Waihora Ellesmere Trust
Riparian Restoration Program
2008/2009
In the Te Waihora/Lake Ellesmere
Catchment

Stephen Brailsford - Restoration Consultant to WET
Selwyn River
Chamberlains Ford at plantout
Selwyn River
Chamberlains Ford after 1 yr
Selwyn River
Chamberlains Ford after 3 yrs
Silverstream site preparation
Silverstream during plantout
Silverstream after 1 yr
Silverstream after 18months
Riparian Restoration – lessons learned

Planting the riparian margins of waterways can improve stream health and water quality, enhance biodiversity, increase property values, and reduce the need for waterway maintenance. Over two planting seasons, Waikoropupu Ellesmere Trust (WET) has been directly involved in the installation of over 50,000 native plants on a range of riparian sites. We are keen to share what we have learned and to encourage and support landowners who would like to undertake planting of natives along waterways.

Outlined here is a way to approach riparian planting which we have found to be a cost-effective means to ensure high plant survival and growth—well over 90% survival has been achieved by WET where this method has been used.

Key steps:
- Planning
- Consents and approvals
- Site preparation
- Species choice & plant selection
- Planting
- Maintenance

Planning
Before you start, be clear about your objectives and decide what approach and system you will use, who will be involved, and exactly what resources will be required. Successful restoration involves more than just putting plants in the ground.

Consents and Approvals
In Selwyn District, most waterways have a land drainage function and this means that there are restrictions on what can be planted alongside waterways. The use of chemicals near water may also mean that a resource consent is needed. Before you start, check with both district and regional authorities about the need for consents and approvals.

Site Preparation
WET has found that success is best achieved when all competing vegetation is removed prior to planting where possible, particularly in drier areas (but not on steep banks where existing vegetation cover provides some stabilisation). It will also be necessary to erect fencing to exclude stock from the area to be planted.

Species Choice & Plant Selection
Soils and climate need to be carefully evaluated across the whole site and the appropriate species chosen—those which can tolerate the extremes they will encounter. There may be considerable variation within one site. There are publications available which can give you guidance, or you can consult someone with experience in plant choice. Base the species choice on the communities that would naturally occur, which will increase the chance of success. Eco-sourcing of plants wherever possible will give the best outcome for biodiversity—see the Selwyn District Council website for details. You may need to place orders for seedlings well before you intend to plant.

Restoration seedlings can be grown in pots of volume 250cm³ to 400cm³ (T7 through to RX90). Seedlings should have a stem diameter at ground level of at least 5mm when planted out. Care should be taken to source well-grown restoration grade seedlings and make sure they are hardened off before planting out.

Planting
Most plants do well at a spacing of 1.5m x 1.5m. This equates to an average of 4500 plants per hectare. Different species have different growth habits and a plant mix which mimics that which would occur naturally will lead to a sustainable plant community. WET typically uses a mix of 15% large trees, 45% small trees/large shrubs, and 40% understory shrubs/grasses.
Getting the plants in the ground involves considerable effort. The sites WET has been involved with have been planted in a variety of ways - community/volunteer planting days, commercial contractors, or prison labour crews. In all cases, labour needs to be well organised, equipped and supervised to be effective.

Seedlings are best planted between autumn and spring while they are dormant. Main considerations are moisture and frost - if the site is prone to heavy winter frosts it is best left until spring. Lower altitude, coastal sites can generally be established in autumn.

In riparian margins, the effects of floods should also be considered. Newly planted seedlings are more susceptible to the effects of waterlogging than established plants, so it may be preferable to wait until peak winter floods have passed.

When planting out, the hole should be well cultivated and the seedlings well firmed in. Including a 23g slow release fertiliser tablet in the bottom of the planting hole will help supply a balanced volume of nutrients to the young plant. This improves vigour and reduces the time needed until plants become well established.

