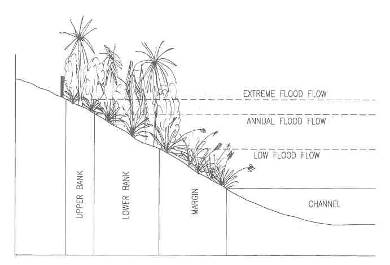
**RIPARIAN PLANTING ZONES**

For planting purposes riparian margins are grouped into three distinct zones reflecting the frequency of flooding. The riparian profile below shows an example of each of these zones and outlines the type of species that should be chosen to withstand flooding events and protect the banks from erosion.





**Margin:** Frequently submerged lower banks and wetlands next to the channel. Plants are flexible and able to bend and sway with frequent low flood flows e.g. *Carex secta* which will allow flood water to pass with minimal obstruction and damage.

**Lower Bank:** This zone is less frequently submerged but still subject to fairly regular flooding. Low, multi-stemmed growth forms resist toppling and reduce water velocity. The plants must have vigorous root growth to control bank erosion.

**Upper Bank:** This zone is above all but the largest flood flows. Taller species are unlikely to cause problems with toppling and will provide nesting, roosting and feeding for resident and migratory wildlife.

– also see planting advice below

For the planting you will want to do a couple of pre-plant sprays, one next month and the other in April - ready to plant with frost tolerant plants in May. Likely this will entail spot spraying the thousand odd 1m areas which are c.1m to 0.75m apart, using a glyphosate based product since we are near to a waterway. It is best to avoid a blanket spray along the waterway as this leaves banks vulnerable to erosion/slumping.

This from ECAN

Our key factor is that all plants must be Eco sourced (the seed is collected locally). Graham (Orari Nursery) is excellent at Eco sourcing as long as he knows where you live! He should be able to advise you on what will survive best in your climate from the attached list.

Kind regards,

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| Jess |
| **Jessica**  Biodiversity Officer Environment Canterbury |  |

Other Nurseries:

* Riverside Nursery - 75 Boys Road, Rangiora 7400; Ph 03-313 8734 (plant supply and contractor planting services)
* Wai-Ora Forest Landscapes Ltd - 48 Watsons Rd, Harewood; Ph 03-359 2458 (plant supply and contractor planting services)
* Trees for Canterbury - 261 Opawa Rd, Christchurch; Ph 03-332 8586 (plant supply only I believe)
* Motukarara Nursery (DOC) - Motukarara near Tai Tapu; Ph 03-329 7846 (plant supply only)

SUITABLE PLANT LIST for North Canterbury\*

*(\*some will not be available at nurseries. Key is that the plants are requested to be ecosourced –see below- and this will ensure they are suitable)*

Stream Margin

|  |  |  |
| --- | --- | --- |
| Scientific Name |  | Common Name |
|  |  |  |
| *Astelia grandis* |  | swamp astelia (seed may be available from a site near Rangiora if required) |
| *Carex secta* |  | pukio; tussock sedge |
| *Carex virgata* |  | pukio; tussock sedge |

Lower and Upper Bank Zones

|  |  |  |
| --- | --- | --- |
| Scientific Name |  | Common Name |
|  |  |  |
| *Coprosma propinqua* |  | mikimiki |
| *Coprosma robusta* |  | karamu |
| *Coprosma rubra* |  | mikimiki |
| *Coprosma virescens* |  | green coprosma |
| *Cordyline australis* |  | cabbage tree; ti kouka; ti |
| *Corokia cotoneaster* |  | korokio; wire-netting bush |
| *Cortaderia richardii* |  | toetoe |
| *Griselinia littoralis* |  | broadleaf; papauma; kapuka |
| *Hebe salicifolia* |  | koromiko |
| *Hoheria angustifolia* |  | narrow-leaved lacebark |
| *Kunzea ericoides* |  | kanuka; white tea tree |
| *Leptospermum scoparium* |  | manuka; red tea tree |
| *Lophomyrtus obcordata* |  | rohutu |
| *Muehlenbeckia astonii* |  | bush pohuehue |
| *Muehlenbeckia complexa* |  | shrub pohuehue; small-leaved pohuehue; wire vine; |
| *Olearia paniculata* |  | akiraho; golden akeake |
| *Pennantia corymbosa* |  | kaikomako |
| *Phormium tenax* New Zealand flax; harakeke; flax | | |
| *Pittosporum eugenioides* |  | lemonwood; tarata |
| *Pittosporum tenuifolium* |  | kohuhu; black matipo; tawhiri |
| *Plagianthus regius* |  | lowland ribbonwood; manatu; ribbonwood |
| *Pseudopanax arboreus* |  | five-finger; whauwhaupaku |
| *Pseudopanax crassifolius* |  | lancewood; horoeka |
| *Sophora microphylla* |  | kowhai; weeping kowhai |
| *Sophora prostrata* |  | prostrate kowhai |

