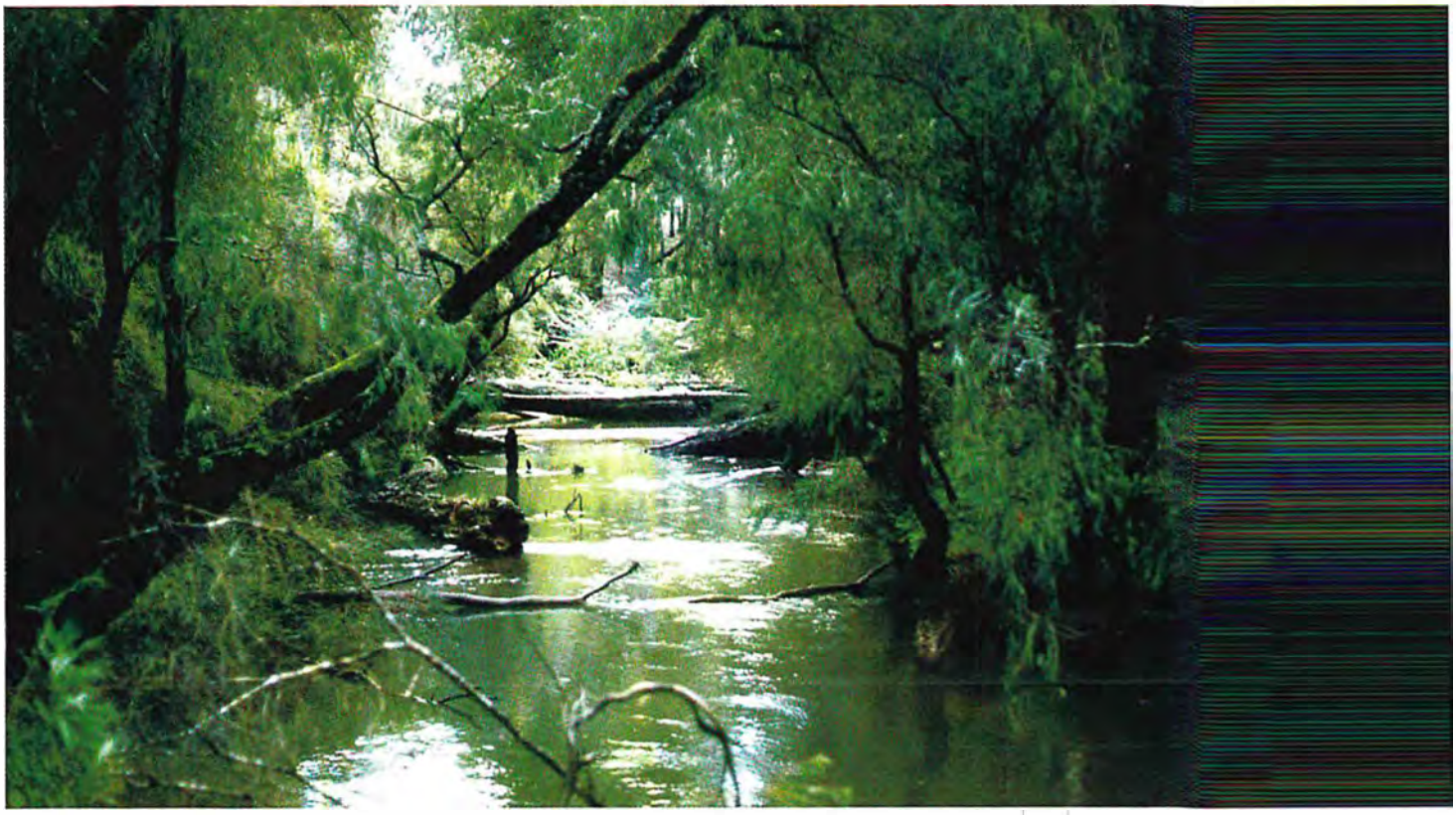
GOVERNMENT OF WESTERN AUSTRALIA

HARVEY BASIN STREAM RESTORATION TRUS

A proposal for funding stream restoration works in the Harvey



WATER RESOURCE PROTECTION SERIES

WATERS AND RIVERS COMMISSION REPORT WRP 14
1999

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Cover Photograph: Harvey River, upstream of Harvey Reservoir, 1998
[Photograph by Luke Pen]

Contents

1. Introduction

This document is a proposal for how the Harvey Basin Stream Restoration Trust could be established. It outlines the reasoning behind establishing the Trust and makes recommendations on the operating framework for the Trust. An initial recommendation on the financial size of the Trust has also been made.

1.1 Background

Establishment of The Harvey Basin Stream Restoration Trust was recommended by the Water and Rivers Commission's (1998) *Proposed Harvey Basin Surface Water Allocation Plan.* In this document one of the conditions of development of the proposed Harvey Dam was that there should be some replacement of the water resource values that would be lost through the resulting inundation. The concept of establishing a Trust which would fund river restoration projects downstream of the proposed dam was seen as a means of achieving coordinated restoration of riparian values.

This document outlines the proposed form of the Trust and how it would operate in the current natural resource management framework. It also provides an estimate of the financial size of the Trust with justified cost estimates.

The document also outlines the concept of a river restoration strategy. The proposed strategy would guide the Harvey Basin Stream Restoration Trust administrators in supporting river restoration activities.

1.2 Focus audience and next steps

The Water and Rivers Commission's Water Allocation and Catchment and Waterways Management Branches have prepared the present proposal. The document will be used to liaise with the Water Corporation of the proposed new Harvey Dam and natural resource managers and community groups in the region.

It is proposed that a final document will be prepared which will outline the agreed form of the proposed Harvey Basin Stream Restoration Trust as determined by further negotiations with the relevant stakeholders.

2. The Harvey River Basin

2.1 Physical environment

The total area of the Harvey Basin is 2055 km^2, and includes the Waroona Irrigation District and most of the Harvey Irrigation District. Approximately 29% (605 km^2) of the Basin is State forest and 45% (925 km^2) is cleared (WRC, 1998).

Climate

The climate of the Harvey Basin is a warm temperate Mediterranean type with distinct seasons. Summers are dry and warm to hot, and winters are wet and cool. Most rainfall occurs between May and September and annual rainfall ranges from 840 mm along the coast to more than 1200 mm on the Darling Scarp. The average annual evaporation rate ranges from 1200 mm in the south to 1600 m north of the Basin (WRC, 1998).

Geology

The Darling System has two distinct geological provinces that are separated by the Darling Fault. East of the fault is the Yilgarn Block that is a relatively stable shield area of crystalline rocks overlain with regolith. The western side is the sedimentary rocks of the Perth Basin, which are extensively covered by Quaternary deposits.

Geomorphology

The regional geology has a major influence on the pattern of landform and soil units. The geomorphological provinces in the study area are the Darling Plateau of Precambrian crystalline granite rocks and the Swan Coastal Plain of aeolian and fluviatile sediments (DCE, 1980). The Darling Scarp separates these provinces. The Darling Plateau shows a distinct trend from west to east with changes to the nature of the slopes and erosional modifications to the weathered mantle. In the west is the Yarragil unit with narrow flat swamp floors with orange earths and smooth slopes and gravelly sands. These give way to the Pindalup unit that has broader floors and shows evidence of more stripping of the weathered mantles. Red and yellow duplex soils occur on the Catterick unit.

The land west of the Darling Scarp is predominantly low lying with a gently undulating to flat surface. The Swan Coastal Plain consists of a number of sandy systems including the Quindalup Dune, Estuarine and Lagoonal Systems, Spearwood Dune, Bassendean Dune and the Pinjarra System.

Fluvial features

The Harvey Basin contains a series of small rivers and brooks that originate in the Darling Range and drain onto the Swan Coastal Plain. The watercourses and major drains include

- the Upper Harvey River, stretching from the Darling Plateau to the Harvey River Main Drain;
- the Lower Harvey River, stretching from the Harvey River Main Drain to the Harvey Estuary;
- Harvey River Main Drain;
- Harvey Diversion Drain (taking overflow from the Upper Harvey River to the Indian Ocean);
- Coolup Main, South Coolup, Mealup, and Caris Drains, which empty directly into the Harvey Estuary;
- Mayfields, Waroona, Logue, Bancell Brooks, Samson Brook, Meredith and Clarkes Brook drainage lines, which all empty into the Harvey River;
- numerous creeks and brooks conveying water from the Darling Range to the drainage systems on the Swan Coastal Plain; and
- Wellesley and Wokalup Creeks.

The locations of these waterways are shown on Figure 1.

