

Managing Unwanted Vegetation in Southland Rivers



A Concept Plan

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*A proposed partnership between Environment Southland, communities, Iwi,
Department of Conservation & Land Information New Zealand*

Improving the river corridors for people, fauna and flora!

This plan aims to develop a new long-term approach to sustainably manage unwanted vegetation in riverbeds in Southland, reduce management costs and dependency on herbicides.

It is expected this plan will also achieve:

- ✓ development of tracks for walking and cycling;
- ✓ more native forest areas and increased biodiversity;
- ✓ increased river access points for recreation and picnic areas;
- ✓ enhanced connection of local communities to their rivers.

This concept plan has been endorsed by the Southland Biosecurity Interagency Group, Environment Southland, Department of Conservation and Land Information New Zealand.

For more information, please contact the Biosecurity Manager or the Catchment Works Supervisor, Environment Southland on 0800 76 88 45, or email service@es.govt.nz.



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Concept Plan for River Corridor Vegetation Management

What is a concept plan?

This document sets out the issues and options as they relate to vegetation control within our river corridors. It outlines a wish list, or a best case scenario, of new or improved techniques for dealing with the issues around vegetation control. The concept of an interagency vegetation control management plan is quite unique in New Zealand. However, in Southland, Environment Southland and the Crown agencies responsible for much of the land this plan affects, have been working closely for many years.

What is the problem?

This concept plan has been created as a result of the concerns surrounding the future financial sustainability of managed vegetation control within river corridors¹ throughout the Southland region, involving both weed and pest management and the maintenance of flood fairways.

These concerns, identified through the Biosecurity Interagency Group (BIG), include the need to:

- reduce the cost of ongoing vegetation control in riverbed land;
- reduce reliance on the use of herbicide spraying as the prime management tool;
- reassess long-term funding sources, with the possibility of a new region-wide rating model to be considered.

The river corridors, especially those upper catchment systems containing extensive berm areas, have long been a haven for pest plants. In particular, this involves gorse and broom, but they also have the potential to harbour serious environmental weeds such as Old man's beard, as well as agricultural threats like nodding thistle and ragwort.

Pest plants are of major concern as they have the ability to:

- impede flood flows;
- increase mobility of fine sediments impacting water quality due to loss of natural grass cover;
- impede recreational access;
- decrease native biodiversity;
- spread to and affect neighbouring agricultural productive land.

A range of other land uses and management regimes, other than the current spraying programme, could be applied to riverbeds and berm areas to achieve these aims. These include various types of livestock grazing, realignment of current fenced boundaries,

¹ The Biosecurity Interagency Group defines a river corridor to be public estate land (typically DOC, LINZ and SDC occupied land) that occurs in and immediately adjacent to a river. In practical terms this means all land between the private boundary fence on one side of the river to the similar private boundary fence on the other side of the river.

cropping, commercial and carbon forestry, native biodiversity restoration and development projects/reserves, increased public access and facilities for recreation and tourism, greater use of biological control to suppress key woody weeds, etc.

An approach or strategy such as this is possible because of the very good working relationship that exists between the Crown landowners, Land Information New Zealand (LINZ) and Department of Conservation (DOC), and Environment Southland, with its biosecurity and river management responsibilities. This is essential to enable effective sustainable resource management because of complex land tenure in, and adjacent to, rivers systems and the related cross boundary issues.

What will this concept plan achieve?

It is hoped that this concept plan will culminate in the development of a long-term River Vegetation Management Plan detailing short, medium and long-term goals that will focus on the subject of vegetation control and management with respect to major river systems in Southland. The intention is to develop holistic, sustainable approaches to vegetation management, which should, in turn, achieve positive outcomes such as increased biodiversity and recreational activities.

Pilot trials and the development of a business plan will be carried out on the Upukerora, Whitestone, Mararoa and Upper Oreti Rivers. These concepts, if successful, could then be developed into a River Vegetation Management Plan template to be applied to all rivers in the region as and where appropriate.

It is intended that this proposal will bring together the various communities and agencies under a common agreed vision that will result in the more sustainable management of river corridor vegetation in both the main stems and sub-catchments.

Vision

That all those involved or interested in river vegetation management will seek to develop and implement a more sustainable 'whole of catchment' management approach to the issue of unwanted riverbed vegetation. This will be a long-term approach and consequently requires equally long-term commitments in order for this vision to be realised.

The desired long-term outcomes from this vision include:

- increased native vegetation;
- increased indigenous biodiversity;
- increased recreational access and opportunities.

Intermediate outcomes that should be realised in achieving the above include reduced herbicide use and incidence of pest plants.

It is the intention of this plan to involve the community and other interested parties as far as possible in the above process, as this is seen as a key part of adding sustainability.

It is anticipated that a wide range of alternative management approaches would be implemented within each catchment. Implementation will favour a “top-of-catchment-

down” approach. This is to reduce seeds from pest plants upstream washing down and affecting projects downstream. This is based on the premise that it is more cost effective to reduce the key re-infestation sources early in the process, rather than later. Furthermore, with some management alternatives, it installs a native seed source upstream which should have a positive seeding effect downstream.

Biosecurity Interagency Group

The Southland Biosecurity Interagency Group (BIG) was formed over 15 years ago to focus on the most effective and efficient management of river corridors and, in particular, the control of pest plants. The group includes representatives from Environment Southland, LINZ and DOC.

The parties involved have statutory responsibilities with regard to riverbeds, and have a Memorandum of Understanding in place that details how the group will seek to work collaboratively in planning action, and resourcing to best meet these responsibilities.

Work programmes and budgets are formalised annually at an Annual General Meeting typically held in July.

The main priorities of the BIG are:

- minimising pest plant growth in the “flood fairways” so that the impacts of high river flows, flooding and loss of soils through erosion is reduced. These flood fairways were created through the 1941 Soil Conservation and Rivers Control Act;
- protecting and enhancing indigenous biodiversity and other natural values on riverbed land as and where appropriate;
- dealing with pest plant and pest animal compliance issues under the Regional Pest Management Strategy as and where they arise;
- preventing the spread of pest plants up catchments into areas which are free of pest plants;
- achieving sustainable control of pest plants in the headwaters² and then progressively moving control down catchments;
- facilitating public recreational use of riverbed land by providing, improving and maintaining access.

What has previously been done?

Before the formation of the BIG, management of unwanted woody vegetation within the river corridors was through river management works programmes run by Environment Southland. Budgets were approved annually by Council, following a public consultation process involving river catchment rating district liaison groups.

² ‘Headwaters’ refers to the beginnings of a catchments water source, typically the small feeder streams that begin in the hills and mountains inland.

Management was usually limited to controlling crack willow, gorse and broom within the active riverbed and designed floodway areas, as controlling vegetation along the berm areas was primarily not required for floodway capacity design, not a responsibility in terms of land ownership, and was considered too costly. However, programmes were often extended to the berm areas in the more confined lower and mid catchments due to intensive agricultural land being immediately adjacent to the river.

