

Report No:	RESC11-08-06
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Information Only – no decision required	

REPORT SUMMARY

Report to: Engineering Services
Meeting Date: 4 August 2011
Report Author: Gary Clark, Transportation Manager
Subject: **Crack Willow Removal/Management Programme**

EXECUTIVE SUMMARY

By 2004-05 over 60% of Council's rivers maintenance budget that was being spent specifically on crack willow management. It was clear that a review of the need to use crack willow for the majority of river bank protection was needed.

During 2007 the Ministry of Agriculture and Forestry was successfully petitioned to have *salix fragilis* (crack willow) added to the New Zealand list of Unwanted Organisms (Noxious Plants).

The practice of planting crack willow almost anywhere has not been used for 10 to 15 years. The concept was developed to remove crack willow at the end of its rotation and replant using a variety of alternatives.

Tasman District has a whole range of river banks where bitter willow has been developed as the primary control plant regime. It can be noted that the River Y section of the Motupiko River is a fine example of matching the plants with the needs of the river.

RECOMMENDATION/S

That the report be received.

DRAFT RESOLUTION

THAT the Engineering Services Committee receives the Crack Willow Removal-Management Programme report, RESC121-08-06.

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1. Purpose

- 1.1 This report provides information on the management of Crack Willow and recent concerns about the removal of this plant from the Sherry and Motueka Rivers.

2. Background

- 2.1 Councillor Bryant has requested information on the management of Crack Willow and the removal of this pest plant from the Sherry River and Motueka River as a result of a presentation during the public forum at the last meeting.

3. Crack Willow Information

- 3.1 The Nelson Catchment Board made a concerted effort from about the early 1960s to use live crack willow as a front line erosion control plant. The *salix fragilis* clone introduced to New Zealand was a male of the species. It was known in other parts of the world to be a prolific coloniser of river banks and expanded onto the adjacent plains without help from mankind. Provided that there were no female flowered trees, seed would not be produced.
- 3.2 The introduction was managed from a central research centre which produced a small number of poles for each catchment board who set up nursery plots. The poles were developed into stools by coppicing the shoots. In this way within about five years the nurseries expanded their ability to produce many poles for use along the rivers. At first the need outstripped the supply from the nursery. The crews resorted to coppicing in the field from established crack willow. Unfortunately this has led to the pure strain held in the nursery being down-graded in the field.

- 3.3 By the 1970s crack willow trees were well established throughout the country. Cutting enough poles was not a problem any longer. However the size and spread of each tree was. The clone had a liking to branching frequently as well as growing tall. Eventually the spread of the developing crowns led to whole sections of the tree collapsing. The density of the large root structure was found to be four times that of any other tree that could be used for river bank protection works and this swayed the opinion to cultivate more. Catchment Boards began to add felling and layering the trunks to their management process to further expand the areas planted.
- 3.4 Trees needed to be cut down after about fifteen to twenty years. The stems were lain parallel to the banks to minimise the amount that might float downstream during floods. The initial spacing of crack willow was determined by the expected spread of the root structure. However it was found that the process of felling and layering of the trunks led to sprouts developing wherever the trunks touched the ground. Regrowth was coupled with the fact that the trunks were very capable of coppicing directly from a stump and by the roots sending up many suckers.
- 3.5 These attributes have led to the tree being recognised as a plant that can easily colonise new areas and quickly threatens other species at almost any site.
- 3.6 By 2004-05 the Tasman District Council had a rivers maintenance budget that was allocating over 60% of the funding specifically on crack willow management. It was clear that a review of the need to use crack willow for the majority of river bank protection was needed.
- 3.7 It was discovered that the process of cutting down the trees at a time when they became vulnerable was being managed in way that simply proliferated the density of the trees along the river bank. This process actually increases the cost of maintenance at each 10 to 15 year rotation.
- 3.8 An investigation into the need to use crack willow at sites that were potentially of low to medium risk erosion showed that a considerable length of river bank could be cleared and a lower grade of protection planted. The concept was developed to remove crack willow at the end of its rotation and replant using a variety of alternatives. The alternatives available are bitter and shrubby willows, and a range of native species. Bitter and shrubby willows are approved willows for New Zealand soil and conservation use. These can be supplemented by a couple of other taller single stem willows, and a number of poplar species.