Vegetation

The vegetation of the Darling Range is mainly jarrah-marri forest with open woodlands of *Melaleuca preissiana* and *Agonis linearifolia*. The understorey is dominated by *Banksia grandis and Allocasuarina fraseriana* over water tolerant Myrtaceae and sedges (WRC, 1998).

Clearing on the coastal plain for agriculture and construction of drains for flood control have resulted in the loss of most of the original wetland vegetation. In many areas little of the original understorey remains

having been replaced by pasture or weeds. The coastal plain rivers and drainage channels support woodlands of *Eucalyptus rudis* and *Melaleuca preissiana* with some *Agonis linearifolia*. There are often dense stands of *Melaleuca rhaphiophylla* occurring in the wetlands adjacent to the river channels. Low banksia woodlands grading into jarrah – marri woodlands, cover the well-drained areas of the plain.

2.2 Social setting

The Harvey Basin lies within three local government jurisdictions:

- the southern portion of the Shire of Murray;
- the Shire of Waroona; and
- the northern half of the Shire of Harvey.

The area supports a range of agricultural activities including dairying, beef cattle production, citrus fruit growing and viticulture. Other industries include mineral sand mining, bauxite mining and alumina refining. The Basin also supports a range of recreational activities from the water-based activities at Harvey Estuary to bushwalking and picnicking areas in the Darling Plateau. The Harvey River is also used for white-water canoeing.

The Waroona and the northern half of the Harvey Irrigation District fall within the Harvey Basin. Dairying is the mainstay of these irrigation areas. The South West Irrigation Area was privatised in 1996 and Transferable Water Entitlements were also established at this time (WRC, 1998).

2.3 Major environmental issues

The major problems afflicting rivers in south west Western Australia have been identified as:

- the loss of fringing vegetation, principally through livestock grazing, but also as a result of poor fire management (this is part of the wider problem of land clearing);
- stream salinisation (this is part of the wider problem of land salinisation);
- weed infestations;
- channel instability (erosion and sedimentation);
- eutrophication;
- degradation of river pools;
- pollution and contamination;
- regulation of rivers (includes extraction of water from rivers and wetlands in times of drought and provision of water to wetlands outside the natural cycle);
- conflicting and unsustainable use of rivers;
- feral aquatic animals (mainly fish); and
- floodplain management (Olsen and Skitmore, 1991).

Hydrology

The primary waterways management issue in the Harvey Basin area is the alteration of the natural hydrology. The drainage system combined with extensive clearing of native vegetation and irrigated agriculture has resulted in radical changes to the hydrology of the coastal plain in the Harvey Basin. Today, the Harvey Basin is approximately 45% cleared, mainly in the valleys and extensively on the coastal plain (WRC, 1998). As a consequence, the total annual flow received by the Harvey Estuary from the Harvey River is about 164 GL. This flow is about 25% greater than it was prior to European settlement. The predominant contribution to the increase in flow is the coastal plain runout, including groundwater discharge and return of irrigation water. The flow regime of the Harvey River has also significantly changed through time as a result of:

- increases in storage regulation for water supply purposes;
- clearing and land use changes;
- changes in water supply operating strategies, such as changes in irrigation releases;
- geotechnical releases for Harvey Weir safety testing from Stirling Dam; and
- the introduction of white-water releases from Stirling Dam, (Welker *et al.*, 1997).

Water quality:

As a result of clearing and extensive agricultural practices the water quality in the Harvey Basin has also been altered from its original state. Water quality can be measured using turbidity, which is a useful indicator of catchment disturbance. It is often associated with bank erosion, and is strongly influenced by livestock access to stream banks. Recent surveys of tributaries above the Harvey Weir show that turbidity was highly varied and was dependent on location and magnitude of flows (WRC, 1998). Instream silt loads have filled many of the permanent waterholes in streams and rivers including the Harvey River and major drains.

Nutrient enrichment

Clearing, cultivation and drainage on the coastal plain have increased the input of nutrient – rich water to the Peel – Harvey Estuary. Due to the strongly seasonal river flow, approximately 85% of nitrogen and phosphorous loadings occur during winter. The increase in nutrients to the Peel-Harvey Estuary caused the decline of sea grass communities and the increase in a number of macro-algae species and eventually the increase in toxic micro-algae, *Nodularia*. Since the opening of the Dawesville Channel in 1994, the Peel-Harvey has been changed to a more marine environment with increased flushing of the estuary. The new conditions have proved unsuitable for the massive growth of algae that occurred prior to the opening of the channel. In addition, improved catchment management programs are working towards reducing nutrient input into the waterways.

Wetlands in areas of high phosphorus export, act as nutrient sinks collecting phosphorous from agricultural sinks (Chambers *et al.*, 1993). There is the possibility that if these wetlands are disturbed they will release nutrients back into the drains and waterways.

2.4 History of Landcare and streamlining in the Harvey area

Since European settlement in the Peel-Harvey area, extensive drainage networks were built to ensure rapid drainage of the region. However, excessive loads of silt and nutrients were also carried along with the drainage water, which has contributed to the eutrophication of the Peel-Harvey system. The downward trend in the estuary's health led to research and key actions being implemented from the early 1980s onwards. These include reducing phosphorous loads through improved fertiliser efficiency, management of the weed nuisance in the Peel-Harvey Estuary, monitoring and management controls. Streamlining[1] was one of the catchment management initiatives undertaken. It is a more environmentally acceptable drainage management system, which involves the process of changing existing artificial drainage into more natural waterways. It can include the physical modification of the drain, exclusion of stock and revegetation of drain banks and reserves.

2.5 Regional Integrated Catchment Management and the South West regional strategy

It has been recognised for many years that the best way to manage natural resources in a sustainable manner is for all levels of government to work together with the community. A regional focus can help all stakeholders set priorities and common goals for on-ground activities to maximise the benefits for everyone and ensure the best possible long term environmental outcomes. The Western Australian State government is currently preparing a framework on how integrated natural resource management could be implemented in Western Australia (State Govt, 1998). One proposal is the State will be divided into a number of regions. One such region could be the South West Region. It could be made up of a number of sub-regions or large catchments, which may in turn contain river basin and sub-catchment groups.

A number of sub-regions have been already established and have community-based catchment coordinating groups including Geographe catchment and Blackwood catchment. The following present and proposed partnership arrangements may manage subregions; GeoCatch, Leschenault Partnership, Blackwood Basin Group, Peel-Murray catchment: Cape to Cape Alliance and Warren catchment. These sub–regions would be coordinated by a regional strategy. The Harvey River Basin is likely to fall into the proposed Peel-Murray Catchment Group. However, there may be some overlap with the Leschenault Partnership area.

The whole South West Region will be responsible for preparing a coordinated natural resource management strategy. This will guide sub-regional strategies and identify priorities for management. It is recommended that the Water and Rivers Commission assist the Peel-Murray sub-region in the preparation of a river restoration strategy. Details of what the river restoration strategy could include and potential stakeholders are outlined in Section 3.

[1] Refers to the revegetation of riparian zones of creeks and drains.

2.6 Water resource beneficial uses and values

Water resources support a wide range of beneficial uses and/or values. These include the use of water resources by the ecosystems they sustain; non-consumptive instream uses (including recreation, scientific and educational use and heritage values); and consumptive uses, including irrigated agriculture (WRC, 1998).

Effective water resource management requires careful long term investigation and planning which is responsive to community needs and values. The water allocation process takes into account existing and potential ecological, social and economic values of the water resources when allocating water among various beneficial uses. Some water resources may be allocated to compatible multiple uses. Allocation plans establish ecologically sustainable limits on the development of surface water resources. Allocation means giving a party an entitlement to use a certain amount of water or the setting aside of a water resource for a designated beneficial use.

2.7 Harvey River allocation plan

The Harvey Basin Surface Water Allocation Plan defines surface water resources available for use on an ecologically sustainable basis. The *Perth's Water Future* strategy identified the surface water resources of the Harvey Basin as having a strategic role in meeting the future water needs of Perth and Mandurah (WRC, 1997). The Water and Rivers Commission has made a determination on the acceptability of the water supply developments proposed for the Harvey Basin. The allocation plan proposal was submitted to the Environmental Protection Authority and also made available for public comment.

One of the recommendations of the allocation plan was the establishment of a Harvey River Restoration Trust to promote the rehabilitation of the Harvey River system while meeting water supply and drainage objectives. The proposed 34 GL public water supply allocations from the Harvey River resources would result of the loss of riverine systems up stream from the dam wall. To ensure the protection of water resource values in the whole Harvey Basin, this paper further explores the concept of setting aside funds to support restoration of the waterways within the Harvey Basin.

