Assessment of Freshwater Ecosystem Values *in the* Sassafras - Wesley Vale Irrigation Scheme Area: Guidance for Water Management

Water Resources Division
Department of Primary Industries and Water
Report Series WMP 07/10
April 2007

CFEV project

Preferred Citation

DPIW (2007) Assessment of Freshwater Ecosystem Values in the Sassafras – Wesley Irrigation Scheme Area: Guidance for Water Management. Technical Report No. WMP 07/10. Water Resources Division, Department of Primary Industries and Water, Hobart.

Cover Images

Top left. Tree species in the lower part of Panatana Rivulet
Top right. Burrowing crayfish burrows in the Panatana Rivulet catchment
Bottom left. Low dam levels near Pardoe Creek
Bottom right. River mouth of Panatana Rivulet at Port Sorrell

The Department of Primary Industries and Water (DPIW)

The Department of Primary Industries and Water provides leadership in the sustainable management and development of Tasmania's natural resources. The Mission of the Department is to support Tasmania's development by ensuring effective management of our natural resources.

The Water Resources Division provides a focus for water management and water development in Tasmania through a diverse range of functions, including implementing the *Water Management Act 1999*, the Water Development Plan for Tasmania and the National Water Initiative; design of policy and regulatory frameworks to ensure sustainable use of surface water and groundwater resources; monitoring, assessment and reporting on the condition of the State's freshwater resources; and facilitating water infrastructure development projects.

Glossary

Biophysical class: Individual element (either biological or physical) used to characterise freshwater-dependant ecosystems as predicted under pristine (or pre-European settlement) conditions. For example, the biophysical classes for riverine ecosystems are fish assemblages, geomorphic river types, aquatic plant assemblages, tree assemblages, crayfish assemblages, macroinvertebrates and hydrology. Every ecosystem spatial unit has a suite of biophysical classes attached to it, the most representative being the "important biophysical class".

CFEV project: The 'Conservation of Freshwater Ecosystem Values' project which has developed a planning and information tool (an analytical framework and database) to support the inclusion of freshwater values within a strategic framework for the management of Tasmania's freshwater resources.

Conservation Management Priority: Summary estimate of the priority for conservation management, integrating assessed conservation value, condition and land tenure security. An ecosystem can be categorised as Very High, High, Moderate or Low Conservation Management Priority.

Distinctiveness: Expressed in two ways: whether the ecosystem unit contains rare classes of ecological components (a rare biophysical class) and/or 'Special Values' (i.e. conservation values other than those selected for representativeness).

DPIW: Department of Primary Industries and Water

Integrated Conservation Value: The conservation value of an ecosystem spatial unit where the Representative Conservation Value has been combined with it Special Value rating.

Naturalness: A measure of the departure from pre European natural reference condition. This was derived for each ecosystem unit within the audit process as a single score based on a variety of sources of biophysical information.

Representativeness: This was assessed by undertaking a biophysical classification of each ecosystem based on pre European settlement natural features (e.g. fish, riparian vegetation, hydrology, etc.). It is defined as the degree to which each ecosystem is representative of the class to which it has been assigned.

Important biophysical class: The biophysical class, which is the main driver for the selection and conservation value rating of an ecosystem spatial unit. This is the value of which the ecosystem spatial unit is considered to be most representative.

Representative Conservation Value: Measure of relative importance of ecosystem units based on their rarity, their representation of biophysical classes and condition.

Special Values: Unique or 'distinctive' conservation values other than those captured by the representativeness assessment process. These include values such as threatened flora and fauna species, threatened flora and fauna communities, priority geomorphic and limnological features and important bird sites.

Table of Contents

1. Introduction

1.1. Background

Providing water to meet the needs of aquatic ecosystems is a key component of the management of water resources.

In general, Tasmanian rivers and streams are managed to provide a flow regime that meets the needs of the entire aquatic ecosystem, rather than discrete elements of the ecosystem such as a fish species. The natural flow regime is taken as the best guide to the flow requirements of the entire aquatic ecosystem, and hence the management of flow is based on maintaining or mimicking key flow components of the natural regime.

Whilst broadly aiming to meet the flow requirements of the entire ecosystem, flow management in Tasmania can now be undertaken utilising information on specific freshwater ecosystem values, and integrating the flow requirements of these values within the broader ecosystem context. The information tool used in Tasmania to determine the values specific to an ecosystem is the newly-developed Conservation of Freshwater Ecosystem Values (CFEV) database.

The purpose of this assessment is to identify priority freshwater ecosystem values in the Sassafras - Wesley Vale Irrigation Scheme area in order to provide guidance to the management of water resources in the catchment.

1.2. The Sassafras - Wesley Vale Region

The Sassafras - Wesley Vale Region is a part of the Rubicon Water Management Region, located on the central north coast of Tasmania east of Devonport (Figure 1). It is 175 km^2 bounded in the west by the Mersey River, in the east by Port Sorell and to the South by state forest. In addition a part of the area is in the Latrobe area of the Mersey River catchment, and water from this area flows back into the Mersey River.

