PROPOSED CLASSIFICATION OF INLAND WATERS AS RECREATIONAL FISHERIES IN THE NORTH EAST & GOULBURN CATCHMENT MANAGEMENT REGIONS OF VICTORIA

Native Fish Australia

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Feedback

This draft document is an outline of proposed classifications for streams supporting recreational fisheries in the north east region of Victoria based on the DPI Stream Classification Model. It outlines proposed classifications and the rationale behind the proposals based on the model and policies of Native Fish Australia. The draft is intended to broadly outline the organisation's objectives and proposals for the classification of individual waters and it is anticipated that it will be largely similar to the final version.

Although good up to date information is available on the larger angling sized species of native fish there is some uncertainty about the conservation significance of populations of smaller native species in some of the smaller streams. As a consequence while this document is likely to be a reliable indicator of Native Fish Australia's proposed classifications for larger streams it is possible that once additional information is sourced the classification of some smaller streams may be amended to reflect their significance for conservation of native fish species generally of too small a size to be of significance to recreational fisherman but important from the conservation and biodiversity perspective..

Native Fish Australia invites feedback from members, general anglers, angling organisations, conservation organisations, scientists and government agencies, particularly with respect to the presence of fish species in individual waters, use by anglers and as to their conservation value. The draft will be available for comment until the 30th of September 2009 after which it will be amended and become the formal policy of Native Fish Australia (Victoria).

Acknowledgements

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Native Fish Australia wishes to acknowledge Will Trueman who provided information in the course of being published by the Murray Darling Basin Authority on historic records and the past distribution of native fish in each catchment in northern Victoria. The organisation acknowledges all individuals and agencies that have been used as information sources in the preparation of this document including the Victorian Government's Water Warehouse Website. Catchment maps have been sourced from the DPI website for *A Guide to the Inland Angling Waters of Victoria* and are utilised with full acknowledgement as to their source.

Terminology

Native Fish	fish species naturally found in a waterway prior to European settlement
Exotic Fish	fish species not native to Australia
Translocated Fish	fish species native to Australia, not naturally found in a designated waterway, which have been introduced
Lowland Zone/Habitat	riverine habitats below approximately 200 m AMSL typified by a low gradient, wide floodplain and substrates dominated by silts and clays
Slopes Zone/Habitat	riverine habitats between approximately 200 - 400 m AMSL typified by low to moderate gradient, modest floodplain and substrates dominated by sands and gravel
Upland Zone/Habitat	riverine habitats between approximately 400 - 700 m AMSL typified by moderate to steep gradient, narrow or absent floodplain and substrates dominated by gravel and rock.
Montane Zone/Habitat	riverine habitats above approximately 700 m AMSL typified by moderate to steep gradient, narrow floodplain, substrates dominated by gravel and rock, experiencing snowfall on a regular basis.
Native Fishery	a fishery were the focus of management is maintaining/enhancing recreational angling opportunities for native fish species. May also be of conservation significance. Exotic fish species may still contribute to the recreational fishery.
Salmonid Fishery	a fishery were the focus of management is maintaining/enhancing recreational angling opportunities for exotic fish species. In most cases not of high conservation significance for native fish. Native fish species may still make a minor contribution to the recreational fishery.
Mixed Fishery	a fishery were the focus of management is maintaining/enhancing recreational angling opportunities for both native and exotic fish species. May also be of high conservation significance and in such cases will require careful management to ensure that native fish populations are maintained.
NFA	Native Fish Australia (Victoria) Inc.
ATF	Australian Trout Foundation
MDBA	Murray Darling Basin Authority
DPI	Victorian Department of Primary Industries
DSE	Victorian Department of Sustainability and Environment

Fish Species

Murray cod	*Maccullochella peeli peeli*
Trout cod	*Maccullochella macquariensis*
Golden perch	*Macquaria ambigua*
Macquarie perch	*Macquaria australasica*
Silver Perch	*Bidyanus bidyanus*
Catfish	*Tandanus tandanus*
Northern blackfish	*Gadopsis marmoratus*†
Two spined blackfish	*Gadopsis bispinosus*
Barred galaxias	*Galaxias fuscus*
Mountain galaxias	*Galaxias olidus*
Brown trout	*Salmo trutta*
Rainbow trout	*Oncorhynchus mykiss*
Atalantic Salmon	*Salmo salar*
Redfin	*Perca fluviatilis*
European carp (carp)	*Cyprinus carpio*
Tench	*Tinca tinca*
Roach	*Rutilus rutilus*

† Note: It has been suspected for many years that two distinct species are represented by *Gadopsis marmoratus*, namely a southern form growing to 6 kg in weight and a northern form rarely exceeding 200 g in weight. Recent genetic evidence suggests that there may be two separate species. The two forms are identified in this document as northern and southern blackfish.

Preamble

In recent years there has been debate as to how the middle and high altitude waters in the state of Victoria should be managed as recreational fisheries. At the time of European settlement many rivers and streams in these environments are recorded as containing substantial populations of large angling size native fish species. By the end of the twentieth century most of these populations had vanished and native fish that were once characteristic species of these habitats had become endangered, sometimes restricted to a handful of remnant populations.

Many of the population declines occurred well before the era of modern ecological research and the causes even today are largely speculative. Factors that have been suggested include habitat modification/destruction/pollution initiated by collectively mining, land clearing, and general agriculture, snag removal, construction of barriers to migration, changes to flow and thermal regimes by irrigation schemes, overfishing by both recreational and commercial fishermen, competition and predation by exotic fish species and death or debilitation by exotic diseases. Definitive research in many cases has not been undertaken to assess the degree of impact of these factors on individual species or waterways. The scientific literature acknowledges that all probably played a role with specific or combinations of these agents varying in their impact both on particular waters and individual native fish species. While specific agents may have been responsible for the loss of species many years ago in a large number of areas, further environmental change has subsequently taken place obscuring what may have been the original causative agents for population decline. These changes have in some cases made more difficult the task of recovering native fish populations.

In the early 1860s exotic animals, including fish species, were introduced to Victoria by acclimatisation societies with the objective of populating the Australian environment with flora and fauna from other regions of the world but particularly from Europe. In 1872 brown trout were first introduced to Victorian streams by these societies as were rainbow trout about two decades later. Initially, these introductions took place into very high altitude waters in catchments where natural barriers prevented larger native fish species from accessing them or into very small streams were the habitat did not support significant populations of native angling species. Through natural dispersion and deliberate introduction, and ongoing stocking by both private and government hatcheries, both trout species spread to virtually all waters in montane, upland and slopes habitats within the state. Some environmental changes have allowed the development of trout populations at low altitudes where they otherwise would not exist. Since that time, once trout became established most of these waters have been managed as recreational trout fisheries which continue to be popular with anglers and make an important contribution to the economy of some rural areas.

There has been much speculation and at times heated debate on the role that introduced salmonids played in the disappearance of larger native fish species in non-lowland habitats. There are documented opinions stating that trout have been one of the factors in the decline of some small native fish species such as the critically endangered barred galaxias. For the larger native fish species studies of their biology have indicated the potential for competition for food and space with trout and there are reported instances of predation having occurred. These results combined with significant overlaps in the former distribution of some native fish species with trout have suggested that the introduction and ongoing stocking of trout may have contributed to the decline of some native fish. No research was undertaken at the time of the introduction of trout - over a century ago - and definitive contemporary research has not been undertaken to clarify the extent to which trout contributed to the demise of native fish populations. Recently, historical research conducted to map the former distribution of native fish has shed some light on what took place during those early years. There are instances where factors such as habitat change have been clearly identified as being primarily responsible for the loss of native fish populations in some higher altitude habitats. There were also identified, however, some examples where the introduction of trout and redfin, together with factors such as a lack of management of the native species and uncontrolled habitat changes, were associated with rapid declines in native fish populations. Examples were also identified where long term persistence of native fish populations occurred in the presence of trout. Collectively the

historical evidence suggested that trout may have had the greatest impact on native fish populations in waters that were small, at higher altitudes and in those which had very cool thermal regimes. While the historical evidence does not constitute absolute proof of trout having had a serious impact on the larger native fish in some environments it has highlighted the most likely instances where it took place.

By the late twentieth century there was growing awareness of the loss of native fish from waterways and government initiatives including endangered species action statements, recovery plans and the national MDBA Native Fish Strategy have set goals for the recovery of populations, the latter proposing a benchmark of restoring populations generally to 60% of their pre-European abundance. This of necessity includes the recovery of native fish populations in non-lowland habitats. There is also a philosophical belief shared not only by conservationists but by the general community of the need to provide examples for future generations of what many non-lowland rivers were like prior to European settlement and that they should be restored to contain populations of native fish as examples of the past. There has also been a re-evaluation of native fish as recreational angling species with some now being regarded as amongst the best in the world. Native fish anglers desire the creation of some non-lowland streams dedicated to native species to recreate what were unique fisheries and this aspiration is also shared by the conservation movement. Over the past twenty five years stocking of hatchery produced fish have managed to establish populations of some native fish species in lowland areas which now support excellent recreational fisheries. More recently efforts have been made at restoring some native fish populations in non-lowland rivers and streams notably Murray cod, trout cod and Macquarie perch.

Trout anglers have expressed concern at the prospect of the re-introduction of native fish to non-lowland environments viewing such a prospect as a reduction of angling opportunities for them. The wider angling and general community has also expressed some concern fearing that return of some waters to native fish would entail a closure to fishing with a general loss of recreational and regional economic benefits. This has been exacerbated by a fear of loss of access to waters in national parks should native fish be returned to these areas, highlighting the endangered status of some species as possible justification by government for such action. There has been a perceived decline in the quality of the trout fishery and this has been linked to a cessation of the stocking of trout in many streams over the past two decades. Despite this, surveys conducted by government agencies have consistently revealed many streams to contain self-supporting trout populations where stockings could negatively impact on the quality of the fishery. It is acknowledged that in some areas trout fisheries may have declined but the factors responsible are short term environmental disturbances such as drought and bushfires, long term decline of environments and increased angling pressure. There has also been a perception in some quarters of a general agenda by government to eliminate trout from the Australian mainland. Stories perpetuated in the media that there is a plan to totally eradicate trout are simply untrue. Regardless of the implications of occasional departmental documentation, no government policy has ever advocated such a course of action and it would be totally impractical in any case - there is no realistic way of controlling or removing trout, in all but the tiniest of streams. There are isolated examples where trout have been removed from small habitats for conservation purposes but broad scale removal has never been contemplated. Progressively, a conjunction of a range of factors has made the trout angling community anxious about the future of their sport.

The conflicting viewpoints of native fish and trout anglers, the conservation movement, the scientific community and government agencies have lead to much heated debate, acrimony and been counterproductive particularly with respect to recreational angling. Over the past three years individuals from Native Fish Australia have entered into dialogue with members of the Australian Trout Foundation about resolving some of the issues of concern to both organisations. NFA offered to engage with peak groups representing trout anglers with the proposition that if support was forthcoming in returning populations of native fish to key waters in a range of catchments that the organization would in recognition of this support the ongoing existence and enhancement of most trout fisheries with the proviso these fisheries did not conflict with general conservation objectives. This was a major concession by NFA and received in principle support from some in the conservation

movement. Previously, some management plans have been developed for recreational fisheries in the state by the Department of Primary Industries such as the North East Fisheries Management Plan. These plans broadly divided waters into lowlands, midland and uplands without clearly delineating areas for native fish upstream of the lowlands. Both NFA and some conservation organisations have concerns about the outcomes for native fish in these plans. Similarly, some trout anglers have been dissatisfied with parts of these plans.

From this, a good working relationship was developed which ultimately led to the formation of the Inland Waters Classification Committee, a group of people encompassing representatives from VRFish, the state peak angling group, NFA, and the ATF, coordinated and chaired by DPI Victoria. While the possibility of formally classifying streams had been previously touted, this represented the first serious engagement between trout and native fish representative groups towards developing solutions and resolving the conflict that had previously occurred. The brief of the Inland Waters Classification Committee was to develop a model for classifying streams in the state for the way in which they would be managed as recreational fisheries. The aspiration was that if a suitable model could be developed and an equitable allocation of waters be achieved for both salmonids and native fish that this would end the ongoing debate and bring harmony to the recreational angling community. Through the efforts of the committee a model was prepared and is currently available on the web:

http://www.dpi.vic.gov.au/dpi/nrenfaq.nsf/LinkView/154F005CB61C1CC0CA257440007D5ED9B43DB2A1BECEB2A04A256812001DD817

NFA has consistently given in principle conditional support to the stream classification process. Its ultimate test is that it delivers an equitable outcome for native fish and restores some former non-lowland fisheries. Full support will only be given if this objective is achieved. The only serious reservation entertained by the organisation is if the model is applied strictly on the basis of what species are currently present in waterways - this in effect would lock in the status quo. That must inevitably deliver some poor outcomes for native fish. One species, the trout cod, is currently totally protected from angling but in the near future will form the basis of recreational fisheries and the first stockings dedicated for anglers recently took place. Another species, Macquarie perch, cannot be reliably produced in hatcheries at the present time. A recent workshop held by the DPI has developed a proposal to resolve the issues over breeding this species and it is envisaged that fingerlings will become available in the near future. Target waters for future recreational fisheries have been nominated. There have been difficulties in mass producing Australian bass for stocking in Victoria though it is anticipated that this will be overcome. At the present time, catfish, blackfish and Australian grayling are not being massed produced in hatcheries but are likely to be available in the future. These are important developments on the horizon that must be considered by the classification process. The original intent of the stream classification process was to end the ongoing debate and to do so it must be visionary, incorporating what can realistically be achieved in the ten year time frame after which individual classifications are reviewed.

The Stream Classification Model outlines five criteria for assessing waters namely: 1. Species evidence, 2. Known range of angling species, 3. Waterway management, 4. Recovery plans for threatened species and 5. Socio-economic value. While we can all lament past actions and history, the present provides the circumstances that dictate what options are available. Native fish supporters and government agencies would like to see the larger native fish species returned to the high altitudes they once frequented, but realistically in many cases this is not possible as the environments have often been permanently altered. Such considerations need to be kept to the forefront when evaluating possible classifications of waters. What is important is to concentrate on the best remaining opportunities at moderate altitudes and perhaps select one or two candidates where trout are less prevalent at higher altitudes. Therefore it can be reasoned that it is better to devote time, energy and resources into actions which are feasible and likely to succeed in the circumstances of today or the near future. Trout anglers seek long term reassurance of the continuation of their sport and retention of the best of their fisheries. There needs to be some concession of a few marginal waters currently carrying lower densities of trout to be dedicated to native fish. Habitat and climate change are also altering the picture turning what were formerly good trout fisheries into marginal ones so trout

anglers need to focus on the best trout fisheries which in the future will continue to have good flows and cool thermal regimes. Both trout and native fish interests need to consider individual waters in the light of these facts and come up with realistic classifications in the interests of both groups.

NFA has indicated to the ATF that unless there exists a conservation imperative that it will endeavour not to propose classifying high quality trout fisheries in Victoria for classification as native fish waters. This is in deference to the aspirations of trout anglers and also makes common sense for there is probably a practical difficulty in establishing native fish populations where high densities of trout exist, given their suspected negative impact. In addition, connectivity is important for native fish to allow migration and with many rivers now containing high altitude impoundments acting as barriers, concentrating at modest altitudes also makes sense for this reason. NFA seeks concessions from trout anglers so that some of the more marginal waters at the lower end of trout fisheries in slopes and lower upland habitats may be dedicated to native fish. In particular, there are a small number of examples which at the current time would be classified as mixed fisheries, but NFA believes that management should be directed over the next decade at turning them into high quality native fisheries. NFA will propose classifying them as native waters for management purposes and seeks support from peak angling groups to do so right from the outset. The organisation believes it is more realistic to concentrate on these waters and concede some more marginal candidates (from the native fish point of view) as trout fisheries. NFA will provide ongoing support for salmonid fisheries and the organisation is also prepared to make concessions on a number of issues important to trout anglers and develop compromise solutions if these waters are classified as native from the outset.

The Victorian Inland Waters Classification Model proposed that waters be classified into one of three categories namely salmonid, native or mixed fisheries effectively determining the primary focus of the management of those waters as recreational fisheries. Native Fish Australia supports the ongoing stocking of dedicated salmonid fisheries, if required, and other actions to enhance the stock in those waters. The organisation also believes that potential mixed fisheries really fall into two distinctive categories. Some, as found in many impoundments, will exist primarily for the purpose of recreational angling and be supported by stocking of both native fish and salmonids. Others will exist in some streams and be in effect overlap or buffer zones between downstream populations dominated by native fish and those upstream dominated by trout. These will be areas of important conservation value for native fish and will have to be carefully managed. Trout in these areas will be derived from natural spawning and recruitment and they should not be stocked to maintain the equilibrium of the mixed fishery. NFA also believes that some waters need to remain 'unclassified' for recreational fishing purposes as their primary function is for conservation and while they might provide some angling this is clearly of secondary importance. Streams containing the endangered barred galaxias, for example, should remain unclassified.

The Inland Waters Classification Committee agreed that once waters were classified removal of fish, be they salmonids or native species, would not take place. While the classification of the stream would determine the focus of management of that water it would not nullify regulations providing protection of fish nor prevent anglers targeting non-classified species, i.e., it will still be possible for native fish anglers to target their preferred species if present in a trout water and trout anglers to target trout present in waters managed for native species. The classification process will determine the management focus of waters and will not directly regulate angler choices in the species which they target. This should reassure trout anglers that they can continue their current activity in some waters that may be classified as native where trout will naturally maintain an ongoing presence.