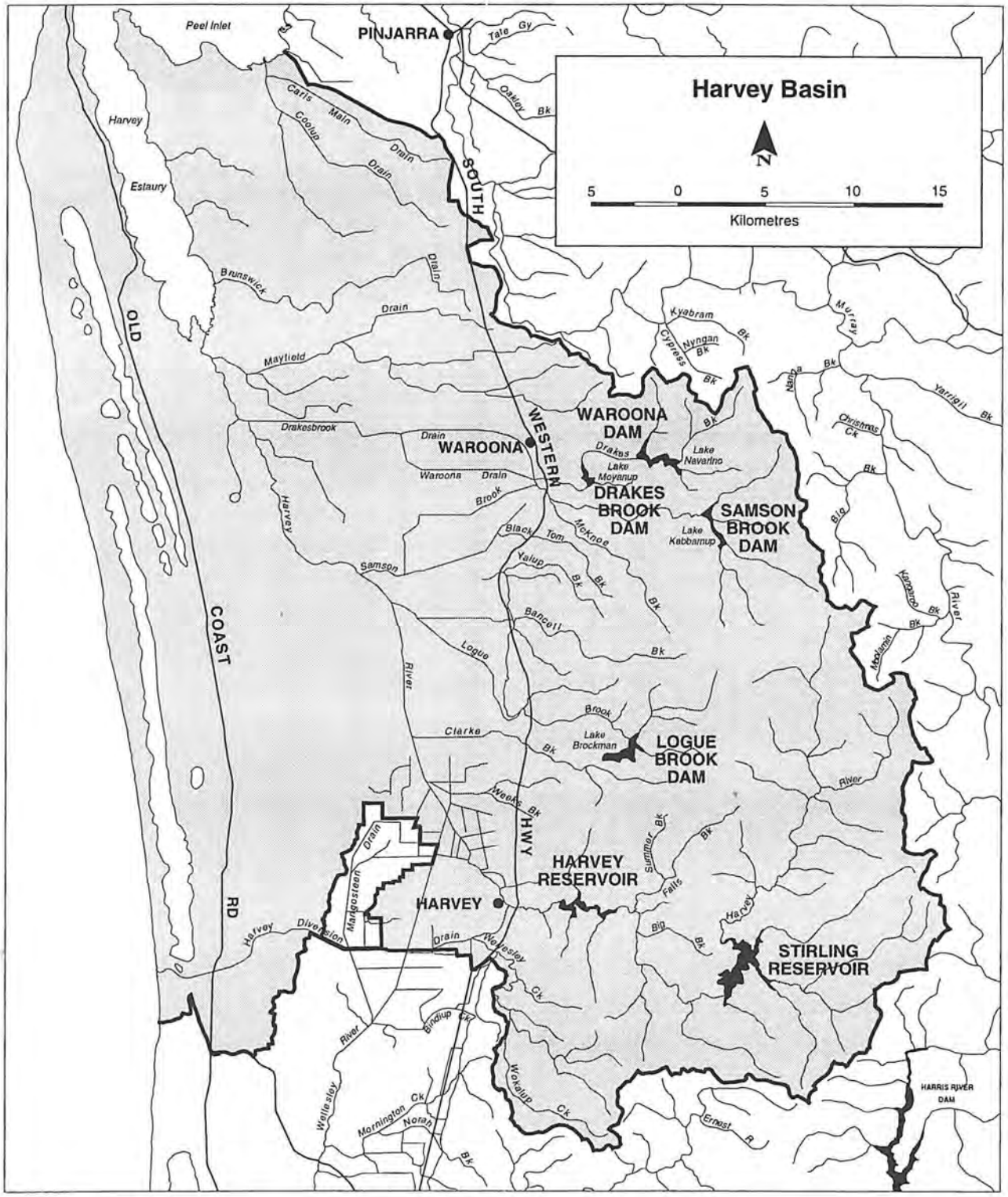

Figure 1. Harvey Basin study area

3. The Harvey Basin Stream Restoration Trust

3.1 Rationale for establishing a Harvey Basin Stream Restoration Trust

The concept for the Harvey Basin Stream Restoration Trust was outlined in the Water and Rivers Commission's *Proposed Harvey Basin Surface Water Allocation Plan* 1998. The allocation plan defines surface water available for use on an ecologically sustainable basis after providing water for the environment and important social uses. The report also set in context the respective roles and responsibilities of the various agencies involved in planning and development of water resources for the sustainable development of Western Australia.

The allocation plan acknowledges that there would be a loss of water resource values upstream of the proposed Harvey Dam if the surface water allocation were to proceed. The community felt that if a development were to proceed then there should be some replacement of the water resource values that were to be lost as the result of the development.

A further reason for establishing the Trust was highlighted by studies of Environmental Water Provisions in the area which have shown that the clearing of the area for agriculture had in fact dramatically increased the amount of water entering the river channels on the coastal plain. Flow quantity had increased from the natural regime to the extent that there is widening of the natural stream channels. Consequently river restoration to reverse this trend is a priority in the catchment.

The initial concept outlined that the Harvey Basin Stream Restoration Trust would receive funding from the Water Corporation of the new Harvey Dam to ensure the maintenance of the water resource values in the Harvey Basin study area. A community panel would make decisions on the broad use of the funds, using priorities outlined in a catchment management plan and river restoration strategy. Further discussion on the natural resource management framework is outlined in Section 3. It is proposed that the local Harvey and Coolup LCDCs coordinate project proposals received from local landcare groups and individual land managers and ensure they meet river restoration priorities.

3.2 Recommended aims, objectives and targets

Overall aim for the Trust

It is recommended that the overall aim of the Harvey Basin Stream Restoration Trust be to provide a source of funding which will assist in the replacement of the riparian functional and ecological values of the vegetation and instream habitat that has been lost through the proposed dam development.

The riparian functional and ecological values of riparian vegetation and stream channel that would be lost include:

- control of erosion and sedimentation;
- filtering of nutrients and pollutants;
- controlling light, colour and conditions in the water column;
- reducing channel erosion by decreasing the speed of river flow;
- maintaining river courses through control of meandering; and
- maintaining river habitats and biodiversity associated with riparian values.

Objectives of the Trust

To ensure that riparian functional and ecological values are maintained in the Harvey Basin, it is proposed that the Trust have the following objectives for stream restoration:

- to restore form and function;
- to restore stream habitats and maintain stream ecosystems;
- to establish ecological corridors;
- to control nutrient loss from farmlands;

- to control erosion and sedimentation; and
- to ensure minimal impact on downstream ecosystems.

It is recommended that the Trust will work towards these objectives using the proposed outlined operating structure and principles as discussed in this chapter.

Outcomes of the Trust

The Commission will work with the community and the Water Corporation to come to an agreement on the outcomes of the Trust. It is suggested that the major outcome for the Trust be:

- coordinated on-the-ground river restoration works on both public and private lands in a way that represents maximum return for the investment.

Outputs of the Trust

The Trust will be required to demonstrate a quantifiable difference resulting from the establishment of the Trust. It is recommended that the Trust will have stream restoration targets to measure its success in meeting the above restoration objectives. The exact targets will be determined through preparation of a *Peel-Murray Sub-Region River Restoration Strategy*. The overall target of amount and degree of restoration could be achieved in a number of ways. The plan will need to determine whether to fully restore a section of river, or undertake partial restoration of stream sections over a greater stream length or a wider riparian zone. For example, 1 km of fully restored streamline with a fully vegetated 60 m wide riparian corridor (6 ha) could be considered to be equivalent to 3 km of streamline with only 20 m wide riparian corridor (also 6 ha). Again this could be considered equivalent to 9 km of a 20 m wide corridor of trees-only plantings over grass which is intended to be controlled grazed. In terms of the improvements to water quality brought about by streamlining, the above treatments could very well be roughly equivalent.

This approach in meeting the restoration targets is necessary to enable a degree of flexibility in the types of projects that would fit into different farm plans and can reasonably be submitted to the Trust for funding support. To enable comparisons of projects with respect to meeting the aims of the Trust a simple points system will be developed, which is agreeable to all stakeholders. A constraint on this approach, as has been alluded to above, lies in costs that are related to stream length rather than area planted out. For this reason, subsidies on fencing and stock crossings and watering points may well have to decrease with decreasing intensity and lateral extent of streamlining.

