

**THE NSW
FRESHWATER FISH STOCKING
FISHERY MANAGEMENT
STRATEGY**



**NSW DEPARTMENT OF
PRIMARY INDUSTRIES**

2005

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1. Introduction

1.1 Brief description of the activity

The 'activity' of freshwater fish stocking is currently delivered by NSW DPI as two specific services that make up the designated fishing activity. These service components are referred to as *Harvest Stocking* and *Conservation Stocking*. Together they encompass the practice by NSW DPI and private groups or individuals of stocking inland natural waterways and the freshwater reaches of coastal drainages with native fish and/or salmonids to enhance fishing for recreational and Aboriginal cultural purposes, for religious and ceremonial purposes, and to rebuild depleted native fish populations.

According to records kept over the past 43 years, NSW DPI, aided by acclimatisation societies, angling clubs, conservationists and volunteers, have stocked over 86 million freshwater fish comprised of 12 species (natives and salmonids) into the waters of New South Wales. NSW DPI has five hatcheries producing most of the stock for the activity while a number of privately owned hatcheries produce stock for a variety of smaller scale events.

The Environmental Impact Statement (EIS) prepared for freshwater fish stocking in 2003 provides a comprehensive description of the activity and included a risk assessment that examined historical aspects of the activity's operation and how the activity has continued in recent times. See NSW DPI (2003) for further information.

1.2 The role of the Fishery Management Strategy

This FMS outlines the rules, regulations and programs that are designed to manage the activity of fish stocking in future. Impacts by related activities (such as recreational fishing) or industry sectors (aquaculture and the aquarium trade) are also considered in the FMS, although the rules applying to such sectors are dealt with under separate management or legislative arrangements. In particular, aquaculture has long been synonymous with fish stocking, but the risk assessment in the EIS highlighted the need to de-couple these two forms of fish production. Issues related to the aquarium trade are addressed through legislation prohibiting the release of fish into natural waterways without a permit, listing of noxious or pest species, and the concurrent program of establishing a list of species permitted for importation into NSW for use in the aquarium trade.

A key priority for the FMS is the introduction of an appropriate management regime to minimise the environmental risks that were identified in the EIS risk assessment. The EIS concluded that many elements of the previous activity of fish stocking posed some threat to ecological sustainability.

Strengthening of hatchery protocols and the general administration and information management elements of the activity will mitigate many of the risks. In particular, distinguishing between hatcheries that aim to produce fish for stocking as opposed to traditional aquaculture will mitigate most of the risks related to the genetic integrity of wild populations. It will also serve to make administration and compliance less complicated and allow for more targeted monitoring or research related to broodstock and their progeny. Developing and improving research and monitoring of the activity will also reduce much of

the uncertainty identified by the risk assessment by assessing the actual rather than potential environmental impacts of fish stocking.

It should be noted that this FMS does not cover the stocking of fish into marine or brackish waters. Any proposals to stock fish into waters not provided for by this FMS will require separate environmental assessment.

1.3 Overview of the management regime under the fishery management strategy

The FMS provides a framework for the management of fish stocking activities in public freshwater rivers, streams and impoundments in NSW. The FMS covers stocking for conservation and harvesting purposes and implements these programs in a manner that reduces the environment risks of the current stocking activity. The key elements of the FMS are described below.

1.3.1 Parameters for fish stocking

The FMS defines the parameters within which the annual stocking events by the Government (through the Fish Stocking Program run by NSW DPI) and private individuals or groups will be reviewed and approved. The parameters will be updated as required to be consistent with broader national or multi-jurisdictional policies being developed (e.g. National Policy for the Translocation of Live Aquatic Organisms, Murray-Darling Basin Native Fish Strategy, etc.).

1.3.2 Species and waters that can be stocked

The FMS details the species and waters that can be stocked. The species and waters provided for in the FMS have been identified taking account of issues such as translocation, genetics and historical stocking activity.

Any proposals to stock species into waters that are not covered by the FMS would need to be accompanied by a separate environmental impact assessment, except for proposals to stock in waters permanently closed to stocking, which will not be approved (unless it is conservation stocking for a recovery program – see below).

1.3.3 Species and waters that cannot be stocked

The FMS lists a number of waters or sections of waterways that will be permanently or temporarily closed to fish stocking:

1.3.3.1 *Permanently closed waters*

This is a list of waters where the stocking of some or all species will not be approved due to those waterways comprising pristine or unique aquatic environments and where there are no or few official records of fish being stocked. Proposals to stock into these waterways will not be approved, even if the proponent supplies a separate environmental assessment on the proposal. The only exception to this is conservation stocking as part of a recovery program following a natural or human induced environmental catastrophe.

1.3.3.2 Temporarily closed waters (i.e. restricted waters)

This is a list of waters or sections of waterways where the stocking of some or all species will not be approved due to the presence of threatened or protected species or to avoid areas of special significance (except conservation stocking for species recovery purposes). The FMS includes a mechanism to review the list every five years and to list or de-list waters based on criteria involving a range of ecological (e.g. threatened species listings, stream condition), economic (e.g. local economic dependencies) and social (e.g. history of stocking, alternative opportunities) factors.

1.3.4 Ongoing review of stocking events

Prior to any authorisation, each proposed stocking event will be subject to an explicit environmental review by relevant officers of NSW DPI to ensure that all matters likely to affect the environment (including those within the local area) have been properly considered and, where relevant, strict conditions are imposed on the stocking event. Stocking Review Guidelines for stocking events will guide this process (see section 3.5 and Appendix 1). The stocking review process will ultimately incorporate a 'classification of waters' scheme to ensure that each stocking event is likely to result in a high survival rate of the stocked fish (e.g. by requiring the release of certain size classes of selected species into individual waterways).

1.3.5 Management of fish hatcheries

The FMS incorporates plans to better manage the production of fish by Government and private hatcheries for stocking purposes. This includes the development of a quality assurance and accreditation scheme for hatcheries to increase the certainty that fish supplied for stocking have been produced using best practice techniques for broodstock collection and husbandry, management of disease risks, genetic resource management and stock identification. Policies and guidelines relating to each of these factors have been prepared and will be implemented along with the hatchery accreditation scheme.

1.3.6 Information management

A central stocking database has been developed to record all information reported by accredited hatchery operators, from proponents who undertake the stocking activity and from the various research programs that produce information relevant to the review and assessment of individual stocking events. The database, built in a form that can be transposed to GIS software, will allow for spatial management of the activity.

1.3.7 Research

A Research Plan has been prepared and is based on the outcomes of the risk assessment of the previous activity to ensure that the projects being undertaken are focussed on the areas of greatest environmental risk. Of particular importance is research into the presence of any sub-populations of native species that are stocked. Research and monitoring related to the survival of stocked fish within the receiving waters is also important to determine whether the stocking events being undertaken are providing good returns for the effort.

1.3.8 Compliance and education

A targeted compliance strategy will be developed to focus compliance activities in the high-risk areas and utilise the improved information management system developed under the FMS. Improved education of stocking proponents and the community about the environmental risks associated with stocking is critical to promote responsible stocking. An education program will highlight the potential damage that can be caused by people placing species of fish in areas that have not been approved for stocking. The education program will also include information provided to individuals or groups about best practice techniques for transporting and releasing fish at the stocking site.

1.3.9 Responsiveness

The controls within the FMS, including the detailed policy and guideline documents are responsive to new information originating from research programs or the central information management system. The strategy is also subject to reviews if the performance monitoring (incorporating performance indicators and trigger points) indicates that the management goals are not being met.

2. Vision and Goals for the Activity

2.1 Vision for the activity

The long-term vision for the activity of fish stocking is:

An activity that provides effective enhancement of freshwater recreational and Aboriginal cultural fishing in NSW and supports conservation outcomes for fish, that is undertaken within a clear management framework and consistent with the principles of ecologically sustainable development.

2.2 Goals for the activity

The proposed goals that have been designed to achieve this vision for the activity are as follows:

1. to manage the activity in a manner that minimises impacts on aquatic biodiversity including threatened species and genetic resources
2. to enhance fishing opportunities through cost-effective stocking programs that maximise economic benefits and provide social equity from the activity for recreational fishing and Aboriginal cultural fishing purposes
3. to ensure the consistent production and release of appropriate quality stock
4. to provide efficient administrative services, information management and reporting systems
5. to improve the knowledge of the activity and ecosystems in which it operates, and
6. to maximise community understanding and voluntary compliance through education and support services while providing effective deterrence against illegal activity.

3. Designated Stocking Activity

This FMS describes the fish stocking programs proposed to service recreational fishing (hereafter referred to as harvest stocking) and conservation needs within freshwater areas in NSW, as outlined in Table 1. The fish stocking program involves regular review of the species to be stocked and stocking areas, and is dependent upon the annual production of fish from public and private hatcheries across NSW.

Table 1. Overview of the activity under the FMS

Component of Designated Stocking Activity	Programs/events that make up the activity
Harvest Stocking	<ul style="list-style-type: none"> • Stocking of native species into dams, lakes, rivers and other public waterways by NSW DPI or authorised agents (including recreational fishers or Aboriginal people), through the Dollar-for-Dollar Native Fish Stocking Program, Australian Bass Stock Enhancement Program and the Impoundment Stocking Program • Stocking of salmonid species into dams, lakes, rivers and other public waterways by NSW DPI or authorised agents through the Salmonid Stocking Program or Snowy Lakes Trout Strategy • Individual applications to stock under section 216 of the FM Act (permit to release fish) including applications from fishing clubs, acclimatisation societies, other organisations or individuals and religious/ceremonial purposes
Conservation Stocking	<ul style="list-style-type: none"> • Stocking of native species to support programs developed under Part 7A of the FM Act (e.g. threatened species recovery plans) • Compensation stocking subject to policy requirements (i.e. stock compensation requirements under NSW Coastal Policy and the NSW DPI Broodstock Collection Policy)

3.1 Policies for harvest stocking and conservation stocking

NSW DPI will continue to stock inland waters of NSW to meet the balance between conservation and fishing interests (subject to appropriate environmental assessment), as outlined in the following sections.

3.1.1 Harvest stocking policy

Harvest stocking will involve the stocking of native and salmonid species into specified public inland waters of NSW, subject to the following stocking policies and other provisions of the FMS.

3.1.1.1 *Native species stocking policy*

1. Native species produced from approved hatcheries may be stocked into specified public inland waters of NSW to create, maintain or enhance fish stocks to levels considered necessary to provide quality recreational fishing and Aboriginal cultural fishing opportunities.

2. Native species will be stocked for harvesting purposes only in waters within their natural range and known distribution, with the exception of golden perch and silver perch into the Hunter River catchment where previous stocking of these species has occurred.
3. Native species that have been historically stocked will continue to be stocked, although other native species may be used if technology to produce viable stocks becomes available, the activity is consistent with the goals and objectives of the FMS and satisfies the stocking review requirements.
4. NSW DPI will produce stocks of native species for stocking. Where a suitable alternative source is available from an accredited NSW hatchery (or interstate hatcheries using production methods to the satisfaction of the Minister), stock may be obtained from those sources. A combination of these sources may be used to meet stocking requirements.
5. Native species will only be stocked where all of the following conditions apply, unless part of a research program approved or conducted by NSW DPI:
 - pertinent environmental conditions are available for the welfare and optimal survival and health of the stock
 - self-sustaining populations are insufficient to support harvesting
 - the stocked waters offer reasonable access to fishers, including potential future access, and
 - sufficient demand for stocking native species in a particular area is evident during the preparation of the annual stocking program
6. Priority

An annual stocking program for fish produced in NSW DPI hatcheries will be developed prior to the spawning/production season, with representatives of relevant angling clubs, private hatcheries, other relevant groups and NSW DPI managers.

3.1.1.2 Salmonid stocking policy

1. Salmonid species will be restricted to the traditionally stocked species: rainbow trout, brown trout. Brook trout and Atlantic salmon will continue to be stocked in certain waterways, as provided for in points 4 and 5 below. No other non-native species will be introduced into NSW for stocking under the FMS.
2. NSW DPI will produce the stock of salmonid species for stocking programs. Where a suitable alternative source is available from an accredited NSW hatchery, stock may be obtained from that source. A combination of these sources may be used to meet stocking requirements.
3. NSW DPI may carry out any salmonid fish stocking, subject to this salmonid stocking policy and the stocking review framework, in order to meet the objectives of the FMS.

4. Stocking of Atlantic salmon will be limited to the waters of Lake Jindabyne and Khancoban Pondage.
5. Stocking of brook trout will be limited to the waters of Lake Jindabyne, Three Mile Dam and Dry Dam.
4. Salmonids will only be stocked where all of the following conditions apply:
 - the official records held by NSW DPI indicate that stocking of salmonids has occurred in the waterway concerned since 1990 (or section of waterway if barriers exist which prevent the movement of fish), or when a natural or anthropogenic catastrophe/disaster removes an existing self-sustaining fished population
 - environmental conditions are available for the welfare and survival of the stock (i.e. generally between 700 and 1500m above sea level, water temperatures between 5 and 25°C and dissolved oxygen levels of >5 ppm)
 - self-sustaining populations are insufficient to support harvesting
 - the proposed waters for stocking offer reasonable access to fishers, including potential future access
 - sufficient demand for salmonid stocking in a particular area is evident through consultation and during the preparation of the annual stocking program, and
 - stock produced in excess of requirements may only be released into low risk areas such as large impoundments and rivers that have been previously stocked with that species.
5. Despite the above requirements, salmonid stocking may be carried out for research purposes provided the research is consistent with the goals, objectives and management arrangements in this FMS and the research plan and priorities outlined in section 3.7.
6. Priority

An annual stocking program will be developed following scheduled meetings held prior to the spawning/production season with representatives of relevant acclimatisation societies, other relevant groups and NSW DPI managers.

3.1.2 Conservation stocking policy

1. Stocking of native species will be conducted for the purpose of supporting fisheries conservation management objectives at a State, national or international level.
2. NSW DPI will produce the stock of native species for conservation programs. Where a suitable alternative source of stock is available from an accredited NSW hatchery (or interstate hatcheries using production methods to the satisfaction of the Minister), stock may be obtained from those sources. A combination of these sources may be used to meet conservation stocking requirements.
3. Conservation stocking will be permitted where:

- the activity forms part of a threatened species recovery plan or recognised research program relating to the conservation of a native species of fish
 - there is a justifiable need to increase the local stocks of a threatened species, or
 - the activity forms part of an enhancement program or compensation requirement of any policies or management plan recognised by the FMS (e.g. NSW Coastal Policy and broodstock collection policy).
4. Despite any other limiting provision within the FMS, stocking for conservation purposes may take place provided an appropriate environmental assessment, such as a Review of Environmental Factors or an Environmental Impact Statement, has been undertaken and duly considered prior to the stocking event.
 5. Priority

The priority arrangements for conservation stocking programs will vary from time to time but will be subject to consultation with the NSW Advisory Council on Fisheries Conservation (ACFC) or equivalent body.

3.1.3 Stocking policy for adult fish

Large or adult fish will not be stocked on a major scale due to the cost of production and concerns that larger fish can become domesticated and do not fare well in the wild. However, the stocking of adult fish is appropriate in a limited number of circumstances to assist with conservation or research programs, or to create unique recreational and Indigenous fishing opportunities. Accordingly, adult fish will only be stocked when one or more of the following criteria are met:

1. The activity forms part of a Conservation Stocking event or a research program that underpins a conservation initiative
2. In relation to native species, the activity:
 - (a) is for Indigenous cultural purposes and the fish are released into the waters from which they were captured, or
 - (b) relates to the return of brood fish to the waters from which they were captured
3. In relation to salmonid species, the activity relates to the return of brood fish that have expended their function in the hatchery, been stripped of eggs and would otherwise be killed, into freshwater impoundments only for recreational fishing and Indigenous fishing purposes.

'Adult fish' are defined as fish above the size at which 50% of the stock are mature (ie. in spawning condition), unless otherwise agreed for individual species between the Director-General, NSW DPI, and the Director-General of the Department of Infrastructure, Planning and Natural Resources.

3.2 Catchments, zones and species to be stocked

The State's catchments have been categorised into 'stocking zones' (Figure 1) that reflect a broader grouping of 'like' catchments. This will facilitate the review of stocking events for areas displaying similar environmental requirements and matters of environmental concern that are characteristic of each stocking zone.