In 1997, the BIG was formed to provide greater coordination of funding and work programmes in all the above areas.

What is currently being done?

Formation of the BIG has been pivotal in resolving fragmented authority and responsibility for the management of pest plants on riverbeds. This has led to the development of integrated work programmes between the three agencies, which have led to more effective woody vegetation control.

In general, DOC and LINZ concentrate on a headwaters-down catchment approach, while Environment Southland continues catchment flood protection and river management needs. Resources have also been made available for controlling specific pests in riverbeds such as nodding thistle.

Definition

River Corridor -

For the purposes of this plan the river corridor is considered to be all public estate land (typically DOC, LINZ and Southland District Council occupied land) that occurs in and immediately adjacent to a river. In practical terms, this means all land between the private boundary fence on one side of the river to the similar private boundary fence on the other side of the river.

The Value of Wide River Corridors

River berm areas provide habitat for a wide range of wildlife. The wider these areas are the more habitat there will be, and potentially a wider range of habitats. Wider berm areas therefore can typically support higher levels of biodiversity than narrow berms.

Braided river birds, some of which are nationally endangered, rely on a wide braided river for habitat.

With this in mind, any management option that results in a narrowing of these corridors, or represents a decrease in wildlife habitat, should be considered with some caution.

As a measure of controlling the pest plants on these wide berms, narrowing the river corridors could provide some short-term gains, however it is possible that there would be a higher cost in the long-term if productive land were to flood through infrastructure failure.

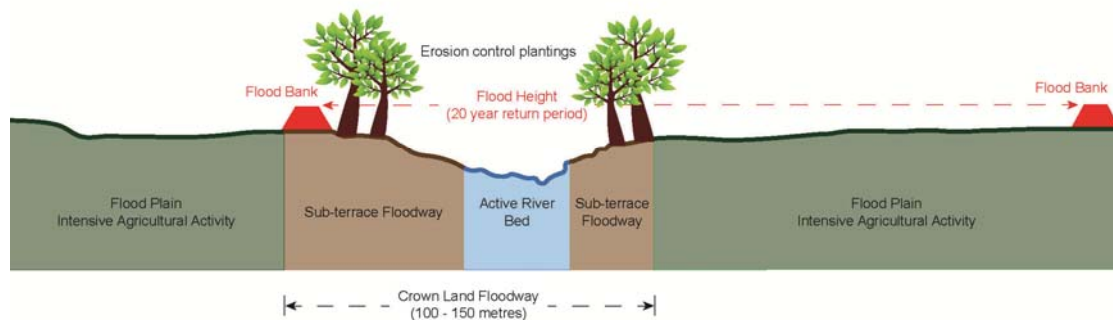
It is possible that river corridors would narrow over time if no management were to occur at all, as woody vegetation would overcome much of the existing low-stature vegetation,

bind the soil and cause the river to form narrower channels such as those seen in forested areas of the conservation estate. This process, which will take centuries to happen with native vegetation, is happening faster now due to the highly competitive nature of exotic vegetation.

The following drawings show typical low, medium and high catchment river profiles as well as examples of actual river berm widths in Southland.

River Corridor – Mid to Lower Catchment Profile

Highly modified, confined active river bed

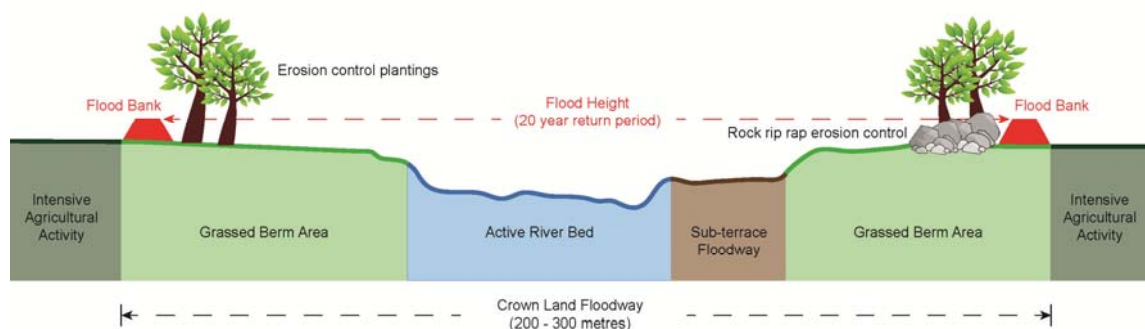


Mararoa River – Low Section (1.0 km downstream of Lagoon Creek confluence)

Active channel	86 m
Total (active channel + floodway + berm)	350 m
Difference	264 m

River Corridor – Mid Catchment Profile

Semi-modified, semi-braided system, grassland berms



Oreti River – Mid Section (3.0 km downstream of Dipton Bridge)

Active channel	200 m
Total (active channel + floodway + berm)	275 m
Difference	75 m

Whitestone River – Mid Section
(4.0 km downstream of Mt Prospect Station Bridge)

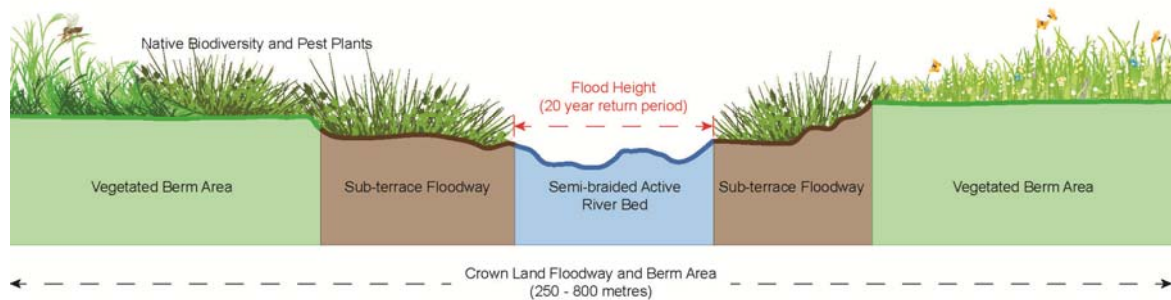
Active channel	80 m
Total (active channel + floodway + berm)	300 m
Difference	220 m

Upukerora River – Mid Section
(1.5 km downstream of Ladies Mile)

Active channel	55 m
Total (active channel + floodway + berm)	405 m
Difference	350 m

River Corridor – Upper Catchment Profile

High ecological, natural river and landscape values



Oreti River – Upper Section
(8.5 km upstream of Rocky Point)

Active channel	168 m
Total (active channel + floodway + berm)	500 m
Difference	322 m

Mararoa River – Upper Section
(1.7 km upstream of Mararoa Station Bridge)

Active channel	166 m
Total (active channel + floodway + berm)	800 m
Difference	634 m

Key Considerations for Selecting Control Options

In general, the headwaters of a catchment have higher landscape and biodiversity values, less unwanted woody vegetation present and are bordered either by extensive farming operations, or public conservation estate. As the river progresses downstream these values

tend to decrease; the river narrows, unwanted woody vegetation becomes dominant and the river is bordered by more intensive farming operations.