3.3 The proposed structure of the Trust

It is proposed that the Harvey Basin Stream Restoration Trust be part of the WA Landcare Trust. The WA Landcare Trust is an established funding mechanism for Landcare projects in the South West and it receives funds from private industry, notably ALCOA of Australia Ltd. The benefit of using an already established Trust is that it already has an administrative framework that has successfully operated over a number of years. It will also minimise the cost and allow the major portion of the funds to be used for on-ground works. It is envisaged that the Water Corporation will provide a determined amount of funds to the WA Landcare Trust. The funds will be held separately from other funds in the Landcare Trust in a special fund known as the Harvey Basin Stream Restoration Trust Fund.

The expenditure of these funds will be directed by a community panel to be convened by the Water and Rivers Commission.

It is suggested that the panel will negotiate broad areas of funding for stream restoration with the two local LCDCs. These LCDCs, which are in close contact with local catchment and community groups and active farmers, will have the actual responsibility of distributing funds to groups and individuals for on ground activities. It is recommended that the LCDCs prepare applications that demonstrate coordination between their local catchment groups in meeting specific river restoration objectives.

The working arrangements for the realisation of the Harvey Basin Stream Restoration Trust are illustrated in Figure 2.

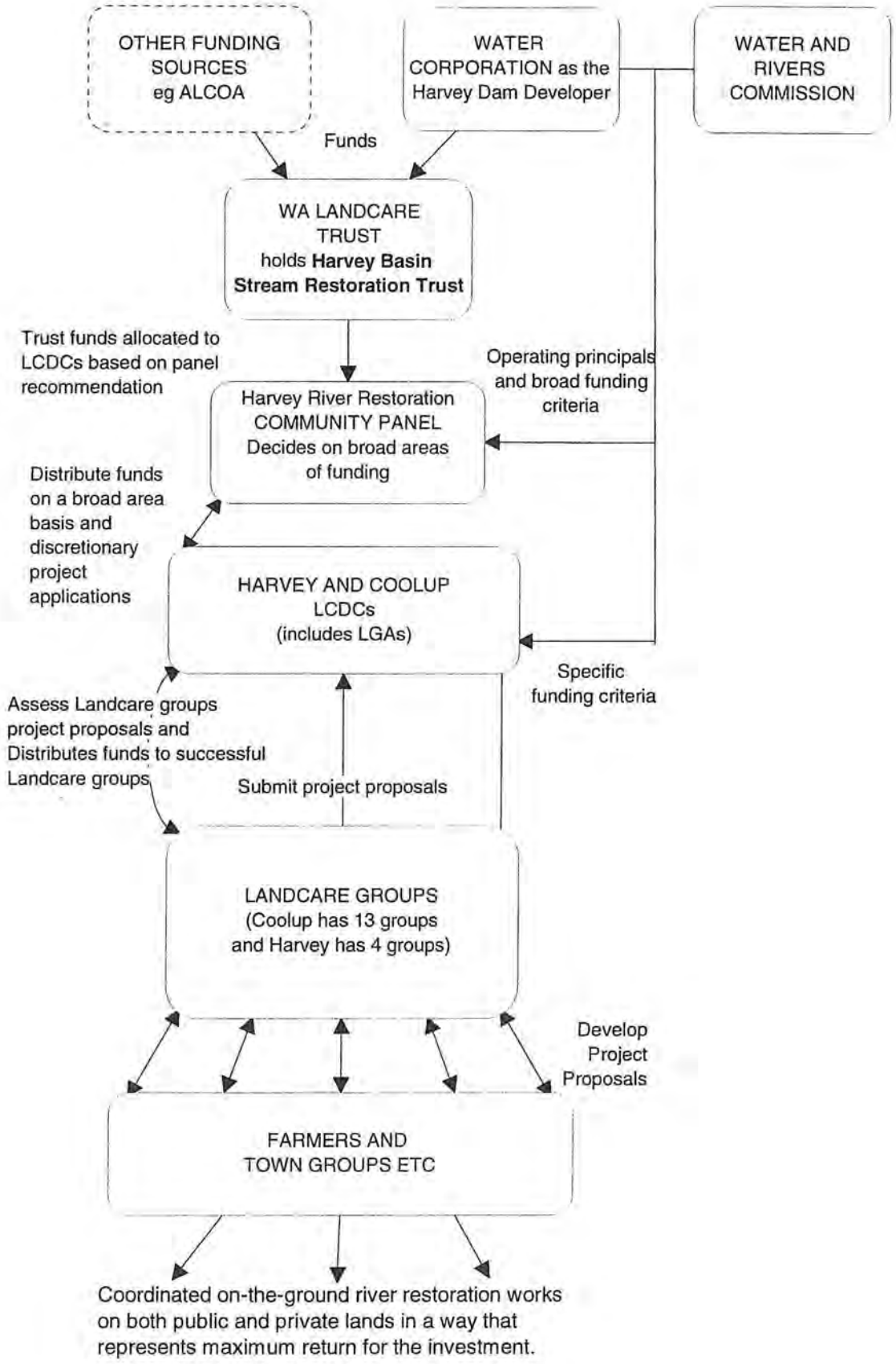

Figure 2. The proposed structure of the Harvey Basin Stream Restoration Trust

3.4 Scope and operating principles

The Water and Rivers Commission will prepare in conjunction with the Water Corporation and the community panel operating principles and broad funding criteria. The Water Corporation and the community panel will be asked to work with the Commission in establishing and agreeing on the scope and operating principles. At this stage, the Commission has prepared some draft operating principles that it believes should be negotiated with the other parties and these are outlined below. The final responsibility for ensuring that the Trust is functioning lies with the Commission.

The Commission believes that the Trust should operate in such a way that:

- the funding is used in a way that maximises value for money and maximises the return on the investment;
- the funds will be used predominantly for on ground improvements to the riparian environment in the study area;
- funds be used according to strategic river restoration priorities established by the community and other stakeholders including the Water Corporation and the Commission;
- the funds be used on works which are feasible and technically sound;
- the funds not be the sole contribution to works, and that there is community support, contribution and/or investment to the works;
- the funds are used so as to meet the proposed objectives and outcomes for the Trust.

In addition to the above recommendations, there should also be operating principles that guide the panel on

- delegation of decision making;
- how it will manage the funding;
- membership of the panel;
- selection of the chair of the panel;
- membership timeframe;
- process for deciding broad areas of funding; and
- process for dealing with discretionary project applications.

However, there should be some leeway for the panel to determine its own *modus operandi* for the assessment of the projects and operations of the meetings.

It is recommended that Memorandum of Understanding will need to be established at several levels. There will need to be interagency agreements between the Water and Rivers Commission and the Water Corporation on when the funds will be delivered and when the Trust should be established. There will also need to be an understanding between the community panel and the Water and Rivers Commission on operating procedure and when decision making power is delegated for project proposals. The community panel and the LCDCs will also need to agree on the process of submitting project proposals and how the funds will be delivered to the community groups.

It is recommended that the Water and Rivers Commission and the Water Corporation delegate to the community panel decision making powers on determining broad areas of funding. Specific funding criteria for project proposals should also be given to LCDCs. The Water and Rivers Commission in consultation with the community and the community panel should prepare these criteria.

The roles of the community panel will be:

- to review progress in restoration projects against the river restoration strategy;
- to allocate broad areas of funding for each funding round;
- to coordinate with the LCDCs the funding of these projects;
- to clarify and if necessary amend specific funding criteria; and
- to decide on projects submitted against discretionary funds.

The roles of the LCDCs will be to:

- liaise with the landcare groups and individuals on priorities for project proposals;
- ensure that the projects submitted meet the broad criteria set by the community panel; and
- negotiate with the community panel on discretionary project applications.

Both the panel and LCDCs will be cognisant of the need to fund projects that will incrementally achieve the stream restoration target figures for stream length and riparian area.

3.4.1 Membership of the community panel

It is recommended that the panel will have representatives from the Harvey Basin community, Harvey and Coolup LCDCs, Agriculture WA, CALM, Water and Rivers Commission, local government and the Water Corporation. The members should demonstrate:

- knowledge of issues in the Harvey Basin;
- links and commitment to the community through living in the area or being involved in relevant work in the area; and
- good communication and negotiation skills.

It is recommended that the membership of the panel should be for at least two years and the membership terms should be staggered to ensure that there is continued knowledge of the projects and objectives of the Trust. The Water and Rivers Commission in consultation with the panel and relevant community groups will make future appointments to the panel.