- 3.9 The range of native species useful for river erosion management is somewhat harder to define as many native plants do not have good rooting structures. Currently we are using *toe toe* and flax with fibrous roots as key plants. Several *pittosporum* species and other trees have a role in second row growth. We have a level of acceptance with these plants from iwi interests. At best we are evolving a range of mixtures of these plants. There are some promising other introduced species that may also prove helpful in the Tasman District. Once the natives become established the poplar and willow single stemmed trees can be removed by forestry grapple type equipment at a time when shading of the actual waterway will not be unduly compromised.
- 3.10 During 2007 the Ministry of Agriculture and Forestry was successfully petitioned to have *salix fragilis* (crack willow) added to the New Zealand list of Unwanted Organisms (Noxious Plants). The declaration was made just a short time after the Tasman District Council's last review of its Pest Plant Management Strategy. It is due to be reviewed again by mid 2012.
- 3.11 A group of nine of the Regional Councils and Unitary Authorities, all being responsible for catchment control management issues in their respective areas, banded together to ask for a range of exemptions from the rule of immediate ban on propagation. The authority took many months to deliberate on the councils concerns and gave a number of interpretations of what might be seen as blatant, and not so blatant, propagation of a classified unwanted organism.
- 3.12 Nevertheless Tasman District Council has an issue of control. It was discovered five years ago after the Easter floods in 2006 that large scale germination of seedlings of a type of willow had occurred in the Motueka River from Kohatu to the sea. (Ref. Engineering Services Committee, 31 Aug 2006).
- 3.13 To a lesser degree this has continued each year since. It is important to return to the matter of clones that were introduced and the reason for crack willow being a male clone. The seedlings were identified by John Ellis in 2006. He has been in the river maintenance supervisory role for more than 40 years. His opinion was that they appeared likely to be crack willow hybrid seedlings. Tasman District Council's Soil Scientist has had a more recent site inspection of some surviving seedlings and considered that they may be hybrids from an osier type willow. Mr Ellis has reported observing the shower of viable seed floating on the wind at his home downstream of the Kohatu Bridge on SH6.
- 3.14 In accordance with Mendel's Law the seedlings will be approximately 50% male and 50% female. The various clones of a range of willows introduced to New Zealand have included some species being all male and others being all

female. In recognition of each of the species flowering at different times this should not be a problem.

- 3.15 However we have discovered that a problem exists and identification is needed.
- 3.16 It is this type of inference that exacerbates the very problems that have worried the Department of Conservation enough for them to have made the submission to the Ministry of Agriculture and Forestry to have *salix fragilis* added to the Unwanted Organism Register.
- 3.17 Until we can find the reason for these annual germinations of willow seedlings along the rivers we need to increase the annual surveillance programme. Control of the seedlings requires us to carry out maintenance spray work in the central Motueka River area which is not a classified river.
- 3.18 The practice of planting crack willow almost anywhere has not been used for 10 to 15 years. We have a whole range of river banks where bitter willow has been developed as the primary control plant regime. It can be noted that the River Y section of the Motupiko River is a fine example of matching the plants with the needs of the river.
- 3.19 The current misconception that removing crack willow simply because it has been added to the Unwanted Organism Register was not, and is not, intended as the primary driver for removal. It also needs to be noted that removal of crack willow from upper reaches of our catchments is crucial to the programme. It will provide a primary function of minimising the supply of storm transported twigs and branches downstream. We must minimise the re-colonisation of downstream river banks where it is no longer cost-effective to use crack willow.
- 3.20 There is no current programme to totally remove the large stands of crack willow along reaches where there is high erosion potential. Protection from floods on stretches of river such as the more open braided section of the Upper Motueka near Tapawera may well need the crack willow. However more targeted management of this section of crack willow will be introduced to minimise the cost implications without threatening the effectiveness. This will include clearance of gravel berms within the braided channel. It is essential to ensure that a wide, straight and clear floodway exists for those flood events that exceed the annual flood.
- 3.21 Funding to allow management in the upper catchment areas is now part of the annual programme. This work will benefit landowners from the top to the bottom of catchments.

