic top dressings as for sown grasses.

Appendix XII: How to 'Bioblitz'

Engage local children and adults living near a Public Park to take part in a 'Park BioBlitz'! This is be a friendly fun day when children and parents and locals can help identify as many species of insect/bird/flower at the Park. Resources should be given with photos which are included in the links below.

Check out this lovely video about a Backyard Bioblitz: Take part in the School Backyard Bioblitz Challenge! (rte.ie)

A number of lovely national Citizen Science initiatives could be used here, all of which provide resources to take part:

- Flower Insect Timed Count: https://pollinators.ie/record-pollinators/fit-count/

Video: https://www.youtube.com/watch?v=lrKqKm3dRV8&feature=emb_logo

- Bumblebee survey: https://www.biodiversityireland.ie/projects/monitoring-scheme-initiatives/bumblebee-monitoring-scheme/get-involved/

    - How to identify Irish bumblebees: https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Crash-course-in-bumblebee-identification_2015.pdf

- Backyard Biodiversity Survey: https://records.biodiversityireland.ie/record/backyard-biodiversity#7/53.455/-8.016

    - 20 most common backyard species: https://www.biodiversityireland.ie/projects/additional-survey-schemes/backyard-biodiversity/species/

- How to identify and survey wildflowers: : https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Plant-Monitoring-Scheme-Booklet.pdf

  This monitoring scheme is not active but the booklet gives a great simple method of how to survey wildflowers in a garden or school or park and an easy to use identification photo guide.

Any results from a BioBlitz could be logged on the pollinators.ie website:

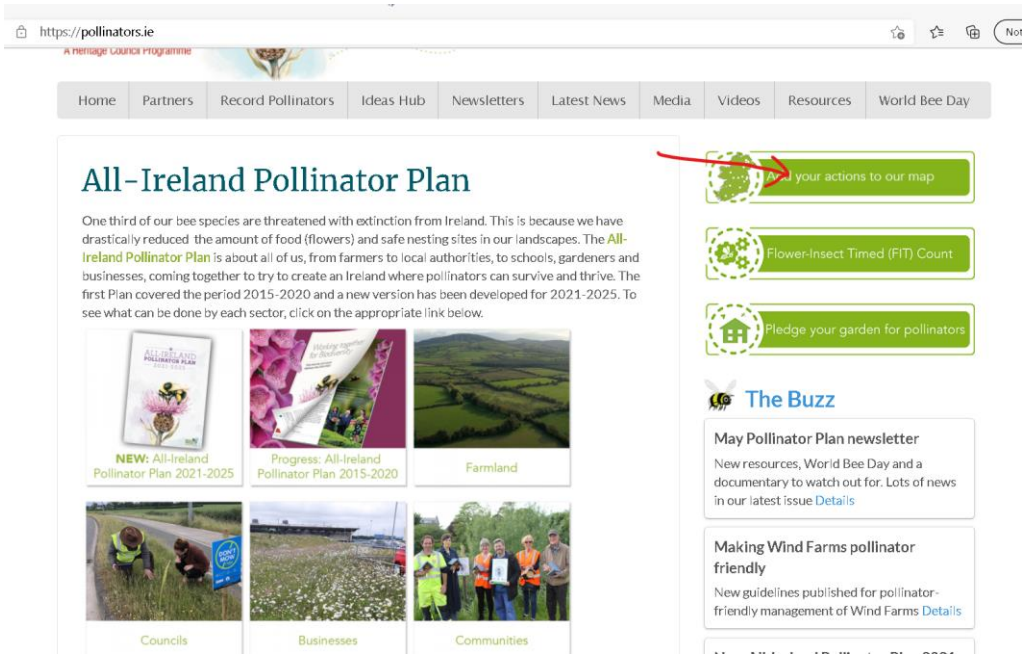


Figure 1: All Ireland Pollinator Plan Website (www.pollinators.ie) managed by the National Biodiversity Data Centre. This website provides myriad resources to local groups and is where you log your pollinator site so it shows up on the national pollinator map.