3.5 Determination of the size of the Trust

The Water and Rivers Commission believes that there should be no net loss of riparian values in the Basin. Inundation of the riparian zone will result in the loss of stream ecological, functional and social values. It must be acknowledged that not all these values will be replaced by simply restoring an equivalent length of riparian zone elsewhere in the catchment. Hence additional compensation will be required to ensure there is no net loss of riparian values. The size of the Trust in dollar terms has been based on the estimated cost of restoring a section of river ecosystem equivalent to that which would be lost through the proposed Harvey Dam development. The major part of the cost is based on replacing the functional contributions of the fringing vegetation and coarse woody debris to the stream ecosystem that would be lost through inundation. The calculation of cost also includes incidental costs of recreating a riparian ecosystem in an agricultural landscape such as fencing, gates and crossings.

Riparian zone lost

The Water and Rivers Commission has used Microstation to calculate the total length of line strings captured at 1: 25 000 to determine an initial estimate of the total area of riparian zone to be inundated by the proposed dam. This was confirmed using aerial photography. Ground truth surveys of the exact area of inundation have not yet been undertaken.

To determine the area of riparian zone, the length of streamline that lies within the area to be inundated was calculated and that figure multiplied by a notional riparian zone of 100 m width for the main channel and 60 m width for tributaries. The somewhat wide riparian corridor on the main channel is to allow for the vegetation located on the small, but significant floodplains lying in areas along the river.

Table 1. Calculations for the riparian area to be inundated by proposed Harvey Dam

Parameter	Total
Main streamline length to be inundated	10.049 km
Minor streamline length to be inundated	14.594 km
Total streamline length to be inundated	**24.644 km**
Area of main riparian zone to be inundated (10.049 km x 100 m riparian zone)	100.49 ha
Area of minor riparian zone to be inundated (14.594 km x 60 m riparian zone)	87. 56 ha
Total area of riparian zone to be inundated	**188.06 ha**

The length of waterway that would be inundated by the dam is calculated to be 24.6 km (not including the current perimeter of the Harvey Reservoir foreshore). The area of riparian zone that will be lost is calculated to be 188 ha.

Cost of restoring riparian zone

In addition to replacement of riparian zone vegetation, there should also be some consideration of the instream functioning. Calculations of the number of riffle zones which will be inundated by flooding show that there is currently approximately one riffle every 200 m on the main tributaries, which is around 44 major riffles in total. On the minor tributaries there is approximately one riffle every 100 m. These small riffles are small woody debris sites that play an important part in stream ecosystem functioning.

Table 2. Calculation of costs of replacing riparian vegetation lost through the proposed Harvey Dam

Item	Cost $
Fencing both sides at $4510/km for 24.6 km	110 950
Manual noxious weed removal and follow up control at $330/ha for main streamline riparian zone of 100.49 ha	33 162
Revegetation at 3000 plants/ha $3000/ha for 188 ha	56 400
Battering and small riffles $2500/km for 2 sites every 1 km	50 000
Major riffle restoration $16 000/sequence for 10 sequences	160 000
Major woody debris sites $12 000/site for 10 sites	120 000
Crossings $2500/crossing for 15 sites	37 500
Watering points $2500/ point for 15 sites	37 500
Foreshore condition surveys $550/km x 2 sides for 24.6 km	27 060
Project management	75 000
Monitoring and evaluation	50 000
Total cost	**757 572**

The Water and Rivers Commission estimates that the cost of restoring the equivalent of the 188 ha of riparian zone that will be inundated is approximately $757 500. The breakdown of the cost of restoring 188 ha is shown in Table 2.

The costs of the specific actions were based on a mean for cost estimates given for similar riparian zone restoration project applications during the 1998-99 Natural Heritage Trust funding round as well as other restoration projects and personal communication. The derivation of mean costs is tabulated in Appendix 1. The costs include both labour and materials. The Commission has accounted for the cost of project management to implement and coordinate the restoration. It will also be essential to assess whether the project has made a meaningful difference to the health and condition of the waterways by the time the Trust has wound up. This cost should be considered as essential to any restoration undertaking.

The costs acknowledge that the area that will be restored is most likely to be in a rural setting. The calculations are based on the cost of restoring a riparian zone from what is on average a 'C- D grade' stream condition to what is on average a 'B grade' stream (based on Pen and Scot's *1995 Stream Foreshore Assessment in Farming Areas*). A waterway at 'C – D' grade has a foreshore that supports only trees over weeds or pasture, or just plain pasture. Bank erosion and subsidence may occur in a few to most locations.

The Commission emphasises that there would still be a net loss of riparian values in the whole Harvey Basin. This is because the restored riparian zone was already existing in the Basin and the inundated riparian zone would be permanently lost. Simply, there is a length of waterway that will no longer exist in the Basin. It is possible to upgrade the remaining length of waterway to recover some of the functional and ecological values lost with the inundated length of waterway. The Commission also acknowledges that the full cost of replacing the lost values can not be fully accounted for due to our inability to restore a degraded site to an undisturbed 'A grade' waterway.

It should be noted that the $757 500 of Trust funds would be matched with in-kind support from the LCDCs and project proponents. This means that 188 ha of riparian zone is the minimum area that could be restored in the whole Harvey Basin.

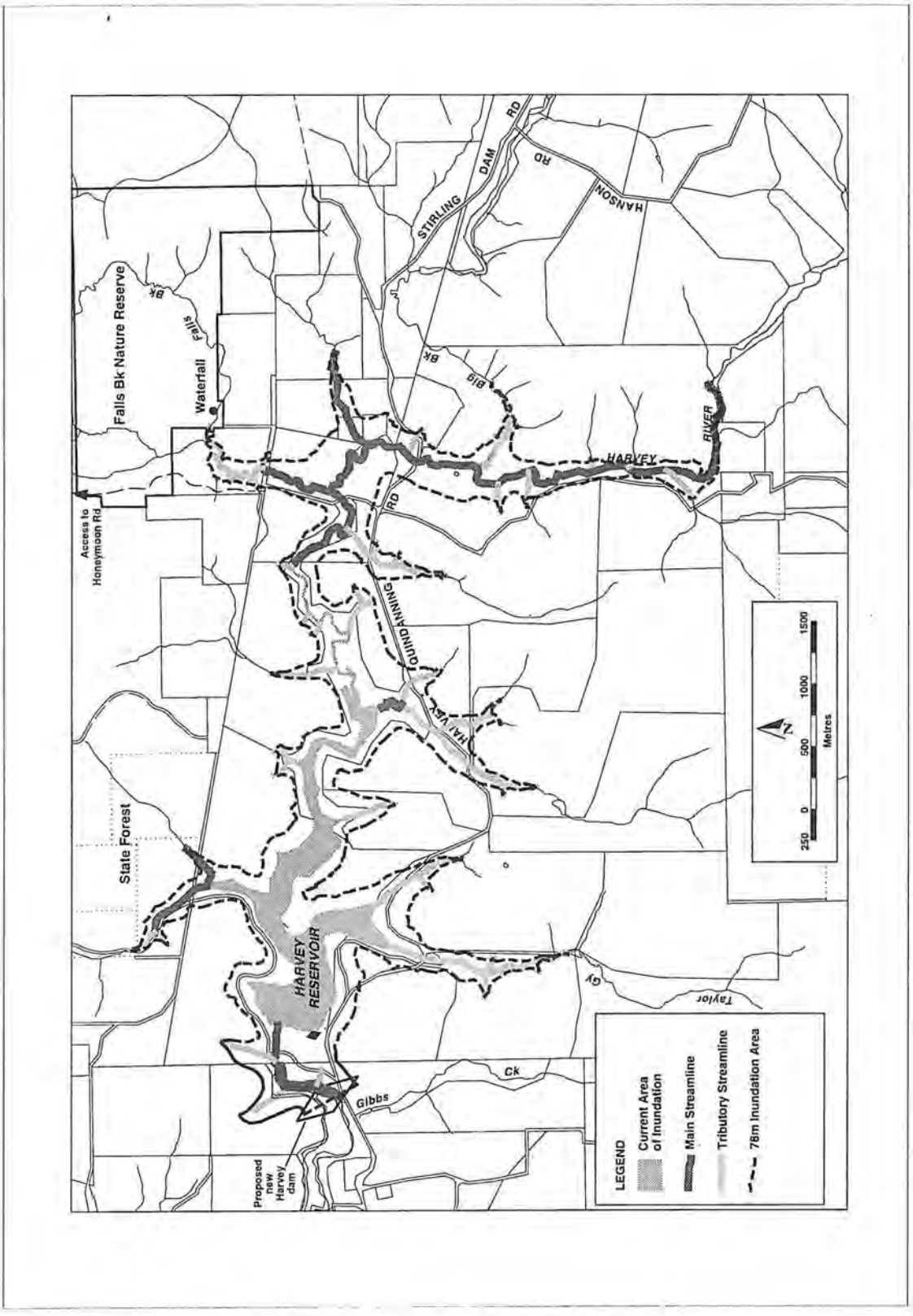

Figure 3. Area of inundation of the proposed Harvey Dam

(Shows current area of inundation of Harvey Weir and the minor and major streamlines which would be inundated by the proposed dam.)