Stocking zones will be classified as follows and are shown in Figure 1 (see further detail in Appendix 3): East Coast: (all eastern drainages), Montane (all salmonids), Murray (Murray, Murrumbidgee & Lachlan catchments), Darling (Darling, Macquarie, Castlereagh, Namoi, Gwydir and Macintyre catchments) and Far West (all other western catchments within NSW). The Montane zone relates to all salmonid stockings and encompasses areas within other zones where pertinent environmental conditions are available for trout and salmon. Those areas and waters are generally determined by an elevation of 700 to 1,500m above sea level and where water temperature ranges between 5 and 25°C.



Figure 1. Stocking zones in NSW. [Note the Montane Zone may overlap adjacent zones]

To ensure that the environmental impacts of fish stocking are minimised and in some cases avoided altogether, the species to be stocked into each catchment will be limited to those outlined in Table 2 below and subject to the controls established for stocking those species (see Appendices 1-3).

In addition to the waters in Table 2, native species can be stocked into any waterway, but any such stocking events undertaken in previously unstocked waterways must meet the genetic standards established for conservation stocking, irrespective of the purpose for of the event. Account must also be taken of the relative cost and benefits of alternative measures to rebuild native fish populations, such as riverine ecosystem restoration. As outlined in section 3.1.1.2, salmonids can only be stocked into waters stocked with the species since 1990.

Any proposals to stock fish that does not comply with the above, or the specifications in Table 2, will not be permitted to proceed under the FMS and would need to be subject to a separate environmental impact assessment process.

Table 2. Permissible species to be stocked in catchments within each stocking zone.

East Coast Stocking Zone	
Tweed River	Australian bass
Richmond	Australian bass, eastern freshwater cod
Clarence	Australian bass, eastern freshwater cod, rainbow trout*, brown trout*
Macleay	Australian bass, rainbow trout*, brown trout*
Hastings	Australian bass, rainbow trout*, brown trout*
Camden Haven	Australian bass, rainbow trout*, brown trout*
Manning	Australian bass, rainbow trout*, brown trout*
Port Stephens	Australian bass
Hunter	Australian bass, golden perch, silver perch, rainbow trout*, brown trout*
Lake Macquarie	Australian bass
Hawkesbury	Australian bass, rainbow trout*, brown trout*
Port Jackson	Australian bass
Lake Illawarra	Australian bass
Shoalhaven	Australian bass, rainbow trout*
Clyde	Australian bass - in impoundments only
Moruya	Australian bass - in impoundments only
Tuross	Australian bass - in impoundments only
Bega	Australian bass - in impoundments only
Towamba	Australian bass - in impoundments only
Genoa	Australian bass - in impoundments only
Snowy	Brown trout*, rainbow trout*, brook trout*, Australian salmon*, Australian bass
Murray Stocking Zone	
Lake George	Golden perch, silver perch, Murray cod, brown trout*, rainbow trout*
Murrumbidgee	Golden perch, Murray cod, silver perch, trout cod, brown trout*, rainbow trout*,
Murray	Golden perch, Murray cod, silver perch, rainbow trout*, brown trout*
Lake Hume	Golden perch, silver perch, trout cod, Murray cod, brown trout*, rainbow trout*,
Lachlan	Golden perch, Murray cod, silver perch, brown trout*, rainbow trout*
Peacock Creek	Golden perch, Murray cod, silver perch
Darling Stocking Zone	
McIntyre	Golden perch, Murray cod, silver perch, brown trout*, rainbow trout*
Gwydir	Golden perch, Murray cod, silver perch, brown trout*, rainbow trout*
Namoi	Golden perch, Murray cod, silver perch, brown trout*, rainbow trout*
Castlereagh	Golden perch, Murray cod

Macquarie	Golden perch, Murray cod, silver perch, trout cod, brown trout*, rainbow trout*
Darling	Golden perch, Murray cod, silver perch
Montane Stocking Zone	
Includes parts of other zones where salmonids are stocked (as indicated above by an asterisk)	Atlantic salmon (in Lake Jindabyne and Khancoban Pondage only) Brook trout (in Lake Jindabyne, Three Mile Dam and Dry Dam only) Brown trout Rainbow trout
Far West Stocking Zone	
Bulloo, Warrego, Paroo, Cooper, Condamine, Lake Frome, and Lake Bancannia	Nil

Note: * indicates species stocked in Montane Zone that overlaps this catchment.

3.3 Permanently closed waters

Some waters within NSW are pristine or unique environments, where there are no official records of fish stocking and minimal or no other anthropogenic influences. Such areas will be permanently closed to stocking to protect existing aquatic biodiversity and proposals to stock fish into such areas will not be considered by NSW DPI (irrespective of the potential level of environmental impact). The waters permanently closed to stocking are listed in Table 3. Apart from proposals to undertake conservation stocking in these areas as part of a recovery program, no proposals to stock fish for harvest purposes in these waterways will be considered, even if an associated environmental impact assessment is completed and furnished to the Government.

Table 3. Waters permanently closed to stocking.

Waterway	Feature
Blue Lake Club Lake Hedley Tarn Lake Albina Lake Cootapatamba	Glacial lakes of Kosciusko NP that have not been stocked in the past and are likely to contain unique faunal assemblages
Bogong Creek	Thought to be the only waterway in NSW to contain the endangered spotted tree frog
Murray River between Tocumwal and Yarrawonga Weir	No stocking of trout cod into that part of the Murray, except to return broodstock. This area contains the last known wild self-sustaining population of the endangered trout cod and is the source of broodstock to produce progeny to be released into the former range of the species as part of the recovery plan

Waterway	Feature
Bulloo River catchment Condamine River catchment Cooper River catchment Lake Bancannia catchment Lake Frome Moonie River catchment Paroo River catchment Warrego River catchment	These rivers have not been previously stocked and are likely to contain unique faunal assemblages
Waters above 1500 metres in Kosciusko NP and any other waters within Kosciusko NP jointly identified as trout-free by NSW DPI and NSW NPWS	These waters have not been substantially stocked in the past and are likely to contain unique faunal assemblages
Natural ephemeral lakes of the Western Division as defined by the <i>Crown Lands Consolidation Act 1913</i> immediately before its repeal (subject to any regulations made under section 4(3) of the <i>Crown Lands Act 1989</i> that affect the boundary between the Western Division and the Eastern and Central Division)	These waters have not been previously stocked, are likely to contain unique faunal assemblages, and are generally considered an unsuitable environment for stocking
All waters within the 47 declared Wilderness areas and 3 declared World Heritage areas (as at December 2003)	No harvest stocking within those Wilderness areas and Declared World Heritage areas

3.4 Waters with restricted stocking

Specific waters within the catchments and stocking zones will be excluded from stocking on a temporary basis (Table 4), primarily in response to the risk assessment conducted on the existing stocking activity in the EIS. Such waters may be placed on (or removed from) the 'schedule of restricted waters' for a range of reasons that include, but are not limited to, those listed in Table 5.

The schedule of restricted waters includes a 'buffer zone' of 5 km radius around most threatened species' sightings in which stocking cannot take place. The 5 km buffer zone is a precautionary measure that was determined during the risk assessment, taking into account the limited number of Australian or overseas studies regarding the movement of stocked fish. The buffer zone concept has been adopted to allow stocking to continue within a particular waterway, but alleviates the immediate and some of the subsequent pressures imposed by introducing fish, native and non-native, into the receiving waters. The use of a buffer zone around threatened species is a new arrangement in the management of fish stocking in Australia. It represents a significant step towards mitigating the potential impacts of stocking on aquatic threatened species, and provides a zone within which those species can expand their distribution and abundance unhindered by the immediate pressure associated with introducing relatively large numbers of predators, albeit as juveniles. It is acknowledged that

the use of a buffer zone does not guarantee that the stocked fish will not impact on threatened species, but is seen as a precautionary measure to be implemented whilst research is conducted to examine the movement and mortality of stocked fish in NSW waterways.

Note: Any buffer zone applied to a waterway does not include an adjacent waterway as depicted in Figure 2 below.

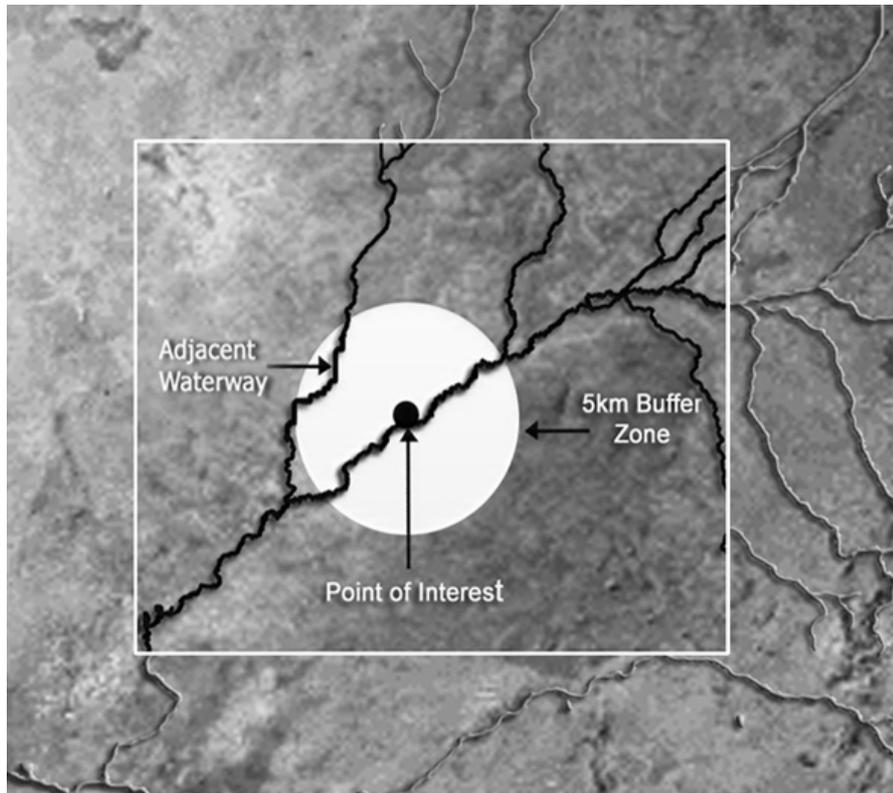


Figure 2. Application of the buffer zone concept (ie. not including adjacent waterways).

During the review of stocking events, consideration will be given to the presence of structures (e.g. dams, waterfalls) within the buffer zone that could negate the need to apply it in its strictest sense. As previously stated, the buffer zone concept is a precautionary measure, and in accordance with the responsive management regime of the FMS, can be changed as is deemed necessary by research or as other information becomes available.

The buffer zones will be recorded in a database maintained by NSW DPI and will be identified using information periodically provided by Government agencies such as the National Parks and Wildlife Service, the Department of Infrastructure, Planning and Natural Resources and the Department of the Environment and Heritage (for instance, to determine specific locations of confirmed threatened species sightings, boundaries of Ramsar wetlands, etc). The precise boundary of each buffer zone will be approved by an authorised Conservation Officer within NSW DPI.

The schedule of restricted waters and the buffer zones (size and adequacy) will be reviewed and updated every five years in light of new information or decisions and having regard to a range of ecological (e.g. threatened species listings, stream condition, frequency

and magnitude of stocking), economic (e.g. local economic dependencies) and social (history of stocking, alternative opportunities) factors.

The schedule of restricted waters is an effective compromise between the aim of continuing harvest stocking while ensuring the ongoing protection of natural fish populations, threatened species and/or the effectiveness of stocking. The schedule is an important reference point in the stocking review.

Table 4. Schedule of restricted waters.

Note: A 'confirmed' sighting is one that has been substantiated by NSW DPI or another authorised agency as a reliable sighting.

Issue	Waterway	Stocking restriction
Endangered species		
Booroolong frog (TSC Act)	Bombowlee Creek, Brungle Creek, Gilmore Creek, Maragle Creek, Macquarie River, Native Dog Creek, Sewells Creek, Turon River (upstream of Sofala), Goobarragandra River, and additional sites recorded by NPWS by grid reference (stream or town names not identified by NPWS records)	No harvest stocking within 5km radius of confirmed threatened species sighting unless otherwise authorised by NSW NPWS
Eastern cod (FM Act)	Upper Clarence River and tributaries (Nymboida River, Little Nymboida River, Guy Fawkes River, Boyd River, Mann River, Washpool River), Rocky Creek, Richmond River and tributaries above Kyogle	No harvest stocking within 5km radius of the extent of recovery operations (consult NSW DPI Conservation Officers)
Trout cod (FM Act)	Any waters identified as critical trout cod habitat in the Trout Cod Recovery Plan	No harvest stocking within 5km radius of waters declared as critical trout cod habitat
Giant barred frog (TSC Act)	Clarence, Richmond & Hastings River catchments - NPWS to provide sighting details	No harvest stocking within 5km radius of confirmed threatened species sighting
Murray hardyhead (FM Act)	Bundidgerry Creek, a tributary of the Murrumbidgee near Narrandera	No harvest stocking
Oxleyan pygmy perch (FM Act)	Lake Hiawatha, coastal creeks and dune lakes at Bundjalung, Yuragyir and Broadwater National Parks	No harvest stocking within 5km radius of confirmed threatened species sighting
Stuttering frog (TSC Act)	Clarence River, Macleay River, Manning River and their tributaries	No harvest stocking within 5km radius of confirmed threatened species sighting
Fleay's barred frog (TSC Act)	Clarence River and Richmond River and their tributaries	No harvest stocking within 5km radius of confirmed threatened species sighting
Endangered populations		
Western population of olive perchlet (FM Act)	Bogan River, Condamine River, McIntyre River, Severn River, Dumaresq River	No harvest stocking within 5km radius of confirmed threatened species sighting
Western population of purple spotted gudgeon (FM Act)	Condamine River, Dumaresq River, Gwydir River, McIntyre River, Severn River and Tenterfield Creek	No harvest stocking within 5km radius of confirmed threatened species sighting

Issue	Waterway	Stocking restriction
Tusked frog (TSC Act)	All waters within the Nandewar and New England Tablelands bioregions	No harvest stocking within 5km radius of confirmed threatened species sighting
Vulnerable species		
Macquarie perch (FM Act)	Abercrombie River, Goodradigbee River, Hawkesbury River above Marulan and tributaries of the Hawkesbury River above Warragamba Dam including the Wingecarribee River and the following parts of the Wollondilly River system: downstream of Marsden Weir (and upstream of Marsden Weir following the installation of a fishway); Tarlo River downstream of Tarlo Gap, Mannus Creek (flows into the Tooma River), Murrumbidgee River above Cooma, Queanbeyan River above Googong Dam, Shoalhaven River and its tributaries including the Mongarlowe River	Brown trout stocking not permitted
New England tree frog/Davies Tree Frog (TSC Act)	Clarence, Manning & Hunter River catchments - NPWS to provide sighting details	No harvest stocking within 5km restriction will apply
Peppered tree frog (TSC Act)	Clarence & Macleay River catchments - NPWS to provide sighting details	None until status of species is confirmed at which point the no harvest stocking within 5km restriction will apply
Southern pygmy perch (FM Act)	Billabong Creek near Holbrook, Murray River near Gunbower Island, Blakneys Creek tributary of the Lachlan River near Dalton, numerous billabongs adjacent to Murray River	No harvest stocking within billabongs and no harvest stocking within 5km radius of confirmed threatened species sightings within rivers
Stuttering frog (TSC Act)	Clarence River catchment - NPWS to provide sighting details	Partially protected by the provision in this table not to stock within wilderness areas
Protected from fishing under section 19 of the FM Act		
Australian grayling	Genoa, Towamba, Tuross, Bega, Moruya and Clyde catchment areas and their tributaries	No harvest stocking except for Australian bass into impoundments
Protected from commercial fishing under section 20 of the FM Act		
Wild Australian bass populations in far south eastern catchments	Genoa, Towamba, Tuross, Bega, Moruya and Clyde catchment areas and their tributaries	No harvest stocking except for Australian bass into impoundments
<i>Euastacus australasiensis</i>	Wentworth Falls Dam, waters above Horseshoe and Bridal Veil Falls, Leura Falls Creek, Kedumba Creek, Yosemite Creek (above Minnie Ha Ha Falls), Grose River, Morong Creek (tributary of Boyd River), Gambenang Creek and tributaries	With the exception of Wentworth Falls Dam where stocking will continue, these waterways have not been previously stocked and are not proposed to be stocked. Also protected by the provision in this table not to stock within wilderness or world heritage areas