Protecting the plants
Installing a ‘combi guard’ for each seedling provides a wide range of benefits. This involves a wool mat around the plant’s base and a 300mm high plastic sleeve, supported by bamboo sticks. This provides each plant with some protection from wild animals, wind, frost and herbicides. A microclimate is also established which encourages growth.

Maintenance
Removing competing weeds will allow seedlings to get adequate water and light. WET generally achieves this using herbicides (after ensuring that we hold the appropriate permits). In wetter areas spot spraying around each seedling works well; in drier areas spraying for total weed control between seedlings gives the best results. The plastic sleeves will protect the seedlings from spray, although choice of herbicide is critical. Sleeves can be removed once the plant is well established –1 to 4 years, depending on species and site conditions.

What does it all cost?
As noted above, WET used a range of different types of labour. This, plus variations in plant costs and logistics of establishing each site, gives a range of costs. If you expect to pay commercial rates for labour, your costs are likely to be towards the top end of the range.

In addition to establishment costs, maintenance must be undertaken – exact maintenance costs will depend on the site characteristics and the weather in the first few years but it is likely to be around $1.50 – $2.50 per seedling per year, for at least two years.

<table>
<thead>
<tr>
<th>WET’s Planting Costs (excluding maintenance)</th>
<th>WET’s range</th>
<th>WET’s average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning &amp; set up</td>
<td>$0.50 - $1.00</td>
<td>$0.72</td>
</tr>
<tr>
<td>Site preparation (not including fencing)</td>
<td>$0.50 - $0.80</td>
<td>$0.68</td>
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<tr>
<td>Seedling purchase</td>
<td>$1.20 - $2.45</td>
<td>$1.53</td>
</tr>
<tr>
<td>Planting labour (based on 69 – 130 seedlings per person per day)</td>
<td>$1.12 - $1.41</td>
<td>$1.10</td>
</tr>
<tr>
<td>Resources (fert tabs, combi guard)</td>
<td>$0.27 - $1.41</td>
<td>$1.11</td>
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<tr>
<td>Logistics, supervision &amp; co-ordination</td>
<td>$0.76 - $1.96</td>
<td>$1.40</td>
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<tr>
<td>Totals</td>
<td>$5.45 - $8.50</td>
<td>$6.54</td>
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</tbody>
</table>

To find out more about WET’s planting programmes and techniques, or to get involved in our activities, please contact:

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Mitchells Road
Mudfish Restoration Project
Mitchells Road release spraying
Tramway Reserve/Skilling after 1 yr
Tramway Reserve after 5 yrs
## True Cost of Mortality

<table>
<thead>
<tr>
<th>Operator</th>
<th>Costs per seedling</th>
<th>Total Cost</th>
<th>Survival after 1yr</th>
<th>Survival %</th>
<th>Cost per live plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor A</td>
<td>1000 @ $6.00 each</td>
<td>$6,000</td>
<td>160</td>
<td>16%</td>
<td>$37.50 per live plant</td>
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<tr>
<td>Contractor B</td>
<td>1000 @ $6.50 each</td>
<td>$6,500</td>
<td>680</td>
<td>68%</td>
<td>$9.55 per live plant</td>
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<tr>
<td>Contractor C</td>
<td>1000 @ $7.50 each</td>
<td>$7,500</td>
<td>950</td>
<td>95%</td>
<td>$7.89 per live plant</td>
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</tbody>
</table>
Boggy Creek / Inwood at plantout
Boggy Creek / Inwood flood flow following plantout
Boggy Creek / Inwood after 1yr
Boggy Creek / Inwood after 18 months
Willow removal
Rebatter banks
600m of stream bank planted out
Flood flows
Flood flows
DANGER
RAW SEWERAGE
WATER POLLUTED

Earthquake
Dredging the river
Winter snow
1 yr after planting
1 yr after planting
Carex secta on the edge
Working bill board
Today
Inappropriate species
Wind throw – bank damage
Sustainable Drain Management in Selwyn/Waihora

Healthy waterways within productive land