The region contains five subcatchment areas:

- the Wesley Vale area, which includes the coastal streams, Pardoe & Andrews Creeks;
- Panatana Rivulet catchment;
- Greens Creek catchment;
- the Sorell area, which includes several small creeks flowing into Port Sorell; and
- the Latrobe subcatchment which is in the Mersey Water Management Region.

The Sassafras – Wesley Vale region overlies coastal and northern tertiary basin sediments. Groundwater is present, and springs supply water to several of the creeks and rivulets in the area. Groundwater is widely used as an additional source of water for irrigation in the area.

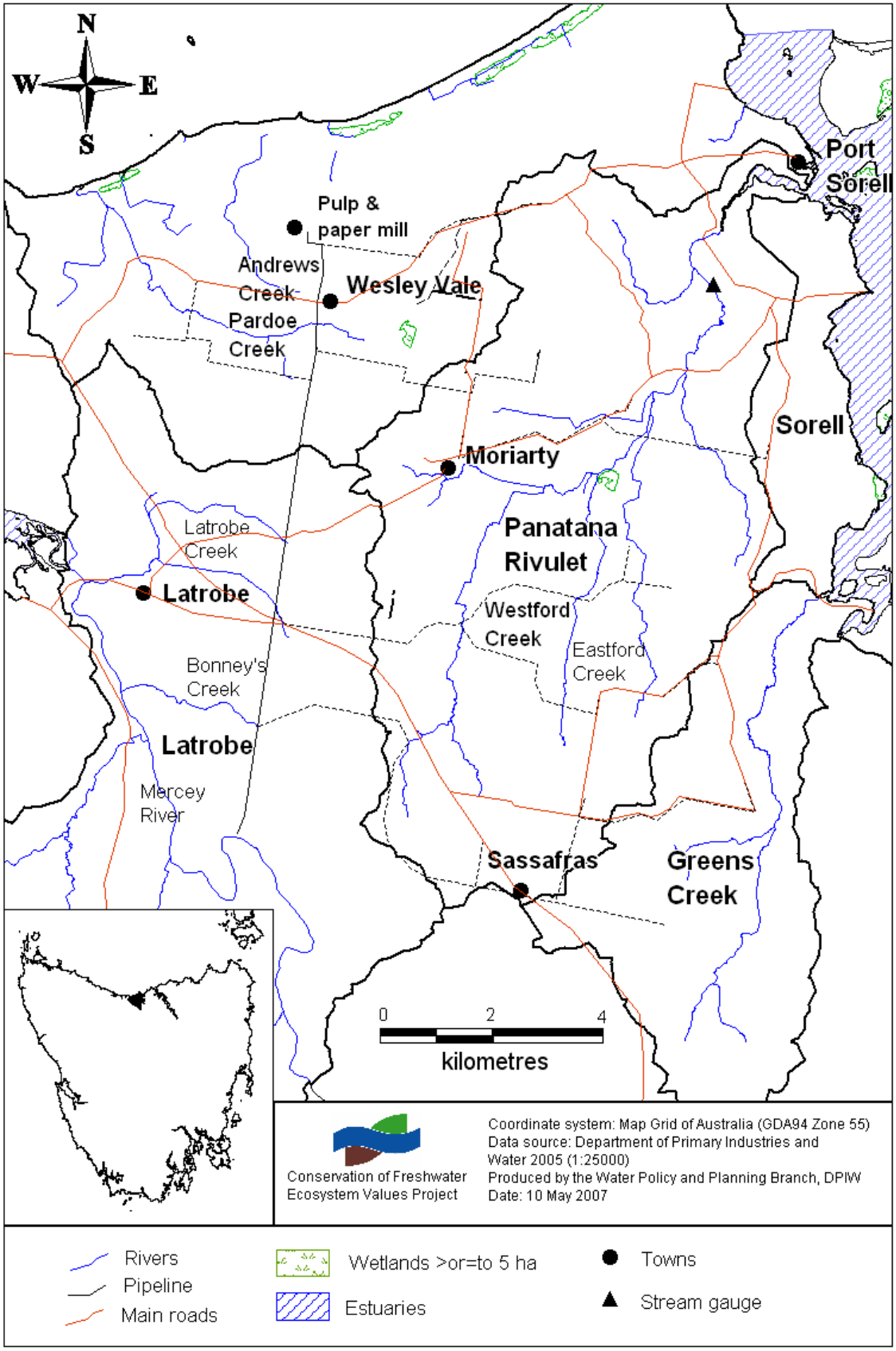

Figure 1. Surface water drainage in the Sassafras – Wesley Vale area including the stream gauging station and subcatchment areas. CFEV, © State of Tasmania and the LIST.