Issue	Waterway	Stocking restriction
<i>E. clarkae</i>	Cockerawombeeba Creek (tributary of Forbes River, Hastings catchment)	Waterway not previously stocked, not proposed to be stocked, and protected by the provision in this table not to stock within wilderness or world heritage areas
<i>E. crassus</i>	Alpine creeks around Mt Kosciuszko	This species is catered for under the 'no harvest stocking in waters above 1500m in Kosciuszko NP' provision in Table 3, and partially protected by the provision in this table not to stock within wilderness or world heritage areas
<i>E. dharawalus</i>	Wildes Meadow Creek (above Fitzroy Falls)	No harvest stocking in Wildes Meadow Creek
<i>E. gumar</i>	Gorge Creek (north-eastern tributary of Clarence River)	Waterway not previously stocked, not proposed to be stocked
<i>E. neohursutus</i>	Nana Creek (tributary of Orara River), Brimben Creek (Little Nymboida near Ulong), Upper Bobo River and Flaggy Creek (near Lowanna), Moonmerri Creek (tributaries of Nymboida), Little Murray River, Boundary Creek, Coutts Water & Allans Water (tributaries of Nymboida up around Dorrigo), Sullivans & McKays Creeks (tributaries of Nambucca River), Richardsons & Rosewood Creeks (above Crystal Shower Falls) (tributaries of Bellinger River)	Partially protected by the provision in this table not to stock within wilderness or world heritage areas and most waters not previously stocked, not proposed to be stocked
<i>E. polysetosus</i>	Headwaters of Hunter (Tubrabucca Creek) and Manning rivers in Barrington Tops NP/Wilderness	Partially protected by the provision in this table not to stock within wilderness or world heritage areas
<i>E. reductus</i>	Upper Allyn River (Hunter River), Jerusalem Creek, Telegherry Creek, Martins Creek and Whispering Gully (upper Karuah River), Sandy Creek (west of Bulahdelah), Duffers Creek	Not previously stocked, not proposed to be stocked - also protected by the provision in this table not to stock within wilderness areas
<i>E. rieki</i>	Waters of Kosciuszko NP	This species is catered for under the 'no harvest stocking in waters above 1500m in Kosciuszko NP' provision in Table 3 and partially protected by the provision in this table not to stock within wilderness areas

Issue	Waterway	Stocking restriction
<i>E. simplex</i>	Majors Creek, Little Falls Creek, Allans Water, Coutts Creek, Boundary Creek, Guy Fawkes River (tributaries of Nymboida River), Styx River, Little Styx River & Five Day Creek (tributaries of Macleay River), Falconer Creek & Fenwicks Creek (tributaries of Hastings River), Native Dog Creek	Partially protected by the provision in this table not to stock within wilderness or world heritage areas and some waterways not previously stocked
<i>E. spinichelatus</i>	Fenwicks Creek (tributary of Hastings River), Joyces Creek (tributary of Yarrowitch River) & Tia River (above falls) Macleay River, Cells River (Manning River), Bobbin Creek, Numble Creek	Partially protected by the provision in this table not to stock within wilderness or world heritage areas, and all waters except for Tia River not previously stocked
Species that are not listed as threatened under any legislation but are considered to be of conservation concern		
Darling River hardyhead	Glennie Creek (Macquarie River), Bowmans Creek (Hunter River), Loders Creek, Wallamore Anabranh (Namoi River), Warialda Creek (Gwydir River), Macintyre River	None until status of species is confirmed at which point the no harvest stocking within 5km restriction will apply
Mountain galaxiid (<i>Galaxias olidus</i>) variants	Certain waters of the upper Snowy River around the summit of Mt Kosciuszko (Blue Lake, Sawpit Creek and Carruthers Creek) Rosewood Creek (Bellinger River) Little Nymboida River, Bielsdown River, and Bobo River and their tributaries (Clarence River)	This species is catered for under the 'no harvest stocking in waters above 1500m in Kosciuszko NP' provision in Table 3, most waters not previously stocked nor proposed to be stocked and partially protected by the provision in this table not to stock within wilderness or world heritage areas
Non-parasitic lamprey	Moruya and Tuross rivers, lower to middle reaches	Not stocked since pre-1990 and not proposed to be stocked; also protected by the provision in this table not to stock within wilderness areas
Wild Murray cod populations	Lake Mulwala	Lake not to be stocked with Murray cod Not historically stocked with Murray cod. Excellent self-sustaining population of Murray cod present
Non species-specific issues		
Hunter River impoundments (western drainage species in eastern drainage)	Glenbawn Dam, Glennies Creek Dam and Lake Liddell within the Hunter River system	The NSW Fisheries (DPI) Introduction and Translocation Policy allows for the stocking of silver perch and golden perch into these dams but does not permit the stocking of Murray cod
Ramsar wetlands	Blue Lake Gwydir Wetlands Hunter Estuary Wetlands (formerly known as Kooragang Island Nature Reserve)	No freshwater harvest stocking within these nine existing sites

Issue	Waterway	Stocking restriction
	Lake Pinaroo Little Llangothlin Nature Reserve Macquarie Marshes Myall Lakes National Park Narran Lakes Nature Reserve Towra Point Nature Reserve	

Table 5. Factors for listing (and de-listing) areas on the schedule of restricted waters.

Reason for restriction	Potential reasons for listing (and de-listing*)
Protection of listed threatened species, endangered ecological communities and critical habitat of threatened species and/or aquatic biodiversity conservation	<ul style="list-style-type: none"> • If, after a declaration of threatened species, population or ecological community by notification in the Government Gazette and a joint assessment by NSW DPI and NPWS, it is agreed that the species, population or community could be detrimentally affected by stocking fish in that area • If required by threatened species recovery plan • If recommended by the NSW DPI or another authorised agency's threatened species unit • If recommended by Fish Stocking EIS
Determined as 'unsuitable' by classification system (see under Management Response 2.3a) or through the stocking review framework	<ul style="list-style-type: none"> • If the area is defined as unsuitable under the classification of waters (e.g. temperature ranges, regularly dries out, consistently poor returns) • If a specific area of concern is identified through a stocking review with respect to an individual stocking event
Places of cultural, historic or Aboriginal significance	<ul style="list-style-type: none"> • If such places are identified as requiring special management in consultation with relevant stakeholder groups • If the areas are protected from disturbance under legislation • If otherwise recommended, with sufficient justification, by an authorised agency
Determined to be unsuitable for stocking due to environmental factors	<ul style="list-style-type: none"> • If drought or flood affected • If affected by toxic agents, noxious aquatic flora or disease

* De-listing generally applies if the reverse situation to a specified trigger occurs.

3.5 Regular review of stocking events

This section outlines the process of reviewing stocking events prior to them being carried out, by either NSW DPI or private individuals or groups.

Fish stocking carries inherent risks that can pose significant negative impacts on the environment. Issues such as the translocation of undesirable species, potential impacts on threatened species, and the possibility of genetically inferior stock having a detrimental effect on wild populations are major issues that need to be considered as part of the ongoing stocking process to ensure that fish stocking is carried out in a way that minimises the negative impacts.

To ensure that individual stocking events are properly reviewed before being carried out, a review framework will be used (Figure 3 and see Management Response 1.1a later in this document). The framework will consider all matters likely to affect the environment and

identifies inappropriate events early in the planning stage. Events that do not comply with the Stocking Review Guidelines (in Appendix 1) or otherwise fail to demonstrate compliance with the FMS will not be authorised.

3.5.1 Process of reviewing stocking events

Reviews of stocking events, using Stocking Review Guidelines (Appendix 1), will be carried out by appropriately qualified staff within NSW DPI with the delegated power to approve stocking permits under section 216 of the FM Act. The outcomes of each review will be counter-signed by appropriately qualified staff to advise on threatened species issues to ensure that threatened species, populations and ecological communities and biodiversity issues are addressed before the stocking event takes place. The review process is shown diagrammatically in Figure 3.

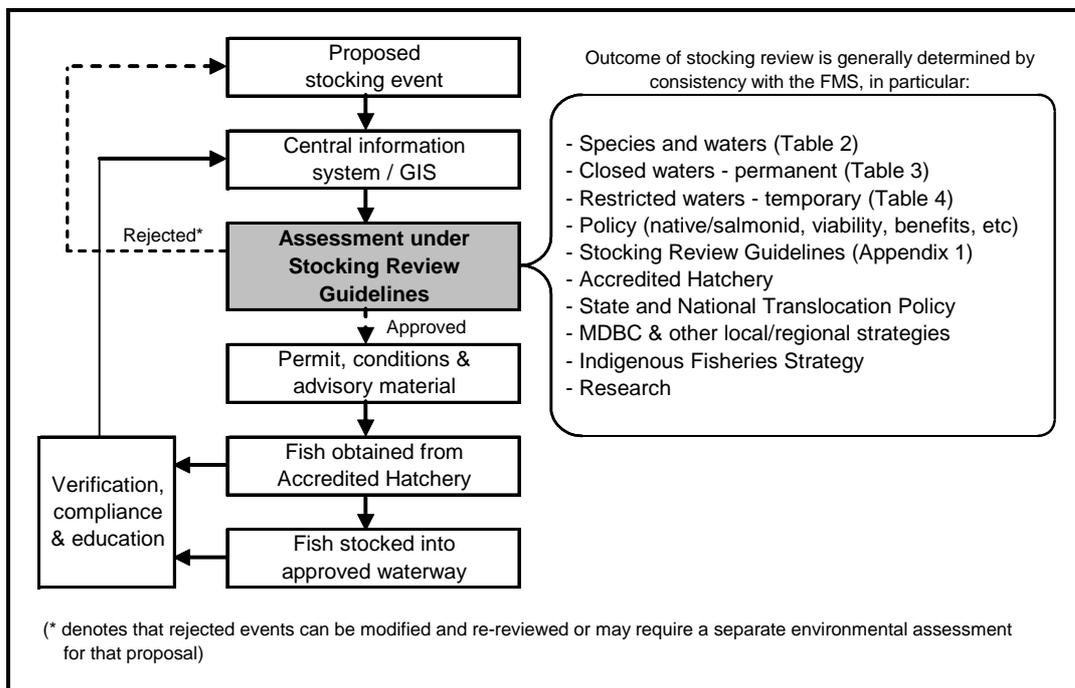


Figure 3. Diagram of the stocking review process.

3.5.1.1 Policy and procedures manual

To ensure consistent application of the review process within NSW DPI, a Fish Stocking Policy and Procedures Manual will be developed (see Management Response 4.1b). The manual will describe the relevant policy, procedures, assessment protocols and management arrangements that are to be observed when reviewing a stocking event in NSW. The manual will provide consistency within the organisation and provide transparent review and permit systems to support the strategy.

3.5.1.2 Delegation of power

The delegation of power to exercise the Minister's authority to issue a stocking permit under section 216 of the FM Act currently rests at the senior manager level, although this is subject to change from time to time by the relevant Minister.

3.5.1.3 Stocking review guidelines

Guidelines have been developed and will be used to assess individual fish stocking events whether the proponent is NSW DPI or a private individual or group (e.g. a one-off event by a fishing club to stock a particular waterway or for cultural/Indigenous purposes). The guidelines provide a format for rigorous review to be undertaken before any activity can take place by taking into account all matters likely to affect the environment and other relevant FMS issues. The Stocking Review Guidelines, incorporated into the Policy and Procedures Manual (see section 3.5.1.1), will ensure the consideration of matters such as the source and quality of the stock, translocation and disease risks, local environmental issues and potential conditions that should be applied to the event.

The Stocking Review Guidelines will be adaptive to reflect the dynamic nature of the natural environment and may be amended by the Director-General, NSW DPI at any time in light of new information, such as research outcomes, that could influence the decision about whether an individual stocking event should proceed.

The four parts of the guidelines are summarised below and detailed in Appendix 1:

Part 1. The stocking activity - This part examines the source and quality of the stock, the appropriateness of the intended release site and general compliance with the FMS.

Part 2. Translocation of live aquatic organisms - This part is based on the National Policy for the Translocation of Live Aquatic Organisms (stocking open waters) and examines the likelihood and consequences of inadvertent translocations of non-target species into the zone through the stocking activity. It identifies translocation risks, highlights mitigating actions that need to be taken to minimise risks and leads to further assessment, where necessary.

Part 3. Local environmental issues - This part considers any potentially significant impacts at a local level that may be caused by the activity. Using the best available information on the zone, the decision-maker can determine whether further assessment or action is required.

Part 4. Review of the stocking proposal and permit arrangements - This part provides a review of the entire proposal to ensure that all matters have been taken into account and that the proposal is permissible under the FMS. It ensures a transparent appraisal of the proposal and outlines the authorisation arrangements, including the application of special conditions where necessary to mitigate unacceptable impacts.

3.5.1.4 Review resources

Resources used to undertake the review of stocking events will include, but not be limited to the:

- Fish Stocking Fishery Management Strategy
- Fish Stocking Policy and Procedures Manual (incorporating Stocking Review Guidelines)

- BIONET (biodiversity information resource) - An Internet based resource developed by a consortium of State Government departments (including NSW DPI, Australian Museum, Royal Botanical Gardens) and coordinated by NSW National Parks & Wildlife. Provides participating agencies with high-quality and sensitive biodiversity information not available to the public.
- NSW catchment blueprints – Developed by the Department of Infrastructure, Planning and Natural Resources to highlight areas of environmental concern
- Water Management Plans
- NSW Rivers Survey 1997 (Harris and Gehrke, 1997) – the most comprehensive survey ever undertaken in Australia that shows the distribution, diversity and abundance of native fish and alien species
- Threatened and potentially threatened species of the Murray Darling Basin (Morris *et al.* 2001) – provides data on all freshwater fish of coastal NSW and the Murray-Darling Basin. This volume includes basic biological information, distribution and conservation status of 30 threatened and potentially threatened freshwater fish species including threatening processes and recommendations to mitigate impacts
- Schedules of closed or restricted waters – schedules prepared under the FMS that lists all waters subject to no stocking or restricted stocking, including the scope and reason for the restriction (see Tables 4, 5 and 6, and Management Response 1.1d)
- NSW National Parks and Wildlife Service resources – including the natural resources atlas containing information on terrestrial threatened species
- Other existing relevant resources or others as they become available.

3.5.1.5 *Application forms*

Forms will be designed for fish stocking events to procure the information required for the review of Dollar for Dollar Native Fish stocking or one-off stocking events in NSW. The forms will be designed to guide the proponents into planning events that comply with the provisions of the FMS.

The information provided in the forms will be considered during the review using the Stocking Review Guidelines. Where a stocking event fails to comply with the Guidelines or has unacceptable environmental impacts, the activity will not proceed.

The forms for fish stocking events will be designed and printed following approval of the FMS by the Minister for Primary Industries.

3.5.2 *Authority to stock fish*

Stocking permits are required for events undertaken by private individuals or groups. The permits authorise the activity and outline the conditions under which the event must be carried out.

3.5.2.1 *NSW Fisheries Fish Stocking Program*

The NSW DPI Fish Stocking Program involves stocking of native and salmonid fish into waters within each Stocking Zone. The details of the stocking events will be consistent

with the species permitted to be stocked under the FMS (see Table 2) and the other controls described in this section (see also Appendices 1-3).

A stocking event is deemed authorised if it is undertaken under any NSW DPI Fish Stocking Program and has been favourably reviewed under the Stocking Review Guidelines to ensure that local environmental issues are properly considered prior to the event. Any measures that are required for individual stocking events in order to manage potential environmental impacts must be complied with before the event progresses.

This FMS and the policies and management arrangements contained herein constitute the permit issued by the Minister (by virtue of section 216 of the FM Act) to undertake stocking for authorised events by NSW DPI staff or agents of NSW DPI. The authority is subject to any special conditions determined during the stocking review process.