At this point in time it is unclear when the formal process of stream classification will be commenced or who will assess submissions. The freshwater streams of Victoria fall into four distinct regions delineated by somewhat different environments and in some instances distinctive fish faunas. These regions are the south east generally referred to as Gippsland, and the south western volcanic plains, both of which drain into Bass Strait, and the north west which is largely semi arid and the north east, the latter two being part of the Murray Darling Basin. To remove all uncertainty and make clear its aspirations NFA has prepared this draft of its formal proposal for the classification of all streams in the north east of the state (including the Goulburn catchment) for consideration by all angling interests. This region was selected as it is perceived to be the most contentious and therefore a good

test for assessing the classification process. The organisation believes it will be advantageous to all parties if a proposal is presented at the outset which can form the basis of discussion.

What is presented for each catchment in the north east is a brief overview of past and present fisheries, conservation interests, environmental changes, and existing, developing or proposed fisheries. Each overview has been prepared sourcing information from published historical records, the DPI Guide to the Inland Angling Waters of Victoria, government reports, the Victoria Water Warehouse Website, reports on stream conditions, articles in the published media and angler reports. The information has not been cited in the body of this report so as to keep it concise but the sources are listed in the references section. Utilising these information sources and the five criteria contained in the Stream Classification Model, classifications are proposed for waters in north eastern Victoria. In this region it is generally assumed that most of the waters in the lowland zone would be classified as native waters. Where there are exceptions in the form of mixed fisheries containing salmonids and in some cases redfin they have been identified. The Stream Classification Model effectively excluded redfin on the basis that fisheries for this species are totally unmanaged. However, NFA acknowledges that in some waters they make an important contribution to recreational angling and are included for discussion. The focus has been on classifying fisheries that lie upstream of the lowland zone. Existing or potential native angling species considered are Murray cod, trout cod, golden perch, silver perch, Macquarie perch and catfish. Northern blackfish and two spined blackfish while contributing to angling are for the most part not considered but it is expected that the classification of waters as native and mixed fisheries will assist their populations. In some specific instances they are discussed from a conservation perspective.

The proposal presented in this document does not constitute an ambit claim for waters but a carefully considered proposition of how individual waters should be managed not only for the ten year time frame but into the foreseeable future. While NFA acknowledges the potential for adjustments of classifications or boundaries based on the information currently unavailable to us, the support of the organisation and other interest groups such as conservation orientated organisations for the classification process is fundamentally dependent on many of the proposed classifications being put into practice. NFA assures the general angling community, and in particular groups representing trout anglers, that the classifications proposed are not part of some long term agenda to steadily gain more waters over time for native fish. The Inland Waters Classification Committee recognised that the classification process had to flexible enough to allow for long term changing environmental conditions and new recreational fishing opportunities, hence the incorporation of a review process every ten years. Except for unanticipated developments or drastically changed conditions, NFA does not envisage any substantial long term changes to the classifications proposed in this document. The organisation takes the view that if native fish assemblages can be created in the identified waters then the organisation would be well satisfied with this being close to the most ideal outcome that can realistically be achieved.

The express intent of this proposal is to bring closure on the debate that has occurred in recent decades. If successful, the process can be applied to the other regions of the state and possibly other states and territories. If trout and native fish interests can reach a consensus on stream classification, old animosities can be discarded and the groups work collaboratively on protecting and improving the aquatic environment and ensuring the best possible recreational fisheries are delivered to Victorians.

Rationale

Native Fish Australia entered into the stream classification process with the following primary objectives and it is these objectives which are the basic principles driving the proposed classifications outlined in this document. These principles are:

1. Representative examples of former populations of angling native fish species must be re-established in non-lowland riverine habitats in the slopes and upland zones in Victoria;
2. Re-established populations should comprise the original species assemblages that would have occurred naturally in the type of habitat or altitude zone;
3. Re-established riverine populations should eventually become largely self supporting with the capacity to spawn or recruit under natural conditions;
4. Native fish populations should be re-established at the highest practical altitudes where there can be a realistic expectation in the foreseeable future of such populations having the capacity to be self supporting. For Murray cod, trout cod and Macquarie perch maximum temperatures should exceed 16 °C by the beginning of December on a regular basis, for catfish, golden perch and silver perch they should exceed 20 °C by January;
5. If possible, non-lowland waters with good credentials to be managed as native fisheries should be identified in each major catchment and be strategically placed to encompass the best available habitat and allow connectivity between waterways and populations;
6. Such populations should be ultimately accessible to recreational anglers. Interim protection to allow the establishment of populations is supported, provided that the management intention is clearly stated to eventually permit angling. Total protection and catch and release angling are short term management options for stocked endangered species to provided an opportunity for establishment;
7. The classification process must deliver waters offering the potential of a diverse range of angling techniques, i.e., bait, lure and fly fishing;
8. Artificial impoundments with limited potential for the development of self supporting populations of native fish may be identified for the creation or maintenance of recreational fisheries including native fish. Where possible such fisheries should be based on the original species assemblage expected to be found at that altitude in the given catchment; however, as impoundments are not natural environments it may be acceptable to establish fisheries including species not found originally at that altitude but native to the catchment, eg, golden perch in Lake Eildon;
9. Unless there is a relevant conservation imperative, high quality trout waters should be not considered for classification as native fish waters. Therefore, the rationale for developing native fish waters is to identify those waters supporting only limited trout fisheries with marginal conditions to avoid conflict with trout interests, unless a particular water has been identified to be of conservation significance;
10. Stream classification must take into account not only existing fisheries, but also those in the process of being established or proposed to be established within the ten year life span of the classification. NFA believes classifying waters based on what they currently contain would place native fish at a great disadvantage and re-enforce what it believes was historically an inequitable management of waters. It is totally opposed to such an approach. Taking a visionary approach, encompassing the long term aspirations of both native fish and trout interests, is the only realistic way of providing assurance of those aspirations being realised.

Upper Murray Catchment

Note: The Murray River and most of its larger tributaries lie in the state of NSW and outside of the scope of the Victorian stream classification process. They are mentioned in places to provide an overall picture of the region. The recreational fishery in Lake Hume is managed by DPI Victoria and is included in the discussion.

Historic Species Presence

The upper Murray catchment can be roughly defined as containing slopes habitat from Lake Hume upstream to Towong. The Murray Valley Highway from Towong to near Cudgewa approximately defines the boundary of upland habitat of the major feeders namely the Cudgewa and Corryong Creeks. In the river itself, upland habitat continues upstream to the Tom Groggin area and montane beyond. In Victoria, most of the montane habitat is located in the headwaters of the Murray upstream of Tom Groggin, although a significant area also exists in the Nariel Creek upstream of Nariel. The other notable feeder stream, the Koetong Creek, rises in upland habitat in the Mt Lawson range and descends through a granite gorge to enter slopes habitat upstream of Bungil. The smaller Burrowye Creek which originates near Shelley has similar characteristics to the Koetong Creek.

The historical evidence indicates that substantial populations of Murray cod, trout cod and Macquarie perch formerly existed in slopes and upland habitats in the upper Murray catchment. This included Victorian tributaries where cod and perch were abundant in the slopes habitat of all of the larger perennial creeks including the Koetong, Cudgewa and Corryong. Catfish were common in lagoon habitats and some silver perch and golden perch were also present in the Murray River itself and probably caught at times from the lower reaches of these creeks.

The two cod species and Macquarie perch were common in the upland section of the Indi (Murray) River upstream to the Murray Gates area with suggestions they may have penetrated further. Trout cod and Macquarie perch were particularly common in the Cudgewa Creek with cod being reportedly captured in numbers as far upstream as Lucyvale. The Corryong Creek has been reported to have contained an abundance of Macquarie perch, but cod were also taken. The smaller perennial creeks in the upland zone, such as the Berringama Creek carried good numbers of Macquarie perch and produced occasional catches of cod including trout cod. There are few records of larger native species in montane habitat which in this region remained relatively isolated for a long time. Evidence that native fish were present near the top of upland habitat in some streams combined with some isolated reports suggests that in some waters the larger native fish species had a presence where stream gradients did not prevent their accessing them.

The earliest documented introduction of brown trout to the catchment occurred in the Albury area in 1892 and there is evidence of trout becoming common in some NSW tributaries around 1905. In the Indi River both brown and rainbow trout became common just after the end of the First World War as well as in Victoria tributaries such as the upper Cudgewa Creek at about the same time. Redfin first appeared in the Albury area around 1912, at Burrowye in about 1917 and by the end of the 1920s redfin had became abundant in the Murray River upstream to at least Towong and in the lower reaches of the major creeks. The arrival of tench in the catchment has not been precisely recorded though they are known to have been present by the end of the 1930s. European carp arrived in the catchment during the 1980s and are now common upstream to Towong and present in significant numbers in upland habitat both in the Murray River and the larger creeks.

Changes to Physical Environment

The major physical changes that have transpired affecting the upper Murray Catchment fishery are:

(a) Construction of the Hume Weir after the First World War (enlarged during the 1950s) has isolated fish populations from further downstream. Due to the size of the barrier there is no practical way of facilitating fish passage over Hume Dam;

(b) Siltation created by agriculture and to smaller degree mining has impacted on some feeder streams. However, much of the upper reaches of the catchment is forested and generally stream condition is good. The Murray River between Towong and Tintaldra has largely been cleared of riparian vegetation which has promoted erosion of banks and added silt to the river;

(c) On two the two major NSW tributaries, the Tooma and Swampy Plains Rivers, dams have been constructed creating physical barriers to upstream fish movement;

(d) The Murray River downstream of Towong experiences a depressed thermal regime generated by coldwater releases from Khancoban Dam on the Swampy Plains River and Tooma Dam on the Tooma River. These releases are conducted for hydro-electric power generation and for irrigation storage in the Hume Dam. Both of these impoundments receive water diverted from the Snowy Mountains Scheme. These releases have impacted on native fish populations but created good conditions for salmonids in the Swampy Plains and Tooma rivers downstream and in the Murray River between Towong and Tintaldra;

(e) Regulation of flows of the Murray River by these dams has altered the natural flow regime of the river downstream of Towong. The reduction in flooding by river regulation and reduced flows may be affecting fish recruitment below Towong. The Murray River upstream of Towong is not impounded and has an unregulated flow regime as do all of the Victorian tributaries; and,

(f) Reductions in runoff in the catchment generated by land clearing and climate change have generally reduced stream flows. The changes to flows are having multiple impacts. The reduced flows have produced warmer thermal regimes making the lower reaches of some streams marginal for salmonids. Indirectly, the reduced flows into storages combined with warming of the feeder creeks have produced a warmer thermal regime in the Murray River compared to past decades. There is evidence that these changes may have reduced the impact of cold water releases in the Murray River improving conditions for native fish.

Conservation Imperatives

The upper Murray catchment is viewed as important for native fish conservation since it contains some good slopes and upland habitat and some significant streams remain unregulated. This catchment contains at least one and possibly two stocked populations of the critically endangered trout cod namely in the Murray River and possibly in the middle reaches of the Koetong Creek. In the Murray River there is recent evidence that the small stockings that took place around 1990 have produced a small self supporting population with evidence that spawning and recruitment are taking place. Most captures are occurring downstream of Tintaldra, though fish are caught occasionally in the Bunroy area and the lower reaches of the Cudgewa Creek. It is understood that NSW agencies are likely to stock trout cod into the Murray River in the near future to support the existing population. Trout cod were also stocked into the Koetong Creek during the late 1980s and were reported to have done well for some time. In recent years there have been few reports of captures though some reports have suggested the presence of juvenile fish indicating that reproduction may have occurred. The current status of trout cod in the Koetong creek is unknown. It is understood that DSE Victoria considers the lower Cudgewa Creek to be a potential candidate water for releases of trout cod in the future to aid recovery of the species.

A NSW tributary, the Mannus Creek, contains a relic population of the endangered Macquarie perch the size and viability of which is unclear at the present time. Reports indicate that a relic population may also exist in the Murray River between Towong and Murray Gates. The species has been absent from the Victoria tributaries for many decades. The recent DPI Macquarie perch workshop resolved that stockings would be undertaken in the future for conservation purposes in the upper Murray region though the target water was not identified. NSW DPI was represented at the workshop and also indicated interest in re-establishing the species in the region. It has been suggested to NSW DPI that the Murray River between Towong and Murray Gates would be an excellent candidate for

relocation of adults or stocking of fingerlings as it has unregulated flows, reasonably large sized habitat and forested catchment, probably making it the best remaining stretch of upland habitat in the Murray Darling Basin. The lower and middle reaches of the Cudgewa Creek also offer good potential for re-introduction of Macquarie perch.

A relic population of Murray cod has persisted in this catchment with regular captures for many years taking place downstream of Tintaldra, in the lower Cudgewa Creek and in the Murray River near Bunroy. These populations, while small, have been self supporting and that in the Cudgewa Creek is of conservation significance from the Victorian perspective. Stocking of Murray cod into the lower Cudgewa Creek over the past decade has established a significant population and the cod population in the Murray River also appears to be increasing either as a result of these stockings or through natural recruitment. The major conservation imperatives in this catchment are to preserve and expand the existing trout cod and Macquarie perch populations.

Angling Opportunities

Collectively the upper Murray River and its major tributaries are very popular recreational fisheries supporting some outstanding trout fisheries and a number of waters are now providing reasonably good fishing for Murray cod. NFA have proposed that in the long term a recreational fishery for trout cod be established in the Murray River upstream of Lake Hume once the conservation status of the species improves. In addition, when Macquarie perch are returned in numbers to the catchment and its conservation status improves this species will once again make an important contribution to the recreational fishery in the upper Murray. As the intent of this proposal relates specifically to the classification of Victorian streams the rest of this discussion will consider only those waters located in Victoria and Lake Hume.

The lower Cudgewa Creek is now a very good fishery for Murray cod and is becoming increasingly popular with anglers. Cod are very common downstream of Cudgewa North with catches regularly taking place upstream to Cudgewa. This stretch of creek contains good numbers of redfin and carp and used to provide some good trout fishing although this has declined over the past few decades, probably as a result of reduced flows and warmer temperatures. Some good trout are still taken in the cooler months. It is expected that trout cod and Macquarie perch will eventually be stocked into this section of the creek and ultimately will enhance the recreational fishery. Upstream of Cudgewa, apart from northern blackfish, native fish are uncommon today. Most angling is directed at trout and the upper Cudgewa Creek provides some good trout angling although it is silting and suffering from reduced flows.

The Corryong Creek, known in the upper reaches as the Nariel Creek, in its lower reaches contains redfin, carp and some trout as well as Murray cod, the latter of which may be derived from the fish stocked into the Cudgewa Creek which have subsequently dispersed. As in the lower reaches of other streams, in this catchment the quality of the trout fishing is reported to have declined in recent years probably due to reduced flows and warmer water temperatures. Some of the tributary streams feeding into the lower reaches are nursery areas for trout. Upstream of Colac Colac this stream and its tributaries are considered one of the best trout fisheries in this catchment producing good catches of both species of trout. It is popular with anglers due to the good fish and for aesthetic reasons as much of the upper catchment is heavily forested. Similarly, to the east many of the small tributaries of the Murray River upstream of the Tom Groggin area, such as Limestone Creek, while small also provide some good trout angling.

The Koetong Creek historically has provided good trout fishing particularly upstream of Mt Lawson State Park though trout have been captured throughout its length. In recent years, the lower reaches have produced mainly carp, redfin, a few trout and occasional captures of stocked trout cod. The upper reaches of the Burrowye Creek, while a small habitat, produce regular captures of both species of trout from self supporting populations. The lower reaches in recent years have produced carp, redfin and a few trout. The other water of significance in the catchment is Lake Hume where DPI Victoria is responsible for fish stocking into the water body. The Lake offers a diverse mixed fishery

which includes redfin, an excellent fishery for golden perch and brown trout sustained through ongoing stocking as well as some fishing for Murray cod which are also stocked.

Proposed Classifications of Streams

The Victorian tributaries in the upper Murray are recognised for the most part as good to outstanding trout fisheries and should be classified as such. The principle exception is the lower Cudgewa Creek which now offers excellent clear-water fishing for Murray cod with lures and flies which is rapidly increasing in popularity. The water is also of interest from the conservation perspective for the future re-introduction of Macquarie perch and trout cod which will also contribute to the fishery. In recognition of this water being the best of the Victorian tributaries for native fish and its potential conservation significance it is proposed to classify the Cudgewa Creek downstream of Cudgewa as a native fishery. It is recognised that some trout are also taken in this section of the creek but this classification will not preclude anglers from targeting them. Upstream of Cudgewa this stream and its tributaries should be classified as salmonid waters. It is anticipated that once Macquarie perch fingerlings become available for stocking that the species will be stocked in this stream. As the granitic habitat between Cudgewa and Beetoomba is well suited to the species at a later date NFA may apply for this section of creek to be classified as mixed. This option is made known at this point for the process of transparency of NFA's policy to other stakeholders.

The lower Corryong Creek supports a fishery at the present time that is dominated by less desirable exotic species, with some trout and a few Murray cod. This fishery would benefit from stocking of Murray cod which would also assist in the conservation of the species. It is therefore proposed to classify the Corryong Creek downstream of the Corryong as a mixed fishery. The creek and all of its tributaries upstream of the highway are quality trout fisheries and should be classified as salmonid waters.