3.22 Over time the green management of the river banks for this important asset will improve significantly. The current issues relate to the changing over from what is currently an ineffective and costly method to manage our communities river system to a more sustainable and river friendly approach for future generations.

4. Sherry River

4.1 Landcare Research has managed the Motueka River Integrated Catchment Management project. The Sherry River is a specific focus where they have been working with the landowners to fence off stream banks and replace willows with native plants to see if a return to the more historical regime of plant species would help in lowering water pollution and improving other in-stream values adjacent to dairy farms (eg water temperature).

4.2 Their experiments focused on growing natives in an un-grazed river bank situation. In early April 2011 the Landcare Research project manager advised the landowners that no real benefits have so far been identified and the ongoing project will not be funded. Tasman District Council Scientists advised that there had been a steady lowering of faecal coliform pollution.

4.3 Tasman District Council has been carrying out a number of trials to remove crack willow from sections of our rivers. The two most reported sites are the North Branch of the Riwaka River and sections of the Sherry River not being developed by Landcare Research. There are a range of other locations where this has also been carried out. The prolific nature of crack willow growth and spread is not well understood.

4.4 The removal of crack willow before introducing a replacement plant regime can put reaches of a river at real risk of temperature increases that they claim cannot be accommodated by fish, particularly trout. If the willow is not completely removed and sprayed for re-growth it becomes a very costly follow up manual operation of many years to completely remove the willow. The objective is to leave a healthy new regime of trees and plants that will resist the erosion potential in low to medium risk sites.

4.5 In the Sherry River an operation was carried out by the previous contractor which over a three day period ended in an unsatisfactory result. The methodology was agreed with the contractor at the start. They were left to complete the works.

4.6 They decided that there was more crack willow amongst the other bitter and shrubby willow than could be easily removed by hand. A decision was made on

site to use the excavator to pull out the crack willow with much of the root structure. Some distance was covered during that day. When they returned to the site the next morning they discovered that many of the bitter willow trees that had their roots disturbed the day before had simply slipped off the banks and into the stream. The contractor made an on the site decision to remove the whole lot without talking to the consultant.

- 4.7 The operation was stopped as soon as it was reported to Council. The crack willow was supposed to be cut off and the stumps poisoned. The root structure stays in place for at least a couple of years and gives the bitter willow time to spread their roots. The removal of the deeper and more prolific crack willow roots was not intended.
- 4.8 The banks will be remediated this winter-spring planting season and a careful watch put on the establishment of regrowth. It is also believed that with spring there will be a lot of regrowth of willow species, probably including crack willow from trees that did not get swabbed with glyphosate and have left sections of root in the ground.
- 4.9 The replanting work would ideally have begun in June however the contractor unexpectedly withdrew from the contract to maintain our rivers.
- 4.10 A very careful and time consuming process of getting a new contractor to take over the work has lost us valuable time with regard to new planting. There is adequate time left to get the work done. Taylors Contracting Ltd has been awarded the river maintenance operations contract for the next three years.
- 4.11 This is the first time that a new team has been given the task of achieving our programmed work. Taylors have supervisory staff with many years of exotic and mixed indigenous forestry experience. They have also taken on key staff from the former contractor's crew as a way of ensuring that they will have a continuous link in management of the contract.
- 4.12 Getting the mix of new plants right is not yet well understood. A number of species being trialled is noted earlier in this report. The people previously involved with field work of the new plant regime (clearing, replanting, nurturing) have shown some lack of commitment to the proposal. This focus has now changed with the new contract having a greater emphasis on green management of the river systems.
- 4.13 The objectives have changed and we must change with the principles in which we carry out green management of our rivers. This coming season the team