3.6 Priorities for use of the Trust funds

In establishing the Trust it should be understood that the Trust funds would be used with the understanding of getting maximum return from the investment. This principle will determine the proportion of funds used for planning, administration and on-ground works.

Strategic planning

One of the advantages of working in partnership with the local community groups is that both parties provide some form of contribution to the overall output of river restoration. The combined output will be significantly more than the individual parties could provide singly. By matching Trust funds with in-kind contributions or other contributions from the local community groups, there will be an additional capacity for river restoration compared to just using the Trust funds alone for the full cost of restoration. By having additional community contribution, it is acknowledging that there would be both public and private benefit to the restoration of the riparian zone.

Specifics on priorities for restoration and recommended restoration techniques should be covered in the proposed *Peel-Murray Sub-Region River Restoration Strategy*. The Water Corporation should have input to the strategy with possible representation on a working committee. The Water and Rivers Commission will be the lead agency facilitating the restoration strategy; however, the community groups and LCDCs will be the key groups responsible for the prioritisation of works and the organisation of implementation. The Water and Rivers Commission's Restoration and Management and Protection and Enhancement Sections will provide specific guidance on recommended restoration techniques for the area.

Agriculture WA is preparing a catchment management plan. This plan will be complementary to the river restoration strategy that will help address many of the catchment management issues such as loss of riparian vegetation and habitat corridors, eutrophication, erosion and bank stabilisation. The Water and Rivers Commission and the Water Corporation may be key stakeholders identified in the catchment management plan.

It is recommended that a portion of the Trust funds go towards project development support; however, the main portion of the Trust funds should be used for on-the-ground works. It is essential that on-the-ground works be planned in a way that involves the local community and gains their endorsement and ownership for the proposed works. The community panel, which will oversee the funding of river restoration projects, should ensure that funds are available for the planning of the on-the-ground works. LCDCs will assist community groups and landowners in the development of river restoration projects and action plans. These plans should include auditing and evaluation of projects and long term monitoring to be carried out by stream ecologists before and during the life of the Trust and once the restoration work has matured.

On–the-ground works

It is recommended that for each funding round the community panel determines how much money will go to each LCDC. This decision should be based on the works proposed by the LCDCs to meet priorities identified in the river restoration strategy. It will be up to the LCDCs how they distribute the allocated funds to the groups implementing the on-the-ground works.

In addition to these allocated funds, it is recommended that a portion of the total annual funding be used for discretionary projects. LCDCs could apply with specific project proposals that meet the objectives of the river restoration strategy but are outside of the major priorities identified for that funding round. This will allow the panel discretion to fund projects on their merits. Discretionary funds will encourage a process of innovation and taking advantage of unforeseen opportunities.

The community panel and the LCDCs should negotiate the suitability of using funding to employ Landcare coordinators. The negotiations will identify the benefits of spending the money on the ground or establishing a coordinator's position.

Administration

It is recommended that administration costs be kept to a minimum. It is hoped that, by aligning the Harvey Basin Stream Restoration Trust to the WA Landcare Trust, there will be minimal expense in setting up an administrative framework. The Water and Rivers

Commission should cover costs incurred in establishing the scope and operating principles with the stakeholders. Typically, members of a community panel are allowed to claim travel costs incurred when attending a working panel. Other costs may include the distribution and printing costs of funding eligibility conditions and application forms. The community assessment panel will also need to have copies of the applications distributed to them for assessment. A small budget should be set aside for these costs.

3.7 When should a Trust be formed?

The Water and Rivers Commission and the Water Corporation will need to negotiate at what point during the development of the proposed Harvey Dam should the delegation of responsibilities for riparian replacement be made to the Commission. It is recommended that the Trust be formed as soon as possible after the development is approved in the Public Environmental Review process. It will be necessary to determine when the Commission is able to establish the Trust and when funds for riparian restoration can be transferred. A Memorandum of Understanding will outline the timing of the delivery of the funding by the Water Corporation and whether the funding is to be delivered to the Trust in instalments.

3.8 Funding timeframe

The timeframe for the Trust will be determined by the capacity and pace of those community groups and landowners involved in streamlining within the Basin. It is envisaged that the Trust may expend all of its funds within 5 to 10 years. In this way, the community panel and LCDCs can ensure that funds are put to best use, allowing ample time for groups and landowners to form teams, draw up projects and implement them within realistic timeframes, without over-taxing community members and engendering burnout amongst those committed to catchment management.

3.9 Boundary of interest

It is proposed that the areas of interest for the Trust to operate are the waterways within the Harvey Basin as shown on Figure 1. These will include:

- the Upper Harvey River, stretching from the Darling Plateau to the Harvey River Main Drain;
- the Lower Harvey River, stretching from the Harvey River Main Drain to the Harvey Estuary;
- Harvey River Main Drain;
- Harvey Diversion Drain (taking overflow from the upper Harvey River to the Indian Ocean);
- Coolup Main , South Coolup, Mealup, and Caris Drains, which empty directly into the Harvey Estuary;
- Mayfields, Waroona, Logue, Bancell Brooks, Samson Brook, Meredith and Clarkes Brook drainage lines, which all empty into the Harvey River;
- numerous creeks and brooks conveying water from the Darling Range to the drainage systems on the Swan Coastal Plain; and
- Wellesley and Wokalup Creeks.

3.10 How the Trust will work

Details on how the Harvey Basin Stream Restoration Trust will work will need to be filled in at a later stage following consultation with the principal stakeholders including the Water Corporation, community groups and the LCDCs.

The following details will need to be negotiated:

- who can apply for funds;
- how to apply for funds;
- details of the project application forms;
- details of the assessment criteria;
- details of the broad funding criteria;
- details of the 'target scoring system' for projects.

3.10.1 Determining project and proponent funding eligibility

The Water and Rivers Commission recommends that:

1. All Landcare groups and individuals within the Harvey River Study Area boundaries be eligible for funding.

2. Any stream restoration works (or streamlining) aimed at private or public land within the Harvey Basin are eligible for funding support.

3. Full costs (except for labour) will be met for any works on public land, except for fencing out of stock where a 50:50 cost share on materials will be acceptable.

4. On private land the cost share will be 50:50 and it is envisaged that most of the matching funds will be as in-kind contributions of labour and personal time for planning and coordination.

5. Actual subsidies for fencing will be determined by the community panel but will rise with the intensity of streamlining. For example, at one extreme, subsidies for fencing will be minimal for only a narrow riparian corridor planted only with trees (and allowed to be crash grazed once the trees have matured), and at the other extreme, will be maximum for a broad riparian corridor with a full assemblage of native plant species (see Section 3.6). This is necessary as the cost of fencing will remain largely the same regardless of the planting intensity or lateral extent of streamlining which are factors that the panel and LCDCs must take into account in meeting the targets of the Trust.

6. There will be three levels of river restoration, limited, partial and full restoration. Project proposals will be scored according to their final restoration outcome and contribution to the desired total restoration target. Table 3 gives an initial idea of how the three levels of restoration may be classified.

3.11 Measuring the success of the Trust

3.11. 1 A compliance system

It is envisaged that a variety of stream restoration projects will be acceptable to the Trust, including traditional streamlining activities. A system will be required to assess how well proposed projects comply with the objectives of the Trust and to what extent they should be financially supported for those aspects of the projects which do not directly contribute to restoration, such as fencing, stock crossings and watering points. The system will be simple, based on rules of thumb, and will be agreed to by the community panel and applied by the LCDCs.

3.11.2 Auditing and accountability

There will be a need to audit projects and to be accountable for funds. This should be done in a very simple way. State government agencies that are involved in a support role on various projects will do simple one-page reports on the implementation of projects, confirming that the area and stream length rehabilitated is as stated in the original application, more or less. The reports will also be a record of the work done and its successes and failures, and will be lodged with the Water and Rivers Commission as part of a historical record of stream restoration projects. Eventually, this record will be reviewed to produce a 'State of the Art' report that can contribute to the development of stream restoration expertise and technologies in the south west of WA. Before and after photographs will be taken as a visual record. Financial reports will be a simple written report of actual financial and in-kind community costs. Once again this information will go towards the 'State of the Art' review.