Until the status of the trout cod population in the Koetong Creek is clarified, NFA proposes that this stream from the Mt Lawson Track downstream remain unclassified due to its potential conservation significance. NFA have also proposed that this stretch of creek could eventually support a limited take or put and take fishery for this species. The classification of this section of the Koetong Creek should be reviewed at a later date when more information becomes available. Upstream of this area this stream provides some good trout fishing and should be classified as a salmonid fishery though if trout cod are present downstream it should not be stocked with trout. The upper reaches of the Burrowye Creek above the Koetong Road crossing should be classified salmonid water while downstream it is proposed to classify it as a mixed fishery. In recent years, the lower reaches have become marginal for trout and while exotic species provide most of angling the creek and some tributaries offer good habitat for some smaller native species.

Summary of Proposed Classifications of Streams in the Upper Murray Catchment

A. Cudgewa Creek & Tributaries

- Downstream of Cudgewa (Ashmead Park Lane) = NATIVE
- Upstream of Cudgewa (Ashmead Park Lane) = SALMONID

B. Corryong Creek

- Corryong Creek downstream of Corryong (Briggs Gap Rd) = MIXED
- Tributaries of Corryong Creek downstream of Corryong (Briggs Gap Rd) = SALMONID
- Corryong Creek & all tributaries upstream of Corryong (Briggs Gap Rd) = SALMONID

C. Koetong Creek

- Downstream of Mt Lawson Tk = UNCLASSIFIED
- Upstream of Mt Lawson Tk = SALMONID

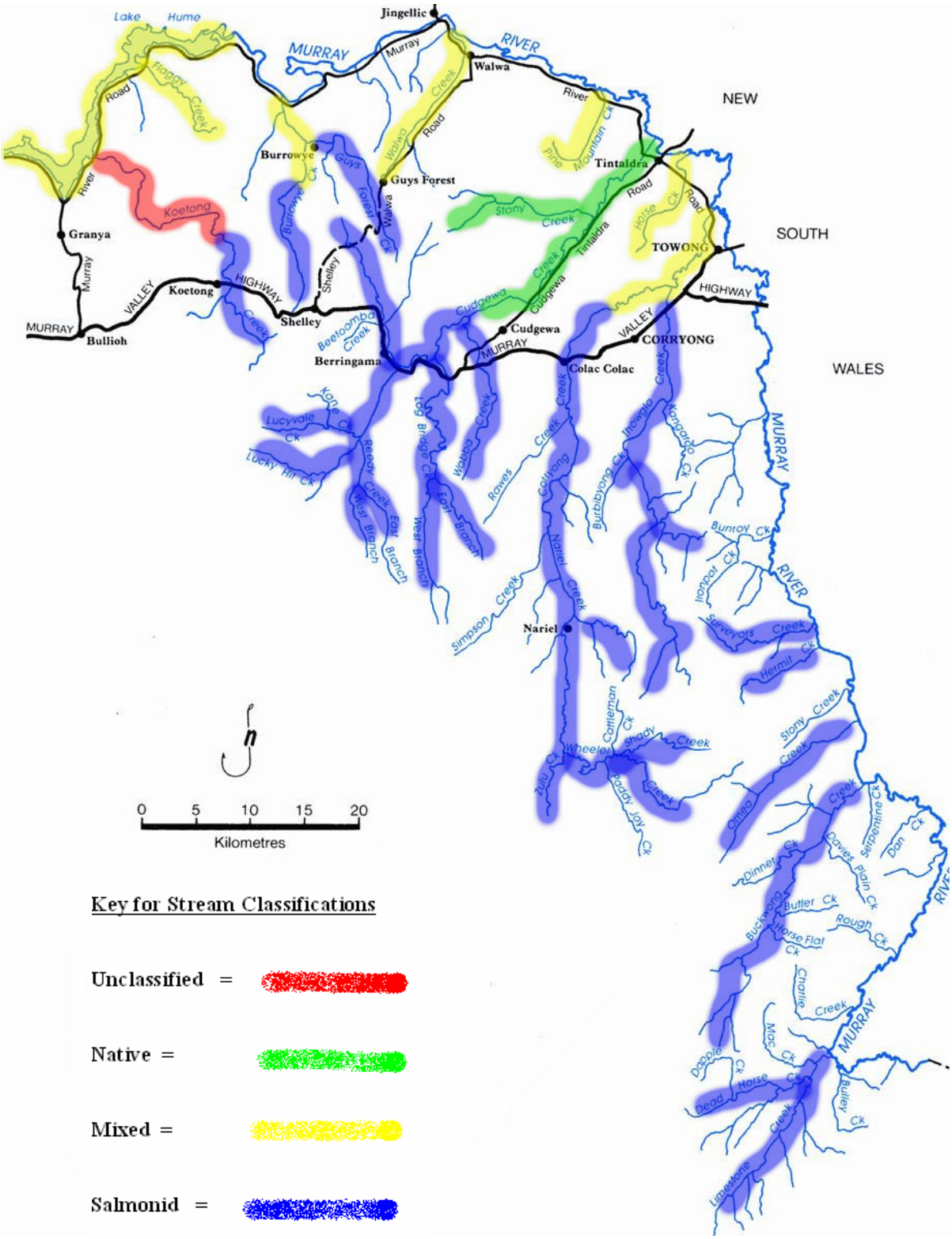
D. Burrowye Creek & Tributaries

- Downstream of Koetong Rd = MIXED
- Upstream of Koetong Rd = SALMONID

E. Other Waters

- Lake Hume = MIXED
- All other Victorian tributaries upstream of Murray Valley Hwy = SALMONID
- All other Victorian tributaries downstream of Murray Valley Hwy = MIXED

Proposed Classification of Streams in the Upper Murray Catchment



Mitta Mitta Catchment

Historic Species Presence

The Mitta Mitta catchment can be roughly defined as containing slopes habitat from Lake Hume upstream to just above the town of Mitta Mitta. Upland habitat extends from that point upstream to the Benambra/Hinnomunjie where the river enters the montane zone, having its origins in the snowfields east of Mt Hotham.

Good historical evidence indicates that substantial populations of cod and Macquarie perch formerly existed in the lower reaches of the rivers and larger creeks of the montane zone in this catchment. 'Cod and perch' were recorded as being abundant in the Livingstone Creek at Omeo, in the Mitta Mitta River near Hinnomunjie and in the Morass Creek at the time of European settlement. These larger native species were also recorded as being present in the lower reaches of the rivers in the Anglers Rest area. Specific accounts describe trout cod and Macquarie perch being abundant in the Big River near Anglers Rest and that trout cod were by far the more common of the two cod species at the top of the upland zone near the Gibbo River. Progressively, Murray cod increased in abundance to be relatively common in the Dartmouth area towards the bottom of the upland zone. Cod and Macquarie perch were present in the Gibbo River and some larger creeks such as the Larsen Creek carried large numbers of perch. Silver perch were at times taken at the lower end of the upland zone near Banimboola. In the slopes habitat of the Mitta Mitta River the two cod species and Macquarie perch were abundant as were catfish in the adjacent lagoons while silver perch were also taken at times. Macquarie perch were abundant in some creeks such as the Snowy Creek while cod were also present in the larger creeks such as the Tallangatta Creek where they were found well upstream. Small numbers of golden perch were present in the lower reaches of the river near its confluence with the Murray.

After an unsuccessful attempt to introduce salmon in 1889, brown and rainbow trout were successful introduced to the catchment in the Omeo area in 1902 with trout becoming common in many montane habitats by 1910. The trout progressively colonised downstream arriving in the Dartmouth area by the late 1920s and came to dominate most montane and upland habitats as well as some in the slopes zone by the Second World War. An accurate date for the arrival of redfin was not recorded but they reached the Albury area around 1912 and probably the lower Mitta Mitta River by the end of the First World War. The species proliferated in slopes habitats during the 1930s and penetrated into lower upland habitat reaching as far upstream as the lower reaches of the Dart River and the Mitta Mitta River to the Larsen Creek area by the 1970s. European carp arrived in the lower reaches of the catchment during the late 1970s and appeared in Dartmouth Dam about a decade later. They are now abundant in the lake with some fish being present further upstream to at least the Hinnomunjie area.

Changes to Physical Environment

The major physical changes that have transpired affecting the upper Mitta Mitta Catchment fishery are:

(a) Extensive mining and dredging on the upper Mitta Mitta River in the Hinnomunjie area and in the Livingstone Creek destroyed much of the original aquatic habitat. Some areas, particularly the Livingstone Creek, are experiencing significant silting, due to the movement of sand slugs from mining, destroying many of the holes. To a lesser degree, stretches of the Mitta Mitta River, near the town of Mitta Mitta, and other tributaries were also impacted by mining;

(b) Siltation created by land clearing and agriculture has impacted on some feeder streams. However, much of the upper reaches of the catchment is forested and generally stream condition is good. Sedimentation is most evident in some of the streams in the Omeo area and in the slopes zone;

(c) Construction of the Hume Weir after the First World War (enlarged during the 1950s) has isolated fish populations from further downstream. Due to the size of the barrier there is no practical way of facilitating fish passage over Hume Dam;

(d) Extensive wetland areas have been drained and turned into agricultural land resulting in a loss of aquatic habitat;

(e) 'River improvement works' destroyed some habitat in this system. Notably, extensive removal of wooden debris took place in the slopes habitat of the Mitta Mitta River after the Second World War;

(f) During the 1970s construction commenced on the Dartmouth Dam near the bottom of the upland zone preventing fish passage upstream. Due to the size of the barrier there is no practical way of facilitating fish passage over Dartmouth Dam;

(g) The Mitta Mitta River downstream of Dartmouth to Towong experiences a depressed thermal regime generated by coldwater releases from the dam. These releases are conducted for hydro-electric power generation and for irrigation storage in the Hume Dam. They have impacted on native fish populations but created good conditions for salmonids in the lower Mitta Mitta River;

(h) Regulation of flows of the Mitta Mitta River by Dartmouth Dam has altered the natural flow regime of the river downstream. The reduction in flooding by river regulation and reduced flows may be affecting fish recruitment;

(i) Reductions in runoff in the catchment generated by land clearing and climate change have generally reduced stream flows. The area is one of the more reliable in the state for rainfall and also receives significant runoff from snowfalls. However, long term reductions in runoff are apparent. The reduced flows have resulted in a warming of some upland streams while some smaller streams in the slopes zone are becoming more ephemeral; and,

(j) Large bushfires in the past decade devastated parts of the catchment which has led to poor water quality and increased silting of streams in those areas.

Conservation Imperatives

This catchment contains at a natural self supporting population of the endangered Macquarie perch in Lake Dartmouth, the Mitta Mitta River upstream to the Hinnomunjie area and in the lower reaches of other feeder streams of the dam. The population flourished after the filling of the dam during the 1980s becoming the largest remaining population in the country. Since the lake filled, the population has declined but now appears to be stable. It is both of state and national relevance for conservation and maintaining this population is a high priority.

Stocking of fingerlings of the critically endangered trout cod took place into Lake Dartmouth and the Mitta Mitta River immediately upstream during the early 1990s. The program was curtailed after two years as at was decided that devoting all fingerlings produced annually to one river at a time was more likely to lead to the establishment of sizeable populations. Consequently, the Goulburn River at Murchison East and the Ovens River have been stocked with great success. Small numbers of trout cod have been reported by anglers as being taken from Lake Dartmouth and the Mitta Mitta River. NFA understands that DSE considers this water to be a candidate for the re-establishment of trout cod and stocking may resume in the future.

In the Mitta Mitta River downstream of Dartmouth the former good population of Murray cod declined in response to coldwater releases from the dam. There is recent evidence that a small population persisted in the lower reaches near Tallangatta and recent stockings may support this population. This Murray cod population, if sustainable, may warrant recognition as making a contribution to the conservation of the species.

Angling Opportunities

While many waters in this catchment once supported excellent fisheries for native fish most streams are now good to outstanding trout fisheries with some considered to be the best in the state. Headwater streams such as the Cobungra and Big Rivers and the Morass Creek are considered premier destinations for fly fishermen. A number of waters, however, provide mixed fisheries. Lake Dartmouth is notable for its Macquarie perch population which attracted large numbers of anglers during its heyday. At that time the species was also common in the Mitta Mitta upstream to Hinnomunjie with odd fish beyond. Today the species is less common in the lake and river and less fishermen target them though they are still considered a welcome catch. Most specimens are caught near the inflowing streams and in the river itself in the Taylor's Crossing area. Today, the most common angling species in the lake are the two trout species and carp with small numbers of Macquarie perch still being taken regularly.

Downstream of Lake Dartmouth, coldwater releases decimated the Murray cod fishery which has been replaced by excellent trout fishing, this stretch of river being perhaps the most productive for trout in the state. Many smaller creeks, such as the Snowy Creek, also provide good trout fishing. The lower reaches of the Mitta Mitta River near Yabba contain redfin, trout and some Murray cod and DPI have recent stocked Murray cod in this area. The upper reaches of Tallangatta Creek while suffering from reduced flows still support a trout fishery while the lower reaches downstream mainly contain redfin and carp with a few trout as summer conditions are marginal for salmonids.

Proposed Classifications of Streams

The waters in the Mitta Mitta catchment are recognised for the most part as good to outstanding trout fisheries and should be classified as such. The principle exception is Lake Dartmouth which is now one of only two locations where anglers can target and keep Macquarie perch (the other is the Yarra River. A third water, Upper Coliban Reservoir, lost its population in the drought). Apart from containing what is today a novel angling species, the conservation importance of this population dictates that Lake Dartmouth, and a portion of the Mitta Mitta River upstream, must be classified as a mixed fishery. In addition the presence of trout cod in these waters from previous stockings combined with the fact that they are likely to be stocked in the future provides an additional conservation imperative for these areas to be managed as mixed fisheries. NFA has also proposed advocated stocking trout cod into Lake Dartmouth to provide another recreational angling opportunity in this water as well as aiding the control of carp which has received widespread support.

It is proposed that Lake Dartmouth, the Mitta Mitta River upstream to the Hinnomunjie Road Bridge and the Gibbo River upstream to the Corryong Road Bridge be classified as mixed fisheries to encompass all waters inhabited or used by the Macquarie Perch population. NFA would not support the stocking of trout into these sections of these two rivers due to possible negative impact on the perch population. There is also no need, due to the excellent natural recruitment of trout in these waters. Upstream of these points and all other tributaries of Lake Dartmouth are proposed to be classified as Salmonid waters.

Downstream of Lake Dartmouth cold water releases have turned the Mitta Mitta River into perhaps the most productive trout stream in state and some tributaries are also excellent trout streams. Temperature data for the past decade indicates that when the dam is below capacity the depression of temperatures in the Mitta Mitta River downstream is reduced. At Tallandoon maximum water temperature in the past ten years have often exceeded 16 °C and in quite a number of years have reached 20 °C indicating improved conditions for Murray cod. In some years with increased irrigation releases temperatures have been depressed somewhat, typically in February and March when there is a high demand for water downstream. In the long term the lower Mitta Mitta River does have some prospect of supporting a significant fishery for Murray cod, and possibly Macquarie perch and trout cod.

At the present time the lower reaches of the Mitta Mitta River constitute a mixed fishery with the bulk of the catch comprising trout and redfin, but with increasing numbers of cod. It is proposed that downstream of Dartmouth Dam the Mitta Mitta River and all of its tributaries to the Omeo Highway Bridge near Tallandoon be classified as salmonids waters. NFA proposes that downstream of the bridge the river and most tributaries be classified as a mixed fisheries, managed to maximise returns to anglers of both salmonid and native fish species. Some of these contain populations of smaller native fish species. The Tallangatta Creek contains a self supporting trout population as well as being used by large trout which move upstream out of Lake Hume for spawning. It should be classified as salmonid water.