The management approaches taken should reflect these characteristics, and it may mean that certain approaches are considered unsuitable for the area, for example the use of exotic tree plantings and grazing in upper reaches. Similarly, trying to install native biodiversity areas in the narrow lower reaches may not be the best use of resources.

In order to narrow the management options available at a given site, there may need to be some parameters around what characterises low, medium and high value areas.

Mapping of Rivers and Alternative Management Areas

Part of the planning process will be to survey each river to identify where alternative management approaches may be undertaken. This process will identify land tenure, flood zones, which agency will manage the area, the values present in each area, infrastructure and possible recreational opportunities.

Biodiversity

Government agencies such as DOC, regional and city/district councils have statutory responsibilities to conserve and maintain biodiversity³. However, how those responsibilities should be met is not specified.

Strong leadership is required to conserve and maintain indigenous habitat and species and seek opportunities for better biodiversity management as many view protection and reinstatement of biodiversity as a threat to future development and present practice.

Throughout this concept plan, biodiversity values can be assumed as underpinning future management options regarding control and management of vegetation with the region's river corridors.

Legislative and Planning Framework

There are a number of areas of legislation and policy which apply to the management of riverbeds in Southland.

Soil Conservation and Rivers Control Act 1941 (SCRC)

This Act has been replaced in part by the Resource Management Act 1991, but sections of the SCRC are still operative and relevant to this concept plan with respect to the flooding and soil erosion responsibilities of regional councils, as follows:

- (a) the promotion of soil conservation;
- (b) the prevention and mitigation of soil erosion;
- (c) the prevention of damage by floods;

³ Biodiversity describes how a wide variety of species interact together, and as such form an inter-dependent ecological community. A reduction in an individual species will therefore have an impact on the whole community.

- (d) the utilisation of lands in such a manner as will tend towards the attainment of the objectives of the Act.

Resource Management Act 1991 (RMA)

Part two of the RMA and amendments, outlines the purpose and principles of the RMA, as defined in Sections 5, 6, 7 and 8, as follows:

- (a) Section 5 outlines the purpose of the Act to promote sustainable management of natural and physical resources;
- (b) Section 6 deals with Matters of National Importance;
- (c) Section 7 addresses Other Matters. Of particular importance are:
 - (i) Section 7(c) - the maintenance and enhancement of amenity values;
 - (ii) Section 7(h) - the protection of the habitat of trout and salmon.
- (d) Section 8 relates to the Principles of the Treaty of Waitangi.

In particular, it requires regional councils to develop policy statements and regional plans which detail how the environment will be managed.

Regional Policy Statement

The Southland Regional Policy Statement provides a framework for resource use, which enables the regional community to achieve its social and economic aspirations within the capacity of the environment. Where resource quality is high, it is the intention of objectives and policies to retain high resource quality. Where resource quality has been degraded through inappropriate use, the quality of such resources is intended to be improved over time.

Regional Water Plan

The Regional Water Plan for Southland, under the RMA, promotes the sustainable management of Southland's rivers, lakes and water resources. The Regional Water Plan also enables the use and development of water where this can be undertaken in a sustainable manner. It also addresses matters relating to water quality and quantity. Under Sections 13, 14 and 15 of the RMA, many activities involving water or water bodies can only occur if they are expressly allowed by a rule in a regional plan, or by resource consent.

Transitional Plan

The Transitional Plan has largely been superseded by regional plans, however, there are some plan provisions that do not have equivalent provisions in other regional plans, or are covered by other plan provisions. Therefore, the Transitional Plan needs to be referred to when looking at defences against water (construction/addition to), defences against water and watercourses (maintenance and protection of), planting trees, fires and other land clearance activities.

Regional Pest Management Strategy (RPMS)

The RPMS provides a number of tools which can be used to assist with the management of pest plants in river corridors. The general objectives of the RPMS are to:

- minimise the actual and potential adverse effects of pests on the environment and the community; and
- maximise the effectiveness of individual pest management action, through a regionally co-ordinated approach.

This high level objective is a key driver of the pest plant management in river corridors.

In addition there are various management objectives for specific pests, e.g. gorse, broom, ragwort, nodding thistle, Crack willow, etc, which impact on river corridors. Some pests have rules applied to them to prevent unwanted spread across property ownership boundaries. For example, landowners must maintain a 10 m wide gorse/broom free buffer along property boundaries where the neighbouring side is clear. Landowners are also responsible for keeping a 10 m wide margin free of gorse and broom along waterways. Because of the enormous length of boundaries between properties and along waterways current resourcing only allows compliance to be enforced where formal complaints are laid. It should also be noted that currently the Crown, as a landowner, is not bound by rules in a RPMS.

As a result, regulatory compliance is not a complete management tool for unwanted vegetation in river corridors. It does, however, provide a useful contribution in some areas.

Environment Southland, through the RPMS, also actively supports the use of biological control agents for control of widespread and intractable pest plants such as gorse and broom, ragwort and thistle species. A number of introduced insects which predate on these target species are now widespread in the region and are starting to reduce the vigour and ability of these plants to reproduce and spread. It needs to be stressed that the use of “bio-control”, while low cost, is a long-term strategy and it may take decades before significant benefits can be measured.

Southland District Plan

The Southland District Plan takes an effects-based approach towards the management of physical and natural resources in a significant part of the Southland region. Activities are managed on the likely effect to the environment, infrastructure and communities. The Southland District Council is required to sign off certain activities to ensure it is not adversely affected, especially when it comes to road reserves, dust, smoke and potential effects to infrastructure. Therefore, it is a key party in the river management process.

Conservation Act 1987

The Conservation Act was developed to promote the conservation of New Zealand’s natural and historic resources.

The key functions of the Act with respect to river corridor management are:

- the management for conservation purposes of all land and natural and historic resources held under the Conservation Act;

- the preservation of indigenous freshwater fisheries (so far as practicable);
- the protection of recreational freshwater fisheries and freshwater habitats;
- conservation advocacy.

Land Act 1948

LINZ has responsibility under delegation from the Commissioner of Crown Lands (CCL) for the management of Crown-owned land governed by the Land Act 1948 and includes some riverbeds. Among LINZ's river management activities is its biosecurity programme that plays an important part in protecting New Zealand's biodiversity values.

The role of the CCL is another key party in the river management process. Any activities on Crown land that requires a lease, licence, easement, permit or authorisation under the Land Act are matters that are subject to independent statutory approval by the CCL.