3.5.2.2 Stocking by private individuals or groups

Following a favourable review under the Stocking Review Guidelines of a stocking event proposed by a private individual or group, NSW DPI will issue a permit under section 216 of the FM Act to authorise the event. The stocking permit will detail:

- the principal individual(s) or organisation(s) who will carry out the event
- the nominated species
- the approved source of the stock
- the approved number of stock to be released
- the class of the stock (age/size)
- the location of the stocking
- whether the stock must be marked with an identifying agent or technique
- the timeframe within which the fish are to be released
- compliance with any ancillary information provided with the permit (i.e. Code of Practice)
- the requirements for verification of the stocking event, and
- the inclusion of special conditions, where necessary, to mitigate any potential negative environmental impacts or measures to support the objectives of the FMS.

The permits will be accompanied by advisory material relating to best practice stocking methods to promote effective stocking methods and highlight environmental issues. A verification system will be in place to ensure that information relating to each stocking event is fed back into the information management system for monitoring, compliance and future management purposes.

3.6 Management of Hatcheries Producing Fish for Stocking

To ensure the consistent production of quality stock used for fish stocking, NSW DPI has developed a Hatchery Quality Assurance Program (HQAP). The HQAP will be used to

support the development of a Fish Stocking Hatchery Accreditation System (HAS) and a Broodstock Collection and Management Policy.

3.6.1 Hatchery Quality Assurance Program

A first of its kind in Australia, the HQAP involves the production of the freshwater native fish golden perch, silver perch and Murray cod. Prepared by senior NSW DPI scientists, hatchery managers and aquaculture managers the program was developed in consultation with private hatchery operators and other relevant agencies. The program is designed to guide the production of these key native species in a manner that provides high quality, disease free and genetically sound stock. To be implemented within the first year of commencement of the FMS and covering all aspects of hatchery production through a hazard analysis critical control approach, the HQAP will form the basis of the HAS.

The HQAP will evolve over time to include all species used in fish stocking activities in NSW and will apply to *any* facility producing fish for stocking. It will ultimately include production techniques for Australian bass to complete the suite of production techniques required under the Dollar-for-Dollar Native Fish Stocking Program, as well as for species stocked for conservation purposes and salmonids. A key principle of the FMS is the requirement for hatcheries to use an effective population size (N_e) of 100 for Conservation Stocking and for the stocking of any native species into previously unstocked waterways. This principle will be effective from the date of commencement of the FMS. Similarly, a N_e of 50 will be used for all Harvest Stockings of native species for the first five years of the FMS. After five years, all stockings of native species will be required to meet the standard for Conservation Stocking (at this stage N_e is 100, but may be modified on the basis of research outcomes).

3.6.2 Hatchery Accreditation System

The Hatchery Accreditation System (HAS) will draw on the HQAP and FMS provisions to establish minimum standards for accreditation as a 'NSW Fish Stocking Hatchery'. The HAS will apply to *any* facility producing or growing out fish for stocking (including hatching eggs sourced from another hatchery, whether native species or salmonids). Hatcheries will be accredited based on their capacity to implement agreed standards under these programs and to maintain minimum requirements in the form of appropriate infrastructure, equipment, breeding techniques and relevant expertise. Several workshops and training days will initiate the system within the first three years of the commencement of the FMS while ongoing support and compliance checks will also form important components of the system.

Hatcheries will be given three years to comply with the HAS in order to provide sufficient time to set up the necessary equipment and procedures. After the three years, any hatcheries failing to comply with the HAS will not be permitted to provide fish for stocking. Some of the key initiatives within the HAS include an N_e of 50 for Harvest Stocking for the first five years, and the supply of broodstock fin-clips and a sample of fish from larval rearing ponds at least once a year for compliance and monitoring purposes. They will be analysed at

NFC or an authorised agent to confirm compliance with the Broodstock Collection and Management Policy.

3.6.3 Broodstock Collection and Management Policy

The collection of wild fish for use as broodstock is a critically important component of the FMS supporting the production of quality fish for stock enhancement and conservation programs. Managed by NSW DPI, the activity of broodstock collection receives a renewed focus under the FMS and a comprehensive Broodstock Collection and Management Policy is being developed to ensure this component of the activity is managed in accordance with the FMS and the principles of Ecologically Sustainable Development. The Broodstock Collection and Management Policy will supersede the existing 'Broodstock Collection Policy' and involve extensive consultation and progressive development and implementation during the first few years of operation of the FMS.

As well as managing the collection of broodstock, the Broodstock Collection and Management Policy will include the genetic resource management guidelines being developed under the FMS (see Management Response 1.3a) to control how broodstock are taken, kept and bred so as to maintain the genetic integrity of wild fish populations. The guidelines underpin the critically important use of genetic material in NSW covering issues such as appropriate conservation breeding programs, stock enhancement breeding programs, best practice broodstock sampling, rearing systems and stock release procedures.

3.7 Research

3.7.1 Overview

This section describes the planned research programs designed to support the FMS and provide information that will lead to continuous improvement in the way the stocking activity is undertaken.

Should a research outcome provide information that leads to a minor change to the way stocking is undertaken, this would normally be incorporated as part of the continuous improvement theme of the FMS (without triggering a review of the management regime). Where a research outcome formally triggers a review, then the review process will be engaged as set out in section 5.2.2. However, should any research outcome dramatically alter the aim of the FMS and the change not be specifically provided for, contingency planning will take place in accordance with section 5.3, subject to consultation with the relevant advisory bodies.

3.7.2 Research priorities and timeframes

In this plan, research priorities are categorised into three levels depending on the relevance to the risks identified in the EIS and information required to support the goals and objectives of the FMS, as follows:

Level 1 (initial research): Commencement scheduled for within two years of approval of the FMS and reviewed within five years of commencement

Level 2 (intermediate research): Commencement scheduled for within three years of approval of the FMS and reviewed within ten years of commencement

Level 3 (supportive research): Commencement scheduled for within five years of approval of the FMS and reviewed within ten years of commencement

3.7.3 Funding sources

The implementation of the programs within the FMS, including research, will need to be supported by appropriate funding arrangements. The range of funding sources that exist and can be potentially accessed include State government funding, the Recreational Fishing Trust, national grant programs such as the Natural Heritage Trust, and/or funding through Commonwealth agencies. It is also likely that similar research will be undertaken in adjoining states where stocking is also widely practised – especially in Victoria and Queensland. Opportunities to conduct joint research programs with other state agencies and to apply research results from other states will be actively pursued in order to utilise the funding available in NSW in the most cost-effective manner.

Table 6. Research topics and components supporting the FMS.

Abbreviations: AAHL- Australian Animal Health Laboratory; ARC - Australian Research Council; DEH - Department of the Environment and Heritage; DSE VIC - Department of Sustainability and Environment (Victoria); FRDC - Fisheries Research and Development Corporation; MDBC: Murray-Darling Basin Commission

Research Topic	Priority	Order of components	Short description of research project and expected outcomes	Lead agency (including other agencies that may have a likely role in the project)	Cost estimate \$ and likely funding source
1. Genetics					
1.1 Distribution of native species and sub-populations	Level 1	1. Golden perch 2. Murray cod	To research and map the distribution of native species used in the activity with regard to identifying any population substructures within each species. Research outcomes will be to provide reliable information, upon which stocking locations and broodstock collection zones are determined, thereby minimising negative impacts on genetic resources. Supporting management responses 1.1a, 1.1b, 1.1c, 1.2a, 1.2b, 3.2a, 5.1a, & 5.3a.	NSW DPI in conjunction with universities, MDBC, FRDC and VIC, QLD, ACT & SA fisheries agencies	\$450K over 3 years NSW DPI & Recreational Fishing Trust
	Level 2	1. Catfish			
	Level 3	1. Silver perch			
1.2 Library of micro-satellites	Level 1	1. <i>Maccullochella</i> suite 2. <i>Macquaria</i> suite 3. <i>Bidyanus</i> suite	A precursor to population substructure research the development of this proposal involves establishing a bank of relevant DNA sample suites and the development of 'primers' that are used to compare genetic variation between samples. Supports management responses 1.1b, 1.1c, 1.3a, 1.5a, 3.2a, 5.3a	NSW DPI in conjunction with universities, MDBC, FRDC and VIC, QLD, ACT & SA fisheries agencies	\$200K NSW DPI & Recreational Fishing Trust
1.3 Cumulative impacts of stocking on native species	Level 1	1. Golden perch 2. Silver perch 3. Murray cod 4. Australian bass	To research the cumulative impacts of the activity on the native populations of the four most stocked native species in terms of genetic effects on wild populations (outbreeding/inbreeding). Resulting data will be used to guide future stocking programs using these species Supporting management responses 1.1b, 1.2a, 1.3a	NSW DPI in conjunction with universities, MDBC, FRDC and VIC, QLD, ACT & SA fisheries agencies	\$K (not yet determined)

Research Topic	Priority	Order of components	Short description of research project and expected outcomes	Lead agency (including other agencies that may have a likely role in the project)	Cost estimate \$ and likely funding source
1.4 Genetic Resource Protocols	Level 1	<ol style="list-style-type: none"> 1. Conservation breeding programs 2. Native species breeding programs 3. Broodstock management 	<p>Review current literature and research the most appropriate genetic protocols under NSW conditions with regard to conservation breeding programs, native species breeding programs and broodstock management arrangements. Resulting data will guide the development and review of Genetic Resource Management Guidelines (FMS management response 1.3a).</p> <p>Supports management responses 1.1b, 1.1c, 1.3a, 1.5a, 3.2a, 5.3a.</p>	NSW DPI	\$K (not yet determined)
2. Environmental impacts of stocking					
2.1 Impacts of golden perch, silver perch and Murray cod in the Hunter Catchment	Level 2	<ol style="list-style-type: none"> 1. Identification and status of any self-sustaining populations of GP, SP and MC 	<p>To investigate whether golden perch and silver perch previously stocked in the Hunter Catchment have established self-sustaining populations and to determine any environmental impacts of those species in the eastern drainage. Research outcomes will provide data for consideration in the future stocking of these waters and appropriate adjustments (such as introducing triploidy/sterile stock and adjustments to stocking densities).</p>	NSW DPI	\$ Partly funded by ARC linkage project outlined in 3.1 below
		<ol style="list-style-type: none"> 2. Environmental impacts of any self-sustaining populations to date 	<p>To assess the presence and status of self-sustaining populations of Murray cod in the Hunter Catchment. Murray cod have been translocated into the Hunter catchment on at least two occasions for angling enhancement and potentially through farm dam escapement with reported captures of juvenile cod suggest there may be a breeding population. Research outcomes will provide information on the extent and range of any Murray cod populations within the catchment and whether there is a case for further management arrangements to minimise any impacts.</p> <p>Supports management responses 1.1b, 1.2a, 1.5a, 5.3a.</p>		

Research Topic	Priority	Order of components	Short description of research project and expected outcomes	Lead agency (including other agencies that may have a likely role in the project)	Cost estimate \$ and likely funding source
2.2 Impacts of salmonids on threatened species	Level 1	<ol style="list-style-type: none"> 1. Booroolong frog 2. Macquarie perch 3. Southern pygmy perch 	<p>To determine the impacts of salmonids on the Booroolong frog and two threatened fish species. Outcomes will provide data relevant to future stocking programs where these species occur including the development of appropriate buffer zones and ongoing reviews of waters listed as closed to stocking.</p> <p>Supports management responses 1.1b, 1.2a, 1.5a, 5.3a.</p>	NSW DPI, DEH, VIC fisheries agency, NPWS, University of Canberra	\$K (not yet determined)
2.3 Movement of stocked fish	Level 1	<ol style="list-style-type: none"> 1. Salmonids 2. Native species 	<p>To determine the distance that stock may travel from the point of release. Outcomes will provide data to support accurate reviews of stocking events where threatened species or ecological communities may be affected.</p> <p>Supports management responses 1.1b, 1.2a.</p>	NSW DPI in conjunction with Universities, ARC, MDBC, FRDC and VIC, QLD, ACT & SA fisheries agencies	\$ Partly funded by ARC linkage project outlined in 3.1 below
2.4 Aquatic diseases	Level 2	<ol style="list-style-type: none"> 1. Disease audit of NSW waters 2. Audit of all hatcheries 3. Mapping distribution of pathogens 	<p>To determine the presence of aquatic pathogens throughout NSW waters where stocking is conducted (including all hatcheries) and subsequent disease mapping within stocking zones to support accurate stocking reviews to minimise translocation risks.</p> <p>Supports management responses 1.1b, 1.1c, 1.2a, 1.5a,</p>	NSW DPI in conjunction with AAHL, University of Sydney, MDBC, FRDC and VIC, QLD, ACT & SA fisheries agencies	\$K (not yet determined)
2.5 Impacts of native fish stocking on threatened species	Level 3	<ol style="list-style-type: none"> 1. Golden perch 2. Murray cod 3. Silver perch 4. Australian bass 	<p>To determine interactions between stocked native fish species and threatened species. The research outcomes may also support the development of appropriate stocking densities, buffer zones and ongoing reviews of waters listed as closed to stocking.</p> <p>Supports management responses 1.1b, 1.1d, 1.2a,</p>	NSW DPI in conjunction with universities, MDBC, FRDC and VIC, QLD, ACT & SA fisheries agencies	\$K (not yet determined)

Research Topic	Priority	Order of components	Short description of research project and expected outcomes	Lead agency (including other agencies that may have a likely role in the project)	Cost estimate \$ and likely funding source
2.6 Food chain interactions	Level 3	<ol style="list-style-type: none"> 1. Salmonids 2. Native species 3. De-stocking study 	<p>To establish reliable data regarding food chain interactions between stocked fish and the aquatic environment. The project will also examine sites no longer stocked to establish relative changes in fish and invertebrate species assemblages. Research outcomes will also support the development of appropriate stocking densities.</p> <p>Supports management responses 1.1d, 1.2a, 5.3a, 5.3b, 5.3c</p>	NSW DPI NSW DPI in conjunction with universities, MDBC, FRDC and VIC, QLD, ACT & SA fisheries agencies	\$K (not yet determined)
3. Efficacy of stocking					
3.1 Cost effective marking techniques	Level 1	<ol style="list-style-type: none"> 1. Native species 2. Salmonids species 	<p>To research the most cost effective and reliable marking techniques used to identify stocked individuals. Current techniques will be reviewed while other methods will be investigated for their potential use in the activity. Outcomes will guide the most appropriate technology for transfer to the private sector.</p> <p>Supports management responses 1.2a, 5.2a</p>	NSW DPI University of Adelaide ARC DSE VIC	\$950K over three years commencing in 2003 as an ARC linkage project
3.2 Optimal stocking practices for NSW waters	Level 1	<ol style="list-style-type: none"> 1. Status/optimisation of harvest stocking techniques 2. Status/optimisation of conservation stocking techniques 	<p>To research the efficiency and effectiveness of current stocking methods for both harvest and conservation stocking programs. Includes appropriate classes of stock, stocking survival/mortality rate, conditioning, timing, release techniques. Information will be used to evaluate success of the activity in achieving the stated goals in the FMS. Outcomes will also guide the development of optimal stocking practices under NSW conditions.</p> <p>Supports management responses 1.2a, 2.3a, 5.2a, 5.3a.,5.3b</p>	NSW DPI DSE VIC ARC University of Adelaide	\$ Included in ARC linkage above project
3.3 Impacts on Aboriginal cultural fishing practices	Level 1	<ol style="list-style-type: none"> 1. Impacts of stocking on cultural fishing 	<p>To research the effects of stocking on Aboriginal cultural fishing</p> <p>Supports management responses 2.2a, 2.2b, 2.2c</p>	NSW DPI (Indigenous Fisheries Strategy)	\$K (not yet determined)

4. Goals, Objectives and Management Responses

This section sets out the goals, objectives and management responses for the activity of fish stocking established under the FMS.