1.3. Conservation of Freshwater Ecosystems Values Framework and Database

Ecological values in the Sassafras - Wesley Vale area were presented using values from the Conservation of Freshwater Ecosystem Values (CFEV) database, which contains the results of assessment using the CFEV Framework (CFEV, 2005).

The CFEV Framework (Figure 2) was developed in order to rate the conservation value and management priority of all mapped examples of freshwater ecosystems in Tasmania. The Framework uses a systematic approach based on Naturalness*, Representativeness*, and Distinctiveness*, and a set of data which identify the natural biophysical character and condition of the ecosystems in a standardised way.

The CFEV Framework provides an assessment of the relative conservation value of an ecosystem unit, based on the relative rarity of its features and their condition. The Framework also provides data on the natural features and condition of single or multiple ecosystem units. These data are used for a variety of purposes, including reporting, resource planning, and environmental impact assessment.

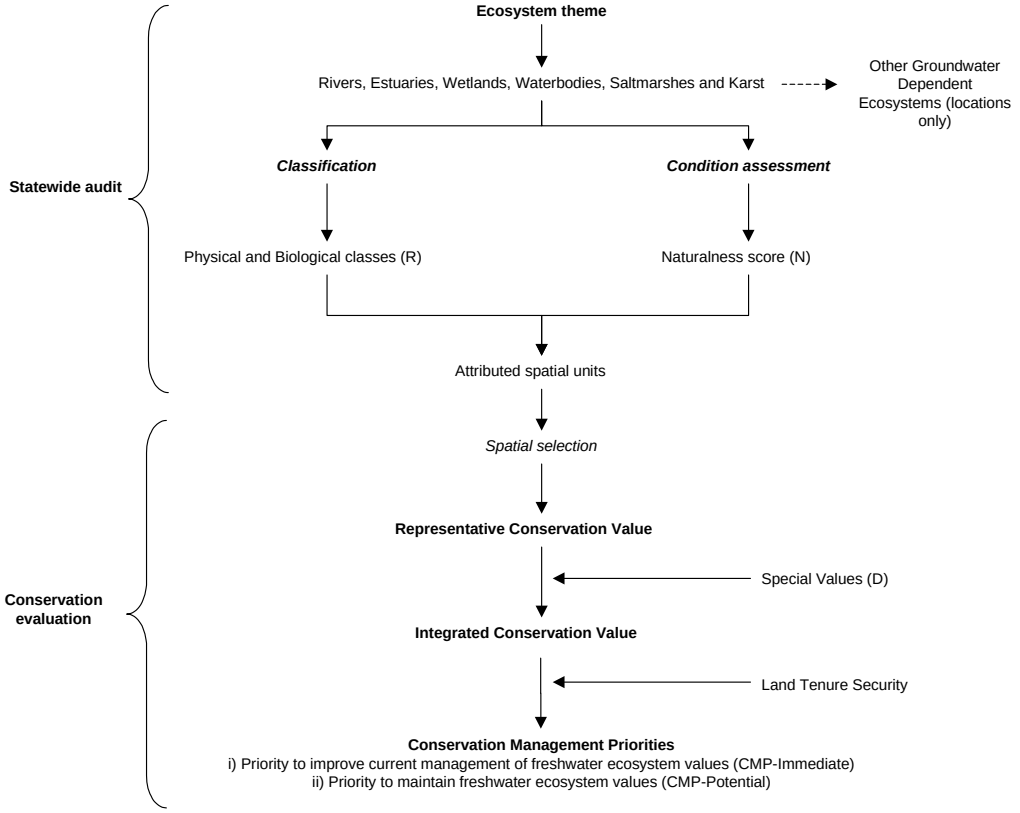

Figure 2. Assessment of Tasmanian freshwater-dependent ecosystems under the CFEV Framework, based on the state-wide audit and conservation evaluation (DPIW, in prep.).

Through a comprehensive state-wide audit, the CFEV Framework has identified the natural characteristics and current condition of freshwater ecosystems in Tasmania. A biophysical classification of each ecosystem unit, based on pre European settlement natural features, provides the Representativeness aspect, which is defined as the degree to which each ecosystem unit is representative of the class to which it has been assigned.

*see Glossary for definition of these words or terms.

An assessment of change from pre European or "natural" reference condition provides the Naturalness aspect.

Through the classification, a suite of associated biophysical classes* is described for each ecosystem unit. The CFEV database provides an important biophysical class* for each identified ecosystem spatial-unit (e.g. river sections and water-bodies). The important biophysical class is the ecological class that is used when considering the value of an ecosystem spatial-unit during the conservation evaluation. It is determined from the relative rarity of the different biological and physical classes identified in each spatial unit from the state-wide audit.

Using the rarity of the important biophysical class and the Naturalness of each spatial unit, a spatial selection algorithm ranks all of the spatial units in each ecosystem type, to indicate the relative importance or Representative Conservation Value*(RCV) of each spatial unit (Figure 2).