Summary of Proposed Classifications of Streams in the Mitta Mitta Catchment

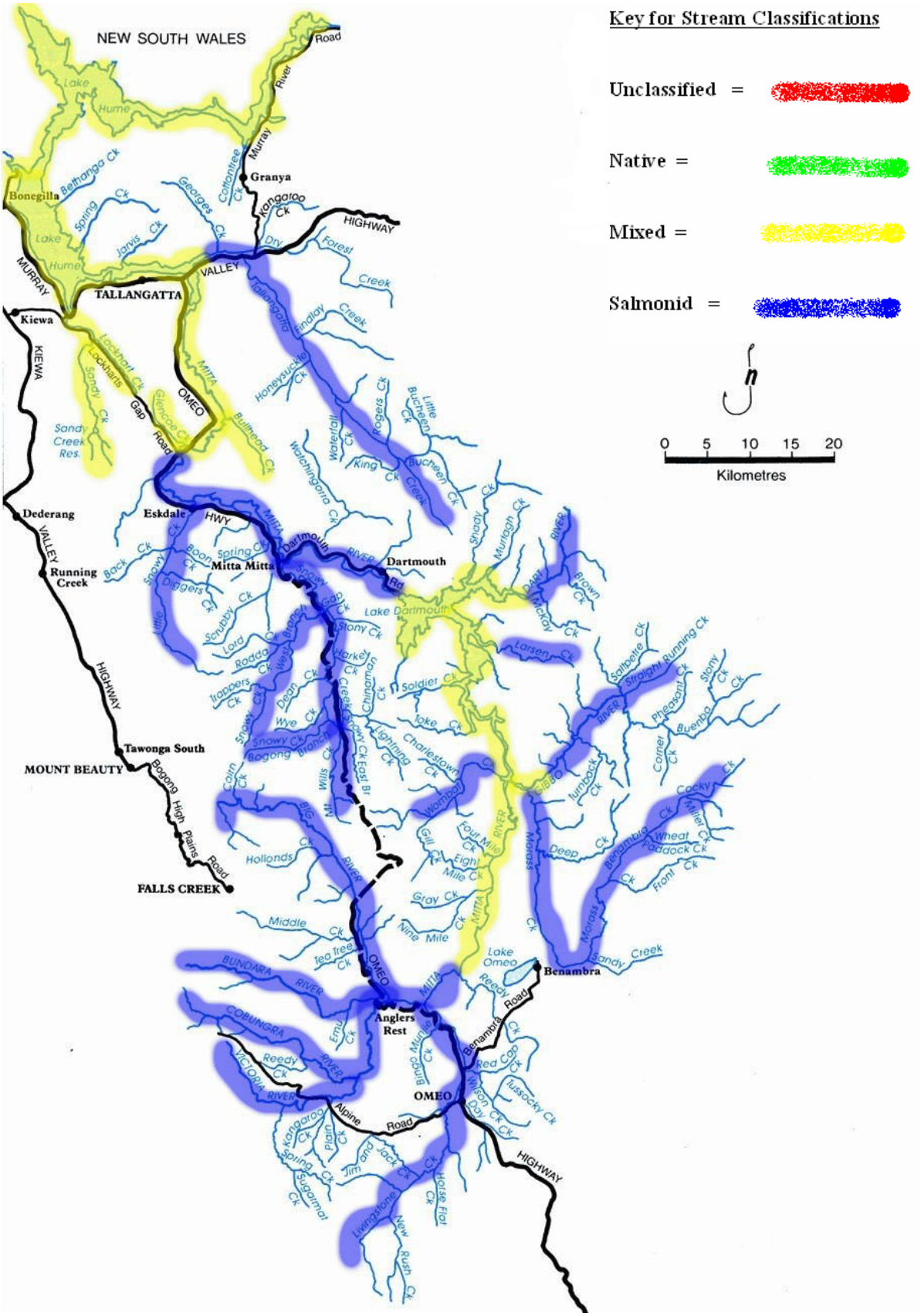
A. Lake Dartmouth & Upstream

- Lake Dartmouth = MIXED
- Mitta Mitta River from lake to Hinnomunjie Rd Bridge = MIXED
- Gibbo River from lake to Corryong Rd Bridge = MIXED
- All other waters = SALMONID

B. Downstream of Lake Dartmouth

- Mitta Mitta River, Dartmouth dam to Omeo Hwy Bridge near Tallandoon = SALMONID
- Tributaries, Dartmouth dam to Omeo Hwy Bridge near Tallandoon = SALMONID
- Mitta Mitta River downstream of Omeo Hwy Bridge near Tallandoon = MIXED
- Tallangatta Creek = SALMONID
- All other tributaries below Omeo Highway Bridge near Tallandoon = MIXED

Proposed Classification of Streams in the Mitta Mitta Catchment



Kiewa Catchment

Historic Species Presence

The habitat zones in the Kiewa catchment can be roughly defined as being slopes from its junction with the Murray River upstream to about Tawonga, transits upland habitat from Tawonga to the Big Hill area upstream of Mt Beauty then enters the montane zone.

There are collectively limited historical records for native fish generally, in the Kiewa catchment. There are good accounts indicating that trout cod and Macquarie perch had been abundant, along with some Murray cod, upstream to the Tawonga area. It was described at the time as providing 'magnificent fishing' for 'white eye and bluenose' indicating that it was an excellent recreational fishery for these native species. Catfish are recorded as having been formerly present in lagoons in slopes habitat. It is likely that silver perch and golden perch would have originally been present in the lower Kiewa River along with increasing numbers of Murray cod based on evidence from adjacent catchments. Oral history indicates that cod and perch penetrated into lower upland habitat in the lower reaches of the east and west branches of the Kiewa River near Mt Beauty. Further upstream the steep gradients may have impeded native fish passage and there are no records of their presence.

The earliest introduction of brown trout to the catchment has not been accurately documented though it is suspected that it occurred during the 1880s. Widespread liberations took place during the early 1900s which also included rainbow trout and government liberations continued into the second half of the twentieth century. By the 1920s they had spread throughout the upland and montane habitat of the catchment which developed into famed fishery. Trout remained uncommon in the slopes zone until the 1939 bushfire which decimated native fish populations in this reach of the river. After this event trout and redfin, the latter of which probably arrived around World War One, colonised the slopes habitat of much of the Kiewa River. While some recovery of Murray cod took place, the trout cod and Macquarie perch populations never recovered. From that time, exotic fish species have dominated the Kiewa River. European carp arrived in the catchment during the 1970s and are now common upstream to beyond Tawonga.

Changes to Physical Environment

The major physical changes that have transpired affecting the Kiewa Catchment fishery are:

(a) Some areas experienced significant silting due to the impacts of the 1939 bushfire, land clearing and agricultural practices;

(b) 'River improvement works' during the 1950s which removed wooden debris downstream of Tawonga;

(c) The construction of major barriers in the form of dams on both branches of the Kiewa River near Mt Beauty and upstream as part of the Kiewa Hydro-electric power scheme;

(d) The hydro-electric scheme regulates downstream flows and depressed the thermal regime as a result of cold water releases into the lower Kiewa River;

(e) Extraction of water occurs for agriculture in the lower reaches may be reducing flows;

(f) Significant reductions of runoff in the catchment generated by land clearing and climate change have generally reduced flows in feeder streams. The changes to flows are having multiple impacts whereby some streams in the slopes zone may no longer be perennial. Reduced flows are warming feeder streams and lower storage levels in the impoundments are combining to reduce the extent of cold water releases into the lower Kiewa River; and,

(g) The reduction in flooding by river regulation and reduced flows may be affecting fish recruitment.

Conservation Imperatives

Stocking of Murray cod into the lower Kiewa River has established a significant population which shows evidence of some natural recruitment and is of state conservation significance. Trout cod have not been stocked into the Kiewa River but small numbers have been taken in recent years - the fish have colonised the river from the Murray River. Officers from DSE are monitoring the progress of trout cod in the lower Kiewa River and may in the future consider some stocking to support the population. Cod are common in the Kiewa River downstream of Gundowring with regular captures taking place upstream to Mongans Bridge. A conservation imperative in this catchment exists in the lower reaches for conservation of the threatened Lowland Riverine Fish Community. The Murray cod population and possible trout cod population in the lower Kiewa warrant recognition as making a contribution to the conservation of these species.

Angling Opportunities

The upper Kiewa River and its major tributaries are famed trout waters, continue to be very popular with anglers and provide excellent angling. The impoundments forming the Kiewa Hydro-electric scheme produce trophy-sized trout and Mt Beauty Pondage is a designated Family Fishing Lake which receives on-grown trout. Below Tawonga a reduction in flows in the feeder streams have impacted upon trout populations as has the recent warmer thermal regime in the Kiewa River itself. However, downstream to the Dederang area numbers of trout are still being taken and the water is popular with anglers.

In the Kiewa River below Gundowring most angler activity is now directed at Murray cod and redfin, with small numbers of trout being taken. Regular captures of cod upstream has resulted in anglers targeting cod particularly near Coral Bank and Mullindolingong areas. Canoe trips down the river are becoming popular targeting both trout and cod in this stretch of river. The tributaries of the Kiewa between Tawonga and Gundowring while affected by reduced flows still support some good trout fishing and are important nursery streams for trout. Below Gundowring the only tributary providing good numbers of trout is the upper reaches of the Yackandandah Creek upstream of Allans Flat. The other tributaries contain mainly redfin, carp, Northern blackfish and the occasional trout and cod.

Proposed Classifications of Streams

The Kiewa catchment is recognised as a premier trout region with the lower Kiewa River now providing an excellent fishery for Murray cod and in the future possibly trout cod. Except for the upper reaches of the Yackandandah Creek, downstream of Gundowring only small numbers of trout are taken and most angling activity is directed at Murray cod and redfin. Upstream of Gundowring all angler activity is directed at trout with the exception of the Kiewa River between Gundowring and Mongans Bridge where the improved numbers of cod are attracting anglers to an interesting mixed fishery, which fishes well for trout in the cooler months and reasonably well for cod in the warmer ones.

NFA proposes that the Kiewa River and its tributaries upstream of Mongans Bridge be classified for management purposes as a salmonid fishery. Between Mongans Bridge and Gundowring the Kiewa River should be classified as mixed reflecting the angling opportunities that now exist in this reach of river as well as acknowledging the significance of the presence of Murray cod in this non-lowland habitat. All the tributaries feeding this stretch of the Kiewa should be classified as salmonid waters reflecting the angling they provide plus their importance to sustaining the trout population in the river. Downstream of Gundowring, the Kiewa River and its tributaries should be classified as native fisheries with the exception of Yackandandah Creek upstream of Allan's Flat which should be classified as salmonid. This classification recognises the importance of the lower Kiewa River as a Murray cod fishery. The tributary streams offer limited angling opportunities and may play an important role in the restoration of some of the smaller native fish species which form part of the

endangered Lowland Riverine Fish Community. There may also be some potential in stocking native angling species in the lower reaches of the Yackandandah Creek.

NFA recognises the importance of the Kiewa River fishery to trout fishermen and proposes the classifications outlined above. In deference to the mixed fishery below Mongans Bridge NFA would prefer that trout are not stocked into this section of river as there is adequate natural recruitment in the tributary streams. Upstream of Mt Beauty there is also no need to stock trout because of natural recruitment but NFA has no objection to the stocking of trout in this area of the Kiewa. Some angling groups have suggested that on-grown trout be stocked into some of these waters particularly prior to holiday periods to enhance the fishery as well as to take some pressure off wild stocks. In addition, if peak groups such as the ATF and VRFish will support NFA's proposed classifications for some key native fish waters in the Ovens and Goulburn catchments, the organisation is prepared to reciprocate and support novel salmonid fisheries in the upper Kiewa impoundments, which at times have been touted, such as the stocking of Atlantic salmon.

Summary of Proposed Classifications of Streams in the Kiewa Catchment

A. Kiewa River and all Tributaries Upstream of Mongans Bridge

- = SALMONID

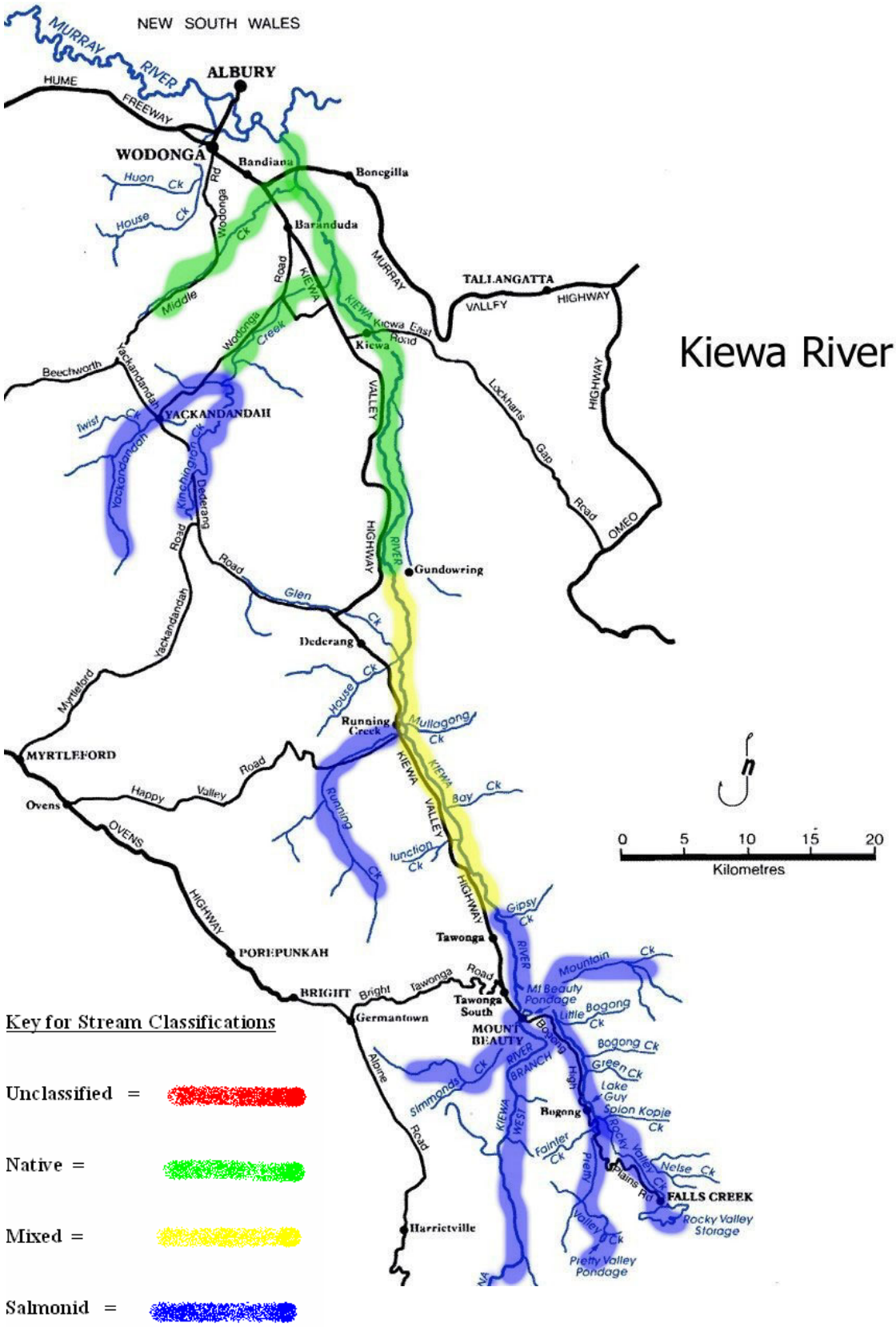
B. Mongans Bridge to Gundowring Bridge

- Kiewa River = MIXED
- All other waters = SALMONID

C. Downstream of Gundowring Bridge

- Yackandandah Ck upstream of Osbournes Flat Rd. = SALMONID
- All other waters = NATIVE

Proposed Classification of Streams in the Kiewa Catchment



Ovens Catchment

Historic Species Presence

The habitat zones in the Ovens catchment can be roughly defined as being lowland from the Murray River upstream to about Tarrawingee and Moyhu, slopes habitat from these points upstream to Germantown, Nug Nug and William Hovell and upland habitat upstream of these areas. Some montane habitat exists in headwater areas and the Mt Buffalo and Mt Cobbler plateaus.

Historical evidence indicates that in many streams some of the larger native angling species originally were present in abundance in upland habitats There is clear evidence of three species being present in the upland habitat in the Buffalo River, and its tributaries, these being Murray cod, trout cod and Macquarie perch with cod penetrating upstream to the lower reaches of the Catherine River. 'Cod' and Macquarie perch were also common in the King River well upstream of the present site of William Hovell Dam in the 'Top Crossing' area. In the Ovens River cod were common in the Bright area and Macquarie perch were caught near Harrietville. Due to the activities of the early goldminers, who drastically altered the habitat, the true upstream limits of the larger native fish species in the Ovens and Buckland rivers is unclear but it is suspected they penetrated well upstream. Evidence from other catchments and the existence of a relic population of catfish near Harrietville suggests this was the case.

In the slopes zone, the two cod species and Macquarie perch were abundant in the rivers and larger creeks and catfish were common in the billabongs and some creeks, and also present in the Ovens River itself. Trout cod were reported as being particularly abundant years ago in this type of habitat. Silver perch were caught in numbers at times in the slopes zone at least as far upstream as Rocky Point and Whitfield with small numbers of golden perch also being taken from this type of habitat. In the lowland section of the Ovens River and adjacent billabongs all of these native species were present and abundant though trout cod were not reported being captured from billabongs.

The earliest introduction of brown trout to the catchment has not been accurately documented though it is suspected that it occurred during the 1880s. Widespread liberations took place during the 1890s which also included rainbow trout. A volunteer hatchery operated at Bright from the 1920s onwards and government liberations also took place into the second half of the twentieth century. Both species are now widely distributed throughout upland and montane habitats and are common in the top half of the slopes zone of the Ovens and adjacent tributaries. Historically trout had a reasonably strong presence in the lower slopes zones and even in some lowland creeks. However, these were for the most part marginal waters reliant on ongoing stocking to replace populations lost in unfavourable seasons. Redfin arrived in the catchment in the 1920s and are now widespread throughout most lowland, slopes and upland waters in the catchment. A date for the introduction of tench is unknown but the species was present by the 1930s. European carp made their appearance during the 1970s and have spread throughout lowland and slopes habitats with some penetration into the upland zone.