Upper Slope Zone Large Trees

|  |  |  |
| --- | --- | --- |
| Scientific Name |  | Common Name |
|  |  |  |
| *Elaeocarpus dentatus* |  | hinau |
| *Podocarpus totara* |  | totara; lowland totara |
| *Prumnopitys taxifolia*  *Nothofagus solandri* |  | matai; black pine  black beech; mountain beech |

*Dacrycarpus dacrydoiodes* kahikatea; white pine – this slow growing large swamp tree could be introduced at a later date if area retains moisture all year round

**For more information on planting or nurseries in your area visit:**

[**http://ecan.govt.nz/advice/your-land/land-restoration/Pages/nurseries-planting-contacts.aspx**](http://ecan.govt.nz/advice/your-land/land-restoration/Pages/nurseries-planting-contacts.aspx)

**Or contact your local Ecan Biodiversity Officer –Call Ecan on (03) 353 9007 or 0800 324 636**

APPENDIX 2. PLANTING GUIDELINES

**General planting advice**

**For more information contact your local Biodiversity Officer –Call (03) 353 9007 or 0800 324 636**

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| --- |
| 1. **Planning & design – don’t bite off more than you can chew** |
| * When planning your project spend some time thinking about your site, what you are hoping to achieve with your planting and how much time and money you will have for the project. * What do you want to achieve from your project? Shade for a stream? Food for native birds, insects and lizards? Expanding an existing remnant area of dryland vegetation? * What area do you have available? Is it a narrow strip along a stream, or a wide corner of a paddock? * Are there any constraints on the site? Will access be required to a stream for drainage maintenance? Will shading from tall plants be a problem? * How much time do you have for the project? As a rule of thumb, for every 100 plants it will take one person half-day for preparation (including ordering plants & pre-plant spraying); an adult can plant 20-30 plants an hour on sites with easy digging (few stones), for school groups children working in pairs allow 10-15 plants an hour; if putting on plants guards as well add another 50% to the time required; maintenance of plants with spraying will take one person two hours every three months for the first two years.      * How much money do you have for the project? Typical costs to think about are fencing, chemical for pre & post plant weed control, plants and plant guards/mulch. |
| 1. **When to plant? - Timetable for works** |
| * Below is an outline of when activities should be taking place throughout the year to prepare, plant and maintain plantings. Spring planting is generally preferred as winter frosts can be hard on plants that have not had time to fully establish after autumn plantings. Early autumn plantings (especially where there is good moisture available) can be used for frost tolerant plants. * **FOR SPRING PLANTINGS**   A number of native plants are frost-sensitive so their establishment should be delayed until spring (September-October) and watering maybe required during dry periods to ensure establishment.   * **FOR AUTUMN PLANTING**   This is designed for autumn planting of frost tolerant plants only. Autumn planting may fit better with other farm work, should allow frost tolerant the plants to establish better root systems before dry weather, reducing the need for watering over the summer months.  \*Any time before planting assess the numbers of rabbits and hares present, if necessary undertake control pre-plantings and regularly as numbers begin to increase or if any sign of browsing is seen on the plants. |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Year 1 | | | Year 2 | | | | | | | | | | | | Year 3 & Beyond | | | | | | | | | | | |
| O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D |
| Pre-plant spray |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Fencing |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pest Control\* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Planting |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Weeding |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Spring Planting Timetable**