Te Tangi a Tauira

The four Runanga Papatipu o Murihiku, are collectively involved in the protection/promotion of the region's natural and physical resources by providing input into the process required by the RMA and other relevant legislation. The RMA makes specific provisions for iwi management plans, with councils taking into account any relevant planning document recognised by an iwi authority and lodged with a local authority. The Natural Resource and Environmental Iwi Management Plan, Te Tangi a Tauira, which has been developed by Ngai Tahu ki Murihiku, is an important document to aid Council in meeting these statutory obligations. Council recognises that giving consideration to this plan will enhance relationships, and assist communities in achieving good environmental outcomes and healthy environments.

Water Conservation Orders

The Oreti River is one of 16 water bodies in New Zealand with a Water Conservation Order. The Oreti order was granted because of the river's outstanding habitat for brown trout and black billed gulls, the angling amenity and significance in accordance with tikanga Maori. The order protects the river against significant changes such damming, requires fish passages to be maintained, and restricts the alteration of water quality. The other Water Conservation Order in Southland covers the Mataura River.

Southland-West Otago Conservation Management Strategy 1998

The conduct of some activities on land administered by DOC can only take place by, and in accordance with, the Conservation Management Strategy (CMS) for that area. A CMS details how general policies are implemented and establishes objectives for the integrated management of natural (including land and species) and historic resources.

Regional and district plans under the Resource Management Act are prepared with regard to the CMS so its values should be reflected by these documents.

Insect-friendly Planting Considerations

Management options that involve new plantings present a unique opportunity to consider the selection of plant species that provide pollen and nectar values for bees and other insects. These play an important role in pollinating flowering plants, and, as such, form a key part of our agricultural systems, yet bees in particular appear to be suffering from declining populations due to ongoing chemical use, radiation from electromagnetic communications and disease.

New plantings should consider the use of insect-friendly plants to provide diverse pollen sources and opportunities for commercial beekeeping.

River Birds Habitat

High value bird species such as braided river birds (black-billed gulls are nationally endangered and Southland is a stronghold for this species) should be considered when selecting a management approach. These species require large areas of bare gravel bars which tend to be in low value stretches of rivers. Restrictions to public access during key breeding and nesting periods could be a consideration, however this falls outside the scope of this plan.

Biosecurity Pathways Management

The concept of “biosecurity pathways management” is one of minimising the spread of pest plants by people. This is done by identifying the pathways by which spread occurs, and then taking steps to minimise or manage the risk posed by those pathways.

For example, if earthmoving equipment is brought in to prepare a forestry site there is a very real risk that this equipment would be transporting pest plant seeds/fragments from another site. It could then collect other weeds at the forestry site and transport them to the next site.

The implementation of many of the above management approaches will pose a risk of introducing new pest plants to a site, or the spreading/exacerbating of pest plants already at a site. In the above example, if the equipment had been water-blasted prior and on departure from the site, then the risk would have been minimised.

It is well recognised that it is more cost effective to deal with pest plants early in the invasion process than later. Analysing the pathways of pest plant spread, and ways to minimise that spread, should be an integral part of riverbed vegetation management.

Concept Test Areas

Several areas have been selected as a focus for testing the concept of several alternative vegetation management techniques. These are sections on the Upper Oreti River, the Whitestone River, the Upukerora River and the Mararoa River. They have been chosen because they have wide braided beds, expansive berms and require a high level of ongoing weed management. While the concept plan will ultimately be expanded to cover all river

systems in the Southland region, it will initially focus only on these sections of river, as follows:

➤ ***Upper Oreti River***

The Oreti River has its headwaters close to the Mavora Lakes between Lake Te Anau and Lake Wakatipu, and flows in a southerly direction across the Southland plains to its outflow at Foveaux Strait. It consists of single thread and semi-braided characteristics throughout its 200 km length, flowing through a series of open valley systems in the headwaters to the wide open plains of the mid and lower sections. A large number of tributaries flow into the Oreti River over its length, with the largest headwater water bodies being the Windley, Ashton and Weydon.

The Upper Oreti River is best described as having “outstanding characteristics” in terms of amenity and intrinsic values such as stunning natural landscapes, water quality and clarity, and endangered bird species.

Anglers consider the Upper Oreti a highly prized trophy fishery unequalled throughout New Zealand for its easy access and stunning wilderness experience. Many experienced overseas anglers travel to New Zealand especially to fish the Upper Oreti River for the challenge the large brown trout offer.

The river has been subject to a Water Conservation Order granted to Fish and Game New Zealand, Southland Region since 2008.

The trial will focus on:

- ◆ Rocky Point upstream to the Windley confluence, a distance of 15 km;
- ◆ Windley confluence upstream to Mt Nicholas Station Road Bridge, a distance of 28 km.

Total – 43 km

Reference: Images 1, 2 & 3

➤ ***Whitestone River***

The Whitestone River is a small to medium-size river with a semi-braided form that flows into the Mararoa River at Hillside. It flows through both flat farmed paddocks between steep river terrace scarps. While it generally flows through a modified rural landscape, the natural patterns and processes of the river are generally dominant.

Key characteristics include:

- ◆ a series of river flats within a broad river valley;
- ◆ diverse land use and small manicured paddocks with mature shelter belts;
- ◆ river as an attractive natural feature;
- ◆ important recreational resource;
- ◆ river maintains an overall high level of stability.

The trial will focus on:

- ◆ Mararoa River confluence upstream the S.H 94 Bridge, a distance of 9.3 km;
- ◆ SH 94 Bridge upstream to Bushy Point, a distance of 19.6 km.

Total - 29 km

Reference: Images 4, 5 & 6

➤ ***Upukerora River***

The Upukerora River is a small to medium-sized river with semi-braided form that outflows into Lake Te Anau at the northern end of Te Anau township.

Through to the upper limits of the Environment Southland managed catchment rating district the river flows through flat farmed paddocks between steep river terrace scarps. Upstream of the rating district boundary the river is confined to a narrow gorge that opens out onto a wide natural tussock covered valley floor subject to limited grazing as part of the Takaro property.

The trial will focus on:

- ◆ Outlet to Lake Te Anau upstream to the upper catchment rating district limits at Coal Pit Flat.

Total - 17 km

Reference: Images 7, 8, 9 & 10

➤ ***Mararoa River***

The Mararoa River is a medium-sized river with a confined single braid and open semi-braided channel form that flows into the Waiau River immediately upstream of the Manapouri Lake control structure. The section river below Weir Road has been highly modified as part of control of Lake Manapouri for hydroelectric generation.

Above Weir Road the river has been the subject of a major willow clearance project that extends to the SH 94 Key Bridge. Since completion of the clearance project in 2011, dynamic river processes are occurring as the river re-establishes a natural intactness.

Above the Key Bridge the channel maintains a high level of naturalness with little past modification.

The trial will focus on:

- ◆ Weir Road upstream to SH 94 Key Bridge a distance of 19 km;
- ◆ SH 94 Key Bridge upstream to Mararoa Station Bridge, a distance of 9 km;
- ◆ Mararoa Station Bridge upstream to upper catchment rating district limits below South Mavora Lake a distance of 26 km.