Changes to Physical Environment

The major physical changes that have transpired affecting the Ovens Catchment fishery are:

(a) Extensive mining and dredging on the upper Ovens and Buckland Rivers destroyed much of the original aquatic habitat. Many of the holes were obliterated along much of the Buckland River and upstream of Porepunkah. Gravel slugs exist down to Myrtleford. The Buffalo river experienced limited mining activity and the King River none;

(b) Some areas are experiencing significant silting due to the movement of sand slugs from mining areas upstream and from land clearing and agricultural practices;

(c) The construction of two barriers in this system namely Buffalo Dam on the Buffalo River and William Hovell Dam on the upper King River which are insurmountable barriers to fish movement. Indirectly, the Yarrawonga Weir of the Murray River a short distance

downstream from the Ovens River confluence may have historically restricted fish passage into the Ovens system from the Murray. This has been overcome with a fishway on the weir;

(d) The Ovens River, not being directly impounded, remains largely unregulated. The two dams on the tributary rivers do have an impact on those streams but maintain flows in the Ovens during dry periods. Extraction of water occurs for agriculture which may be impacting on flows. The impoundments may be having a minor impact on thermal regimes immediately downstream but they do not appear to be serious enough to severely affect fish populations;

(e) 'River improvement works' destroyed some habitat in this system. Notably the King River between Whitfield and William Hovell was channelised with wooden debris being removed and stream morphology altered;

(f) Significant reductions of runoff in the catchment generated by land clearing and climate change have generally reduced stream flows. The changes to flows are having multiple impacts. Where severe some streams are no longer perennial and are now unlikely to support recreational fisheries particularly those in lowland and slopes habitats;

(g) The reduced flows are also associated with reduced flooding leading to less recharging of billabongs and anabranches. As a consequence many billabongs are remaining dry for extended periods and some now appear to be permanently dry. The reduction in flooding may also be affecting fish recruitment; and,

(h) Two large bushfires in the past decade devastated the upper Buckland and Buffalo catchments which led to poor water quality and increased silting of streams in those areas.

Conservation Imperatives

A number of waters in this catchment are of state and national significance in terms of native fish conservation. The Buffalo River upstream of the dam carries a self supporting population of the endangered Macquarie perch. Apart from reported rare captures below the dam and in the lower Buckland River the perch population in the upper Buffalo River is all that remains of a once extensive distribution of this species in the Ovens catchment. This population had its genesis as a relic wild population which survived into the 1980s and was subsequently bolstered by hatchery fingerlings and adult fish relocated from Lake Dartmouth. During the 1990s the population expanded to the point where the species was reasonably common from the dam upstream to the Camp Creek area near Abbeyard's. This population was badly affected by the bushfires but still persists. The Victoria DSE Action Statement for the species has identified the Buffalo River population as a priority for management and recovery of the species including translocation of fish from the Yarra River population to assist it's recovery. Adult Macquarie perch have been also translocated into Lake William Hovell but do not appear to have developed a recruiting population. The recent DPI Macquarie perch workshop resolved that stockings would be undertaken in the future for conservation purposes in the upper Buffalo River. In addition it was resolved that stockings to create additional recreational fisheries will take place in Lake Buffalo, Lake William Hovell and in the Ovens River in the future.

The Ovens catchment contains a stocked population of the critically endangered trout cod for which there is recent evidence that spawning and recruitment is taking place. Trout cod are now abundant downstream of Myrtleford and Edi and significant numbers exist further upstream to near Bright and up to the base of William Hovell Dam. Small numbers were also stocked into the Buffalo Dam and Buffalo Creek. Trout cod are currently totally protected, but recovery plans have highlighted that controlled recreational fishing will be permitted as the species recovers. Recently, trout cod have been stocked into Lake Kerford near Beechworth to create a dedicated recreational fishery for the species. The population of trout cod in the Ovens catchment is the largest in Victoria and if it becomes self supporting will have notably improved the conservation status of the species. The population of Murray cod in this catchment is self supporting and also of conservation significance from the state perspective. The current distribution of Murray cod is similar to that described for trout cod.

There are reports of a population of catfish, which is now considered to be endangered, existing in a waterhole upstream of Bright. This population appears to have been viable over the long term and is of state significance as it may be the only remaining wild population in non-lowland habitat. There is a ban on the taking of catfish from most waters in Victoria with the exception of the Wimmera River. Preliminary techniques have been developed for the hatchery production of catfish which should facilitate the recovery of populations and the establishment of recreational fisheries. While reduced catchment flows have eliminated some of the lagoon habitat favoured by catfish in this catchment there is potential for re-introduction of the species to areas such as the Whorouly Creek and lower Ovens River near Bundalong. A conservation imperative in this catchment exists in the lower reaches lower reaches for conservation of the threatened Lowland Riverine Fish Community. A number of streams in the lowland zone contain important populations of small native fish species.

Angling Opportunities

A recent magazine article summarised the current status of the trout fishery in the upper Ovens region and indicated that most are still in good health and provide good to excellent angling. At the present time, the Ovens River and its tributaries upstream roughly of Myrtleford largely support salmonid fisheries, with a number of important exceptions. While trout get much publicity in the upper Ovens region there is also solid local interest in native angling species. Lake Buffalo was stocked with Murray cod and golden perch at the instigation of a local angling club which clearly illustrates a significant local level of interest. While not widely publicised, local and outside anglers are targeting Murray cod in the Buffalo River upstream of the dam, particularly with flies and, prior to their protection, Macquarie perch were also a popular target. Buffalo Dam is a popular mixed fishery containing redfin, trout and stocked Murray cod and golden perch. In the Ovens River upstream of Myrtleford regular captures of both cod species are occurring out of the larger holes to Porepunkah with odd fish being taken near Bright. The Ovens River above Bright, the Buckland River and the major tributaries of the Buffalo River are solely trout fisheries and considered amongst the best in the state. Between Bright and Myrtleford the abundance of trout declines somewhat with fewer but some larger fish than upstream though it is still popular with trout anglers. Many of the smaller tributary streams upstream of Myrtleford are nurseries for trout and can provide some good angling.

Downstream of Myrtleford Murray cod, trout cod and redfin now dominate angler catches. Historically, numbers of trout have been taken down to Everton with a few fish captured near Wangaratta. Temperatures are marginal for trout in this section of river and the population that existed in the past was probably generated by stocked fish that survived during favourable seasons or fish moving downstream from the upper reaches during cooler weather. The Ovens River has become very popular with anglers doing canoe trips downstream of Rocky Point (and now Porepunkah further upstream) targeting cod with lures and even flies. All of the tributary creeks historically provided good fishing for native fish, but for many years redfin became the stable catch (eg. Whorouly Creek). Most were marginal for trout and now are even more so, the main exception being the headwater streams of the Reedy Creek near Beechworth. The recent DPI Macquarie perch Workshop listed the Ovens River as a target waters for future stocking of Macquarie perch for recreational fishing.

Downstream of Wangaratta, angler activity is directed at native fish and redfin. Murray cod and trout cod are abundant with numbers of redfin, European carp and some golden perch. It is expected that with the introduction of the Yarrawonga Weir fishway that silver perch may eventually recolonise the lower Ovens River. The small tributary streams below Wangaratta provide limited fishing for redfin, northern blackfish, carp and the occasional larger native fish. Two small artificial lakes near Beechworth, Lakes Kerford and Sambell, provide recreational angling. Lake Sambell once supported a trout cod population which was wiped out by a fish kill in 1970. Both lakes contain redfin and have at times been stocked with brown trout, rainbow trout and golden perch for recreational angling. Lake Kerford has been stocked with trout cod for recreational angling purposes and Lake Sambell is under consideration for a similar stocking. Both lakes provided good mixed fisheries.

The King River and its tributaries upstream roughly of Whitfield largely support salmonid fisheries. The river upstream of William Hovell Dam is an excellent wild trout fishery that is very popular with anglers. Downstream of the dam was once an excellent trout fishery that was adversely affected by 'river improvement' works but is still considered to be a reasonably good trout fishery with the west branch being a nursery stream. Trout are common down below Whitfield to the Edi area. The smaller tributaries upstream of Whitfield also provide angling for trout. In the King River both cod species are now present in numbers upstream to William Hovell Dam. For example, one angler's diary records the capture of over 50 cod (both species) during a twelve month period between Cheshunt and Gentle Annie. Lake William Hovell supports a good redfin and trout fishery and is earmarked for stocking with Macquarie perch for recreational angling.

Below Whitfield trout are reasonably common, as are the two cod species, downstream to Edi. Below Edi most of the fish captured by anglers are Murray cod, trout cod and redfin, and a few trout. The Black Range, Boggy, Meadow and Hurdle Creeks have supported trout fisheries in the past but reduced flows in recent years are reported to have decimated trout stocks in the last three waters. The Black Range Creek still supports trout, is being fished by local anglers and is a nursery stream for trout.

Proposed Classifications of Streams

The Ovens catchment is recognised as one of the few remaining examples in the Murray-Darling Basin containing rivers whose flows remain largely unregulated for irrigation. With this attribute and direct access to the Murray River it is viewed as a very important catchment for native fish conservation and for the MDBA Native Fish Strategy. Despite some reports in the media neither NFA or government agencies have proposed devoting the entire catchment to the conservation of native fish. Certainly, slopes habitats in the catchment have good credentials for both conservation of native fish and for recreational fisheries based on these species. However, the upland habitats are a very different proposition. The two rivers whose upland reaches are in good physical condition, the Buffalo and King, contain substantial barriers preventing upstream access of fish. The other two rivers - the upper Ovens and Buckland - while not containing barriers, were dramatically altered by the gold rush and for the most part offer poor habitat for the larger native species.

There has been some adverse publicity about the stocking of trout cod into this catchment, a species which due to its endangered status cannot currently be targeted by anglers, with some people viewing this as a loss of angling opportunities. To the contrary, representatives from two angling clubs in the region have indicated to NFA that they have welcomed the re-introduction of trout cod to the system. Even though they cannot be directly targeted they have indicated that they are welcomed as by-catch for their excellent fighting qualities and already are adding to the attractiveness of the Ovens Valley as an angling destination. There has been no reduction of angler access or changes to angling regulations in the area since the stocking of trout cod and so there has been no direct impact on angling activity.

DSE have placed a ban on the stocking of trout into waters containing significant numbers of trout cod, namely the Ovens River downstream of Bright and the King River downstream of William Hovell Dam. This has also caused concern amongst trout anglers. The many feeder streams are nursery areas for trout and liberations of hatchery trout ceased well before the ban was imposed as DPI surveys revealed the presence of more than adequate natural trout recruitment. Upstream of Bright and William Hovell there is no ban on the stocking of trout and approval was given for stockings subsequent to the drought to aid population recovery. The reduction in trout stockings has not been driven by conservation imperatives but by the fact that strong natural recruitment of trout continues to take place in much of the catchment.

Some anglers have indicated to NFA that they believe that some limited take of trout cod should be allowed or have expressed doubts that legalised angling for the species will ever be allowed. The National Recovery Plan for the trout cod states that angling for the species in rivers will occur in the future as the conservation status of the species improves. Recently Lake Kerford near Beechworth was stocked with trout cod to establish the first legalised fishery for the species which NFA

understands will be a take fishery with a size and bag limit. This clearly demonstrates that the fears of anglers regarding future angling for trout cod are unfounded.

Trout cod are now common in the Ovens River from its lower reaches upstream to Myrtleford then progressively decline upstream with a few fish being present near Bright. Murray cod in the Ovens River show a similar distribution to that of trout cod and are the focus of most of the angling activity downstream from Myrtleford. Apart from the two cod species, below Myrtleford to Wangaratta the main species taken by anglers are redfin, carp and small numbers of trout. The recent Macquarie perch workshop identified the Ovens River as a future water for stocking to develop a recreational fishery and although a specific reach was not identified between Myrtleford and Everton offers good habitat. As the Ovens River between Myrtleford and Wangaratta contains predominantly native species and is possibly the best slopes type habitat remaining in the Murray Darling Basin NFA proposes to classify this section of river, and its tributaries, as a native fishery. This will not impact on those anglers desiring to target the small number of trout present in this section of river. NFA believes due to its high conservation significance for trout cod and the growing popularity for clear water fishing for Murray cod that this is the only acceptable classification. In the future when Macquarie perch are stocked and angling is phased in for trout cod this stretch of river will be an outstanding native fishery. Some streams on the tableland near Beechworth continue to provide trout angling though further downstream they are largely unsuitable. NFA proposes classifying the streams above the Woolshed Falls as salmonid waters and has no objection to future stocking of trout in them. Below the falls should be classified as a native fishery as few trout exist downstream except in the plunge pools immediately below the falls.

Between Myrtleford and Porepunkah most angler activity is directed at trout, and secondarily redfin, although increasing numbers now target Murray cod in this section of river. This reach is clearly a transition zone between high densities of native fish downstream and high densities of trout upstream. Native fish populations in the area require recognition as they will in the long term represent the upstream limits of significant populations, important from the conservation perspective. Because it contains populations of trout cod and Murray cod of conservation significance as well as providing angling for cod this stretch of river clearly warrants classification as a mixed fishery for management purposes. This classification will have no impact on the activity of trout anglers who will be able to continue targeting their quarry.

The Buckland River and its tributaries, while producing occasional catches of the native angling species in the lower reaches, was degraded during the gold rush, supports a very popular trout fishery and should be classified as a salmonid water. Upstream of Porepunkah, and particularly Bright, the upper Ovens River and tributaries provide outstanding trout fishing, particularly with flies and clearly should be classified and managed as salmonid fisheries. The isolated catfish population upstream of Bright while deserving of efforts to ensure its conservation and expansion is probably of insufficient significance to influence the classification of the upper Ovens River. While there is more than adequate recruitment of trout in these streams some trout angling groups have suggested that large on-grown trout be stocked periodically, particularly before holiday periods, to take pressure off the fishery and provide additional angling interest. NFA will support the stocking of on-grown trout upstream of Bright provided below Porepunkah is classified as a buffer zone (mixed) and below Myrtleford as a dedicated native fishery. The long term vision of NFA for the upper Ovens River is a premier trout fishery upstream of Porepunkah, a premier fishery for cod and perch downstream of Myrtleford and a transition zone in between.

The situation in the King River largely parallels that in the Ovens River. Downstream of Edi most angler activity is focussed on targeting native fish indicating that it should be classified as a native fishery. Two tributaries, the Boggy and Meadow Creeks, previously provided some trout angling but are now marginal or lethal waters due to reduced flows and high temperatures. They should also be included in the native classification providing some important habitat for smaller native fish species. This classification would not preclude anglers targeting any trout present in them. The upper reaches of the Boggy Creek may hold a self-supporting population of trout and NFA will consider supporting this reach as being classified as salmonid if this is demonstrated to be the case. Between Edi and William Hovell Dam is clearly a transition zone between native fish and trout dominance though cod

are increasing in abundance and are regularly being targeted now by anglers. The trout fishing is reasonable in the lower reaches but is better upstream of Cheshunt and in the West Branch of the King River. Because of the significant presence of trout cod and the increasing angler activity directed at native fish the King River between William Hovell Dam and Edi should be classifies as a mixed fishery for management purposes. Two tributaries that are important nursery streams for trout, namely the West Branch of the King River and Black Range Creek, should be classified as salmonid waters.

Upstream of William Hovell Dam is an excellent wild trout fishery. While the habitat is very good, historical evidence suggests that rapid declines occurred in native fish populations after trout were introduced c1900. The upper King has a cool thermal regime and temperature records indicate that the river regularly fails to reach 16°C by early December though in recent years during drought it has done so. Temperature data combined with the historical evidence suggests there is limited potential for the re-establishment of long term self-supporting populations of native fish in this reach of river. Therefore it is proposed that the King River upstream of the dam be classified as a dedicated premier salmonid fishery. Lake William Hovell supports a good mixed fishery for trout and redfin has been earmarked for stocking with Macquarie perch for recreational angling and has been suggested by NFA as a potential site for stocking trout cod for angling purposes. Clearly the lake should be classified as a mixed fishery. If the King River between the dam and Edi is classified as mixed water, effectively a buffer zone between trout and native fish populations, NFA will support the stocking of on-grown trout into Lake William Hovell and the King River upstream to enhance the trout fishery as previously outlined for the upper Ovens. In addition NFA will consider supporting the inclusion of a novel salmonid fishery, for example stocking of Atlantic salmon, in the dam as an additional angling attraction/opportunity for salmonids in the catchment.

In terms of conservation imperatives the Buffalo River is a water of state and national significance for the conservation of Macquarie perch and has been earmarked for future stockings of juveniles and relocation of adults of this species to bolster the population. From the recreational angling perspective the Buffalo River contains a fairly good trout fishery though water temperatures make it marginal in some seasons. The many tributaries of the Buffalo including the Catherine, Dandongadale and Rose Rivers provide good to excellent trout fishing and are important nursery streams for trout. Murray cod originating from fingerlings stocked in Lake Buffalo are also regularly captured by anglers, particularly in the Dandongadale area. The dam itself contains a popular mixed fishery which includes redfin, trout, Murray cod and golden perch. It has also been earmarked for stocking with Macquarie perch to provide recreational angling. Immediately below the dam some trout are taken but it is not considered as good a water for trout as some other nearby streams. In the lower Buffalo River most angler activity is now being directed at redfin and native species with some of the rocky stretches offering good habitat for the latter including the two cod species.