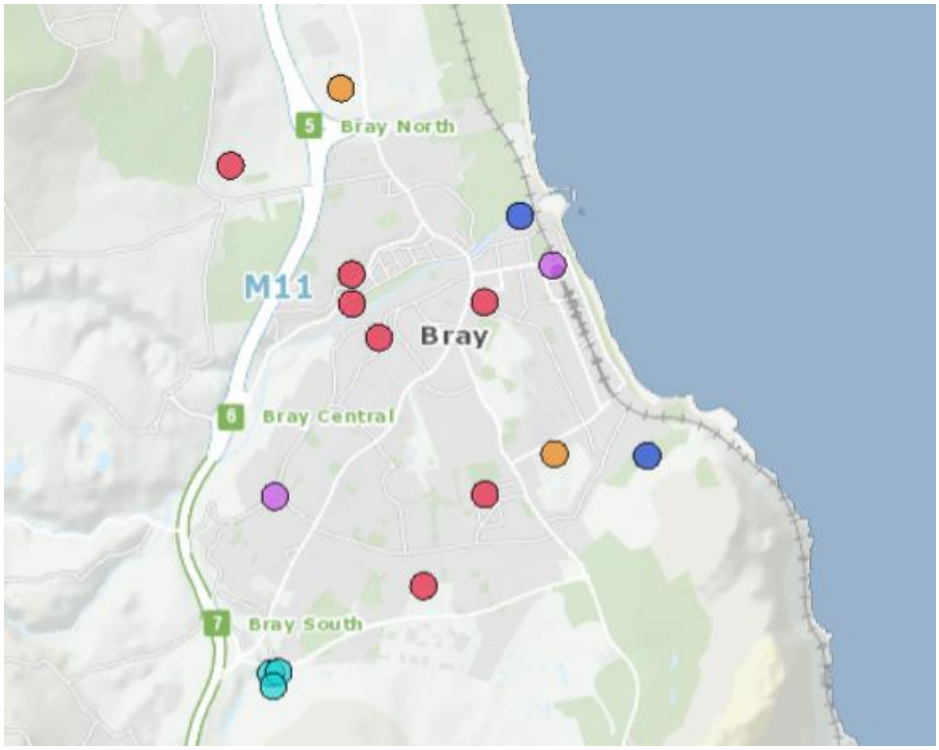


Figure 2: Extract from All Ireland Pollinator plan pollinator site map (\- Actions for Pollinators (biodiversityireland.ie) for the Bray area (taken as an example). Dots are different pollinator sites logged by local groups or individuals. When you click on any dot the information recorded by that group appears.

Appendix XIII: Creating a Pond or Bog Garden

Figure 1: An example of a wildlife pond with rocks for shelter and planting to aerate the pond and provide resting places for insects (Google images)

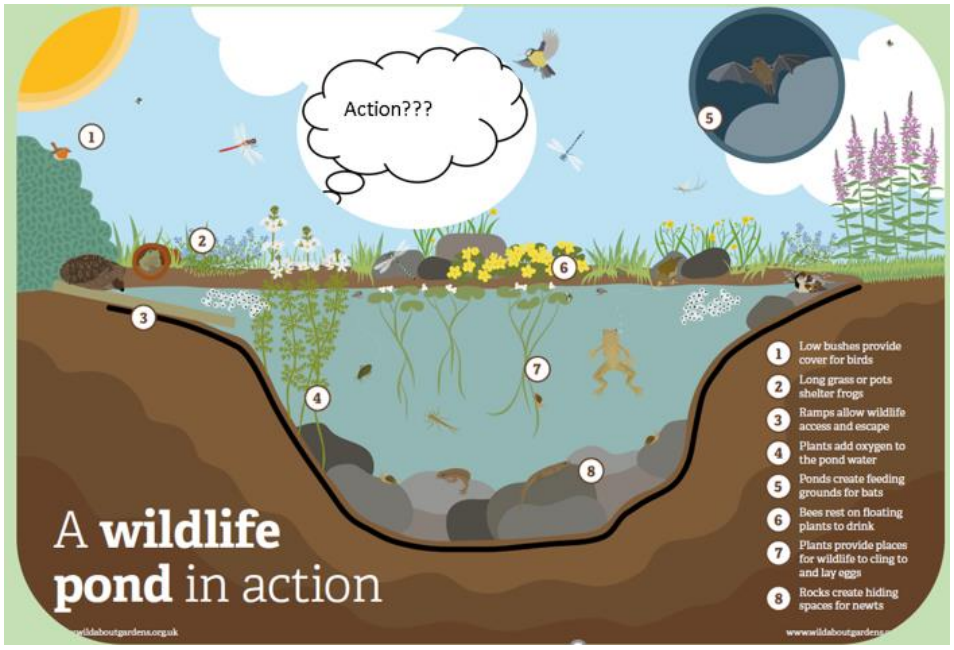


Figure 2: Extract from very useful Pond guide:
https://www.wildaboutgardens.org.uk/sites/default/files/2019-03/Big%20or%20small%2C%20ponds%20for%20all%20Wild%20About%20Gardens%20booklet.pdf