Total – 54 km

Reference: Images 11, 12, 13, 14, 15 & 16

Vegetation Control Options

The following list provides detail regarding the various options for future control of river corridor vegetation. Other options that arise during the consultation process will also be considered.

➤ *Herbicide*

Application of herbicide is the main method by which unwanted vegetation is controlled at present. However, it is the intention of this plan to see its use reduced over time, and that alternative management approaches are promoted instead. This is due to its environmental effects, and that it only provides a temporary reduction in pest plants rather than a long-term solution.

It is likely that herbicide will continue to be used while other management options are being developed, and also to be used as an initial management tool in some alternative options, i.e. initial knock-down spraying before tree planting.

The current Environment Southland vegetation control programme covers seven major catchments, and over a total length of 1,220 km of channel length within the various rating district works boundary limits.

A typical annual herbicide application programme consists of the following:

- ◆ aerial application – 750 ha
- ◆ ground application – 155 km

Aerial application is the most appropriate control method because the river corridor land is generally difficult to traverse by ground based equipment. Primarily it is used to cover extensive areas where regrowth is evenly spread and sufficiently dense to require boom spray methods.

Ground-based application is most effective in treating very scattered isolated infestations, along areas where infestations are immediately adjacent to live erosion control works and flowing water.

➤ *Stock grazing*

Grazing offers minimal benefit in terms of vegetation management. While it may offer some control of seedling pest plants it can also introduce new issues such as effluent, public access restrictions, public perception issues, landholder expectations and the introduction of other agricultural weeds. A lease also requires ongoing management by the Crown agency involved.

Grazing is most likely only appropriate in low or possibly medium value stretches of river. Sheep are generally considered the most suitable animal to graze close to rivers.

A lease arrangement could be used to shift the costs (and responsibility) of vegetation control to the lease holder. Under this scenario the use of herbicide would possibly continue, and potentially in an uncontrolled manner. This could be considered as not meeting the objectives of this plan.

Various levels of stock grazing do occur already within the river corridors. The majority of headwater grazing is via formal grazing licence granted by Crown land managers DOC and LINZ. A per stock unit/weekly fee has traditionally been applied to cover management costs.

Grazing licences may be subject to a number of conditions, such as:

- ◆ fencing of stock a minimum of 20 metres away from flowing water;
- ◆ sheep grazing only;
- ◆ no breaking of the soil for cultivation;
- ◆ no irrigation;
- ◆ control of pest plants.

Concerns with stock grazing include:

- ◆ restrictions on public access for recreation – although grazing licences are not an exclusive right to the public estate, this is a concern to many;
- ◆ incorporating riverbed land into farms may encourage greater stock numbers to be carried than can realistically be supported on-farm;
- ◆ allowing greater use of riverbed land may set a precedent/expectation of the right to it in the future;
- ◆ allowing closer grazing to the river appears contradictory when water quality is already suffering from intensive farming;
- ◆ effluent may enter groundwater when grazing on free-draining gravels;
- ◆ overland flood flows may wash effluent into the river system;
- ◆ fencing may be destroyed in a flood and become a hazard or be unsightly;
- ◆ ground disturbance by stock and farm vehicles may promote pest plant germination;
- ◆ feeding out of stock feed may introduce pest plants;
- ◆ fertilisation and spraying of area may affect water quality.

➤ ***Nomadic grazing***

In many countries the public estate is routinely grazed by nomadic shepherds with a modest flock of animals, typically goats or sheep. While this is unknown in New Zealand it may be a way of mitigating many of the concerns raised with riverbed grazing. A shepherd is with his flock at all times so can keep them out of sensitive areas and waterways, and there are no fences to impede flood flows or public access. It would also allow the use of different animals which may be better at browsing pest plants.

➤ ***Tree plantings***

Tree plantings could be for amenity values, promotion of local timber industries, and to create wildlife corridors in the river system. A well-managed plantation will naturally displace woody weeds as it grew and shaded out their habitat. Tree plantings provide a wide range of wildlife habitats and may be a means of transitioning an area to native plants over time. The establishment of a patchwork of forested areas within a catchment would help provide a vegetation corridor for birds and other wildlife.

Tree plantings may only be appropriate in low and possibly some medium value stretches of river.

Forested areas increase bank stability due to their extensive root systems, so can be used as a means to control a rivers path where necessary. However, this could also lead to an undesirable narrowing of the river corridor. In this case, tree plantings should only be considered beyond the width of a 100 year flood, or if planted within the 50-100 year flood mark, then the trees should be capable of withstanding floodwaters.

If the plantation was to be managed by a commercial operator, then a condition may be that unwanted woody vegetation beneath the trees is controlled. Alternatively, it may be considered acceptable to allow the trees to outcompete weeds naturally overtime, as this would negate the need for herbicide use. The control of unwanted woody vegetation only along boundaries may be an option.

Clear-felling of a tree plantation in the future could have undesirable effects, for example, mass pest plant growth and sedimentation from logging vehicles having to cross waterways. Consideration should instead be given to selective-logging under a continuous-cover forestry system⁴, so that these effects are minimised.

Species selection is important to avoid any future spread issue from wildings.

Native tree species could be considered for tree plantations, or exotic species used and then thinned and transitioned to natives over time. While any tree planting should increase wildlife habitat, native plantings provide the most scope for encouraging indigenous flora and fauna. A native tree species would provide positive seed sources, encouraging further spread in the river corridor.

It may be possible to establish tree plantings underneath stands of mature gorse and broom. This should involve little site preparation or ongoing weed maintenance keeping costs minimal.

The ability to generate revenue from tree plantings would be highly desirable in that it could provide funding for riverbed vegetation management in other areas. However, a tree planting venture would require considerable initial capital investment and it would take a number of years before there would be any return.

A forest regime could be eligible for entry into the ETS⁵.

➤ ***Coppicing***

A variation of the above option is the establishment of coppice⁶ woodlands. Coppicing is a highly effective method of producing a great deal of fast growing, sustainable timber without the need to replant. Some coppice woodlands in Europe have been in continuous existence for centuries.

⁴ A silvicultural system whereby the forest canopy is maintained at one or more levels without clear felling. Harvesting is carried out continually by single tree or small coupe felling's through the whole forest area, followed by regeneration. Biodiversity, soil and water values, and the landscape are not compromised.

⁵ The NZ Emissions Trading Scheme (ETS) is New Zealand's primary response to global climate change. It puts a price on greenhouse gases to provide an incentive to reduce emissions, invest in energy efficiency, and plant trees.

⁶ Coppicing is a method of woodland management that takes advantage of the fact that many trees make new growth from the stump or roots if cut down near to ground level. This regrowth is re-harvested in subsequent years and the cycle begins again.

A range of exotic and native trees are suitable for coppicing, though in the case of exotics, care must be taken that they themselves do not become weeds as often it is the more vigorous growing species that are used. Coppice stands can be mono-cultural, or a mix of species managed to provide a range of timber types. A stand comprising of a mix of species at various ages will have the highest associated biodiversity values.