NFA proposes classifying the Buffalo River below the dam as a native fishery, being a modest extension upstream of the Ovens River classification penetrating to the edge of the upland zone. This will not impact on trout anglers targeting trout immediately below the dam wall. It also reflects the conservation importance of the lower Buffalo River as allowing continuous access with the rest of the Murray Darling System for native fish such as trout cod, Murray cod and Macquarie perch. The Buffalo Dam is a popular mixed fishery and angling opportunities will become even more diverse when it is stocked with Macquarie perch. Upstream of the dam the presence of the nationally significant Macquarie perch population in the Buffalo River upstream to the Camp Creek area dictates that this water must be classified as a mixed fishery for management waters. While trout and redfin are the focus of most angling activity Murray cod are making an increasing contribution to recreational angling in this reach. Eventually as the Macquarie perch population recovers with the support of stocking they will also contribute to the fishery. The Buffalo River may well be the best piece of upland habitat supporting inland native species in the state but is acknowledged by NFA as being a good and popular trout fishery. All the tributaries of the Buffalo River provide very good or excellent trout angling and NFA supports the classification of these waters as dedicated salmonid fisheries.

From Wangaratta, the Ovens River downstream and the lower reaches of its tributaries provide some of the best angling opportunities for native fish in the state. This should continue to improve over time with fish passage now possible past Yarrawonga Weir. New angling opportunities will occur in the future with future stockings of Macquarie perch and possibly catfish and silver perch occurring. Occasional captures do take place of trout that have moved downstream but they do not provide a viable fishery. Some of the smaller streams have experienced reduced flows, provide limited angling opportunities and their rehabilitation will make an important contribution to restoring or enhancing populations of the smaller native fish species comprising the threatened Lowland Riverine Fish Community. The upper reaches of the Fifteen Mile Creek may hold a self-supporting population of trout and NFA will consider supporting this reach as being classified as salmonid if this is demonstrated to be the case. A number of smaller lakes in this catchment are managed under the Family Fishing Lakes Program as mixed fisheries and at times are stocked with on-grown fish. NFA supports the present management of these fisheries with the proviso that the remnant catfish population in the dredge hole near Harrietville be managed specifically to ensure its persistence, as it may in the long term prove to be valuable genetic resource aiding in the recovery of this species.

NFA's vision for long term salmonid fisheries in the Ovens catchment is the management of premier trout fisheries, supported possibly by on-grown fish, upstream of Porepunkah in the Ovens River and William Hovell Dam in the King River, the maintenance of wild trout fisheries in the Buckland River and tributaries of the Buffalo River and a major contribution to angling in mixed fisheries in the Buffalo River, Ovens River between Porepunkah and Myrtleford and the King River between William Hovell dam and Edi as well as in regional impoundments. For native fish the vision is for the development of the state's best wild clear water fisheries for Murray cod, trout cod and Macquarie perch downstream of Myrtleford and Edi and a significant contribution to mixed fisheries upstream of these points. If brought to fruition, this vision will make the Ovens Valley one of the best and most diverse angling destinations in the state if not the nation.

Summary of Proposed Classifications of Streams in the Ovens Catchment

A. Ovens River & Tributaries upstream of Porepunkah (road bridge)

- Harrietville Dredge Holes = MIXED (special management of relic catfish population)
- All other waters = SALMONID

B. Ovens River from Porepunkah to Myrtleford (junction of Buffalo River)

- Ovens River = MIXED
- All other waters = SALMONID

C. Ovens River downstream of Myrtleford (junction of Buffalo River)

- Streams upstream of Woolshed Falls (& others on tableland) = SALMONID
- Lakes Sambell & Kerford = MIXED
- Fifteen Mile & Boggy Cks upstream of Benalla -Whitfield Road = SALMONID
- All other waters = NATIVE

D. Buffalo River

- Buffalo River from dam to Camp Creek Junction = MIXED
- Buffalo Creek downstream of road crossing = MIXED
- Buffalo River downstream of dam = NATIVE
- All other waters = SALMONID

E. King River above William Hovell Dam

- Lake William Hovell = MIXED
- All other waters = SALMONID

F. King River from William Hovell Dam to Edi (road bridge)

- West Branch of King River = SALMONID
- Black Range Creek = SALMONID
- All other waters = MIXED

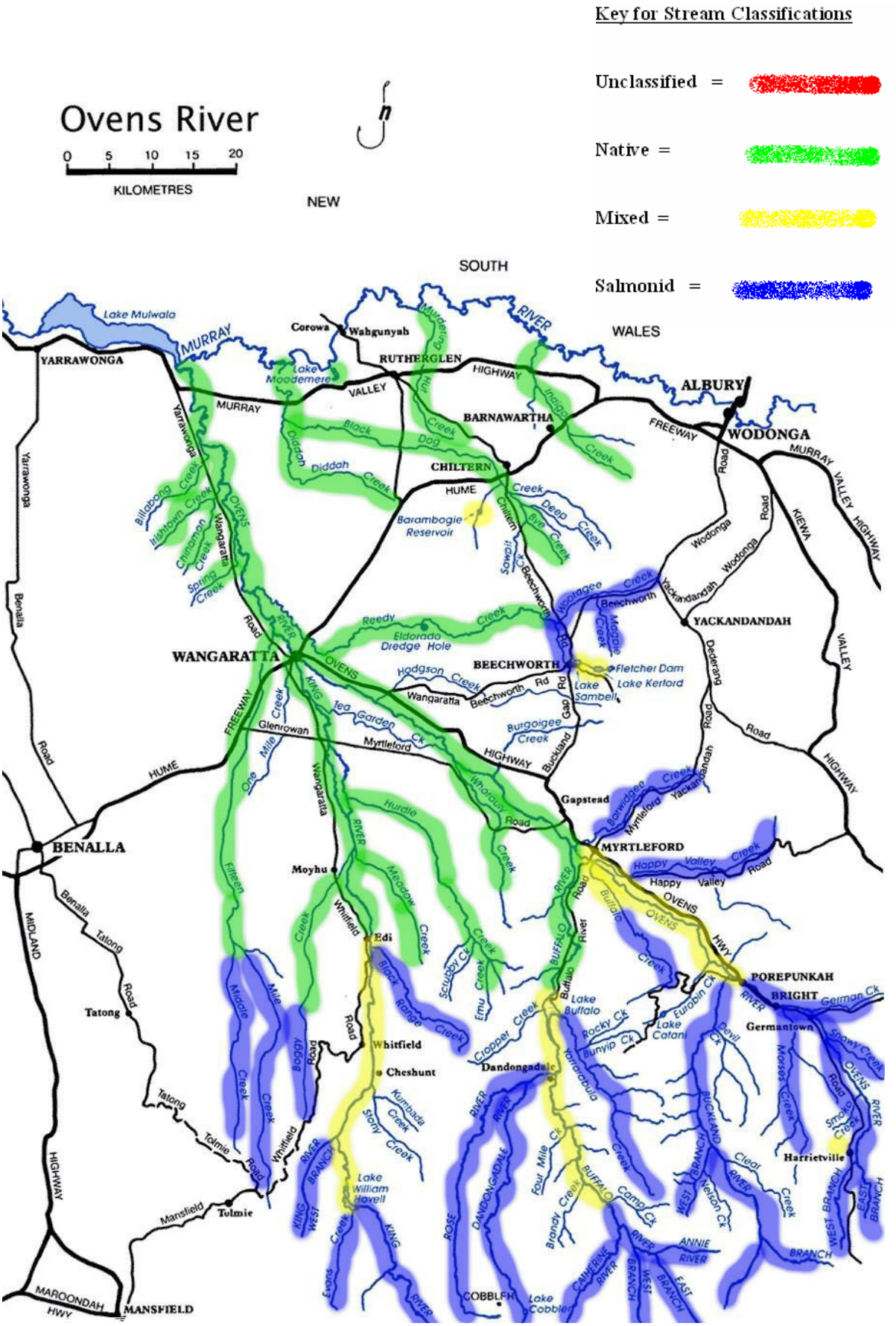
G. King River downstream of Edi

- Boggy Creek upstream of Myrrhee = SALMONID
- All waters = NATIVE

H. Family Fishing Lakes

- All waters= MIXED

Proposed Classification of Streams in the Ovens Catchment



Broken Catchment

Historic Species Presence

The Broken River catchment comprises two major waters which flow through lowland habitat. These are the Broken River which discharges into the Goulburn River near Shepparton and the Broken Creek which discharges into the Murray River near Barmah. The two streams diverge near Benalla and a short distance upstream the Broken River enters slopes habitat in the Yin Barun area which continues to near Barwite. Most of the remainder of the catchment is contained in the upland zone with a few of the tributary streams, notably the Ryan's and Holland's Creeks, making incursions into montane habitat.

Historically this catchment was renowned for its prolific population of Macquarie perch which were abundant from the lowlands to headwater areas except where waterfalls and steep gradients prevented access. Such was their abundance that many thousands of Macquarie perch were translocated from the Broken River to other streams between 1935 and 1962. Macquarie perch have been recorded as far upstream as the Broken River near the Stockyard Creek junction and were probably found further upstream at the time of European settlement. They were found in all habitats but were particularly common in slopes zone of the Broken River and the larger creeks in this type of habitat. Cod also penetrated to the upland Broken River though at this point which species was present is unclear but it is known that both Murray cod and trout cod were originally present in the Broken River. Cod were certainly regarded as present in good numbers in the river in the slopes zone and were present as well in the larger creeks.

Murray cod appear to have been originally abundant in all perennial streams in the lowland zone and were taken from the larger billabongs. Catfish were abundant in the Broken River and Creek, and associated lagoons, and were also present in some lowland creeks such as Baddaginnie Creek. Catfish were present into slopes habitat having been taken in past years from Holland's Creek near Tatong and in Back Creek near Samaria. Golden perch and silver perch were common in the Broken River and Broken Creek upstream to near Benalla.

Brown trout were first stocked into streams near Tatong in 1873 and in subsequent decades, along with rainbow trout, were introduced to all of the streams in the slopes upland, and montane zones by a local volunteer hatchery and by the state government. They became common in the upper reaches of the catchment but less common towards the bottom of slopes habitats where conditions were marginal for them. A precise date for the arrival of redfin is uncertain though it is suspected that the species was present in some lowland habitats by the 1890s. They progressively spread upstream becoming common near Benalla around the 1940s and proliferated in Lake Nillahcootie when it filled during the 1970s. It is also uncertain when tench arrived in this catchment though it is known that stockings into some waters took place during the 1940s. European carp appeared in this catchment during the 1970s and gained access to Lake Nillahcootie during the 1980s. Carp are now common throughout most lowland habitats in this catchment and the larger waters of the slopes zone with some reports in upland habitat in the upper Broken River.

Changes to Physical Environment

The major physical changes that have transpired affecting the Broken Catchment fishery are:

(a) Construction of the diversionary weirs on the Broken River and Broken Creek from the 1890s onwards provided obstacles to upstream fish passage. These weirs were modest structures and fish passage was possible during large floods. In recent years, small fishways have been fitted to these structures to improve fish passage;

(b) Regulation and diversion of flows in the system by these small weirs has reduced flows, particularly in the Broken Creek, adversely affecting fish populations;

(c) Much of this catchment, including the upper reaches, has been cleared for agriculture. Some areas of forest at high elevations not suitable for agriculture are managed for timber and water supply. Siltation created by land clearing and agriculture has impacted on many streams. Cultivation of land in the lowlands has resulted in severe silting of some streams. The upper Broken River above Lake Nillahcootie also has sedimentation evident as do some of the streams in the slopes zone;

(d) Major wetland areas have been drained and turned into agricultural land resulting a loss of aquatic habitat;

(e) 'River improvement works' destroyed some habitat in this system. Wooden debris removal took place from some lowland habitats and parts of the Broken Creek were channelised;

(f) The completion of Nillahcootie Dam in 1971 created a major barrier to upstream fish movement. Due to the size of the barrier there is no practical way of facilitating fish passage over Nillahcootie Dam;

(g) Regulation of flows of the Broken River by Nillahcootie Dam has altered the natural flow regime of the river downstream. Part of the flow was historically diverted to Lake Mokoan, an enlargement of the original Mokoan Swamp created in 1971, for storage. This has recently ceased;

(h) The Broken River downstream of Nillahcootie may be experiencing some degree of depression of its thermal regime that may have impacted upon native fish populations;

(i) Reductions of runoff in the catchment generated by land clearing and climate change have generally reduced stream flows. The area, having limited supply from montane areas and snowfields, has been particularly severely affected. The reduced flows have resulted in a warming of some upland streams while some smaller streams in the slopes zone are becoming more ephemeral. In recent years extensive stretches of the Broken River in the upland zone have ceased to flow or have dried up completely. Streams originating in forested country are faring better.

Conservation Imperatives

This catchment contains several self supporting population of the endangered Macquarie perch. A remnant population in Lake Nillahcootie and the Broken River upstream which was thought extinct appears to be recovering. During the 1980s/90s Macquarie perch fingerlings were stocked into the Broken River downstream of Nillahcootie Dam and into a number of tributary streams to support a remnant population. The project was successful with significant populations now present in the river, Moonee Creek and Holland's Creek. These downstream populations are of high conservation significance being linked by connecting waterways, with the potential to disperse elsewhere in the catchment. The Holland's Creek between Swanpool Road and Spring Creek has been designated a demonstration reach as part of the MDBA Native Fish Strategy with the focus on improving the aquatic habitat to aid the survival and recovery of the Macquarie perch population in that water.

Stocking of fingerlings of the critically endangered trout cod took place into Loombah Weir on Ryan's Creek during the late 1980s and into the Broken River below Nillahcootie during the 1990s, with good results in the former water. It was thought that the trout cod population in Ryan's Creek had been eliminated by angling; however, a DSE survey in 1999 revealed the presence of juvenile trout cod demonstrating that spawning and recruitment had taken being the first stocked trout cod population to have done so. The creek also received a stocking of Macquarie perch during the 1990s. It has not been surveyed for some time and the status of populations of these two species in this water is currently uncertain. While ongoing captures of trout cod have taken place in the Broken River the stocking failed to establish a significant population.

A conservation imperative in this catchment exists in the lower reaches for conservation of the threatened Lowland Riverine Fish Community. It is notable that a remnant population of catfish exists in the lower Broken Creek which is of state significance. A number of streams in the lowland

zone contain important populations of small native fish species. The Broken River has been the focus of re-snagging activities to improve fish habitat.

Angling Opportunities

Some higher altitude waters in this catchment once supported good fisheries for trout which have declined dramatically through reduced stream flows, notably the upper Broken River. Stockings of trout into Lake Nillahcootie failed to produce much of a return to anglers with conditions being marginal for salmonids. Small numbers of trout are taken from time to time from the Lake. Trout are common in the upland reaches of Ryan's and Holland's Creeks and their tributaries. Some trout are present in the slopes habitat of these creeks but these are marginal waters for trout, particularly in hotter, dryer years. The upper Ryan's Creek experiences natural recruitment of trout. Over the years, trout have been regularly stocked into the upper Holland's Creek and DPI and DSE have supported recent stocking of trout into this water for the Tatong Angling Club acknowledging their assistance in the restoration of the demonstration reach and recovery of the local Macquarie perch population. The Broken River downstream of Nillahcootie to Benalla and Ryan's Creek upstream of McCall Say Weir probably provide the best trout fishing in the catchment.

Lake Nillahcootie supports a mixed fishery based on redfin, golden perch and some Murray cod with the native species having been stocked. Generally in the slopes zone, redfin provide most of the angling along with some trout, blackfish and golden perch and Murray cod. From Benalla Weir downstream in most waters angler activity is focussed on targeting golden perch, Murray cod and redfin. The two native species are becoming increasingly common through stockings over the years and Murray cod are regularly spawning in the Broken River. Lake Mokoan has been a popular fishery for redfin in past years and more recently for golden perch and Murray cod; however, with its decommissioning it is likely to decline as a recreational fishery and revert back to swampland.

Proposed Classifications of Streams

Existing in the Broken catchment upstream of Benalla is a conservation imperative to conserve and expand the Macquarie perch population. While the species is currently protected in the region and only contributes to recreational angling as by-catch once its conservation status improves it will ultimately make a valuable contribution to the fishery. Unlike most other catchments in north east Victoria the Broken does not contain a lot of outstanding trout fisheries due to its topography, habitat, altitude and modest run-off. Because of its significance for Macquarie perch conservation, the limited trout fishery and the existence of some good populations of smaller native fish NFA proposes that many of these streams will be classified as mixed or native fisheries. It is acknowledged that the upper Holland's Creek is favoured as a trout fishery by local anglers who are playing an active role in the conservation of Macquarie perch. Surveys of the stream have indicated that most of the trout are found upstream of the Macquarie perch population. A mixed classification will allow local anglers to continue to target trout while recognising the significance of the perch population.

Ryan's Creek upstream of the locality of Ryan's Creek is probably the best trout fishery in the catchment, particularly the upper reaches. The section between Loombah Weir and McCall Say Weir has not been accessible to anglers due to the presence of the stocked trout cod population. Upstream of McCall Say Weir is a small self supporting trout fishery popular with some local anglers. NFA acknowledges that the upper Ryan's Creek is the best trout water in the catchment and will support the classification of the stream above McCall Say Weir as a salmonid fishery. At the present time due to the unknown status of the stocked trout cod and Macquarie perch between the two weirs as well as the closure to fishing of this section of Ryan's Creek it must be unclassified as a recreational fishery. If ultimately trout cod and Macquarie perch are found to be absent and the stream opened to angling then the Ryan's Creek between the two weirs can be classified, most likely as salmonid water. NFA will also support Ryan's Creek downstream of Loombah Weir towards the locality of Ryan's Creek being classified as a salmonid fishery, and below this point as mixed due to the presence of Macquarie perch. Benalla Lake contains brown trout, has been stocked in the past and NFA has no

objections to future stockings. In the lowland zone most anglers seek either native species or redfin indicating that all of these waters should be managed as native fisheries.