To ensure that specific unique and important values are captured in the conservation evaluation, an assessment of Special (freshwater) Values* is also included. Each Special Value has a priority-based rating, which is added to the Representative Conservation Value* to produce an Integrated Conservation Value* (ICV) (Figure 2).

Some types of land tenure are considered to provide greater protection for freshwater-dependent ecosystem values than others. A ranking based on the type of land tenure security is added to the Integrated Conservation Value to provide the Conservation Management Priority for the ecosystem spatial-unit.* (Figure 2).

The results of the audit and conservation evaluation are used to identify conservation values and rank the conservation management priorities of freshwater ecosystems across the state. Conservation management priorities may be 'Immediate', indicating areas where immediate management actions are required to ensure the protection of significant conservation values, or 'Potential', indicating areas that need to be considered where future developments or changes to land or water management are proposed.

It should be acknowledged that the CFEV database employs a wide variety of data sources, of varying resolution. The assessment data for many sites is derived from complex models, and as a result care should be taken when using specific variables at specific locations. Any results with important management implications should be corroborated by on-ground surveys. The strength of the CFEV data lies with its comprehensive coverage of Tasmania, which allows broad scale comparisons, summaries, and the combination of complicated data sets into readily-interpreted indices.

For further information on the CFEV Framework and how the different values are derived, see the references given in the "Further Information" section on page 13.

*see Glossary for definition of these words or terms.

2. Ecosystem Values in the Sassafras – Wesley Vale Area

2.1. Assessment of Freshwater Ecosystem Values in the Sassafras – Wesley Vale area.

The purpose of this assessment of freshwater ecosystem values in the Sassafras – Wesley Vale area is to provide guidance to the management of water resources. The assessment is based on the Integrated Conservation Value, because it provides an indication of the freshwater ecosystem values (including the different biophysical classes and Special Values) that need to be considered in any future development of the catchment's water resources.

Integrated Conservation Values for the Sassafras – Wesley Vale area are presented in Figure 3. Freshwater ecosystems in the catchment are generally of High to Very High Integrated Conservation Value, with the exception of several creeks in the Latrobe area which have Low Integrated Conservation Values. Areas of Very High Integrated Conservation Value include the lower part of Panatana Rivulet, small upstream areas of Panatana Rivulet, the central part of Greens Creek, small upstream sections of Pardoe Creek and adjacent wetlands, and sections of streams running into Bass Strait and Port Sorrel in the Pardoe & Andrew Creek area. A section of the Latrobe Creek has also been identified as having Very High Integrated Conservation Value.

Summary information indicating the contribution of each of the drivers leading to the High and Very High Integrated Conservation Value in each of the sub-catchments in the Sassafras – Wesley Vale area were extracted from the CFEV database (Table 1). The important biophysical classes identified in the catchment are shown in Table 2. The Naturalness (condition), and the Representative Conservation values of freshwater ecosystems in the Sassafras – Wesley Vale area are presented in Figures 4 and 5 respectively.

The areas assessed in the Sassafras – Wesley Vale catchment are the river sections and wetlands of High and Very High Integrated Conservation Value that are the main river or creek channels, and that are most likely to be impacted by any future flow modification in the catchment.

The Sassafras – Wesley Vale area is a highly impacted area and is generally in poor condition with Low to Medium Naturalness (Figure 4). However, the large number of ecosystem units with High and Very High Integrated Conservation Value reflects the high level of Representativeness and Distinctiveness of freshwater ecosystem values that are present in the catchment, including the presence of Special Values. The Representative Conservation Values in the area are generally high due to the relative importance, or the rarity, condition and representation, of the important biophysical classes in the Sassafras – Wesley Vale area (Figure 5). Areas that are specifically influenced by the occurrence of Special Values are those that are of Very High Integrated Conservation Value (Figure 3).