A coppiced stand can be managed to provide timber for a wide range of purposes from post and poles through to high-grade end uses. It can also be used to produce firewood in the form of logs or woodchip, as well as woodchip for the pulp industry.

Coppice woodlands require skilled, regular management to obtain good quality timber on an ongoing basis, so this option may be best under some form of local community ownership/control.

Pros:

- ◆ areas in Europe have a long history of successful timber production while retaining environmental values;
- ◆ established using known forestry techniques;
- ◆ produces ongoing timber with less site disturbance than clear-felling-at-maturity regimes;
- ◆ a mixed species stand will potentially increase biodiversity;
- ◆ potential to provide local jobs and timber resources;
- ◆ potential for local industries to develop.

Cons:

- ◆ site disturbance, while less than normal commercial forestry, occurs more frequently;
- ◆ if all trees are cut back uniformly, the sudden increase in light coupled with the ground disturbance occurring at harvest may stimulate pest plant growth;
- ◆ exotic species suitable for coppicing could become weeds themselves;
- ◆ ongoing removal of nutrients from the site;
- ◆ lack of coppice management knowledge in New Zealand;
- ◆ forestry can harbour weed species and be an ongoing weed source.

➤ ***Protection and Restoration of Existing Native Biodiversity Areas***

Existing areas with high biodiversity values could be targeted for protection and strengthening. Examples might include braided river bird habitat, skink habitat, fish habitat and areas of existing significant vegetation.

This option should only be considered in areas where good biodiversity values are already present. Typically, this is in the higher stretches of rivers though they can occur elsewhere. Other areas should be considered if they have very high or unique values such as some locations in the Lower Maitai and Lower Oreti floodplains.

Establishing thresholds may be appropriate, for example, how endangered a species is, how rare the habitat is, or for vegetation only using this approach in areas that have 50% or more existing native cover.

Unwanted woody vegetation and exotic grasses threaten many areas of existing native vegetation. Exotic grasses in particular will prevent new seedlings from establishing; this effectively stops the plant community from being able to close-in and thus resist such weed pressure. Reducing the existing weed pressure, inter-planting with taller native species and possibly carrying out pest animal control would help these areas to achieve canopy closure and become tight, competitive plant communities.

Once established these areas become positive native seed sources for the catchment and it may be possible if good canopy closure and height is achieved to enter areas into the ETS.

➤ ***Development of New Biodiversity Areas***

Most areas along the river system would be suitable for native plantings. These plantings could replace/prevent weed growth over time, and serve to increase indigenous biodiversity values.

The design of new plantings should focus on the ability to achieve canopy closure; in this way they will be able to overcome existing weed growth and resist future invasion. Mature stands of gorse and broom lend themselves well to this approach, as there is usually no initial site preparation or ongoing maintenance required. Establishing natives into freshly cleared or sprayed areas would require considerably more investment in terms of site preparation and the ongoing control of weeds.

In all areas, consideration should be given to the control of woody weeds that threaten the areas ability to achieve or maintain canopy closure, in particular weeds that can establish into low light conditions such as Douglas fir.

This method may only be appropriate for high value stretches and possibly some medium value stretches of river. High value areas may be around key habitats for breeding birds or backwater and oxbow fish and water fowl.

Establishing new native areas can provide benefits such as:

- ◆ increased riparian filtering capabilities;
- ◆ bank stabilisation;
- ◆ providing a seed source for surrounding areas;
- ◆ improved landscape values;
- ◆ varied recreational opportunities.

Any plantings should use locally occurring species and be designed to fit with the ecological values of the area. In some situations, it may be possible for plantings to be included in the ETS scheme if they can achieve the height and canopy closure required for this.

➤ ***Cut and carry cropping***

Allowing an area to be cropped, harvested and then fed to stock on adjacent land could be considered a productive use of public land presently growing pest plants, and a means of providing a useful income stream to fund alternative management approaches elsewhere in the river corridor.

The most appropriate crop types may be hay, baleage or lucerne as these allow ground cover to remain intact avoiding potential soil erosion issues.

This option could be subject to some of the concerns raised with the grazing option, such as restricted public access and use of fertilisers/herbicides.

This option may only be considered appropriate in low and possibly some medium value stretches of river. It is possible that allowing the cropping to occur in areas that get lightly flooded may negate the need for further fertiliser inputs, as the frequent depositing of silt may maintain fertility sufficiently.

Continual removal of biomass may result in a net loss of nutrients and soil carbon over time. Biodiversity values would likely be lower under a cropping regime than if the land was left in an undisturbed state.

The need for annual cultivation to achieve product return such as required for grain cropping may not be appropriate. This is because it may introduce soil erosion risks, as well as the need for fertilisers and increased chemical use to maintain production. Ground disturbance may also stimulate pest plant growth necessitating the need for herbicides.

➤ ***Realign river berm boundary fences***

Some areas, particularly in the upper catchments, have extensive berms where realignment of fences to better match physical features or the positioning of adjacent boundary fences may be an option. The land released from the river berm could then be re-fenced and sold and would then cease to be considered part of the river corridor.

Proceeds from any sale of Crown land would return directly to the Crown and not be directly available for use elsewhere in Southland rivers.

This method may only be appropriate for low and possibly some medium value stretches of river.

Pros:

- ◆ sale of land could release funds to invest in other vegetation management projects⁷;
- ◆ potential reduction in costs of managing woody vegetation in that catchment;
- ◆ potential for less herbicide use;
- ◆ potential reduction in pest plants.

Cons:

- ◆ lose control of how this land is managed;
- ◆ moves agricultural land closer to the river. The landholders then place a greater expectation of river management onto the Council and government agencies in order to protect their land;
- ◆ public opinion expresses the view that land is already farmed too close to rivers;
- ◆ reduction in riparian buffer zones;

⁷ This would require an Act of Parliament to achieve, otherwise funds released from the sale of Crown land would return directly to the Crown

- ◆ possible net loss of biodiversity. Agricultural regimes tend to have lower biodiversity than undisturbed berm land;
- ◆ loss of public recreational resource;
- ◆ less room for the natural migration of the river;
- ◆ the land is probably based on free-draining river soils which, if farmed, could leach nutrients into groundwater;
- ◆ no potential reduction in herbicide use;

➤ ***Realign fences to match topography***

To avoid the complications and finality of realigning property boundaries, it may be more practical to realign the fence outwards to match topographical features, and then lease the freed up land for grazing.

An example of where this might be suitable is along a high terrace where the boundary fence is currently set back some distance from the terrace edge. The terrace is not at risk of flooding, has unwanted woody vegetation present and low biodiversity values. Fencing to the actual edge of the terrace and allowing this extra area to be grazed may achieve control of the unwanted vegetation with little impact on any important values present in the riverbed below.