In summary, it is proposed that in the Broken catchment all waters upstream of the weir in Benalla be classified as mixed fisheries with the exception of Ryan's Creek upstream of McCall Say Weir which is to be classified as salmonid, between McCall Say Weir and Loombah Weir to remain unclassified, and from Loombah Weir to the locality of Ryan's Creek as salmonid. Downstream of Benalla Weir all waters are to be classified as native.

Summary of Proposed Classifications of Streams in the Broken Catchment

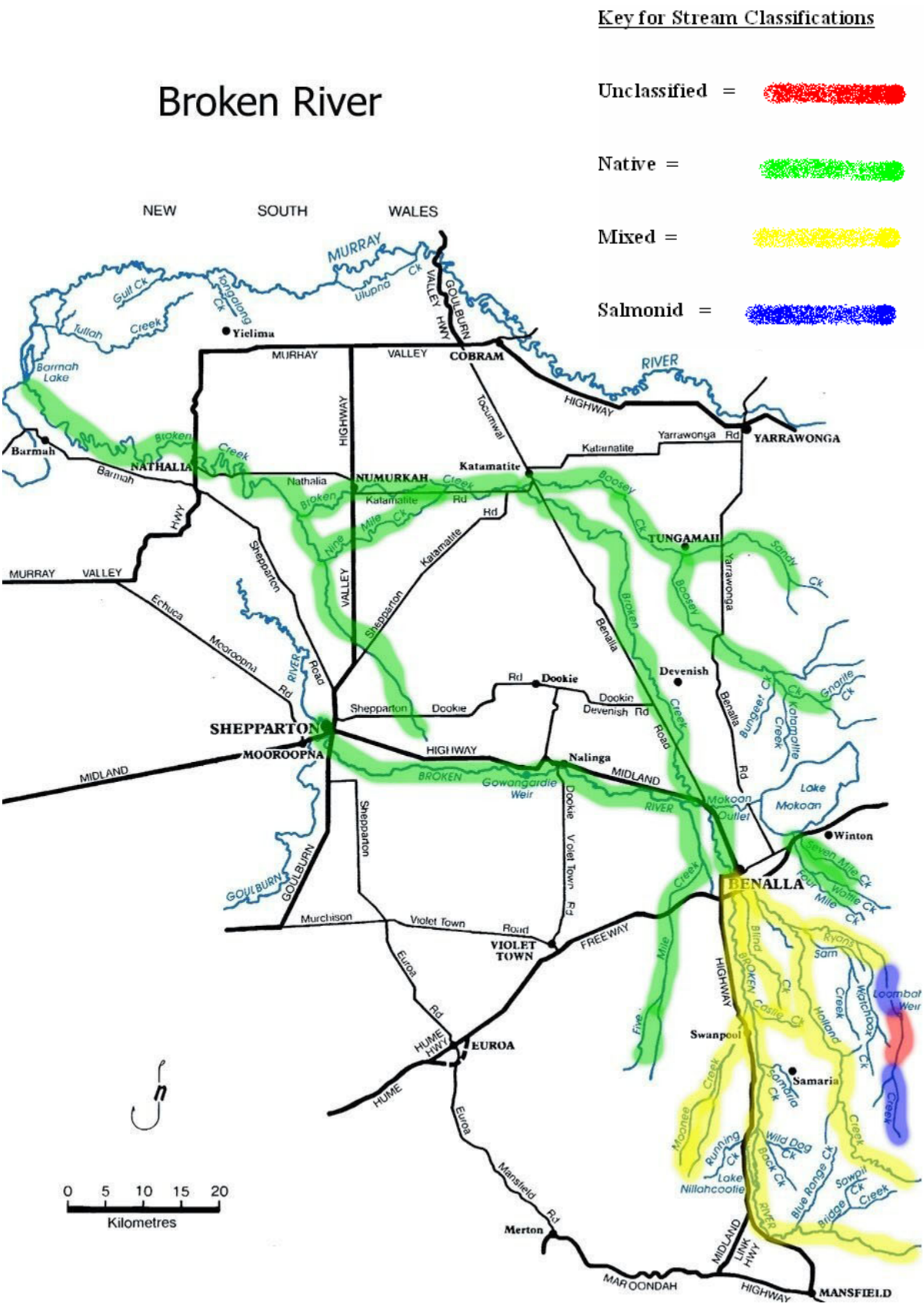
A. Upstream of Benalla Weir

- Ryan's Creek upstream of McCall Say Weir = SALMONID
- Ryan's Creek between McCall Say & Loombah Weirs = UNCLASSIFIED
- Ryan's Creek between Loombah Weir & Ryan's Creek (locality) = SALMONID
- All other waters = MIXED

B. Downstream of Benalla Weir

- All waters = NATIVE

Proposed Classification of Streams in the Broken Catchment



Goulburn Catchment

Historic Species Presence

The habitat zones in the Goulburn catchment can be roughly defined as montane upstream of Enoch's Point, Knockwood and Merrijig, upland from these points downstream to the Eildon area, slopes habitat from Eildon to the Hume Highway and lowland further downstream.

Historical evidence indicates that in many streams some of the larger native angling species originally were present in abundance in upland habitats with possible penetration into the montane zone. In some instances, access to upland and montane streams was blocked by natural barriers in the form of waterfalls. There is clear evidence of three species being present in the upland zone these being Murray cod, trout cod and Macquarie perch. They were not only present in the rivers but some larger creeks, eg, cod and perch were present in the headwaters of the King Parrot Creek. In the slopes zone, these three species were abundant in the rivers and larger creeks and catfish were common in billabongs and also present in the Goulburn itself and larger tributaries, eg, lower Yea River. Silver perch were caught in numbers at times towards the bottom of the slopes zone, with small numbers of golden perch also being taken. In the lowland section of the Goulburn River and adjacent billabongs all of these native species were present and most were abundant with the exception of trout cod which, on current evidence, may have been less common than further upstream. In the major tributary streams feeding the lowland Goulburn the general distribution of fish species largely paralleled that of the type of habitat in the river itself.

Brown trout were first introduced to the catchment near Kilmore in 1872, widespread liberations taking place in 1881 and continued into the second half of the twentieth century. Similarly, rainbow trout were introduced during the 1890s. Both species are now widely distributed throughout upland and montane habitats except for a few areas where natural stream barriers have prevented access. Notable examples exist in small streams upstream of Woods Point and near Mt Howitt which provide important refuges for the endangered barred galaxias. They are common in some rivers in the slopes zone but much less common in the creeks draining the granite ranges in the western part of the catchment which lack good nursery areas and have marginal temperature regimes. A precise date for the introduction of redfin in the catchment is not known, although the species was probably present in the lower reaches by the early 1900s. They gained access above the Goulburn Weir in the late 1920s and upstream of Eildon Dam in the late 1950s. Redfin are now widespread throughout most lowland, slopes and upland waters in the catchment. A date for the introduction of tench is unknown but the species was present in billabongs in the slopes zone of the Goulburn and Lake Eildon by the 1930s. Today they are much less frequently encountered though still maintain their presence in the catchment. European carp made their appearance during the 1970s in the lower Goulburn and at about the same time Lake Eildon and their current distribution parallels that of redfin. English roach also appeared in Lake Eildon during the 1970s but remain largely restricted to that water and the lower reaches of its feeder rivers.

Changes to Environment

The major physical changes that have transpired affecting the Goulburn Catchment fishery are:

(a) Significant siltation created by mining and agriculture which has had the greatest impact on granite streams in the western half of the catchment and some feeder streams of Lake Eildon;

(b) The construction of two barriers on the Goulburn River namely the Goulburn Weir and Eildon Dam. The establishment of a fishway on the former along the lines of the successful example constructed at Yarrawonga Weir has been touted. There is no practical way of facilitating fish passage over Eildon Dam;

(c) Depression of the thermal regime of the Goulburn River by coldwater releases from Eildon Dam. These releases have seriously impacted on native fish populations but created a successful and popular 'tailrace' fishery for salmonids;

(d) Regulation and diversion of flows of the Goulburn River by Eildon Dam and the Goulburn Weir have drastically altered the natural flow regime of the river. The impact on native fish populations is not fully understood but is suspected of being deleterious. Low winter flows are suspected of being harmful to salmonid recruitment. Flows have been significantly reduced downstream of the Goulburn Weir due to diversions for irrigation;

(e) Significant reductions of runoff in the catchment generated by land clearing and climate change have generally reduced stream flows. The changes to flows are having multiple impacts. Where such changes are severe some streams are no longer perennial and are now unlikely to support recreational fisheries. The reduced flows have produced warmer thermal regimes making some streams marginal for salmonids. Indirectly, the reduced flows into Lake Eildon have produced a warmer thermal regime in the Goulburn River downstream of dam, compared to past decades. There is evidence that this may have improved conditions for native fish from the Kerrisdale area downstream while at the same time negatively impacting on the trout population in this stretch of river. Over the past three summers at Trawool temperatures have exceeded lethal limits for trout (>25 °C) and for the past decade have been near them.

Conservation Imperatives

A number of waters in this catchment are of state and national significance in terms of native fish conservation. Around a dozen headwater streams in the upper Howqua, Goulburn, Acheron and Yea Rivers support the only known populations of the critically endangered barred galaxias. Recovery plans have identified the arrival of salmonids as being the major factor responsible in the decline of this species. Actions taken to assist the survival of the barred galaxias have been a ban on stocking trout in waters adjacent to these streams and the construction of barriers to inhibit upstream colonisation by trout. While widespread, there are a number of streams containing the mountain galaxias believed not to carry trout and these should remain that way for conservation purposes. White Creek in the upper Taponga River supports a population of the threatened spotted tree frog (*Litoria spenceri*) and is subject to trout exclusion trials to protect this endangered amphibian.

Three streams carry long term self supporting populations of the endangered Macquarie perch these being the King Parrot Creek below Flowerdale, the Hughes Creek below Tarcombe and the Seven Creeks below Strathbogie. These populations are of state and national significance for the conservation of the species. Another population, created by hatchery stockings, exists in the lower Yea and Murrundindi Rivers. In addition, during the late 1980s/early 1990s many hundreds of adult Macquarie perch were relocated from Lake Dartmouth on the Mitta Mitta River to Eildon Reservoir and appear to have established a small self supporting population. Individuals are being captured from the lake as well as a number from the lower Jamieson River in spring where it appears some spawning is occurring. Macquarie perch were once a popular sportfish but a serious decline in its abundance has resulted in a ban on angling for the species except in Lake Dartmouth and the Yarra River. The recent DPI Macquarie perch workshop resolved that stockings would be undertaken in the future to create additional recreational fisheries as well as for the conservation of this species.

The Seven Creeks contains a translocated population of the critically endangered trout cod which is the only long term self supporting population in the state and of national significance. To protect the species the section of Seven Creeks containing the population has been closed to angling and a ban placed on trout liberations into the waterway. Juvenile trout cod have also been stocked into the Goulburn River at Murchison East and in a heavily silted section of the Hughes Creek near Bungle Boori. In the former the stocking established a substantial population with evidence of recruitment. Unfortunately this population was decimated by a large fish kill thought to have been precipitated by a water quality problem. However, there is evidence that the population persists, continues to recruit and may in the long term prove viable. In the Hughes Creek the stocked trout cod persisted for a few

seasons then disappeared. It appears that fish from this stocking have taken up residence in the Goulburn River upstream of the Goulburn Weir. Over the past five years there have been verified reports of adult trout cod being captured by anglers at Northwood, Kerrisdale and Molesworth, and juvenile fish have been taken at the first two locations. There is the possibility of a small recruiting population existing between Kerrisdale and Mitchellstown.

The Tahbilk Lagoon, Majors Creek and Goulburn Weir contain catfish which is now considered to be endangered. In addition a population is known to have existed until recently in the Corinella Creek near Rushworth which may still persist. There is a ban on the taking of catfish from most waters in Victoria with the exception of the Wimmera River. The catfish population in Tahbilk Lagoon is considered viable, is the southernmost remaining population and is of state significance. The lagoon also contains a number of other threatened species including small native fish and has been designated a demonstration reach under the MDBA Native Fish Strategy. Preliminary techniques have been developed for the hatchery production of catfish which should facilitate the recovery of populations and the establishment of recreational fisheries.

A conservation imperative in this catchment exists in the lower reaches lower reaches for conservation of the threatened Lowland Riverine Fish Community. A number of streams in the lowland zone contain important populations of small native fish species.

Angling Opportunities

At the present time the Goulburn River and its tributaries upstream roughly of Seymour mainly support salmonid fisheries. The streams feeding Lake Eildon are all considered to be quality trout fisheries with those in the south flowing through forested country. The lower Delatite River contains a viable self supporting Murray cod fishery which existed prior to the commencement of stockings in the 1980s. Lake Eildon supports a diverse mixed fishery based on trout, redfin, Murray cod and golden perch. The Goulburn River between Eildon and Yea is considered to be one of the most productive trout fisheries in the state with the stretch downstream to Alexandra being considered to be quality water for fly fishing. Similarly the Rubicon and Acheron Rivers and their tributaries are also considered to be premier fly fishing waters for trout. Eildon Pondage is renowned for the large trout regularly taken from it. The lower Yea River and King Parrot Creek hold viable stocks of Macquarie perch which, until their recent protection, provided an additional facet to the fishery of the region. The upper reaches of these streams support good populations of trout. The recent DPI Macquarie perch Workshop listed both Lake Eildon and the Yea River as a target waters for future stocking of Macquarie perch for recreational fishing. The lower Yea River has also been suggested by NFA as a possible location for stocking trout cod and/or Murray cod also for angling.

From the Seymour area downstream to the Goulburn Weir most angling activity has been directed towards catching redfin with some catches of trout. Anglers in these areas have aspired for many decades to see the return of the once excellent cod fishery this being demonstrated by the activities of the Nagambie Angling Club which, over a number years, raised funds to purchase Murray cod and golden perch fingerlings to stock the Goulburn Weir. These, in addition to some stockings by the government, provided limited returns with reduced water temperatures and the management of water levels in the weir believed to be responsible. There is growing evidence that the situation for native fish in the Goulburn has improved with catches of cod becoming more frequent in recent years as far upstream as Kerrisdale. The recent DPI Macquarie perch Workshop listed the Goulburn River at Trawool as a target water for future stocking of Macquarie perch for recreational fishing. In addition NFA has proposed stocking trout cod in this area and this will be elaborated further shortly. The upper reaches of the Sunday and Mollison's Creeks supported small trout fisheries, which have become marginal and the lower reaches contain redfin. Until the recent protection of Macquarie perch, the Hughes Creek downstream of Tarcombe was a popular focus of local anglers as were redfin in the lower reaches. Trout in recent years have been scarce in this section of the creek, with most captures occurring in the cooler months of fish thought to have moved downstream from the upper reaches or out of the Goulburn River. Above Tarcombe on the Ruffy Tableland there once existed a good trout fishery; however this has declined due to the drought and a long term trend of

reduced flows and higher water temperatures. It is believed that a translocated population of Macquarie perch may persist in this section of the creek.

Downstream of the Goulburn Weir in natural waterways most angler attention has been directed at catching native fish, or redfin, though in many areas populations of the latter have declined in the past few decades. In the river itself Murray cod and golden perch are common from the weir down to the Murray with silver perch common in the lower reaches. Trout cod, while not targeted by anglers, are regularly caught in the Murchison area. The recent DPI Macquarie perch Workshop listed the Goulburn River at Murchison as a target water for future stocking of the species for recreational fishing. A number of natural and artificial lakes in the Rushworth area support popular fisheries with the principle target being redfin. Some have also been stocked in the past with trout and some native species. A number of creeks drain the granite ranges the major ones being the Creighton's, Seven and Honeysuckle Creeks. The upper reaches of all three once supported trout fisheries but Creighton's and Honeysuckle Creeks may no longer support populations due to the drought and have become marginal waters and contain mostly northern blackfish. The lower reaches contain redfin carp, and some native species. The Seven Creeks upstream of the Gooram Falls is well known for containing one of the last viable populations of trout cod which were translocated their from below the falls and from the Goulburn River in the early 1920s. Macquarie perch are also present in numbers from Strathbogie to Gooram Falls, but are found all the way downstream to the Goulburn River. The upper reaches once contained trout which were not self supporting but maintained through ongoing stocking. Liberations ceased during the 1970s to assist the survival of native fish. Redfin were recently illegally introduced to the upper reaches of the Seven Creeks and have established a population in Polly McQuinns Weir. The lower Seven Creeks, from Euroa downstream contains golden perch, redfin, Murray cod and Macquarie perch and has received regular stockings of golden perch.

Proposed Classifications of Streams

A number of waters clearly have conservation imperatives that dictate they should be primarily managed for conservation and not as recreational fisheries. All streams containing the barred galaxias should remain unclassified. While the lower reaches of some of these streams contain trout they are minor fisheries and declaring them unclassified would not deny angler access but simply identify their primary purpose. Similarly White Creek should remain unclassified as its focus is conservation of the spotted tree frog. The downstream limits of these unclassified waters should be based on advice from DSE.