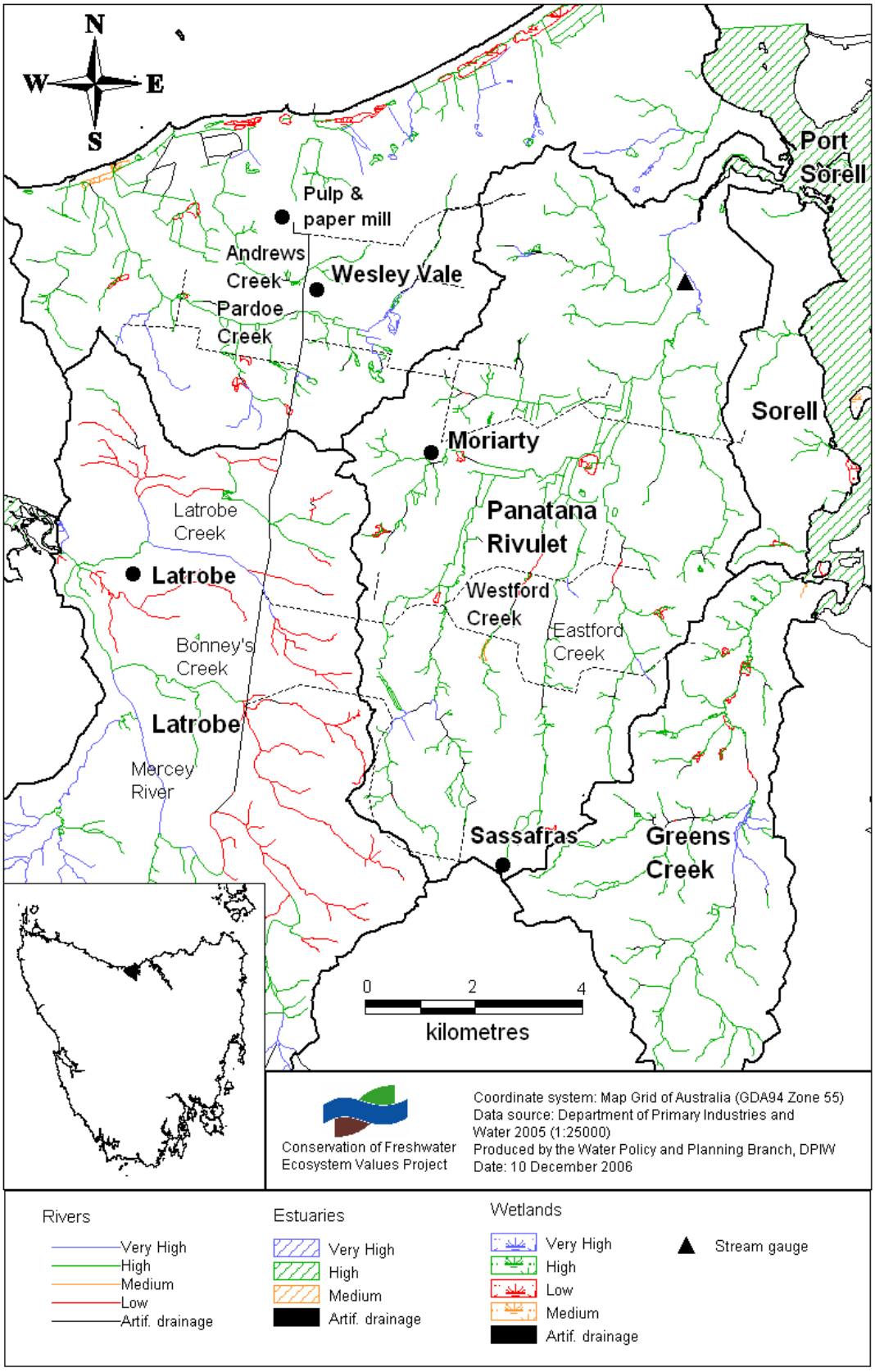

Figure 3. The Sassafras – Wesley Vale area, showing the subcatchments in the area and Integrated Conservation Value according to the CFEV database. CFEV, ©State of Tasmania and the LIST, © State of Tasmania.

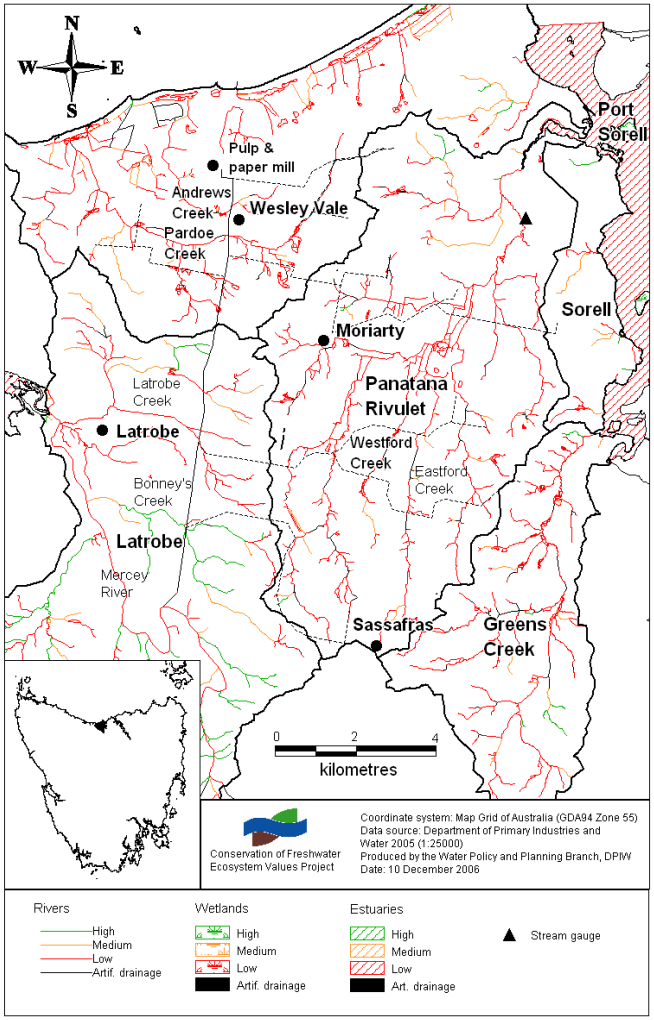

Figure 4. Naturalness of freshwater ecosystems inthe Sassafras – Wesley Vale area according to the CFEV database.