Sections of stream that have been rehabilitated will be entered on a GIS and coded according to the compliance system to determine the extent to which the objectives of the Trust are being achieved.

An annual report of the Trust projects will be produced and distributed to sponsors of the Trust, community groups and government agencies active in the Harvey Basin.

3.11.3 Monitoring for ecological outcomes

At the end of the day, the Water and Rivers Commission must demonstrate to the Department of Environmental Protection and the EPA that the functional attributes of stream section that were lost through the dam development have been effectively replaced in the Harvey Basin. The Commission must demonstrate that the equivalent fringing vegetation has been established, habitat has been created and water quality improvements have been achieved. This will require a long term monitoring program that essentially assesses ecosystem function. It will probably involve measurements of stream invertebrate diversity (which reflects habitat complexity), stream metabolism (which reflects stream ecosystem health) and certain water quality variables, such as nutrient levels, sediment load and gilvin concentrations[2].

[2] Gilvin is the material that gives natural waters their characteristic dark colour. Otherwise known as tannin.

Monitoring will begin before any works are in place, to characterise degraded streams and drains. Then while continuing to monitor these sites, monitoring will progress to rehabilitated sites to assess the rate at which improvements in ecosystem health and water quality are achieved. Monitoring will cease at some point following the completion of those works funded by the Trust.

Reports on the monitoring results, together with summaries of project compliance and auditing, will serve as the basis for periodic reports by the Commission to its Board and to the Trust sponsor, DEP and EPA.

3.12 Sponsor acknowledgment

It is recommended that there should be public acknowledgment of the sponsors of the Trust, namely the Water Corporation of the Harvey Dam and the Water and Rivers Commission. Options for this acknowledgment could include:

- the name of the funding assistance program;
- the Water Corporation's logo on communication and application documents;
- name of project signs at the on-ground works sites.

Table 3. Proposed riparian restoration levels

Restoration level based on riparian resource value	Notional depth of riparian restoration zone	Area of riparian restoration/km	Degree of biodiversity plantings (community species %)	Site preparation for revegetation	Fencing	Bank stabilisation and habitat creation
Limited restoration to maintain drainage function	10 m each side (20 m total)	2 ha	• Floodfringe species (main river channel kept clear of vegetation for drainage) • 100% floodfringe species • Density of 600 seedlings /ha	• Ripping • Mounding • Planting • Weed control	Yes – for exclusion of stock from sites, including crossings and watering sites if necessary	Limited – for isolated erosion and sedimentation 'hot spots'
Partial restoration for buffer zone value	20 m each side (40 m total)	4 ha	• Floodfringe species and overstorey species of riparian verge • 25% floodway species 50% floodfringe species 25% riparian verge overstorey species • Density of 1500 seedlings/ha	• Ripping • Mounding • Planting • Weed control	Yes – for exclusion of stock from sites, including crossings and watering sites if necessary	Limited – for isolated erosion and sedimentation 'hot spot'
Full restoration for biodiversity value	30 m each side (60 m total)	6 ha	• Full restoration of entire riparian zone with understorey and overstorey species • 25% floodway species: 50% floodfringe species: 25% riparian verge under and overstorey species • Density of 3000 seedlings/ha	• Ripping • Mounding • Planting • Weed control	Yes – for exclusion of stock from sites, including crossings and watering sites if necessary	Creation of instream habitat with pools and riffle sequences (logs and rocks) and mitigation of erosion and sedimentation 'hot spots'

4. Outline for the Peel-Murray Sub-Region River Restoration Strategy

4.1 Working together

The recommendation to establish the Harvey Basin Stream Restoration Trust is based on the assumption that strategic planning will help coordinate the river restoration works. This section outlines a proposal for a river restoration strategy that will ensure that Trust funds are spent to achieve maximum return for the investment.

As outlined in Section 2.5 the proposed river restoration strategy will be meeting objectives of the proposed South West Regional Strategy. The regional strategy will determine whether each sub-region has a a separate strategy for the major environmental issues or whether a single sub-regional strategy addressing all issues will be developed. For the purpose of this document, it is assumed that within each South West sub-region a river restoration strategy will be prepared.

It is recommended that the *Peel-Murray Sub-Region River Restoration Strategy* will outline the means or tactics available to achieve the restoration of streams within the Basin. It will describe those groups and agencies involved and their various roles. It will also identify where the strategy fits into regional Integrated Catchment Management (ICM). The strategy will be part of the Waterways WA Program and will also fit into other NHT funded programs such as Bushcare. Details on how planning and coordination will be carried out; where technical support is available; and over what timeframe the strategy will operate should also be identified in the strategy.

4.1.1 Context of a river restoration strategy

State government agencies are presently involved in establishing a framework for integrated natural resource management across the State. A driver for this is the Natural Heritage Trust which, through partnership agreements with the four leading natural resource management agencies, AgWA, CALM, WRC and DEP, requires the development of integrated regional land and water care strategies. The State and Federal governments have a partnership agreement that outlines priorities and programs for natural resource and environmental management in Western Australia. The State has six priority programs: State Salinity Action Plan; Biodiversity Conservation; Rangelands Management; World Heritage; Coast and Clean Seas and Waterways WA. Regional strategies are a way to meet the objectives of these priority programs. Waterways WA is the primary program which will guide river restoration in Western Australia.

Waterways WA program

The Water and Rivers Commission has as one of its responsibilities the coordination of the management of the State's waterways. Clearly the staff of the Commission alone cannot do this. Rather, the Commission must develop partnerships with the community, including local government, and other State Government agencies.

The Commission is developing the Waterways WA program in partnership with the community and other government agencies. The Waterways WA program coordinates and supports those activities that pertain to the direct management of waterways and ensure the appropriate linkages with other programs.

In rural areas such as the Peel-Murray Sub-Region, the Waterways WA program plans to concentrate on waterways as a key part of catchment management. The Commission would also lead catchment revegetation works for stream systems identified as having potential for water supply (eg priority catchments). However many of the problems facing the sub-region cannot be simply addressed as part of one program. The problems of salinisation and eutrophication, which arise on or from farmlands, would be covered by broader catchment management initiatives such as embodied in AgWA's Sustainable

Rural Development (SRD) Program, that addresses water balance and soil erosion issues on agricultural land.

4.2 The Peel- Murray Sub-Region River Restoration Strategy outline

The following section briefly outlines the initial thoughts of what the *Peel-Murray Sub-Region River Restoration Strategy* might include and the process of developing the strategy.

4.2.1 Proposed content of the River restoration strategy

The river restoration strategy should be structured to:

- identify goals and objectives for river restoration;
- describe the local environment and natural resources;
- describe the status and current condition of the waterways;
- assess current management practices;
- identify opportunities and issues of concern and the process for working through them;
- take into account long-term environment, social and economic trends;
- sets targets towards achieving measurable environmental outcomes;
- describe priorities for on-ground actions that implement the strategy;
- outline the techniques for river restoration.

The Water and Rivers Commission has envisaged that the strategy should aim to achieve a number of outcomes which are listed below. However, further consultation will ensure that all stakeholders desired outcomes be considered in the development of the strategy. The stakeholders and their potential roles in the strategy are outlined in Appendix 2. It is suggested that the river restoration strategy should:

- assist community groups and natural resource agencies to better integrate their river restoration activities in the Peel-Murray Sub-Region;
- encourage the development of sustainable river protection practices;
- be the basis for ensuring financial assistance is obtained and is used in a way that is well coordinated;
- encourage the development of action plans and coordination of activities under various programs and funding sources;
- identify where river restoration links with other programs ;
- ensure a mechanism for auditing, accountability and monitoring of the implementation and outcomes of the action plans.

The Water and Rivers Commission will be the lead agency for encouraging the development of the strategy and ensuring that the mechanisms for its implementation are in place. The process for developing the strategy should involve extensive community and government agency consultation through public comment and the formation of a working group.

It is expected that the river restoration strategy for the Peel-Murray Sub-Region, will be developed as a priority initiative of the Waterways WA program. The strategy must be significantly developed prior to the formation of the Harvey Basin Stream Restoration Trust, as its priorities will be essential for decision making on where river restoration funds will be best spent in the region.