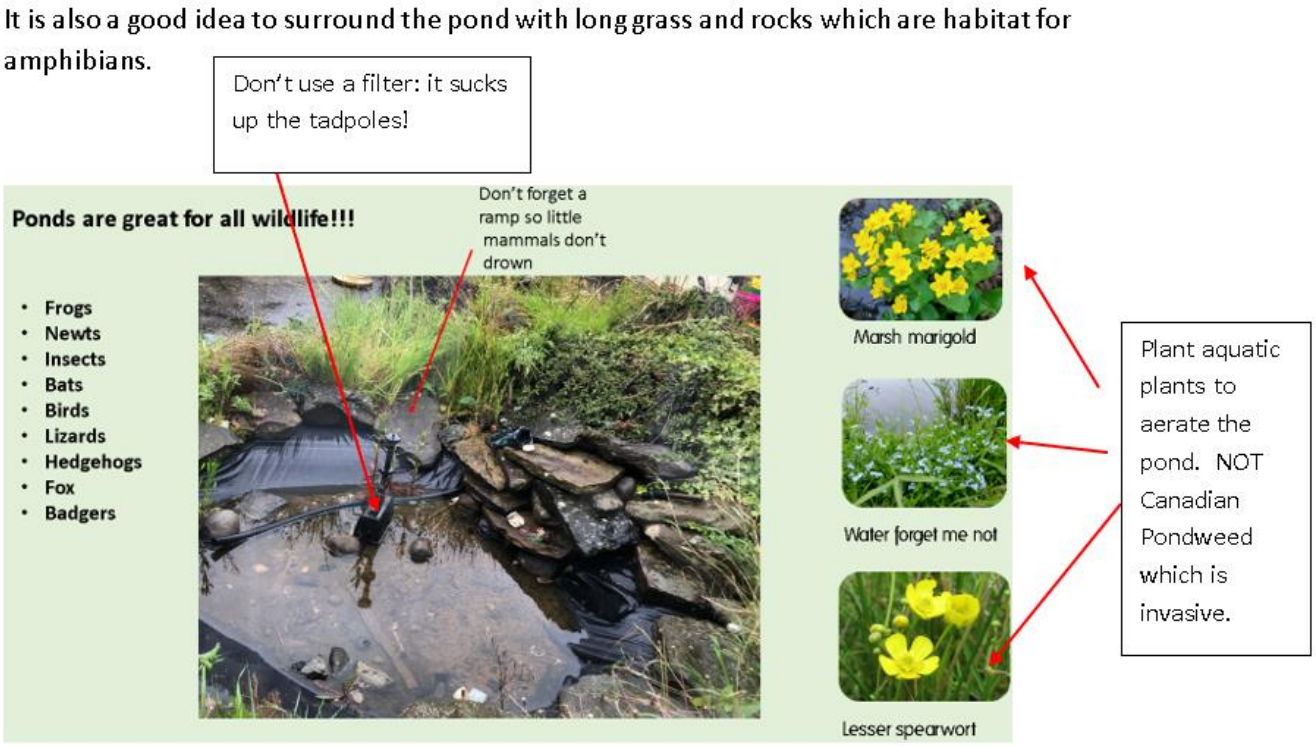


Figure 3: Extract from presentation given by M. Stack on how to create a wildlife pond with images of suitable freshwater plants to install at the periphery of the pond.

If a wildlife pond is not suitable, then perhaps a 'Bog Garden' might be appropriate.

Figure 4: Illustration of a Bog Garden extracted from Laois Co. Co. 'Gardening for biodiversity' https://laois.ie/wp-content/uploads/Garden-Wildlife-Booklet-WEB-17MB.pdf

Bog gardens are wet areas with suitable wet plants that live in the soaked area. See pg. 32 of https://laois.ie/wp-content/uploads/Garden-Wildlife-Booklet-WEB-17MB.pdf for further information on how to make a wildlife pond o