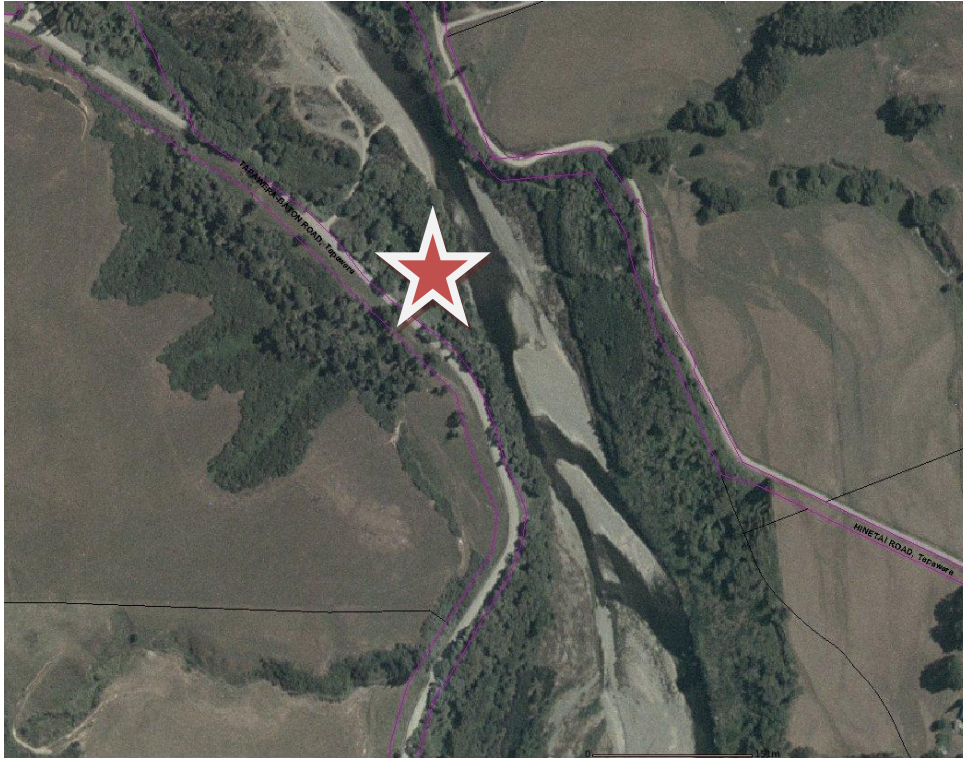
are working towards having more specific planting plans for individual sites. Preparation of these sites needs to be carried out well ahead of time to ensure that the planting season is fully utilised. All work needs to be completed before the end of September to ensure that good root development can occur. This requires direct involvement of the consultant, Council staff and the contractor.

4. Motueka River

- 4.1 During the public forum at the last Engineering Services meeting a photograph of the removal of Crack Willow from a section of the Motueka River was presented and Council staff were criticised (see photo below).



- 4.2 The photo shows a section of the river where the removal of trees from the river edge is clearly shown. As noted above, the crack willow removal programme seeks to improve river flows and remove crack willow from low erosion sites.
- 4.3 The presentation in the public forum did not provide all the information about this site. The image below shows the actual location of the works carried out by Council.



- 4.4 The area where crack willow has been removed is shown by a star. This area is located within the river channel.
- 4.5 This particular project shows the issues that crack willow presents to the river channel. During flood events the recommended flood channel for the Motueka River at this location should be around 220 metres to contain the river within its existing banks.
- 4.6 Crack willow has been allowed to grow and propagate on this section of the flood channel to the point where silt and trees have reduced the flood performance of the river during peak events.
- 4.7 This area where crack willow was removed is not affecting private property. The exception is that since the infestation of crack willow, the active river channel has moved to the true right bank and is now starting to erode away private property on the opposite side.
- 4.8 Crack willow has propagated into the areas of the river that are needed for flood management and used to be the beaches of the river. A number of examples of this crack willow infestation can be seen in many of our rivers and is sometimes seen by the community as an asset but in reality they are liability in terms of floods and long term management costs.

- 4.9 In reality these areas would not exist if crack willow had not been propagated in these locations. These areas are critical to the management of floods and the adverse effects they can create. There are examples of treed banks and vegetated islands that have created flood issues in the recent events in December and in particular downstream of Rockville Bridge. These areas need to be removed and returned to gravel beaches for effective flood channels.

6. DRAFT RESOLUTION

- 6.1 THAT the Engineering Services Committee receives the Crack Willow Removal-Management Programme report, RESC11-08-06.**