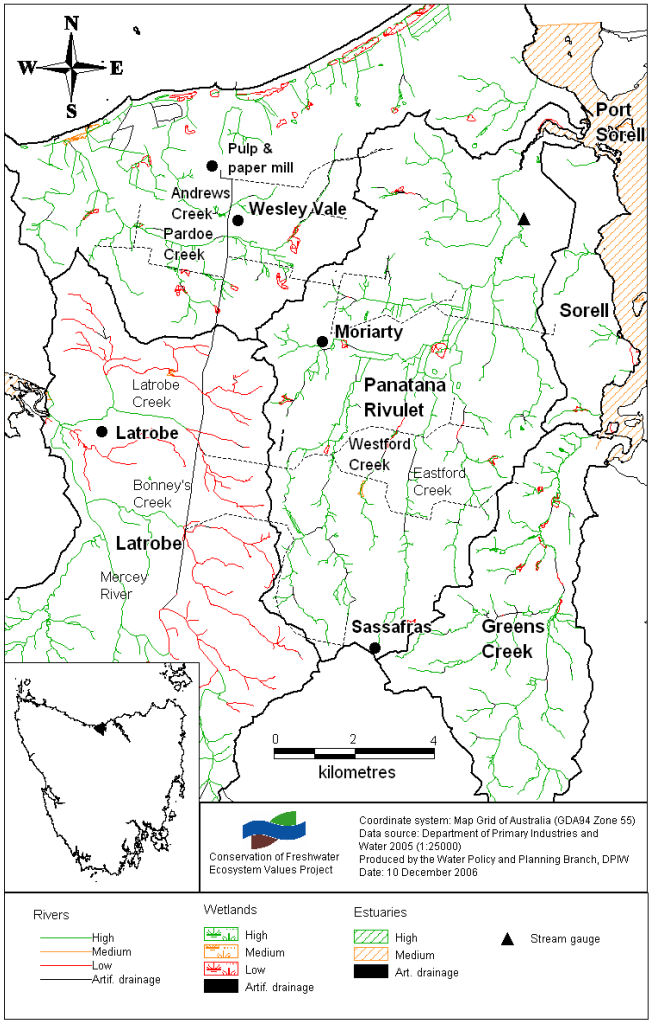

Figure 5. Representative Conservation Value of freshwater ecosystems in the Sassafras – Wesley Vale area according to the CFEV database.

Table 1. Summary table showing the drivers of the freshwater ecosystem units with High and Very High Integrated Conservation Value (ICV) in each of the subcatchments and Port Sorell in the Sassafras – Wesley Vale area. (Figure 3). In some cases the drivers can have multiple classifications because river sections and wetland ecosystems with different drivers are grouped together to form the summary of drivers in each subcatchment. Refer to Table 2 for biophysical class codes.

Area or sub-catchment	Ecosystem types present	ICV	RCV	Natural-ness	Important Biophysical Classes (class code in brackets)	Special Values
Wesley Vale (Andrews & Pardoe Creek)	Rivers Wetlands	High to Very High	High	Low to Medium	Native fish assemblage (F32) Macro-invertebrate assemblage (BC6 & BC6f) Tree assemblage (T8 & T14) Dominant wetland vegetation (DV- ME)	*Melaleuca ericifolia* coastal swamp forest Shrubby *Eucalyptus ovata* Short paperbark swamp Green & golden frog Central north burrowing crayfish Whitebait (northern stock) Sheathing yellow-star (*Hypoxis vaginata)* Sea lavender (*Limonium australe*) Slender knotweed (*Persicaria decipiens*) Platypus
Latrobe	River Wetlands	Low to Very High	Low to High	Low to High	Native fish assemblage (F20 & F32) Macro-invertebrate assemblage (BC6, BC6f) Tree assemblage (T8 & T14) Fluvial geomorphic river type (G6)	Australian grayling Central north burrowing crayfish Riparian priority floral communities Showy willow herb Platypus
Panatana Rivulet	Rivers Wetlands Estuaries	High to Very High	High to Very High	Low to Medium	Native fish assemblage (F32) Macro-invertebrate assemblage (BC6 & BC6f) Fluvial geomorphic river type(G6) Tree assemblage (T8 & T14) Dominant wetland vegetation (DV-ME)	Australian grayling Central north burrowing crayfish Green and golden frog White-bellied sea-eagle *Melaleuca ericifolia* coastal swamp forest Shrubby *Eucalyptus ovata* Riparian priority floral communities Purple loosestrife (*Lythrum salicaria*) Native gipsywort (*Lycopus australis*) Pretty leek orchid (*Prasophyllum pulchellum*) Showy willow herb (*Epilobium pallidiflorum*) Swamp wallaby grass (*Amphibromus neesii*) Homes' sun orchid (*Thelymitra holmesii*) Platypus
Greens Creek	Rivers Wetlands	High to Very High	High	Low to Medium	Native fish assemblage (F20 & F32) Macro-invertebrate assemblage (BC6) Tree assemblage (T8 & T14) Dominant wetland vegetation (DV-ME)	*Melaleuca ericifolia* coastal swamp forest Whitebait (northern stock) Platypus
Sorell	Rivers	High	High	Low to Medium	Macro-invertebrate assemblage (BC6 & BC6f)	Platypus only
Port Sorell	Estuaries	High	Medium	Low	Estuary biophysical type: Marine inlets and bays located along the north coast (ES9)	Australian grayling Riparian priority flora communities Roundleaf mint bush Harsh groundfern White-bellied sea-eagle Fairy tern