**Autumn Planting Timetable**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Year 1 | | | | | | | | | | | | Year 2 & Beyond | | | | | | | | | | | |
| J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D |
| Pre-plant spray |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Fencing |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pest Control\* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Planting |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Weeding |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| **3. Get the right plants for the right place** |
| * When drawing up a plant species list for your project, obtaining quotes and purchasing plants, you will first need to know the physical characteristics of the site – what is your soil type? How wet is the soil? What is the climate? If you are planting along a stream what are the flood levels? Will plants be exposed to wind? How frosty is the site? Will there be any salt spray? Will the plants be in full sunlight or shade?   \*Ensure all plants are ecosourced –discuss this with your plant supplier |
| **RIPARIAN PLANTING ZONES**   * For planting purposes riparian margins are grouped into three distinct zones reflecting the frequency of flooding. The riparian profile below shows an example of each of these zones and outlines the type of species that should be chosen to withstand flooding events and protect the banks from erosion   Tree Diagram  **Margin:** Frequently submerged lower banks and wetlands next to the channel. Plants are flexible and able to bend and sway with frequent low flood flows e.g. *Carex secta* which will allow flood water to pass with minimal obstruction and damage.  **Lower Bank:** This zone is less frequently submerged but still subject to fairly regular flooding. Low, multi-stemmed growth forms resist toppling and reduce water velocity. The plants must have vigorous root growth to control bank erosion.  **Upper Bank:** This zone is above all but the largest flood flows. Taller species are unlikely to cause problems with toppling and will provide nesting, roosting and feeding for resident and migratory wildlife. |

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| **4. How many plants?** |
| * Once you have decided the length and width of each of the zones within the area which you are planting you can use the plant spacing in the table above to determine the exact number of plants which you will need. As a general rule within the margin areas you will need 1 plant per square meter. In the lower bank area you will need 0.7 plants per square meter. And in upper bank areas 0.5-0.7 plants per square meter depending on the mature size of the plants you area using. * Once you have decided on the details of your planting, your nursery should be able to help you confirm that you have calculated the correct number of plants.   **Calculating the number of plants for your project:**  A simple way to calculate the number of plants you will need is to visit the site and spray where you want the plants. Use a different symbol or colour for each species, and then count the spray marks. Otherwise, use the following calculation to work out roughly how many plants you will need.  **Width of area x length of area**  **Plant spacing x plant spacing**  For example: **5m (wide) x 127m (long) / 1.5 x 1.5 = 635m / 2.25 = 282 plants required** |
| **5. Preparing the site** |
| **Fencing**   * Stock need to be excluded from all plantings forever.   **Pre-planting weed control.**   * Remove all existing surface vegetation from the planting area by either spot spraying or grubbing. * Clear a 1m patch for each plant. * Do not over clear surrounding vegetation or remove topsoil. * If using herbicide, spray the area when weeds are still actively growing around 3 months before planting with glyphosate and again 3-4 weeks before planting.   + - Try to minimise the usage     - A 15 litre knapsack will cover approximately 200 planting spots     - Spray only in calm conditions     - Use a wetting agent to improve coverage and adhesiveness     - Use a side-to-side motion for better results (see below).   spraying direction |
| 6. Getting the plants in the ground |
| Planting   * Skim other vegetation off the surface and save it for mulch. * Dig a hole twice the size of the plant container and loosen the soil at the bottom (see below). * Remove the plant from planting pot keeping intact as much soil around the roots as possible. * Cut off any spiralling roots or make vertical cuts along the length of the soil block. * Remove the bottom inch (25mm) of soil plug with a sharp knife or secateurs. * Place the plant in the hole so the base of the stem is at the correct depth. * Gradually add soil around the root ball and gently firm. * Where possible replace dead weed matter around the plants as this will help retain moisture during dry periods, and help deter Pukeko from grubbing in the freshly exposed soil. * A watering soon after planting, if practical, is beneficial. * If you are not using plant guards, it is also useful to place coloured stakes next to your plants during planting so they can be easily located if overtopped by grass or weeds later on. |
| Mulching and plant guards   * Because of the inevitable re-infestation of weeds after the two weed control operations, and bearing in mind the difficulty of subsequent re-spraying after planting, it is suggested that either an inorganic mulch (such as old carpet or weedmat cut to 50cm – 60cm sized squares) and/or plant guards (plastic or netting sleeves) be added at planting. Weedmat will help reduce weed growth and competition for water. Netting and plastic plant guards also protect the plants from browsing by rabbits, hares or possums. The plastic plant guards also give some protection to the young plants from sprays, making post-planting weed control easier. Although an added cost up front they can reduce the amount of maintenance required and greatly increase plant survival and growth rates, saving money in the long term.   planting diagram |