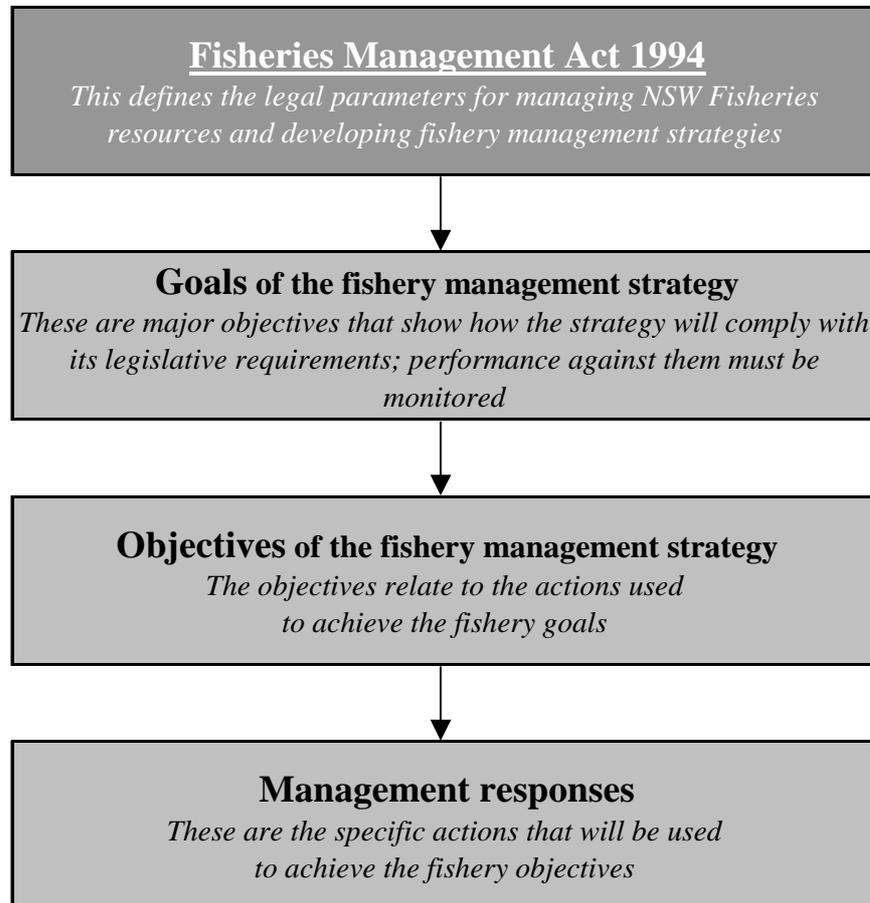


Figure 4. A model of the framework for a fishery management strategy.

The fishery management strategy contains broad goals, operational objectives and specific management responses (see Figure 4). The link between the goals, objectives and management responses is not as simple as that portrayed in this figure. The reality is that most management responses assist in achieving more than one goal, and as such can not be presented in a simplistic issue, goal, objective and response format (see Figure 5).

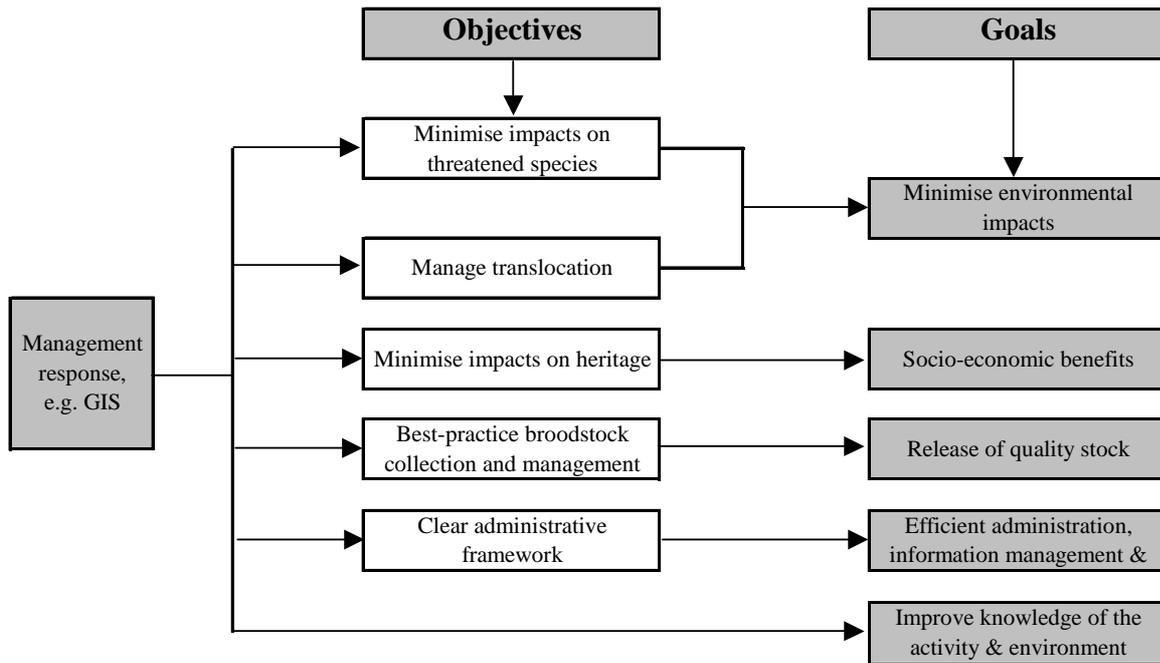


Figure 5. Example of how a single management response from the FMS affects multiple goals and objectives within the activity of fish stocking.

This complex structure has been dealt with in the following section by listing each of the management responses once only, under the objective that the response contributes most towards achieving. There are cross-references associated with each management response to the goals that the response assists in achieving (see Appendix 4).

Information relating to the implementation of management responses is provided in a table located in Appendix 4. The implementation table outlines the scheduled periods within which each management response is to be implemented, as well as information relating to the head of power for implementation and the group who has the lead responsibility for carrying out the actions.

GOAL 1. To manage the activity in a manner that minimises impacts on aquatic biodiversity including threatened species and genetic resources

Objective 1.1 To develop and maintain a framework to guide appropriate assessment of stocking activities

1.1 (a) Utilise “Stocking Review Guidelines” for the ongoing assessment of stocking events

Background: Comprehensive Stocking Review Guidelines will be used to ensure that stocking events are rigorously reviewed before they proceed. The review will consider the risks likely to affect the environment as a result of stocking and will be focused on the primary concerns associated with threatened species, genetics and diseases, and potential translocation of live aquatic organisms. The stocking review framework will be an important management tool designed to ensure that an appropriate and consistent management regime is applied to all fish stocking events.

Each stocking event will be considered in light of potential risks posed by the activity in relation to the stocking zone, the relevant catchment, the individual waterway, and any other issues that warrant consideration such as public access, cultural and social issues

1.1 (b) Use reliable and current information resources to support the stocking review framework

Background: The Stocking Review Guidelines will draw on a set of reliable information sources to assist decision-makers to review stocking events. Information sources used in the review will include the most reliable base-line data available in the “BIONET” information resource (a computer-networked information resource of current natural resource information that draws on a number of data sets including spatial information on threatened species locations, ecological communities and other relevant data supplied by NSW DPI, Australian Museum, NPWS and Royal Botanic Gardens).

1.1 (c) Map the activity in a Geographic Information System (GIS) to:

- accurately depict the historic stocking activity
- record the ongoing activity to the best available standard
- regularly update the assessment resources
- allow accurate reviews of stocking events in relation to environmental considerations
- plot the presence of disease, pest species, noxious species (including aquatic weeds and algae), and
- contribute to other spatial data sets held by the Government or other authorised agencies.

Background: An important component of the FMS is the development of accurate mapping of the activity. The historic and ongoing stocking activity in NSW will be recorded on a series of (GIS-based) maps. This will provide accurate spatial information in a format that can be considered alongside other similar natural resource data also on GIS platforms. This information will be made accessible by recreational fishers and Aboriginal communities.

- 1.1 (d) Implement a schedule of restricted waters where stocking events are limited or prohibited, and review the schedule every five years in light of new information. The applicability of the length of the review period should be reviewed after the first review

Background: From time to time certain waters have restrictions imposed on stocking in response to environmental factors, such as the presence of a threatened species or insufficient/inadequate water. The schedule will be subject to a comprehensive review every five years and amended as new information becomes available. The Stocking Review Guidelines will provide another mechanism for dealing with threatened species issues relating to individual stocking events.

Objective 1.2 To minimise and/or eliminate any negative impact from the activity on threatened species, populations and ecological communities (including mammals, birds, reptiles, amphibians, fish, invertebrates and vegetation), and where possible promote their recovery

- 1.2 (a) Appropriately manage stocking in areas where the activity may adversely affect a threatened species

Background: By drawing on the resources provided by BIONET and in light of the stocking review framework, any stocking event that has the potential to affect a threatened species will be thoroughly reviewed with a view to preventing or minimising any potential impacts. The event may be modified, ceased or allowed to proceed subject to stringent conditions in order to mitigate any potential threats.

- 1.2 (b) Maintain and improve the management of Conservation Stocking programs to promote the recovery of species that are threatened or of conservation concern

Background: Protection, management and recovery of threatened species and populations is a requirement of the NSW Fisheries Management Act 1994, Threatened Species Conservation Act 1995 and the Commonwealth's Environment Protection and Biodiversity Conservation Act 1999. Conservation Stocking forms one of the two main objectives of the FMS and conservation programs currently underway are vital for achieving the objectives of threatened species' management. Existing Conservation Stocking programs are in place for the eastern freshwater cod and trout cod and stocking of other threatened species such as silver perch and Macquarie perch are a possibility in the future. Conservation Stocking activities will continue under the FMS and be refined with the benefit of better information and improved management of fish stocking, including the outcomes of research on Aboriginal cultural considerations.

Objective 1.3 To provide reliable genetic resource management in the activity

1.3 (a) Develop and implement genetic resource management guidelines for fish stocking in NSW

Background: These guidelines underpin the critically important use of, and potential effects on, genetic material as it relates to all fish stocking programs in NSW. Designed to be representative of current scientific literature and understanding on the subject, the guidelines will include the NSW DPI policy on the use of aquatic genetic material and will provide precise standards for private hatcheries (stocking) and all NSW Government hatcheries. In essence, the guidelines will address the critically important feature of any ecologically sound stocking management system, namely adherence to genetic, evolutionary, and ecological principles (Miller & Kapuscinski, 2003).

There are four major components of hatchery production and each component represents a genetic risk: (1) Broodstock collection; (2) Breeding Programs; (3) Rearing Progeny; and (4) Stocking Techniques (Miller & Kapuscinski, 2003). How these factors are managed is representative of the level of genetic risks posed under the activity. Each component will be addressed by the guidelines, either outright or in conjunction with the FMS goals and management responses briefly described below.

(1) Broodstock collection: The Broodstock Collection and Management Policy (Management Response 3.3a) will address the point of capture techniques required to mitigate any sampling bias and provide direction on other broodstock collection issues. This will result in high quality broodstock extraction providing a solid basis for good breeding programs.

(2) Breeding programs: The Genetic Resource Management Guidelines (Management Response 1.3a) will address breeding programs through literal standards resulting in an appropriate mix of suitable progeny for harvest and conservation programs by defining the required amount of parent stock and necessary breeding crosses required to establish an effective population size (relevant to the stocking type). For the first five years of the FMS, the genetic standard for Harvest Stockings will require hatcheries to use an effective population size (N_e) of 50, and after those five years to meet the Conservation Stocking standard of an N_e of 100. Principally, the breeding programs established under the guidelines will be designed to minimise or eliminate genetic drift and inbreeding, outbreeding depression and gene pool swamping by considering and mitigating the factors resulting in these problems including population subdivisions and Evolutionarily Significant Units. Knowledge in these areas will be improved by conducting research as outlined in the research plan, in particular the research into distribution of populations (see section 3.7 - Research Topic 1.1)

(3) Rearing Progeny: This area will be managed under the Hatchery Quality Assurance Program and Hatchery Accreditation Systems (Management Response 3.1a). These systems (each of which draw on the genetic resource management guidelines) will provide direction and guidance on how progeny are to be reared for release into the wild.

(4) Stocking Techniques: Management of this area is improved through the mandatory observance of the Stocking Code of Practice (Management Response 3.4a) that will provide direction for the appropriate release techniques to be used for hatchery progeny under the FMS.

Where the FMS and/or the above requirements generate significant changes to the way the activity is conducted, these will be progressively implemented to minimise any negative impacts on hatcheries.

Objective 1.4 To implement the FMS in a manner consistent with related Commonwealth and State endorsed programs designed to protect aquatic environments and biodiversity

- 1.4 (a) Manage the activity having regard to cross-jurisdictional management arrangements

Background: This FMS operates alongside other programs relating to the protection and management of aquatic resources. Consultation with other jurisdictions, such as interstate fisheries agencies or other management authorities, such as the Murray-Darling Basin Ministerial Council, will occur to ensure compatibility between programs and matters of environmental concern. Fish stocking will be managed consistently with the Native Fish Strategy for the Murray-Darling Basin. Information relating to cross-jurisdictional management issues will be considered during the stocking review process. Where terrestrial threatened species are of concern the relevant managing agency will be consulted.

- 1.4 (b) Recognise and where appropriate incorporate regionally based environmental management arrangements in the stocking review framework

Background: From time to time regionally based environmental management programs may be developed as a response to localised impacts caused by a variety of factors (e.g. habitat protection plans, habitat remediation programs and catchment blueprints). The FMS should recognise these management plans in its stocking review processes and as far as practical operate to support them including the review of the appropriateness of stocking in areas undergoing habitat remediation such as fishway installations.

Objective 1.5 To appropriately manage the risks associated with translocation of live aquatic organisms during stocking activities

- 1.5 (a) Manage the activity consistently with State and national policies governing the translocation of live aquatic organisms and:

- incorporate issues relating to translocation of live aquatic organisms within the stocking assessment framework
- educate stakeholders on translocation issues through educational material and the permit scheme, and
- incorporate translocation management arrangements into the hatchery quality assurance program.

Background: Translocation of live aquatic organisms (translocation) has been identified as an area that has the potential to impact on the sustainability of the activity. Translocation issues such as disease transfer and pest/non-target species introductions are immediate threats that are addressed by the FMS. To guide the management of this issue the policies that will be relied upon are the "Introduction and Translocation Policy (1994)" and the "National Policy for the Translocation of Live Aquatic Organisms (1999)" as amended from time to time. These policies will be factored into the stocking review framework and considered in all stocking assessments, while at the same time best practice techniques designed to minimise or

eliminate translocations will be incorporated into the Hatchery Quality Assurance Program.

In the case of any direct inconsistencies or conflicts between the FMS and the translocation policies, the situation will be reviewed by NSW DPI and the activity or the FMS may be modified as a result.

While related, the environmental impacts arising from the release of aquarium fish species via the aquarium trade (albeit accidental) do not fall within the scope of this FMS and will be managed under separate management arrangements developed by NSW DPI. However, greater awareness of the risks of translocation through educational material produced under this FMS will assist in educating stakeholders about the issue.

GOAL 2. To enhance fishing opportunities through cost-effective stocking programs that maximise economic benefits and provide social equity from the activity for recreational fishing and Aboriginal cultural fishing purposes

Objective 2.1 To provide sufficient quantities of quality stock to support enhanced recreational fisheries

- 2.1 (a) Continue to provide for the stocking of sufficient quantities of fish to provide or enhance quality recreational fishing opportunities in inland rivers and freshwater public waterways

Background: NSW DPI presently provides for the release of around seven million fish per year to maintain the required level of stocking for the existing activity. This program will continue in order to maintain these fisheries and the associated economic and social benefits arising from them, but will operate within the context of the new controls on stocking described in the FMS in order to reduce the environmental risks of stocking fish into natural waterways. Stocking activities will need to take account of other measures to restore native fish populations, such as riverine ecosystem restoration.

- 2.1 (b) Recognise region-specific fishery management arrangements where appropriate, such as the Snowy Lakes Trout Strategy

Background: The FMS will be flexible enough to take account of specific regional management regimes. For example, the Snowy Lakes Trout Strategy is a localised arrangement designed to promote quality recreational angling, regional economic development, and eco-tourism opportunities specifically in the Snowy Mountains Lakes area. It sets out a stocking regime and a number of management responses particular to that area, including research, monitoring and cross-jurisdictional liaison between NSW DPI, the Snowy Mountains Hydro-electric Authority, Landcare, Rivercare and the Environment Protection Authority to ensure quality sustainable fishing.

- 2.1 (c) Broaden the consultation with acclimatisation societies and angling clubs to formulate and implement stocking programs with a view to providing greater equity, access and education about the resource

Background: Under current arrangements, NSW DPI consults with major acclimatisation societies and fishing clubs to allocate stock produced in Government hatcheries for stocking programs across the State. This consultation process will be broadened to improve access to the benefits of the activity for the majority of stocking organisations, the general angling public, to establish a transparent allocation process, to provide a mechanism for distributing educational material and potentially as a conflict resolution opportunity.