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Glossary

Action plans	Action plans identify the activities, costs and timeframes required to implement a regional strategy. A regional strategy may be delivered though a single action plan or a number of plans. Each of the action plans identified in a strategy should undertake clear on the ground activities to be undertaken by stakeholders such as by whom, where, when and how they will be achieved.
Allocation	The quantity of groundwater permitted to be abstracted by a well licence, usually specified in kilolitres/year (kL/a).
Beneficial use	The current or future uses for water resources that have priority over other potential uses because of their regional significance to the community.
Environmental Water Provisions	Actual level (allocation) made after consideration of the economic and social requirements for the water. It may be equal to or less than the Environmental Water Requirements.
Hectare (ha)	10 000 square metres or 2.47 acres.
Kilolitre (kL)	1000 litres, 1 cubic metre or 220 gallons.
Memoranda of understanding	Official documents adopted by two or more organisations to determine how they will operate relative to each other and identify areas of responsibility.
Objectives	The things we want to achieve. They are often referred to as targets. Objectives should be specific, measurable, attainable, relevant and time-framed.
Outcomes	Outcomes are the impact of your project or strategy.
Outputs	The quantifiable "product" or "service" resulting from a project.
Regional strategy	A document with a regional focus, which identifies issues for management as well, as identifying who, when and how plans of action will be implemented to address the issues.
Restoration targets	The measurable outputs of restoration actions such as 20km of streamline fenced.

Appendix 1

Estimates for specific restoration items

Based on 1998-99 NHT applications for the South West and South Coast Regions.
Costings have been crosschecked with the Farm Budget Guide 1998 and *the Draft Best Management Practices for Rural Drains* (1999). Other specific personal consultation is outlined in the acknowledgments.

ITEM	MATERIALS	LABOUR & EQUIPMENT HIRE	TOTAL COST ($)
Fencing/km (one side only)	6 line ringlock fencing = $845 100 steel posts = $380 5 strainer assemblies = $280 1 line plain wire = $150 Total materials = $1655	Fence erection costs (2 people @20 hours at $15/hr) = $600/km	2255 /km
Manual noxious weed removal and follow up control/ha	$10/L glyphosphate/ha	Hire of spray units = 15/day/ha Chainsaw and operator = $200/day/ha General labour =$15/hr @ 7hrs/ha	330/ha
Revegetation: Seedling planting and site preparation – density at 1000 plants /ha	Seedlings at 50 cents each including $10/L glyphosphate for 1 ha and $10/L simazine for 1 ha	Ripping/mounding (hire), spraying and planting at 50 cents per seedling.	1000 /ha
Revegetation of sedge fringe species density of 2 plants/m x 3 rows.	Seedlings are $2 each in cells	Labour is $15/hr at a rate of minimum of 10 m planted/hr	13 500 /km
One rock lined crossing	Rock spoil, concrete and delivery at $165/$m^3$ for 10 m^3 = $1650	Excavator hire for 5 hours including mobilisation charge = $700 Two labourers at $15/hr labour for 5 hours = $150	2500 each
One livestock watering point	Fencing material = $1500 Bank stabilisation materials $800	Two labourers at $15/hr for 6 hours = $200	2 500 each
Creation of a full riffle sequence	Construction material (logs and rocks) = $6000	Log retrieval and placement using excavator hire = $6 000. Labour costs = $1500 Site design and supervision = $2500.	16000 /km
Large woody debris site /km	Timber over a 500 m site = $2 000	Log retrieval and placement using excavator hire = $6 000. Labour costs = $1500 Site design and supervision = $2500.	12 000 /km
Rebattering of banks or small woody debris being placed in river channel.	Construction materials including rock spoil and woody debris = up to $1600	Excavator hire for 5 hours including mobilisation charge = $700 Two labourers at $15/hr for 6 hours = $200	2500 /site
Foreshore condition surveys /km	Consumables =$50/km	Field work, mapping and coordination = $500/km	550 /km

Appendix 2

Key stakeholders in the Harvey Basin

Water and Rivers Commission will be responsible for realising the objectives of the Trust. It will be responsible for the preparation of the river restoration strategy, the formation of the community panel, the distribution of funds via the panel, project evaluation and auditing and long term monitoring to assess outcomes. Monitoring results will be passed to the Department of Environmental Protection for auditing of the environmental management commitments under the PER/ERMP for the dam development, should it occur. The Commission will also provide technical support to groups undertaking streamlining activities through the Waterways WA program.

Water Corporation will provide the funds that make up the actual Trust. In doing this it will delegate responsibility for replacing those stream ecosystem functions lost through the dam development to the Water and Rivers Commission. However, the Corporation will remain a governing member of the Trust through a position on the community panel. The source of the Trust's funds will also be publicised to pay credit to the Corporation's contribution to the Trust initiative and the WA Landcare Trust.

Agriculture Western Australia is responsible for sustainable rural development in the region and has a considerable history of promoting streamlining in the Peel Region, both to buffer nutrient loss from farmland and subsequent transport to waterways. AgWA will continue in this activity, helping to integrate stream restoration projects into farm planning and the general landcare activities of the region. In partnership with CALM, DEP, WRC and the community, AgWA will have probably the strongest role in integrating the river restoration strategy into the broad landcare activities of the Peel Sub-Region.

Department of Conservation and Land Management is responsible for the conservation of native flora and fauna. It should promote the integration of stream restoration projects into protection, rehabilitation and connection of remnant bushland, as a part of the Bushcare Program, and in the conservation of wetlands for which CALM is the lead agency.

Department of Environmental Protection, via the Environmental Protection Authority and the Minister for the Environment, should be responsible for formulating and enforcing the environmental conditions placed on the dam development. These will result from a PER/ERMP that the Water Corporation will be required to carry out in gaining approval for the development. In effect the Trust will be part of the environmental management program for the dam. The Water and Rivers Commission will have responsibility for the Trust and its objectives. The Commission will be subject to an audit by the DEP at various times during the life of the Trust from its initial formation to the assessment of the environmental benefits that should stem from the resultant stream restoration works.

Local Government often supports, or works in partnership with, LCDCs and community groups, often providing, at little cost, expert advice, technical support, equipment and materials necessary for site preparation prior to restorative works. Community groups in return may volunteer their services to rehabilitate Shire reserves. The Trust will support local government activities that contribute to stream restoration and especially community projects.

Land Conservation District Committees are formed under the Soil and Land Conservation Act to protect agricultural land at a district level. However, many LCDCs also take a pro-active role in landcare, bushland protection and streamlining. In the Peel region, the Harvey and Coolup LCDCs and their associated community groups have been involved in streamlining activities since the last decade. With respect to the Trust these two LCDCs will have the crucial role of coordinating river restoration projects and determining the actual allocation and distribution of funds to the community groups, local governments and individual landowners. It is these groups and individuals that will undertake the actual work. It should be noted that in many cases the same individuals are from time to time members of local

government, LCDCs and community catchment groups.

Community Catchment Groups are the fundamental units of project development and action. These groups will draw up and execute most of the projects that will be submitted to the Trust for funding support. They will work with their respective LCDCs to design and coordinate projects that meet the aims of the Trust. It is acknowledged that catchment groups will also engage the cooperation of individual landowners that are not ordinarily group members

Landowners may prefer to act as part of a group or on an individual basis, working cooperatively with catchment groups or directly with LCDCs to obtain funding support for small scale streamlining activities. The Trust will fund individual landowners providing their activities are coordinated by an LCDC.

Peel Inlet Management Authority is a statutory body operating under *the Waterways Conservation Act 1976.* It is part of and is supported by the Water and Rivers Commission. Its role is to protect and manage the natural environmental values of the Peel Inlet and Harvey Estuary and sections of the Murray, Serpentine and Harvey Rivers that fall with its proclaimed management area. As such PIMA has a vested interest in the objectives of the Trust, which will contribute to improvements in the quality of water entering the Harvey Estuary.

Alcoa of Australia Ltd is a multinational corporation that mines bauxite and refines alumina in the Peel Region. Alcoa is a leader in environmental management, not only with respect to its own activities, but also in sponsoring landcare in the wheatbelt and the Peel-Harvey catchment (and recently in the Swan catchment). Stream restoration projects to be supported by the Harvey Basin Stream Restoration Trust may be complemented by or integrated into landcare projects that receive funding support from Alcoa funds.

The Community Panel will comprise representatives of most of the above groups. It will have as its role the annual duty of determining the broad areas of stream restoration works that may be supported by to the Trust and the extent of funding in any one year. For example, a certain amount of money may be set aside for the replacement of coarse woody debris. It will negotiate with the LCDCs as to the types and size of stream restoration projects that will be supported. It will determine the extent of subsidies for particular works (such as fencing and stock crossings and watering points) based on the intensity and extent of streamlining activities. The community panel will be cognisant of the objectives of the Trust and thus determine minimal constraints within which the LCDCs and other community groups will have to work.