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| **7. Protecting your investment – weed & pest control post-planting** |
| **Post-planting weed control**  Whilst maintenance is time consuming it is essential so that plants will survive and grow. Plants should be kept free of grass and weeds for two years after planting. To assist with plant survival:   * Apply mulch where practical to retain the moisture and suppress weeds. * Check plants regularly and weed around the base of plants using a sharp grubber. * If using chemicals to control weed growth be extremely careful not to contact the plant. Protect with a spray shield or place bucket over the plant before spraying. If chemical contacts a plant wash off with water immediately and/or remove affected leaves. If possible use a contact herbicide (such as Buster) rather then round-up.   **Post-planting pest control**   * Control for pests particularly when other food sources are low (early spring, late autumn). * Monitor plants for any signs of browsing and undertake control immediately if signs are seen. * If using rabbit repellant sprays these need to be reapplied as per label instructions, and after any persistent heavy rain. |

**Further advice for protection of new plantings**

Methods of controlling rabbits and hares include exclusion fencing, poisoning, fumigation, guards and repellents, and shooting and trapping. Guards and repellents will help minimise damage and shooting and trapping will reduce numbers. For most revegetation projects exclusion fencing, guards or repellents will be both necessary and the best options. The Modified McLean Rabbit Infestation Scale (see below) may be used to assess rabbit density and the need for control.

Protection from rabbit and hare browse is sometimes vital to the success of your biodiversity project. Rabbits and hares particularly enjoy new shoots and plantings need to be protected from them for the first two to three years of plant establishment.

These pests will also eat bark on shrubs and trees around main stems and lower branches. Trees may even be killed by ring-barking. They will also often scratch around shrub or tree bases exposing root systems.Hare damage to trees is different from that of rabbits. Small trees are usually bitten off at a 45-degree angle, and uneaten chips of wood and bark are scattered around the base of the tree.

*Rabbit-proof fencing*

The mesh size should be no larger than 3 centimetres, fence height at least 1 metre, and the bottomof the fence should have a 15-centimetre apron or be buried 20 centimetres into the ground. Regularly maintain and check your fence to make sure the wire isn’t breached by animals burrowing underneath. If you are in a populous area you should check your fences every month.

Guards

Cylinders of netting, plastic netting sheaths or sheet steel guardscan be used to protect your valuable young trees or shrubs.

Combi-guards are a useful tool because they help protect the base of the plant from rabbits and hares and spray drift. They also retain moisture and are cost effective and easy to install.



*This photo shows the correct installation of a combi-guard which protects plants from browsing animals and maintenance spraying.*

*Repellents*

Repellents are available commercially (brand names Plantskydd, Treepol , Liquid Shotgun or Neem Oil with Raingard.)

APPENDIX **4. THE CONCEPT OF ECOSOURCING**

An important concept of any plant restoration project is that of ensuring the plants established are appropriate with regards to the sites conditions and history. Ecosourced plants are those grown from seeds collected from naturally occurring vegetation in the same ecological region as those to be planted and which share the same meso-climate (ridge line, gully, frosty area, dry area, soil type). Seed may be collected from older plantings if the original origin of the parent plants are confirmed as being ecosourced themselves. The ecological regions can be identified as the high country, foothills, plains, coastal and Banks Peninsula. This site is within the High Plains ecological region.

Many of New Zealand’s plants have adapted to local conditions, developing distinct attributes which give the species resilience against a changing environment or threats such as plant diseases. Through ecosourcing, we can maintain this resilience and also achieve greater planting success because the plants will be adapted to local conditions and are therefore more likely to survive. This practice ensures that genetic diversity is maintained throughout New Zealand.

Ideally all native plantings should use ecosourced plant material. Ecosourcing is however most important for planting near natural areas of native vegetation, particularly if the plant species is threatened or if the species is known to be highly variable across different climates, landforms and soils. Additionally some species which are wind-pollinated have fewer geographic differences because their seed is naturally distributed over long distances, whereas bird or insect-pollinated plants are more likely to distribute their seed locally and therefore display distinct adaptations to local conditions. Ecosouring these bird or insect pollinated plants are therefore of higher importance.

Discussing this concept of ecosourcing with your plant supplier is an important step to ensuring your planting is one following restoration principles. It is important to understand that indigenous plant restoration requires a long-term perspective, not only for plant establishment but also for plant supply; you may have to wait 1-2years before a nursery is able to provide you with suitable plant material.