Most of the pros and cons of the “realign river berm boundary fences” option apply to this option, and it may only be considered appropriate in low and possibly some medium value stretches of river.

➤ ***Develop public access, recreation and tourism***

Well managed public access and recreational opportunities would increase the ownership and connectivity both the local community and the general public have with our waterways. This can be very powerful in generating positive conservation values and may lead to community initiatives such as walkways being developed. Increased community interest has the potential to attract other funding sources.

There is potentially a great deal more scope to enable greater public use of river corridors for passive recreation. This could be facilitated by the provision of tracks that could be used for walking and/or cycling and could extend to commercial tourism purposes based on the scenic values, natural history, etc.

An increase in public use of river corridor land would strengthen the case for seeking a wider base of funding for the management of these areas, and there may be opportunities to shift weed management responsibilities to external parties such as tourism operators. This would, however, raise some issues around health and safety and the use of contractors by external parties.

It is important that any increased public access does not impact on biodiversity values such as nesting habitats for braided river birds.

➤ ***Bio-control Release***

Currently there is a suite of biological control agents available in Southland, which could provide benefits in the river corridors and more importantly in the feeders and sub catchments for which funding is not currently available for weed control. In

particular, there are insects which predate broom, ragwort, thistle species and gorse in descending order of effectiveness.

Generally bio-control agents do not kill the host plants, but this can occur in favourable conditions especially if they are being attacked in several different ways by different agents.

Bio-control should be considered as a low cost but long-term tool which may provide moderate benefits in terms of reducing the vigour and spread of some weed species, and most appropriate for low and medium value stretches of river in areas outside the main flood fairway.

Funding

➤ *Current funding*

Catchment rating districts provide a source of funds that is focused towards river management practices that prevent soil loss through erosion and damage to property through flooding. Control of woody pest plants generally fits into that responsibility only where those plants impact the free passage on flood flows. Outside of those boundaries, Environment Southland's Catchment Management Division's responsibilities more or less cease, as responsibilities in meeting community obligations as defined by the Soil Conservation and Rivers Control Act 1941 will have been met.

The actual mix of funding is determined through the Long-term Plan process that looks at funding requirements over a 10 year period. In addition, funding is also contributed by Crown agencies as landowners and other organisations which receive benefits from effective river corridor management, i.e. Meridian Energy and Fish and Game New Zealand, Southland Region.

➤ *Future funding*

The importance of naturally functioning river corridors is becoming increasingly valued by the wider community in terms of water quality, environmental issues, natural landscape values and recreation places. Therefore, a region-wide rate should be considered, as it would provide the ability to plan long-term sustainable pest plant control programmes outside of the current rated districts works boundaries.

Limiting works only to rated catchment areas would be a major restriction and essentially make the intentions of this plan impossible to realise. A region-wide rate would effectively shift the costs of managing rivers sustainably across to all those who benefit from it, in this case all Southland ratepayers.

Where to from here?

The next stage of developing the concept plan into a River Vegetation Management Plan will be consulting with the affected communities, agencies and other stakeholders. The consultation process will seek to get agreement on the vision presented, as well as some consensus on how, broadly, to proceed with that vision.

From here a “business plan” will be developed for each river in turn. The purpose of this plan will be to present where alternative management approaches could be used, and the cost, process and timeframes of applying them.

To identify where opportunities may exist for alternative management approaches will require a surveying process, both office and ground-based.

It is envisaged that, initially, the existing approach to vegetation management would continue (so that the significant gains made in recent years are not lost) while investigations begin on identifying areas suitable for alternative management approaches.

Concurrently, pilot trials would begin on various management options so that the information gained can be used to tailor future approaches.

A monitoring regime would have to be developed in order to gauge whether the desired intermediate and final outcomes were being achieved.

The project presented is complex and will require detailed planning, investigations and community consultation. As such, it is anticipated that it requires a dedicated manager, special project status and support funding.

A new region-wide rating model should be considered to give the ability to plan long-term sustainable pest plant control programmes outside of the current rated districts works boundaries.

Converting these theoretical management approaches into a reality is the key to this long-term plan succeeding. Funding and logistical restrictions will mean that a certain degree of prioritisation will occur. This should be seen as an expected and normal part of the process, otherwise these activities would not get the chance to occur at all.

Challenges should be expected, especially in raising the funding to invest in projects that will have long payback periods and that result in intangible benefits such as increased biodiversity and landscape values. However, if both the management agencies and the community agree on the vision, then the actual result will follow.

Project Timeframes

1. **25 July 2013** – present updated Concept Plan and Pilot Trials document at Biosecurity Interagency Group AGM.
2. **August 2013** – present progress report to Environment Southland Regional Services Committee at its 21 August 2013 meeting on Concept plan changes suggested by the Southland Biosecurity Interagency Group.
3. **September 2013** – provide copies of the revised version of the Concept Plan and Pilot Trials to the River Liaison Chairs for study ahead of a proposed workshop to present the concept, discuss details and seek acceptance or otherwise of the Concept Plan.
4. **November 2013** – organise and attend Concept Plan workshop with River Liaison Chairs.

5. **November 2013** – agreed to commence the community engagement and consultation process. Release for public comment and submissions through Environment southland website.
6. **February 2014** – via Council process, formally adopt Concept Plan and commence development of a Business Plan/Operational Plan including funding sources for implementation.
7. **prior to July 2014** – commence pilot trials confirmed for establishment.
9. **2014/15** – Business Plan/Operational Plan completed.
10. **2015/16** – full implementation of Concept Plan.



Draft Concept Plan – River Corridor Vegetation Management
Image 1 – Upper Oreti River (D0552 #8200)



Looking upstream with the Windley confluence on the right. Shows active river channel position within a series of confined terraces. Also shows an example of a small berm fence realignment

Draft Concept Plan – River Corridor Vegetation Management
Image 2 – Upper Oreti River, Windley Confluence (D0552 #8183)



Looking upstream into the Windley a major tributary of the Oreti. Shows typical example of small infestation of gorse/broom

Draft Concept Plan – River Corridor Vegetation Management
Image 3 – Upper Oreti River - Windley Tributary(D0552 #8188)



Draft Concept Plan – River Corridor Vegetation Management
Image 4 – Lower Whitestone River - (D0561 #1164)

Looking downstream from the upper limit of the rating district work area. Shows a relatively confined floodway within an outer margin of live erosion control protecting the flood bank network



Draft Concept Plan – River Corridor Vegetation Management
Image 5 – Upper Whitestone River - (D0561 #1580)



Looking downstream through a section of channel and berm located in Glen Echo Station approximately 2 km above the rating district upper works limit

Draft Concept Plan – River Corridor Vegetation Management
Image 6 – Whitestone River above Rating District Works Boundary - (D0561 #1563)



Looking upstream 1 km above the confluence with Lake Te Anau. Shows confined floodway and berm with scattered infestation of broom

Draft Concept Plan – River Corridor Vegetation Management
Image 7 – Upukerora River at Lake Te Anau confluence - (D0559 #8808)