Objective 2.2 To minimise any negative impacts of the activity on cultural heritage values and provide opportunities for Aboriginal communities to participate in stocking activities and to support cultural fishing practices

- 2.2 (a) Provide for the stocking of native fish for Aboriginal cultural fishing and moiety purposes

Background: Stocking events for Aboriginal cultural fishing and/or moiety purposes will take account of a number of factors, including the findings of research relating to the identification of culturally important species and areas fished by Aboriginal people, alternative means of re-establishing native fish populations, and the development of funding partnerships with Aboriginal communities to provide the necessary resources for stocking. It is envisaged that this will be progressed via a pilot scheme developed in consultation with the IFS Working Group.

Other opportunities for Aboriginal people to be involved in stocking activities are being progressed through the IFS. One current example is the increased involvement of Indigenous communities in the fish hatchery industry under the IFS. The IFS actively encourages and supports involvement by these communities in fish production for potential restocking of areas with species of cultural significance.

- 2.2 (b) Ensure that new information about areas or objects of cultural significance is taken into account in the stocking review framework

Background: The management regime must be able to respond appropriately to new information about items or locations of cultural significance. For example, stocking waterways near of sites of cultural significance may cause increased disturbance in the area, or, where the local Aboriginal community considers a species of cultural significance, the activity needs to minimise or prevent any impacts on that species, or class of species. Recognition of cultural sites has been incorporated into the Stocking Review Guidelines. The NSW National Parks and Wildlife Service (NPWS) is responsible for management of cultural heritage within NPWS estate and the protection of all Aboriginal objects on all lands, and their input into BIONET will help ensure protection of such sites.

- 2.2 (c) Consult with relevant Aboriginal groups in the assessment of any new sites proposed to be stocked

Background: Stocking has the potential to impact on Aboriginal values and beliefs and as such the relevant Aboriginal groups within the vicinity of any new stocking locations should be consulted prior to the stocking event proceeding.

Objective 2.3 Maximise economic benefits and provide social equity from the activity

- 2.3 (a) Develop a classification scheme for NSW waters to evaluate the potential viability of a stocking event based on the most appropriate species, class of stock for particular waters

Background: A classification scheme will be developed to support the policy on stocking in NSW and to ensure that released stock have a good chance of survival and a reasonable chance of growing-out for capture. The classification scheme will assist decision-makers during the stocking review process to evaluate the potential success

of the proposed stocking based on pertinent environmental conditions and the life history stage of stock most likely to be successful in each particular area. Life history stages will include 'Larvae or fry', 'Fingerling', 'Year Old', etc., and the classifications of 'Suitable', 'Marginal' or 'Unsuitable' will be declared for each life history stage for each species in each waterway. An example of how the classification scheme will work follows:

[Example only]

Species	Waters	Larvae/Fry	Fingerling	Comment
Australian Bass	Jumbuck Dam	Not Suitable	Not Suitable	Out of range
Rainbow Trout	Jumbuck Dam	Not Suitable	Marginal	Redfin predation
Brook Trout	Jing Jing Creek	Not Suitable	Not Suitable	Dries out regularly

- 2.3 (b) Continue to develop the Dollar-for-Dollar Native Fish Stocking Program to enhance recreational fishing opportunities, including hatchery development, and provide an avenue for private enterprises to benefit from the activity

Background: The Dollar-for-Dollar Native Fish Stocking Program provides enhanced fishing opportunities and a link for private enterprises to benefit from the activity by stimulating regional economies through private hatchery production, fishing and tourism. Creating an environment conducive to private enterprise provides social equity and economic benefits. The Dollar-for-Dollar program also provides ancillary benefits to Aboriginal people who can also fish for species that have been stocked under that program.

- 2.3 (c) Continue to provide opportunities for religious and ceremonial stocking and increase awareness of the legislative and policy requirements with the groups involved

Background: Applications are received each year by NSW DPI to stock fish for religious or ceremonial purposes - e.g. Buddhist communities often seek to release a small number of fish into waterways as part of particular religious festivals. In the past NSW DPI has provided such groups with a permit to stock species endemic to the waters proposed to be stocked and observed the stocking event. Provided that the review of these stocking events demonstrates they are appropriate within the context of the FMS, such applications will be supported and advisory material provided to the stockists to educate them about stocking issues.

GOAL 3. To ensure the consistent production and release of appropriate quality stock

Objective 3.1 Ensure stock is of the highest standard in terms of fish health

3.1 (a) Develop and implement quality assurance standards and an accreditation system for hatcheries supplying fish for stocking:

- to ensure consistent production of genetically sound, quality, disease-free stock
- to eliminate non-target species/parasite releases and other translocation risks
- to provide continual improvement in stock production through progressive implementation of best practice techniques
- to ensure new entrants (hatchery permits) are aware of accreditation standards at the application stage, and
- to provide recognition for hatcheries achieving accreditation under the system

Background: Hatcheries that produce stock for the current activity (including Government Hatcheries) are required to comply with the aquaculture permit system established under Part 6 of the FM Act. The conditions placed on hatcheries under this system require compliance with all facets of responsible hatchery management and operation, however, these standards are set for the aquaculture industry only and do not take into account the more robust standards required of hatcheries to produce quality fish for stocking.

All hatcheries will be required to progressively meet and demonstrate compliance with new quality assurance and accreditation standards that are considered vital to achieving key objectives of the FMS while providing a reliable quality of stock. For instance, hatcheries will be required to comply with the Genetic Resource Management Guidelines as provided for under Management Response 1.3a. By making accreditation mandatory and managing the progressive implementation of the requirements, all hatcheries involved in the activity will need to reach a satisfactory level of accreditation over a three year period, and be at the conservation stocking standard by five years. Such an accreditation scheme will complement any national quality assurance scheme.

3.1 (b) Ensure that any fish, fish eggs or larvae procured from interstate hatcheries for import into NSW for the activity of fish stocking meets quality assurance standards

Background: Hatcheries can be a vector for disease, release of non-target and pest species (e.g. banded grunter), chemicals and stock of unsuitable genetic background. These are all significant potential impacts that threaten the ecology of the receiving environment. Fish produced for stocking are currently supplied through some hatcheries that operate in other jurisdictions (e.g. Queensland). Presently there are no consistent accreditation schemes governing these facilities. The implementation of hatchery standards through accreditation/quality control is the most appropriate way of ensuring consistency in quality assurance. The establishment of a nationally accredited hatchery quality assurance scheme will eventually address these issues. In the meantime, however, any stock produced by interstate hatcheries for import into

NSW will be subject to rigorous review to ensure that standards equivalent to those applied in NSW are met.

3.1 (c) Participate in the development of FISHPLAN, the NSW component of AQUAVETPLAN

Background: AQUAVETPLAN is a national program designed to develop the response capabilities for preparedness and management of diseases in aquatic species. NSW DPI is currently developing an improved disease management system 'FISHPLAN' under the auspices of AQUAVETPLAN. FISHPLAN provides training (emergency response, tracing and procedural guidelines) for NSW DPI staff, while financial components include access to an initial response fund that would provide emergency funding to a disease issue or other incident requiring responsive management action.

3.1 (d) Link the fish stocking activity to the Aquatic Disease Watch Hotline to enable early reporting of disease outbreaks

Background: The Aquatic Disease Watch Hotline is being developed by the Aquatic Animal Health Consultative Committee (AAHCC) with industry, Commonwealth, and full State/Territory representation. As this initiative develops, NSW DPI will advertise the hotline number in all advisory material produced with respect to the activity.

Objective 3.2 To promote the use of appropriate technology for genetic resource management in all hatcheries involved in the activity

3.2 (a) Promote the use of appropriate technology in genetic resource management

Background: The genetic resource management guidelines, as developed under Management Response 1.3a will provide genetic resource management for fish produced for both Conservation Stocking and Harvest Stocking. Appropriate technology includes the use of the Passive Integrated Transponder-tag system (PIT-tags, i.e. microchip identifiers) for stock identification and husbandry, where considered necessary.

NSW DPI will provide leadership and extension services for the implementation of the technology across all hatcheries involved in the activity resulting in the regular use of PIT-tag system.

3.2 (b) Require, where necessary, the mandatory use of microchip technology (PIT-tag system) in broodstock management arrangements

Background: Given the relatively low-cost of the PIT-tag system, microchips (in 2002 AKA PIT-tags were \$10 each and scanners were \$440) it is considered an absorbable overhead to hatcheries. However, funding for the implementation of the guidelines and technology will be sought from relevant sources such as Fisheries Research and Development Corporation (FRDC) or trust funds established for recreational fishing, conservation, information technology or regional development.

- 3.2 (c) Investigate the feasibility of developing a cryogenic gene bank of NSW species to ensure the retention of genetic material for Harvest Stocking and Conservation Stocking programs

Background: No contingency plan currently exists for recovery of genetic diversity of stocked species following inbreeding depression, genetic drift, and introgression of unique sub-populations. To enable the recovery of genetic diversity, the use of a cryogenic-based gene bank can be investigated for all species stocked. A facility exists at Dubbo (Zoological Parks Board & Monash University) where genetic material can be stored cryogenically for future reference. The feasibility of the proposal (including its relative cost and benefits) needs to be comprehensively examined.

Objective 3.3 Implement best practice in broodstock collection and management

- 3.3 (a) Develop a broodstock policy and guidelines that address collection, husbandry and management arrangements for hatcheries engaged in the activity to:
- promote the development of a Code of Practice for hatcheries to encourage best practice techniques in the collection, holding and husbandry of fish
 - complement genetic resource management and hatchery quality assurance programs
 - ensure sustainable use and protection of broodstock resources
 - monitor the level of broodstock collection to ensure that collection areas and methods are appropriate in terms of sustainability
 - ensure the return of healthy broodstock to the waters of their capture
 - minimise any interactions with threatened species
 - provide verification procedures following collection, and
 - document the relevant policy and legislation.

Background: Broodstock collection and management is essential to the sustainability of the activity and the aquaculture industry generally. Currently, broodstock collection is authorised by permit issued under section 37 of the FM Act and managed under the 'Broodstock Collection Policy (1994)' (currently under review). Under the FMS, broodstock collection will attract a greater focus to ensure the level of demand for the resource and ongoing management of broodstock is ecologically sustainable, while ensuring appropriate genetic material is used in stocking programs. Broodstock management will be aligned with genetic resource management arrangements and used to guide the ongoing review of the stocking events. Areas where certain fish populations are of conservation concern or recovering through a recognised management plan will be protected from broodstock collection.

The development of broodstock collection and husbandry guidelines will provide hatcheries involved in fish stocking with vital information regarding critical aspects of broodstock collection operations and further information on maintenance and husbandry that are specific to the activity. The guidelines will be issued with every permit to collect broodstock and provide a source for further information across a range of topics and will include a mandatory verification form for the return of broodstock collection data.

3.3 (b) Integrate broodstock collection information with the NSW Aquaculture Information Database

Background: To support the genetic resource management and broodstock management initiatives within the FMS, broodstock collection information will be linked with the aquaculture information system. The purpose of this measure is to ensure that all fish taken from the wild can be monitored by NSW DPI to allow managers to track the quantum of broodstock removed from the natural population. The information will be used in compliance audits to ensure that all hatcheries comply with the broodstock collection policy, especially with regard to recognised genetic zones.

3.3 (c) Continue to provide for the issue of permits under section 37 of the *Fisheries Management Act 1994* for broodstock collection purposes consistent with the vision and goals of the FMS

Background: Permits are used to manage the taking of species by methods or by persons not normally permitted to do so under the Fisheries Management (General) Regulation 2002. The current management of this aspect of the activity will be enhanced by including relevant advisory material to promote best practice techniques and clearly indicate the permit holder's obligations including the specific locations from which the broodstock may be taken. The permits will be subject to conditions to ensure that the broodstock collection techniques are appropriate and that the number of fish collected does not lead to overfishing of the target species.

Objective 3.4 To promote best practice techniques for fish stocking

3.4 (a) Develop a stocking Code of Practice that defines and promotes best practice in:

- stocking techniques
- transport medium management (including chemical treatments and disposal)
- ethical treatment and care of stock (including humane destruction and disposal methods)
- stocking verification procedures, and
- the assessment of disease and fish health at the point of release.

Background: The provision of a comprehensive Code of Practice to guide the carrying out of the activity at the point of release is seen as an important management tool to ensure a consistently high level of best practice at the stage between fish leaving the hatchery and the eventual point of release. NSW DPI will develop the Code of Practice by drawing on the expertise of hatchery managers and stocking participants.

3.4 (b) Issue a copy of the Code of Practice to each stockist before a stocking event proceeds

Background: Once developed, a copy of the Code of Practice will be issued to each stockist before a stocking event can proceed. The Code of Practice will be a comprehensive information resource to guide the activity at point of release.

As with any instructional material continuous improvement needs to be employed to ensure that information contained within the code is accurate and current. To ensure the Code of Practice remains contemporary, it will be developed as a computer-based resource and distributed at the time the stockist is notified that the stocking event can

proceed. This will ensure that the latest version is provided to stakeholders and that updated versions can be produced at a minimal cost.

GOAL 4. To provide efficient administrative services, information management and reporting systems

Objective 4.1 To provide a clear administrative framework for reviewing stocking events

4.1 (a) Develop stocking event forms in plain English

Background: To streamline the process, stocking event forms will be developed in plain English and will procure sufficient information about the event in order to allow a stocking review to be conducted. The forms should not seek information that has already been gathered and reviewed. The forms will be accompanied by relevant advisory material to assist stockists to complete the form and supply the information necessary to undertake the prerequisite review of the stocking event.

As stocking event forms are developed, all client privacy requirements will be observed and the personal information collected will be managed within the NSW DPI' record keeping system that is compliant with the State Records Act 1998. The forms will be continually improved to procure any further information required as the FMS is progressively implemented. This will be managed by producing only small amounts of paper-based forms at any one time and making such forms freely available by electronic means (i.e. on the NSW DPI web page).

4.1 (b) Develop a policy and procedures manual for NSW DPI' staff

Background: To provide a consistent framework for review, management and administration of the activity by NSW DPI, a Policy and Procedures Manual for Fish Stocking will be developed for the relevant NSW DPI staff. The manual will help to collate and preserve corporate memory and promote consistent management of the activity into the future.

4.1 (c) Widely distribute advisory material on stocking policy and procedures in NSW

Background: To educate the wider community about stocking, an information publication will be developed and distributed that provides accurate information about the activity. The publication will be made available in print at most NSW DPI offices and various other Government outlets while also made available electronically over the Internet.

4.1 (d) Develop interactive self-assessment and education resource

Background: An interactive self-assessment resource will be developed and made available on demand as either a compact disc or via the Internet. The tool will be developed as an Adobe Acrobat® portable document format (PDF) as this format is compatible with most computer platforms regardless of operating system and only requires a freeware reader program available over the Internet. The tool will be designed to guide stockists to plan considered and appropriate stocking events and will serve also as a general information resource that incorporates issues relative to every stocking zone. Once the stockist has completed the self-assessment, the stocking event form will be able to be printed, completed and submitted to NSW DPI - ultimately it is intended to manage this completely as an electronic service delivery.

Such a service is likely to save the time and resources of stockists (in terms of planning a stocking event) and NSW DPI (in terms of reviewing whether events are appropriate and can proceed).

4.1 (e) Provide an efficient enquiry/advisory service for the activity

Background: An enquiry service will be made available through offices of NSW DPI to provide prompt access to information about the activity and to advise on the stocking review process and management arrangements under the FMS. Information will also be made available on the Internet and through all offices of NSW DPI. Specialist advice will be available through three offices, namely Port Stephens (for information management & GIS data), Peel District - Tamworth (for the Dollar-for-Dollar program) and Western Regional Office – Albury (for information on stocking event reviews, allocation of stock, salmonid stocking and Government freshwater hatcheries).

4.1 (f) Provide stocking data to other information resources including:

- BIONET
- Community Access to Natural Resource Information (CANRI)
- NSW DPI' Aquaculture database (including compliance component), and
- NSW DPI GIS systems

Background: Current management of information relating to the activity is presently fragmented and not readily transportable to other information management systems. This FMS will see the centralisation of all information relating to the activity and the provision of the data to other natural resource management systems held by NSW DPI and other recognised agencies with a bone-fide use for the information. Stocking data will be held centrally at the Port Stephens Fisheries Centre where it can be linked to the BIONET database (contributing to biodiversity data), the Aquaculture database (to enhance links between stocking, aquaculture production and compliance), and the GIS database (for integration of spatial data). A key benefit of this amalgamation is that it allows for accurate review, mapping and ongoing reporting of the activity.