2.2. Important biophysical classes and Special Values in the Sassafras – Wesley Vale area

The classification of areas of High and Very High ICV in the Sassafras – Wesley Vale area is largely based on highly representative biophysical classes (native tree, fish and macroinvertebrate assemblages, and geomorphology), as well as Special Values. These important biophysical classes and Special Values are described in the sections below.

2.2.1. Riparian Tree Assemblages

Where tree assemblages are still present, the dominant tree assemblage is largely dry and damp sclerophyll tea tree and paper bark scrub mosaic (T14). However, several river sections also have dry sclerophyll & eucalypt forest and scrub (T8) present.

2.2.2. Fish Assemblages

Where a native fish assemblage is still present it is classified as an assemblage found in river sections and waterbodies along the north-east coast of Tasmania (F32). The assemblage includes short-finned eels, *(Anguilla australis),* spotted galaxias *(Galaxias truttaceus),* pouched & short-headed lampreys *(Geotria australis & Mordacia mordax),* Australian grayling *(Prototroctes maraena),* Australian mudfish *(Neochanna cleaveri),* freshwater flathead *(Pseudaphritis urvillii),* Climbing galaxias *(Galaxias brevipinnis)* and blackfish *(Gadopsis marmoratus).* In creeks close to Port Sorell and the Mersey River, the north-west coast assemblage (F20) is present. In addition to the assemblage above it includes the Jollytail *(Galaxias maculatus)* and Tasmanian smelt *(Retropinna tasmanica*).

2.2.3. Macroinvertebrate Assemblages

The macroinvertebrate assemblages present are classified as those occurring in rivers and streams of the north coast, west of Tamar River (BC6 & BC6f). The indicator species for these assemblages is the mayfly *Bungona* sp.

2.2.4. Special Values

Special Values are unique or distinctive conservation values and may include threatened species or communities, or sites of significance.

Faunal Special Values identified in a number of river sections and wetlands include the central north burrowing crayfish, giant freshwater crayfish and platypus. Australian grayling, the green and golden frog, and the white-bellied sea-eagle are also present. Port Sorell has been identified as an important location for bird life and northern stock whitebait (Table 1).

Floral Special Values include river sections and wetlands with stands of *Melaleuca ericifolia*, *Eucalyptus ovata* and *short paperbark* and other priority riparian flora. Threatened, endangered or protected riparian flora identified in the lower part of the Panatana Rivulet catchment include purple loosestrife (*Lythrum salicaria*), native gipsywort (*Lycopus australis*), pretty leek orchid (*Prasophyllum pulchellum*), showy willow herb (*Epilobium pallidiflorum*), swamp wallaby grass (*Amphibromus neesii*) and homes' sun orchid (*Thelymitra holmesii*). Protected flora identified in the Wesley Vale area include sheathing yellow-star (*Hypoxis vaginata*), sea lavender (*Limonium australe*) and slender knotweed (*Persicaria decipiens*).

Table 2. Important biophysical classes, class descriptions and species compositions in the Sassafras – Wesley Vale area.