Looking downstream with Te Anau Township in the background. Shows river sitting within a narrow valley floor. Major infestations of gorse and broom clearly evident within the river bed and along the terrace scarps



Draft Concept Plan – River Corridor Vegetation Management
Image 8 – Lower Upukerora River - (D0559 #8845)



Looking upstream through mid section showing wider valley floor with river confined to a floodway with terraces and a flood bank network protected by live erosion control plantings. Also shows extensive dense infestations of gorse and broom throughout the floodway and berm areas

Draft Concept Plan – River Corridor Vegetation Management
Image 9 – Mid Upukerora River - (D0559 #8852)



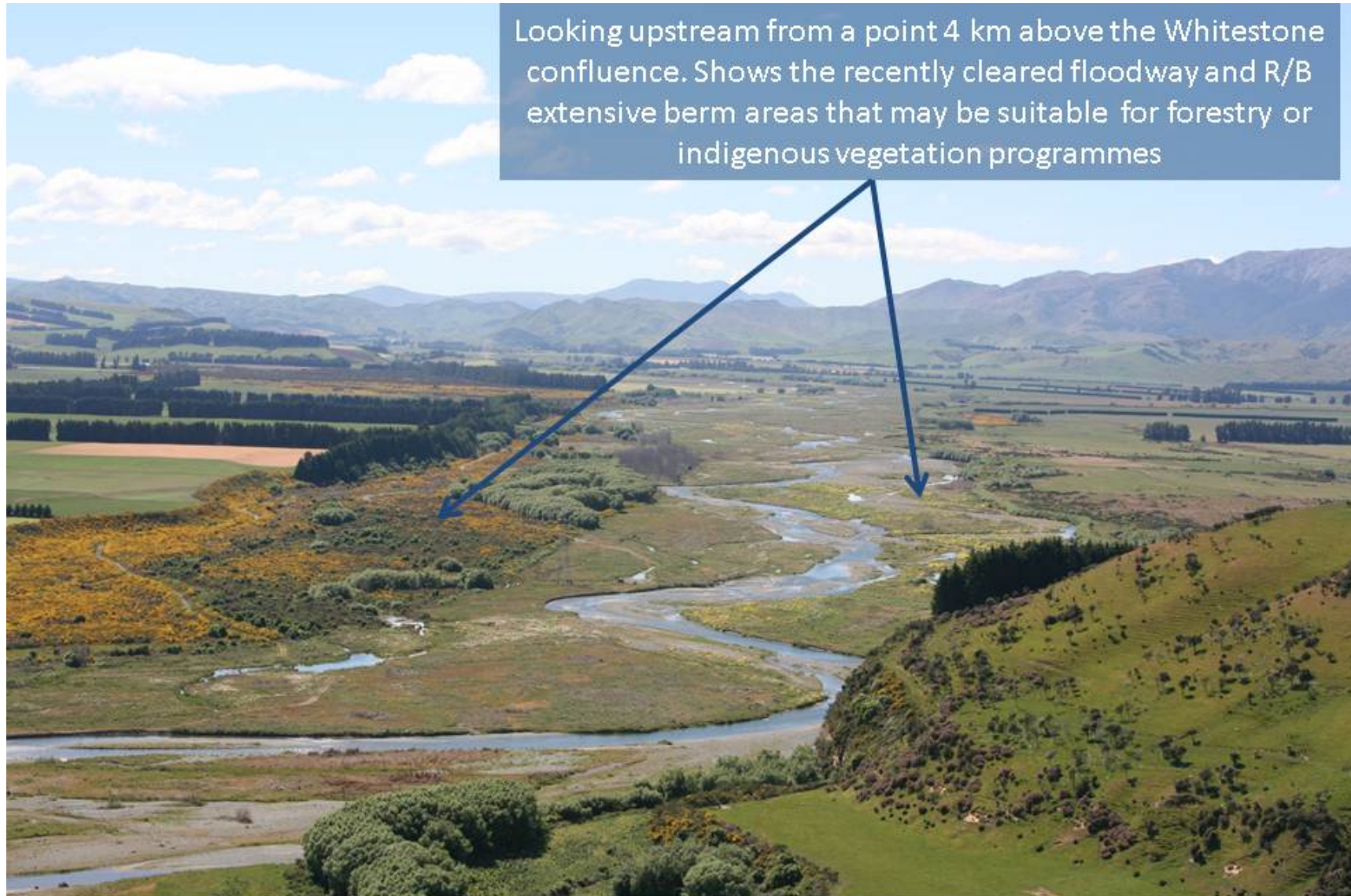
Headwaters looking upstream above the upper limit of the rating district works boundary. Shows a river system clear of gorse and broom

Draft Concept Plan – River Corridor Vegetation Management
Image 10 – Upper Upukerora River Above Rating District Works Boundary - (D0559 #8883)

Looking upstream from a point 3 km above the Manapouri Lake Control weir. Shows floodway clear of pest plants, but close proximity of major gorse and broom infestation along the terrace scarp and adjacent land.



Draft Concept Plan – River Corridor Vegetation Management
Image 11 – Lower Mararoa River Below Mt York - (D0559 #9066)



Looking upstream from a point 4 km above the Whitestone confluence. Shows the recently cleared floodway and R/B extensive berm areas that may be suitable for forestry or indigenous vegetation programmes

Draft Concept Plan – River Corridor Vegetation Management
Image 12– Lower Mararoa River Above Whitestone Confluence - (D0559 #9112)



Looking downstream from SH 94 Key Bridge. Shows a section of berm areaseparated from the floodway by the access road. This area may be suitable for cash and carry cropping

Draft Concept Plan – River Corridor Vegetation Management
Image 13– Lower Mararoa River Below SH 94 Key Bridge - (D0559 #9165)



Looking upstream from a point 4 km above SH 94 Key Bridge. Shows the multi braid Nature of the river sitting within the expansive berm area. Over the past 4 years so \$200,000 has been committed by LINZ to gorse and broom control throughout this section of river with 95 % control achieved

Draft Concept Plan – River Corridor Vegetation Management
Image 14– Lower Mararoa River 3 km Above SH 94 Key Bridge - (D0559 #9185)



Looking upstream – Mararoa Station Bridge in background. Shows a berm area now clear of gorse and broom that may be considered as suitable for sheep grazing to control future seedling gorse and broom regrowth and rank grass

Draft Concept Plan – River Corridor Vegetation Management
Image 15– Upper Mararoa River 2 km below Mararoa Station Bridge - (D0559 #9199)



Looking upstream from a point 2km above the Mararoa Station Bridge. Shows the extent of the braided river system and expansive berm area. The dark brown patches are dense areas of dead broom controlled as part of the DoC commitment to this section of river

Draft Concept Plan – River Corridor Vegetation Management
Image 16– Upper Mararoa River 3 km below Mararoa Station Bridge - (D0559 #9208)

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