Objective 4.2 To maintain and report accurate information relating to the activity

4.2 (a) Maintain records of all stocking events centrally

Background: The review of the current activity highlighted that record keeping of stocking activity is fragmented and could be improved by centralising the records. Under the FMS, all records pertaining to stocking events will be held centrally so they can be kept in a consistent format and reported on accurately when required to do so.

4.2 (b) Periodically report on the activity to clients and stakeholders including:

- internal and external clients
- Ministerial Advisory Councils
- the Indigenous Fisheries Working Group
- other natural resource agencies, and

- angling media

Background: Reporting procedures provide an opportunity to convey information to those engaged in fish stocking as well as those involved in managing the activity. Reporting will take several forms under the FMS including data generated for performance indicators, results of research, production reporting (aquaculture production), NSW DPI Annual Report, scientific reports, via the Internet, and through submissions to advisory councils and other groups. An efficient way to meet these reporting requirements and avoid duplications is to produce a single report to report on all aspects of the activity.

Information on stocking figures and advances in management will be provided to recreational fishers and Aboriginal people through appropriate media in a culturally appropriate manner.

- 4.2 (c) Require hatcheries to report annually on production and other factors relevant to the activity

Background: Improved reporting procedures from hatcheries involved in fish stocking will occur under the FMS. Provisions already exist within Part 6 of the FM Act (Aquaculture Management) to require hatcheries to report on their activities when requested to do so by the Minister. Hatcheries involved in production for fish stocking will be required to report separately from aquaculture so as to collect information specifically relating to the activity. At present there is no requirement to report on fish produced for stocking as opposed to aquaculture.

- 4.2 (d) Conduct client satisfaction surveys

Background: To ensure the level of service provided to clients is satisfactory and consistent with the FMS, it is proposed that a client satisfaction survey be conducted after three years of commencement to gauge satisfaction from clients and guide future arrangements. These will also be used to monitor the success of the education program established under Management Response 6.1a. The need for and frequency of any further surveys will be determined once the results of the first survey are known.

- 4.2 (e) Provide advice to stocking volunteers on appropriate stocking methods, legal implications and other information

Background: Each year NSW DPI stocks around seven million fish into the waters of the State. Numerous volunteers assist with the stockings, which allow for an efficient dispersal of the stock and provides ownership of the resulting benefits to interested parties. To ensure that these volunteers are suitably educated with appropriate stocking practices and procedures an information package will be developed.

GOAL 5. To improve the knowledge of the activity and ecosystems in which it operates

Objective 5.1 To initiate research relating to the activity

- 5.1 (a) Facilitate research programs to fill information gaps identified in the risk assessment of the existing activity, as provided for in the Research Plan

Background: This FMS will draw on existing research programs that are relevant to the activity while actively developing the most appropriate direction of future research. A Research Plan has been developed and included in the FMS and is based on filling identified information gaps and addressing areas of highest environmental risk as identified in the EIS. The research proposed in the plan will be considered in order of priority and, subject to available resources, will be carried out according to the timetable set out in the plan (see section 3.7).

- 5.1 (b) Publish results of research programs

Background: The results of research programs conducted under the stocking research and monitoring program will be published and made available through the appropriate reporting avenues when available.

Objective 5.2 To monitor quality and quantity of catches in enhanced fisheries

- 5.2 (a) Develop reliable marking techniques for hatchery reared stock and introduce the technology to all hatcheries involved in the activity

Background: Marking techniques have had a chequered history in terms of reliability and their ability to last for sufficient time to be effective. Markers can include compounds such as strontium hydrochloride, alizarin complexone and oxytetracycline (prophylactic treatments), scale pattern analyses, fin-clipping, tags, dyes and other substances. NSW DPI has developed marking techniques that are considered to be the most potentially reliable method for marking and identifying hatchery reared fish in Australian conditions. Further work and trials to develop these marking techniques for all species produced for stocking in NSW is continuing to enable the technology to be progressively introduced to hatcheries producing stock for the activity, where necessary.

As techniques for marking stocked fish are refined a program to extend the technology to all hatcheries engaged in the activity will be undertaken. The time frame for this transfer of technology depends on the time taken to refine practices and establish an extension program. Ultimately, most fish stocked under the FMS will be marked with the compound alizarin complexone to enable ready identification through otolith samples. Where marking is not considered necessary, fish may be released without committing hatcheries to any unnecessary expense and potential stress or mortality to stock resulting from the procedure.

An important part of this program will be the ongoing assessment of the success or otherwise of marking techniques. Where better technology or methods become available, they will be introduced if there is a demonstrable need to do so

- 5.2 (b) Continue conducting angler-catch surveys at major inland fishing competitions and gather other relevant information to the management of the activity

Background: Gathering data from specific fishing events where fish are stocked provides an effective way to compile a host of information that is otherwise difficult to obtain. Monitoring of this type has been conducted for the past few years and has established important base-line data. Otolith samples are also taken from a sample of fish caught at these events for analysis to determine whether they are hatchery-reared fish or from natural populations.

- 5.2 (c) Monitor the level of socio-economic benefit from fish stocking using surveys undertaken on an episodic basis

Background: Past economic surveys have confirmed the importance of the activity in areas such as the Snowy Mountains region. These will be of use to recreational fishers, fisheries managers, Aboriginal communities and the other people in regional communities who are also concerned with maintaining and increasing the value of the enhanced fisheries to the local community through the development of tourism opportunities. The economic study of the Snowy Mountains trout fishery was developed as a surveying template for examining the regional economic significance of recreational fishing activities in NSW. Further socio-economic surveys will continue in regional areas to measure the benefits of the activity to the economy and societies and/or cultures in regional areas. This will enable an assessment of the benefits of the activity compared to the expenditure of funds for stocking.

- 5.2 (d) Monitor the level of participation in fish stocking using information gathered through the general recreational fishing licensing system and other appropriate avenues

Background: The recently introduced recreational fishing licence provides an information source for recreational fisheries management. The FMS will draw on the information generated by the database and information on angler participation will be invaluable in the future planning of stocking activity and the ability to report on the activity in a wider context than is presently the case. As the general recreational fishing fee does not apply to Aboriginal fishers, other sources such as the central database for stocking applications, client satisfaction surveys and economic surveys will be used to determine the level of Aboriginal involvement.

Objective 5.3 Use research to develop better stocking practices

- 5.3 (a) Having regard to the research priorities identified in the Research Plan, initiate research into the distribution of stocked native species, including any sub-populations

Background: Recent scientific information suggests that golden perch, silver perch and Macquarie perch have distinct sub-populations within the broader species' ranges. Research to identify these sub-populations including their distributions and whether other stocked species have similar sub-specific variation will allow for more reliable review of stocking events, genetic resource management and broodstock management. In the meantime, strict broodstock collection and management policies,

stocking reviews and release protocols will apply. The priority given to this research compared to other research areas has been determined as the highest priority and as such is scheduled to begin within two years of approval of the FMS.

- 5.3 (b) Apply empirical methods to determine optimum stocking density rates (in terms of efficacy and effectiveness), and assess the feasibility of developing and applying an established formulae in the longer term

Background: To promote efficiency in stocking rates, empirical methods (i.e. experimental) will be used to determine appropriate stocking densities. In the longer term, it may be possible to develop and apply stocking density formulae based on fixed factors such as the surface area, shoreline length and water volume of the receiving waterway, and variable factors such as the type and class of stock, existing stock, frequency of past stocking, harvesting pressure and availability of food and habitat values.

- 5.3 (c) Continually update the Stocking Review Guidelines and assessment resources to accurately review potential impacts from the activity

Background: The Stocking Review Guidelines established under the FMS is designed to be continually improved and updated. As new information or review procedures come to hand these will be readily transposed into the review framework. The document will be assigned version numbers to ensure that only the latest version is in circulation.

This process of modifying the guidelines as new information comes to hand will equally apply to the other policy and procedures prepared under this FMS, such as the Genetic Resource Management Guidelines and guidelines developed under the Hatchery Quality Assurance Program.

GOAL 6. To maximise community understanding and voluntary compliance through education and support services while providing effective deterrence against illegal activity

Objective 6.1 To improve community understanding and public perception of the activity through an education strategy

6.1 (a) Develop and implement a culturally appropriate educational (communication) plan to:

- raise community understanding of the fish stocking activity for recreational fishing, Aboriginal cultural fishing and conservation purposes
- review effectiveness of educational material
- promote best practice in all areas of the activity, and
- maximise voluntary compliance within the activity

Background: To ensure the education component of the FMS is carried out with optimum benefit a culturally appropriate education plan will be developed. The education plan will be developed through liaison with the NSW DPI' Communications and Marketing Branch within the first two years of operation of the strategy. It will be designed to develop appropriate educational material in the form of advisory notes, web-based information and specific publications or fora to meet the needs of people involved in the activity or that would like to become involved. In particular, educational and promotional information will be prepared and delivered in a form that considers the expectations of recreational fishers, Aboriginal communities and other people with an interest in fish stocking. Access to information will be improved through the use of the Internet, through all NSW DPI' offices, Fishcare Volunteer programs, through NSW 'Natural Resource Service Centres' and will be consistent with the IFS. Educational material will be provided to all stockists prior to stocking events proceeding and whenever other opportunities arise (such as field days and in the angling media). In the first instance the FMS and EIS will be made widely available on the NSW DPI website, in NSW DPI offices and through targeted mail-outs.

6.1 (b) Develop an information kit for NSW DPI staff to convey accurate information on fish stocking to clients

Background: An information kit will be developed to assist NSW DPI staff to convey accurate information on the activity to recreational fishers, Aboriginal people and hatchery operators. The information kit will include speaking notes, transparencies, computer-based display and various other sources of educational material. There is a strong demand for such material in the regions where NSW DPI is often called upon to address angling clubs, environmental and community groups, schools and other institutions. The material would be regularly updated, as with other publications and education material on the activity, to ensure it evolves along with the provisions of the FMS.

Objective 6.2 To develop and deliver an effective compliance program

6.2 (a) Develop a fish stocking compliance plan

Background: A fish stocking compliance plan will be developed to ensure adequate levels of compliance by stockists with the provisions of the FMS. Compliance operations can be developed and appropriately targeted using information in the central management and records system being developed under the FMS. NSW DPI officers conduct patrols of waterways that are stocked with angling species, provide a general education service to the angling community and can promote compliance with the FMS provisions. The plan should include the publication of compliance programs and outcomes in media to raise awareness of compliance issues and discourage illegal activity.

6.2 (b) Require persons involved in stocking to verify stocking events when complete

Background: It is important to be able to verify that the species and quantity of fish examined under the stocking review framework were actually stocked in the nominated areas. Accurate and timely data is necessary for the ongoing management and reporting of stocking, particularly for disease management and the ability to trace sources of outbreaks. A failure to comply with stocking verification procedures would attract a penalty that is dealt with under the Self Enforcing Infringement Notice System (SEINS) and could result, in extreme cases, in the rejection of future stocking events by that stocking person or group.

5. Performance Monitoring and Review

5.1 Performance monitoring

The complex nature of fish stocking means that many of the management responses assist in achieving multiple goals. Therefore, rather than examining the performance of each individual response or objective, it is more efficient and appropriate to measure the performance of this FMS against the six goals (i.e. the major objectives). A regular report will, however, be prepared (as outlined later in this section) detailing the progress made in implementing the management responses.

5.1.1 Performance indicators

Performance indicators provide the most appropriate indication of whether the management goals are being attained. A number of monitoring programs are to be used to gather information to measure performance indicators. These monitoring programs are detailed later in this section in Tables 7 to 12.

With the implementation of the new research and information management programs for the activity outlined in Goal 5, a broader information base relating to the activity and its impacts will enable more precise performance indicators to be developed over time.

5.1.1.1 *Data requirements and availability*

The data requirements and availability for each performance indicator in Tables 7 to 12 relate to the collection of information used to measure the performance indicators and the data that are available.

5.1.1.2 *Robustness*

The robustness ratings applied to each performance indicator in Tables 7 to 12 have been selected using the definitions established by the Standing Committee on Fisheries and Aquaculture (2000), as follows:

Level	Description
High	The indicator is a direct measure of the goal, or if indirect, is known to closely reflect changes in the issue of interest
Medium	The indicator is suspected to be reasonably accurate measure against the goal, or the known error is in the conservative direction
Low	The degree to which the indicator measures against the objective is largely unknown, or known to be low. Often this will involve surrogate indicators

5.1.2 Trigger points

Trigger points specify when a performance indicator has reached a level that suggests there is a problem with the activity and a review is required. Tables 7 to 12 establish the performance indicators and trigger points that will be used to measure whether each of the management goals described in section 4 of the FMS are being attained.

5.1.3 Predetermined review of performance indicators and trigger points

It is likely that changes to the activities authorised under the FMS will evolve over time. It is also likely that better performance indicators will become apparent over the course of the next few years and it would then be an inefficient use of resources to continue monitoring the current performance indicators. If new information becomes available as a result of research programs, more appropriate performance indicators and trigger points can be developed and the Minister for Primary Industries may amend the FMS accordingly.

A review of the appropriateness of all performance indicators and trigger points will occur not more than three years from the commencement of this FMS.

5.2 Reporting on the performance of the FMS

There are two types of reports to be prepared under this management strategy. One is a performance report that reports generally on the performance of the fishery with respect to the management strategy. The other type of report is a review report, which is to be prepared if a performance indicator for the fishery is breached. Both types of reports are discussed in further detail below.

5.2.1 Performance report

A performance assessment examining each performance indicator will be undertaken annually and a report on the performance indicators will be submitted to the Minister for Primary Industries within two years of the commencement of the FMS, and biennially thereafter. The annual performance review is the formal mechanism for reporting on performance indicators and trigger points, and the report will be made publicly available. This report will also include a review of progress made in implementing each of the management responses.

The vast majority of management responses in the management strategy are linked to specific implementation timeframes. Some of these management actions are subject to specific trigger points that ensure reviews and appropriate remedial actions if the target timeframes are not met. If the performance report identifies that any specified target timeframe has not been met, a review will be undertaken and any necessary remedial measures recommended to the Minister for Primary Industries¹. The fishery will continue to be regarded as being managed within the terms of the management strategy whilst any remedial measures associated with breaches in timeframes or triggering of performance indicators are being considered through the review process and/or by the Minister for Primary Industries.

5.2.2 Review report in response to trigger points

If the trigger point for a performance indicator is breached, a review is to be undertaken of the likely causes for the breach. While the biennial performance report will

¹ In some circumstances a required action may be completed outside the scheduled timeframe, but prior to the commencement of the review (e.g. an action was due for completion by December 2006, but it is actually completed in January 2007). When this occurs, it is not necessary to proceed with a review.

report on whether any trigger points have been exceeded, this does not prevent a review from being conducted at any other time should it become apparent that a performance indicator has breached a trigger point, especially during the annual performance assessment process.

Where the data or information indicates that a trigger point has been breached, details will be provided to the relevant Ministerial advisory bodies and advice sought on the suspected reasons for the breach.

Reviews arising from activities exceeding trigger points should consider (but not be limited to) the following factors:

- changes in the relative production levels or other factors among hatcheries (including those beyond NSW jurisdiction)
- new biological or stock information, and
- changes in the activities or effectiveness of technology producing the species.

A review report is to be provided to the Minister for Primary Industries within six months of the trigger point being breached, and must include the likely reasons for the breach (where known), and any recommendations for remedial actions.

A review report should include whether the suspected reasons for the trigger point being breached are the result of an effect of the activity or an influence external to the activity, or both.

If a review concludes that the reasons for the trigger point being breached are due to the operation of the activity, or if the FMS objectives are compromised if the activity continued to operate unchanged, management action must be taken with the aim to return the performance indicator to an acceptable range within a specified time period. The nature of any remedial action proposed would vary depending on the circumstances that have been identified as responsible for the trigger point being breached.