Class Code	Class description	Species composition
F20	Fish assemblage found within river sections along the north-west coast and down to and including the Arthur River.	*Anguilla australis, Galaxias truttaceus, Geotria & Mordacia, Prototroctes maraena, Neochanna cleaveri, Pseudaphritis urvillii, Galaxias brevipinnis, Gadopsis marmoratus, Galaxias maculatus, Retropinna tasmanica.*
F32	Fish assemblage found within river sections and waterbodies along the north-west coast and down to and including the Arthur River	*Anguilla australis, Galaxias truttaceus, Geotria & Mordacia, Prototroctes maraena, Neochanna cleaveri, Pseudaphritis urvillii, Galaxias brevipinnis, Gadopsis marmoratus*
T14	Dry sclerophyll and damp sclerophyll forest with tea tree and paperbark scrub mosaics found around Port Sorell, the Tamar valley and extending through the north-east to Rushy Lagoon – Ansons Bay.	*Acacia dealbata, Acacia mearnsii, Acacia melanoxylon, Allocasuarina littoralis, Allocasuarina verticillata, Banksia marginata, Bursaria spinosa, Casuarina monilifera, Dodonaea viscosa, Eucalyptus amygdalina, Eucalyptus obliqua, Eucalyptus ovata, Eucalyptus viminalis, Exocarpos cupressiformis, Leptospermum lanigerum, Leptospermum scoparium* var., *Melaleuca ericifolia, Melaleuca squarrosa, Pomaderris elliptica, Pomaderris pilifera, Zieria arborescens.*
T8	Dry sclerophyll forests, tall wet eucalypt forests and scrubs. This assemblage has two disjunct occurrences, being found in the lowland hinterlands of north-eastern Tasmania and on the drier hill slopes in the Huon valley.	*Acacia dealbata, Acacia mearnsii, Acacia melanoxylon, Allocasuarina littoralis, Allocasuarina verticillata, Banksia marginata, Bursaria spinosa, Eucalyptus amygdalina, Eucalyptus obliqua, Eucalyptus ovata, Eucalyptus regnans, Eucalyptus viminalis, Exocarpos cupressiformis, Leptospermum lanigerum, Leptospermum scoparium var., Melaleuca ericifolia, Melaleuca squarrosa, Monotoca glauca, Notelaea ligustrina, Olearia argophylla, Pittosporum bicolor, Pomaderris apetala, Pomaderris elliptica, Pomaderris pilifera, Zieria arborescens*
BC6 & BC6f	Macroinvertebrate assemblage in major rivers of north coast, west of the Tamar River. BC6(f) is a headwater stream assemblage in catchments of north coast, west of the Tamar River.	Indicator taxa (EPTC groups): *Bungona* sp.
G6	Northern Tertiary Basins and coastal sediments	Dolerite and Parmeener hills in headwaters; Tertiary basins and coastal sediments in mid and lower catchment; Moderate rainfall.
DV-ME	*Melaleuca ericifolia* forest.	

3. Maintaining Freshwater Ecosystem Values in the Sassafras – Wesley Vale area

This assessment has identified the priority freshwater ecosystem values in the Sassafras – Wesley Vale area. Important biophysical classes comprise riparian tree assemblages, native fish assemblages, macroinvertebrate assemblages, and geomorphic river types. In addition, vulnerable, rare or endangered species and communities include the north burrowing crayfish, giant freshwater crayfish, platypus, green and golden frog, Australian grayling, white-bellied sea-eagle, stands of *Melaleuca ericifolia*, *Eucalyptus ovata*, short paperbark tree communities, and a large number of threatened and rare flora in the lower part of Panatana Rivulet. There are also a number of threatened bird species and northern stock whitebait in Port Sorell for which the flow regime in Panatana Rivulet and Greens Creek may provide some habitat and food supply.

A key consideration in the future management of the water resources of the catchment is the continued provision of a flow regime that meets the needs of these priority freshwater ecosystem values, and thereby contributes to their maintenance.

It is important that the key characteristics of the natural flow regime are maintained to ensure the priority freshwater ecosystem values are maintained.

The key components of the natural flow regime that are relevant to the identified freshwater ecosystem values include:

1. base flows that sustain ecosystem health and populations of aquatic biota, and provide refuge during dry times;
2. moderate flows (freshes) and high flows that provide reproductive cues and dispersal mechanisms for some biota, and are important for transporting material downstream and maintaining geomorphic processes;
3. inundation flows to support riparian zones, floodplains and wetlands, and to maintain connectivity and exchange of resources between creeks and rivulets and their floodplains;
4. natural flow variability, including seasonal patterns, frequency and duration of flows, and rates of rise and fall;
5. groundwater levels critical to surface water flows;
6. freshwater flow required to support estuarine processes and habitats.

These flow components support various ecological and geomorphological patterns and processes in a broad sense, and have varying degrees of influence on the various identified freshwater ecosystem values.

4. Further Information

The following references include detailed information on some of the topics discussed within the text of this document. They are available on the Department of Primary Industries and Water web site.

CFEV (2005). Conservation of Freshwater Ecosystem Values Project database. Water Resources Division, Department of Primary Industries and Water, Hobart, Tasmania.

DIPW (2007). Auditing Tasmania's Freshwater Ecosystem Values: Conservation of Freshwater Ecosystem Values Project: Technical Report. Department of Primary Industries and Water, Hobart, Tasmania.