The Seven Creeks contains trout cod with the bulk of the population upstream of the Galls Gap Road Bridge though some fish are present downstream to Euroa. The creek also contains an important population of Macquarie perch which supported a fishery at Polly McQuinns Weir near Strathbogie until the species was protected. Local anglers have suggested that trout be stocked into the weir to restore the former fishery that existed. It is acknowledged that with the protection of Macquarie perch angling opportunities in the weir have been restricted to northern blackfish and the odd wild trout. Some years ago a representative from NFA had discussions with the DPI about organising a small release of trout into the weir for local anglers. It was reasoned that the impact could be monitored and that as trout are not believed to be self-supporting in the stream a cessation of releases could stop any impact. However, the recent illegal introduction of redfin to the weir has placed native fish populations under pressure from this species. NFA cannot support trout liberations into this waterway with the presence of a new threat. It is proposed that the upper reaches of the Seven Creeks, above Galls Gap Bridge remain unclassified. At a latter date when hatchery produced Macquarie perch become available and/or when the conservation status of trout cod is down-listed it may be possible to establish and maintain recreational fisheries for these two species in the weir. Downstream of the Galls Gap Bridge most of the fish taken by anglers are carp, redfin, or native species and it is proposed to classify this stretch of the creek as native.

The Hughes Creek contains a very important population of Macquarie perch. The bulk of the population is found between Avenel and Tarcombe and because of its significance this section of the

creek should be unclassified as its primary function is for conservation. Other species which provide fishing are carp, redfin, blackfish and limited numbers of trout in the cooler months, the water being marginal for salmonids. Upstream of Tarcombe used to be a reasonably good trout fishery which has declined. Government agencies do not support trout liberations into the upper Hughes Creek due to the marginal conditions and possible impacts on the perch population downstream. NFA would prefer this section of creek to be unclassified also but recognises that there may be a resident trout population and so will accept a mixed classification initially. Its classification as a recreational fishery can be reviewed at a latter date when more information on the trout population becomes available and the conservation status of Macquarie perch improves. This would not of course preclude anglers from fishing the water. Below Avenel most of the fish caught in the lower reaches are carp, redfin and Macquarie perch with some Murray cod, golden perch and a few brown trout near the Goulburn. NFA preposes this section to be classified as native as it is not a good trout water and more suited to native species. Other significant waters for Macquarie perch include the lower Yea and Murrindindi Rivers and King Parrot Creek. The same sections of stream support reasonable numbers of trout but the presence of Macquarie perch requires those areas to be classified as mixed. Upstream these waters support very good trout fisheries and should be classified as salmonid.

Lake Eildon is a very successful mixed fishery which will be enhanced in the future with stockings of Macquarie perch. The inflowing rivers are popular trout streams with the lower reaches of the Delatite containing a significant population of Murray cod. It is proposed that the Delatite River downstream of the Mansfield-Jamieson Road for this reason be classified as mixed, with the upper Delatite being classified as salmonid. NFA believes that another feeder stream into Eildon should have a long term focus for re-establishing native fish. The Big and Goulburn Rivers are attractive as they flow through natural forested catchment. However, they are very popular trout waters and have the coolest thermal regimes of the feeder rivers. The Howqua River has been the focus of considerable effort by the ATF to improve access for trout anglers. NFA believes that a long term effort should be made into re-establishing Macquarie perch, Murray cod and trout cod into the lower Jamieson River. It appears to be the best candidate as it has one of the warmest thermal regimes of the feeder rivers and captures of cod and perch are currently occurring. NFA will ask that future stockings of native fish take place in the Jamieson River and proposes classifying the Jamieson River downstream of Mitchell's track as mixed and upstream of that point as salmonid. All other feeder streams into Eildon, apart from the exceptions outlined, should be classified as salmonid.

Downstream of Eildon to Kerrisdale most rivers and streams support premier trout fisheries and apart from the exceptions pointed out for the barred galaxias and Macquarie perch clearly deserve classification as salmonids waters. The most contentious management issue in this catchment are proposals touted by various government agencies and previously supported by NFA, to ameliorate the impact of cold water releases into the Goulburn River downstream of Eildon Dam. Subsequent to the construction of the enlarged dam in 1956 irrigation releases from the storage resulted in coldwater releases, with summer temperatures being around 12-13 °C, a minimum of 10 °C cooler than the expected natural summer thermal regime. Historically, these releases have depressed water temperatures at least as far downstream as the Goulburn Weir. Prior to the impoundment, the Goulburn River was considered one of the state's best native fisheries, particularly for trout cod and Macquarie perch upstream of Seymour and for Murray cod and other species downstream. While a number of factors have been identified as contributing to the decline of native fish populations downstream of Eildon the thermal depression of the waterway has been considered a major impediment to the re-establishment of native fish populations upstream of and including the Goulburn Weir.

Prior to the enlargement of Eildon the Goulburn River as far downstream as Alexandra was considered a world class trout fishery. Below Alexandra the original thermal regime was marginal for trout and the river was not considered a good trout fishery though regular captures took place as far downstream as Seymour. The cooler regime generated by cold water releases subsequently allowed the trout population to expand downstream with trout becoming common down to the Trawool area and regularly captured downstream to the Goulburn Weir. Today the Goulburn River below Eildon is considered to be the most popular riverine trout fishery near Melbourne and one of

the best in the state. Trout angling groups have strenuously opposed proposals to attempt to ameliorate the cold water releases into the Goulburn River fearing possible serious impact to the trout fishery. These proposals have envisaged a warming of from 2-4 °C with the intent of improving conditions for native fish from the Seymour region downstream. While it has been openly acknowledged that this would impact the lower end of the trout fishery it was expected that impacts on most of the trout fishery would be slight.

Temperature data for the Goulburn over the past decade suggests that conditions for native fish have dramatically improved from Kerrisdale downstream due to reduced flows into Eildon Dam. With the storage being well below capacity the reduced depth of water has limited thermocline development and as a consequence the water released downstream has been much warmer than in previous decades. The higher temperatures have impacted on trout numbers towards Seymour and made conditions more favourable again for native fish. Recent climate modelling suggests that reduced inflows to Eildon Dam will be the long term trend. Nevertheless, it is likely that at some stage in the future the storage will again reach capacity but for extended periods in between it will remain below capacity. The likely scenario is that over the long term the thermal regime of the river downstream will be warmer than in past decades but probably punctuated by seasons where cold water releases will occur when Eildon is near capacity. The last five years has seen captures of golden perch at Seymour and Alexandra and regular captures of Murray cod from Nagambie to Kerrisdale with individuals being taken as far upstream as Alexandra. Catches of trout cod have also taken place. Some of these captures are from areas where these species have not been taken for many decades reflecting the improved conditions for native fish. Recently the DPI has commenced large scale stocking of the Goulburn Weir with Murray cod and golden perch and stocked Murray cod into the river itself near Seymour. The recent Macquarie perch workshop identified the Goulburn River at Trawool as a priority area for stocking to develop a recreational fishery. Native Fish Australia has advocated stocking trout cod in the Trawool area and will be making a formal submission for the allocation of funds and fingerlings to achieve this goal.

Previously, Native Fish Australia has strongly advocated partial amelioration of cold water releases into the Goulburn River. Given the improved conditions the organisation is prepared to reconsider its position on the issue if angling organisations are prepared to support the establishment of a high quality dedicated recreational fishery for native fish downstream of Kerrisdale and also support the allocation of funds to create it. Kerrisdale, or more specifically the junction of the King Parrot Creek with the Goulburn, has been identified as where a major change in habitat occurs. Below that point the river flows through many deep holes, interspersed by gravel and rocky runs, boulders and rocks providing refuge and extensive riparian vegetation, an environment favourable to native species such as trout cod and Macquarie perch. This habitat extends from Kerrisdale to near Seymour. The junction of the King Parrot Creek is also highlighted as the lower reaches of this stream contain an important remnant population of Macquarie perch and there is a desire to link this population with that in the Hughes Creek towards Nagambie. From a native fish perspective amelioration of the cold water releases from Eildon is still the preferred option as it is likely in the future that a depressed thermal regime will periodically return when Eildon is full. However, carrying out the works at the dam is likely to entail costs of many of millions of dollars. Therefore it seems prudent to attempt to recreate native fish populations taking advantage of the better conditions without allocating millions of dollars on works at the dam. It may be necessary to support or recover these populations through stockings after successive seasons of lowered water temperatures in the future. NFA is prepared to adopt this approach as its policy for the Goulburn River if it gains support from peak angling bodies to restore native fish populations downstream of Kerrisdale.

NFA will be drafting an application to stock the Goulburn downstream of Kerrisdale with trout cod using recreational angling funds. Trout cod currently cannot be targeted by anglers though in some waters they are greatly appreciated by anglers as by-catch. To date all trout cod stockings have been financed through conservation funds. Recovery plans have outlined that recreational fishing will be permitted in the future as populations recover and recently a stocking of trout cod took place into Lake Kerford for recreational angling demonstrating that recreational fisheries for the species are at hand. NFA's proposal for trout cod in the Goulburn will be to seek funds to stock for five years at

Trawool with initial protection of the fish then introduction of catch and release angling based on agreed benchmarks. NFA may also seek with DSE to stock on a one for one basis for conservation as has been suggested with Macquarie perch. Apart from the trout cod proposal Murray cod are being stocked near Seymour and Macquarie perch are going to be stocked at Trawool. The adjacent billabongs also offer potential conservation and recreational fishery benefits. Irrigation releases ensure that those close to the river are perennial unlike many other catchments were flood reduction has eliminated many billabongs. These billabongs could be the focus of a program reintroducing catfish to them and in some of the larger examples could be stocked with golden and/or silver perch for recreational angling.

NFA recognises that at the present time the Goulburn between Kerrisdale and Seymour could at best be classified as a mixed fishery with trout though it is expected that the trout fishery will continue to decline due to much warmer and at times lethal temperatures. However, it is seeking that the water be classified as native initially as a show of support from the angling community for the proposal. It will not of course prevent anglers from targeting trout in that stretch of the Goulburn but simply sets the direction for a management focus. The long term vision is a premier trout fishery upstream of Kerrisdale and a premier fishery for cod and perch downstream. This could be win-win situation for trout and native fish anglers and NFA requests that the Goulburn downstream of the King Parrot Creek be classified as native water. If the proposal ultimately proves unsuccessful, at a later date this stretch of river can be reclassified as mixed.

Downstream of Seymour few of the tributary streams flowing into the Goulburn support trout fisheries. The upper reaches of the Sunday and Mollison's Creeks have at times contained trout and may still do so. They also contain northern blackfish and redfin and on occasion waters in these areas have been stocked with native species. NFA has no objections to stocking of trout in these streams and suggests that they be classified as mixed fisheries. Major's Creek contains an important remnant population of catfish, provides regular captures of Murray cod and golden perch and also contains redfin. It has never been a good trout fishery and is proposed to be classified as a native fishery. Apart from the Hughes and Seven Creeks, discussed earlier, most tributaries that drain the granite country once supported trout in their upper reaches but reduced flows have made them perennial and they now contain few trout. Some are the focus of stream restoration projects to improve habitat for native fish such as blackfish, mountain galaxias and other members of the threatened Lowland Riverine Fish Community and it is proposed that they be classified as native waters. Lakes in the region including the Goulburn Weir and Waranga Basin have supported quite diverse fisheries based substantially on redfin, but including native fish and some trout. In particular Waranga Basin at times has provided some very good catches of brown trout and NFA has no objections to future liberations of trout into this water if conditions are suitable. It is recommended that all these lakes be classified as mixed fisheries. All other waters downstream of Seymour should be classified as native fisheries.

Summary of Proposed Classifications of Streams in the Goulburn Catchment

A. Upstream of Lake Eildon

- Headwater streams of the Howqua River = UNCLASSIFIED
  (protection of barred galaxias)
- Headwater streams of the Goulburn River = UNCLASSIFIED
  (protection of barred galaxias)
- Headwater streams of the Taponga River = UNCLASSIFIED
  (protection of spotted tree frog)
- Delatite River downstream of Mansfield-Jamieson Rd = MIXED
- Jamieson River downstream of Mitchells Track = MIXED

- Lake Eildon = MIXED
- All other waters = SALMONID

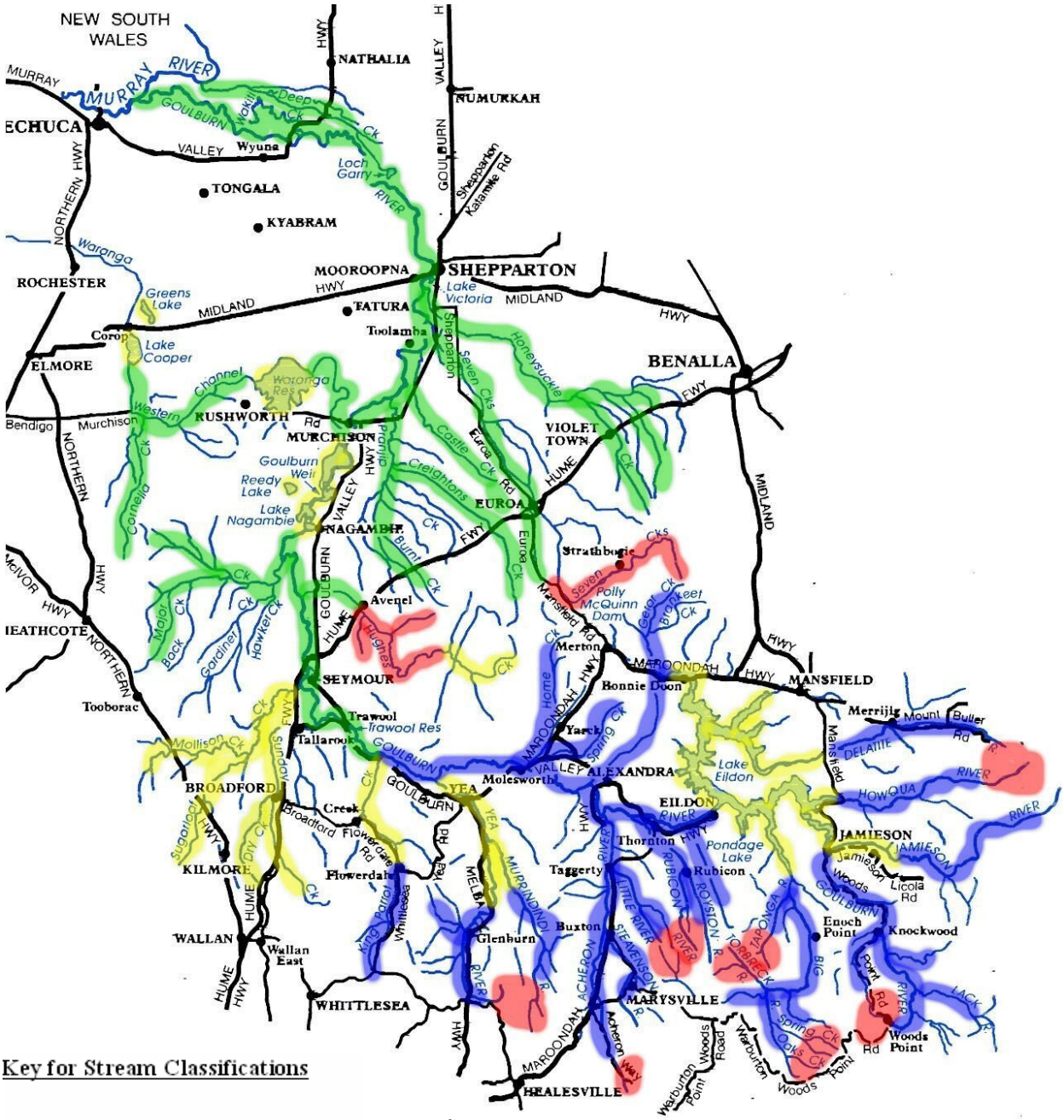
B. Lake Eildon to Seymour

- Headwater streams of the Rubicon River = UNCLASSIFIED (protection of barred galaxias)
- Headwater streams of the Torbreck River = UNCLASSIFIED (protection of barred galaxias)
- Headwater streams of the Acheron River = UNCLASSIFIED (protection of barred galaxias)
- Headwater streams of the Yea River = UNCLASSIFIED (protection of barred galaxias)
- Eildon Pondage = SALMONID
- Goulburn River, Eildon - King Parrot Creek = SALMONID
- Goulburn River, King Parrot Creek - Seymour = NATIVE
- Yea River, downstream of Devlins Bridge = MIXED
- Murrundindi River downstream of mill = MIXED
- King Parrot Creek, upstream of Flowerdale = SALMONID
- King Parrot Creek, downstream of Flowerdale = MIXED
- All other waters = SALMONID

C. Downstream of Seymour

- Seven Creeks upstream of Galls Gap Bridge = UNCLASSIFIED
- Seven Creeks downstream of Galls Gap Bridge = NATIVE (with redfin)
- Hughes Creek upstream of Hume Hwy to Tarcombe = UNCLASSIFIED
- Hughes Creek downstream of Hume Hwy = NATIVE (with redfin)
- Hughes Creek upstream of Tarcombe = MIXED
- Sunday Creek, Mollisons Creek & tributaries = MIXED
- Majors Creek = NATIVE
- Goulburn River = NATIVE
- Goulburn Weir = NATIVE/MIXED (with redfin)
- All other lakes = NATIVE/MIXED (with redfin and possibly trout)
- All other waters = NATIVE

Proposed Classification of Streams in the Goulburn Catchment



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