There may be circumstances where no change to management arrangements or the management strategy is deemed necessary following the review. For example, a review might be triggered because the number of hatcheries producing a species for stocking declines. However, there would be little cause for concern over the performance of the FMS if the decline in production of a species was clearly caused by changing market prices. Price fluctuations can result in hatcheries adjusting their activities.

If a review considers that the management objectives or the performance monitoring provisions are inappropriate and need to be modified, the management strategy itself may be amended by the Minister for Primary Industries. If the reasons are considered to be due to impacts on the resource from factors external to the fishery, these factors should be identified in the review and referred to the relevant managing agency for action.

All review reports will be publicly available.

5.2.2.1 External drivers

External drivers are factors that are known to potentially impact on the performance of the fishery but which are outside of the control of NSW DPI or the hatchery industry (e.g. environmental conditions, social changes etc.). Any external influences that may contribute

to a trigger being breached will be identified during the review and, if necessary, referred to any relevant managing agency for action.

5.3 Contingency plans for unpredictable events

In addition to the circumstances outlined above, the Minister for Primary Industries may order a review and/or make a modification to the activity or to the FMS in circumstances declared by the Minister as requiring contingency action, or upon the recommendation of a Ministerial advisory body on recreational fishing, conservation or Indigenous issues. In the case of the former, the Minister must consult the relevant advisory body on the proposed modification or review.

These circumstances may include (but are not limited to) food safety events, environmental events, and results of research programs or unpredictable changes in stocking activity over time. Notwithstanding the above, the Minister for Primary Industries may also make amendments to the FMS that the Minister considers to be minor in nature at any time.

5.4 Monitoring stocking success

Monitoring stocking success involves the use of various marking techniques to make quantitative predictions about the ratio of populations of stocked fish versus self-sustaining populations. These calculations can vary from simple graphical presentations of landings to sophisticated computer models that predict the biomass of the stock under various harvest regimes. The data and the scientific expertise required to apply these methods vary enormously. Stock assessment processes for the activity need to be defined to suit the resources available. To achieve this outcome, short-term and medium-term approaches will be applied.

The short-term approach will be to improve marking techniques for stocked species in order that effective and cost-efficient methods are developed. The medium term approach will involve introducing a requirement for fish hatcheries involved in the activity to mark all stocked species using the techniques that have been developed. The process needs to be facilitated by NSW DPI and extended to all hatcheries that supply fish for stocking.

5.5 Performance indicators and trigger points for the activity of fish stocking

Tables 7 to 12 outline the performance indicators and associated trigger points to measure the performance of the FMS in relation to the six goals of the FMS.

Table 7. Performance indicators and trigger points for Goal 1 of the FMS.

[Note: Performance indicators apply to goals and not individual management responses]

GOAL 1: <i>To manage the activity in a manner that minimises impacts on aquatic biodiversity including threatened species and genetic resources</i>			
Performance indicator (1)	Trigger point	Justification/comments	
Response of the activity to a threatened species recovery plans or threat abatement plans	Threatened species recovery plans or threat abatement plans require a modification to the activity which the Director-General, NSW DPI, considers is not adequately provided for elsewhere in the FMS	There is no single indicator available to monitor the impact of the activity on biodiversity and, as such, surrogate indicators must be used. NSW DPI and other government agencies monitor sightings of threatened species and develop threatened species recovery plans when required to do so	
Data required	Availability/monitoring programs	Robustness	External drivers
Status of implementation of threatened species recovery plans or threat abatement plans	Readily available from NSW DPI and other government agencies (e.g. NPWS)	Medium	Nil
Performance indicator (2)	Trigger point	Justification/comments	
Response of the activity to strategies, management plans or legislation (state or national) developed to protect aquatic biodiversity	The Director-General, NSW DPI, considers the FMS does not adequately comply with relevant strategies, management plans or legislation concerning protection of aquatic biodiversity	A number of state and national strategies, management plans and environmental protection laws are in force at present that require compliance by activities (such as fish stocking) that may compromise their effectiveness	
Data required	Availability/monitoring programs	Robustness	External drivers
Status of relevant management plans/strategies (e.g. The draft Native Fish Strategy MDBC, National/State translocation policies, and other relevant documents)	Readily available from NSW DPI and other government agencies (e.g. NPWS)	Medium	Nil

Table 8. Performance indicators and trigger points for Goal 2 of the FMS.

GOAL 2: <i>To enhance fishing opportunities through cost-effective stocking programs that maximise economic benefits and provide social equity from the activity for recreational fishing and Aboriginal cultural fishing purposes</i>			
Performance indicator (1)	Trigger point	Justification/comments	
Estimates available to show effectiveness of harvest stocking programs	Estimates not available after four years of approval of the FMS	This relates to the need to have an assessment of the benefits derived from stocking to help guide future stocking events	
Data required	Availability/monitoring programs	Robustness	External drivers
Estimates should be available through research and other programs designed to define and examine the effectiveness of stocking	Results will become available as trials are completed	High	Environmental conditions

Performance indicator (2)	Trigger point	Justification/comments	
Opportunities to stock fish into waters due to classification of waters strategy	Classification of waters strategy reduces opportunities to stock by more than 25% in two years	This relates to the classification of natural waters to ensure appropriate species are released into waters with suitable environmental conditions	
Data required	Availability/monitoring programs	Robustness	External drivers
Number of stocking events not proceeded with or modified due to the classification of waters strategy	Records will be available of the number of stocking events affected by the classification regime after it has been developed and implemented	Medium	Nil
Performance indicator (3)	Trigger point	Justification/comments	
Response to Aboriginal or other cultural heritage issues	The Director-General, NSW DPI considers that the FMS does not adequately meet the needs of Aboriginal or other cultural heritage issues	This relates to the need for this FMS to operate in harmony with Aboriginal or other cultural heritage issues	
Data required	Availability/monitoring programs	Robustness	External drivers
Involvement of Aboriginal fishers in stocking activities	Consultation with the Indigenous Fisheries Strategy Working Group	Medium	Nil

Table 9. Performance indicators and trigger points for Goal 3 of the FMS.

GOAL 3: To ensure the consistent production and release of appropriate quality stock			
Performance indicator (1)	Trigger point	Justification/comments	
Response of the activity to a disease or pest species incursion	The Director-General, NSW DPI certifies that the activity has not responded appropriately to a disease or pest species management program and recommends that the FMS be modified	Pests and diseases can pose significant risks to the production of fish and the receiving waters. This indicator ensures that the activity is appropriately responding to pest and disease issues, particularly the translocation of live aquatic organisms and disease control in all hatcheries engaged in the activity	
Data required	Availability/monitoring programs	Robustness	External drivers
Ongoing monitoring of pests and diseases and records of responses to pest or disease incursions	Disease notification procedures (in line with AFFA and IOE) and AQUAVETPLAN	Medium	Introduction of pests and diseases through other aquatic or land based activities
Performance indicator (2)	Trigger point	Justification/comments	
Number of hatcheries engaged in the activity receiving accreditation	Less than 90% of the remaining operational hatcheries achieve accreditation within five years	Hatcheries will need to meet new accreditation standards before they will be permitted to produce stock for the activity. This indicator monitors the extent to which the accreditation system reduces the number of hatcheries supplying fish for stocking	
Data required	Availability/monitoring programs	Robustness	External drivers
Record of accredited hatcheries	Data will be available through the information management system maintained by NSW DPI	High	General economic factors affecting hatchery businesses

Performance indicator (3)	Trigger point	Justification/comments	
Number of reported breaches of the Code of Practice for stocking	Number of reported breaches increases by 20% or more in any two consecutive years	The Code of Practice is an important resource for stockists and will guide best practice in stocking events, particularly with respect to the release of fish into waterways	
Data required	Availability/monitoring programs	Robustness	External drivers
Reports by NSW DPI officers or from the community	Data will be available through the information management system maintained by NSW DPI	Medium	Nil
Performance indicator (4)	Trigger point	Justification/comments	
Number of hatcheries producing species for the Dollar-for-Dollar Native Fish Stocking Program	Number of hatcheries producing species for Dollar-for-Dollar Native Fish Stocking Program falls below number required to meet demand	To support the Dollar-for-Dollar Native Fish Stocking Program there must be sufficient private hatcheries producing stock to meet demand from stockist	
Data required	Availability/monitoring programs	Robustness	External drivers
Record of accredited hatcheries; and Records of interest in the Dollar-for-Dollar Native Fish Stocking Program	Data will be available through the information management system maintained by NSW DPI	High	General economic factors affecting hatchery businesses
Performance indicator (5)	Trigger point	Justification/comments	
Number of declared diseases that relate to stocking activities	Two or more declarations in any one year	Aims to detect any concerning patterns of disease occurrences	
Data required	Availability/monitoring programs	Robustness	External drivers
Data on the number of declared diseases is required	Data will be available through the information management system maintained by NSW DPI	Medium	Nil

Table 10. Performance indicators and trigger points for Goal 4 of the FMS.

GOAL 4: To provide efficient administrative services, information management and reporting systems			
Performance indicator (1)	Trigger point	Justification/comments	
Reliability of production reporting by hatcheries engaged in fish stocking	More than 20% of hatcheries fail to submit production reports by the required time	Hatcheries (Government and Private) must provide prompt reports on the production of stock for fish stocking and other matters such as presence of pests and diseases, mortalities and trends	
Data required	Availability/monitoring programs	Robustness	External drivers
Record of receipt of hatchery production reports compared to due dates	Data will be available through the information management system maintained by NSW DPI	High	Nil

Performance indicator (2)	Trigger point	Justification/comments	
Satisfaction of stocking participants with stocking programs	Satisfaction of stocking participants is demonstrably low (i.e. less than 50%).	Client satisfaction is an important facet of any management plan. As a performance indicator participants are able to make comment on the level of satisfaction regarding the services provided by NSW DPI in the management and administration of the activity	
Data required	Availability/monitoring programs	Robustness	External drivers
Knowledge of the satisfaction of stocking participants	Random client satisfaction surveys conducted during the review of stocking events will provide data needed for this indicator	High	Environmental conditions that effect fishing success
Performance indicator (3)	Trigger point	Justification/comments	
Publication of stocking information in line with education, compliance and research plans	Publications requirements missed or incomplete on two sequential occasions	This relates to the need to accurately report on the components of the FMS to a range of internal and external stakeholders, and ensuring that the FMS is taking account of new and updated information	
Data required	Availability/monitoring programs	Robustness	External drivers
Details of stocking figures, research outputs and compliance outcomes	Data will be available through the information management system maintained by NSW DPI and the annual performance assessments	Medium	Nil

Table 11. Performance indicators and trigger points for Goal 5 of the FMS.

GOAL 5: To improve the knowledge of the activity and ecosystems in which it operates			
Performance indicator (1)	Trigger point	Justification/comments	
Implementation of research plan in accordance with priorities determined through the environmental assessment process	Research plan not implemented in accordance with priorities identified in the Fish Stocking Environmental Impact Statement	A lack of knowledge about the impact of fish stocking on various environmental factors has resulted in the environmental assessment determining areas of high risk. A research plan developed under the FMS will prioritise research programs based on the areas identified as high risk	
Data required	Availability/monitoring programs	Robustness	External drivers
Research plan available and the research priorities identified	Research plan will be publicly available and progress in implementing the plan will be outlined in the biennial performance report	High	Access to government or external funding sources
Performance indicator (2)	Trigger point	Justification/comments	
Estimates of stock originating from self-sustaining populations or previously stocked fish	Estimates not available within 4 years	An important component of monitoring includes the ability to estimate proportion of stocked versus wild populations to guide management	
Data required	Availability/monitoring programs	Robustness	External drivers
Existence of estimates	Availability of estimates will be outlined in the biennial performance report	Low	Availability of accurate marking techniques

Performance indicator (3)	Trigger point	Justification/comments	
Response of the activity to research results showing genetic variations within populations of species used in stocking or other critical matters	Research demonstrates that a modification to the activity is required which the Director-General, NSW DPI, considers is not adequately provided for elsewhere in the FMS	Genetic variations between populations are managed by the FMS, however, if information arises through research that suggests greater genetic variation, or some other critical matter, the FMS needs to be able to adequately respond	
Data required	Availability/monitoring programs	Robustness	External drivers
Genetic distribution of species used in fish stocking	Research into genetic distribution will be an important component of the research plan	Medium	Nil
Performance indicator (4)	Trigger point	Justification/comments	
Compliance with verification requirements for stocking events	The compliance with verification requirements for stocking events reduces by more than 15% over any three consecutive year period	Compliance with the verification requirements for stocking events provides for the timely management of the activity (eg. in terms of disease traceability, information management and reporting procedures)	
Data required	Availability/monitoring programs	Robustness	External drivers
Number of instances where stocking events have taken place without the necessary compliance with verification procedures	Data will be recorded by NSW DPI as part of the compliance plan developed under the FMS	Medium	Nil

Table 12. Performance indicators and trigger points for Goal 6 of the FMS.

GOAL 6: <i>To maximise community understanding and voluntary compliance through education and support services while providing effective deterrence against illegal activity</i>			
Performance indicator (1)	Trigger point	Justification/comments	
Overall rate of compliance by persons engaged in the activity	Overall rate of compliance with the strategy falls below 80%	The compliance rate associated with the current operation of the activity is not easily measured. As the compliance strategy for the activity is implemented, the reporting of compliance outcomes is expected to be readily available and accurate	
Data required	Availability/monitoring programs	Robustness	External drivers
Outcomes of compliance operations	Data will be recorded by NSW DPI as part of the compliance plan developed under the FMS	High	Nil

Performance indicator (2)	Trigger points	Justification/comments	
Basic level of understanding by stockists of the risks associated with inappropriate stocking and of stocking management requirements	1. Less than 75% of stockists show a basic understanding of the risks and requirements after 3 years of the commencement of the FMS 2. After 3 years, the percentage of stockists showing a basic understanding declines by more than 15% of any three consecutive year period	Community understanding with the current operation of the activity is not easily measured. As the compliance and education plans are implemented, delivery of information resources will indicate approximate numbers of person availed with information about the activity. Future angler surveys will also be used to determine the level of community understanding.	
Data required	Availability/monitoring programs	Robustness	External drivers
Level of understanding, as determined through questionnaires and surveys	Every 3 years, surveys will be undertaken with potential stockists prior to stocking events	High	Influence of regional media
Performance indicator (3)	Trigger points	Justification/comments	
Applications for stocking for cultural purposes by Aboriginal persons or groups	That the number of applications to stock has not increased over every 3 year period following release of the education/communication plan	Partnerships developed through the FMS, primarily with the IFS Working Group, will increase the level of awareness and involvement in stocking by Aboriginal communities. Applications are considered an effective surrogate for determining the effectiveness of the communication strategy	
Data required	Availability/monitoring programs	Robustness	External drivers
Application forms which collect information on cultural background	Data will be available through the information management system maintained by NSW DPI	Medium	IFS

Appendix 1

Stocking Review Guidelines

Part 1: The Stocking Activity

Issue	Response	Significance of potential impacts	Comments – Action required to mitigate impacts (e.g. further assessment required; special conditions; consideration of threatened species)
1.1 Is the species approved for stocking in this zone? (see relevant Stocking Zone proposal)	Yes/No	If "No", stocking cannot proceed	Another species or zone must be nominated
1.2 Is the proposed release site approved for stocking in the zone? (see schedule of restricted waters)	Yes/No	If "No", stocking cannot proceed	Another waterway area must be nominated
1.3 Is stocking an appropriate management option in this case?	Yes/No	If "No", stocking cannot proceed	Another management arrangement should be considered (e.g. habitat rehabilitation)
1.4 Does the event form part of a NSW DPI stocking program?	Yes/No		
1.5 Is the stock to be sourced from an accredited hatchery?	Yes/No	If "No", stocking cannot proceed	Another source of stock must be nominated
1.6 Does the broodstock management for the stock comply with the FMS?	Yes/No	If "No", stocking cannot proceed	Another source of stock must be nominated
1.7 Does the genetic resource management of the stock comply with the FMS?	Yes/No	If "No", stocking cannot proceed	Another source of stock must be nominated
1.8 Is the stock required to be marked with a marking agent or technique (i.e. part of a research or monitoring program)?	Yes/No		
1.9 Will monitoring of the stock be conducted after the release?	Yes/No		
1.10 Is the likelihood of the species developing reproducing populations following stocking of concern?	Yes/No	If "Yes", stocking cannot proceed	Another waterway and/or species must be nominated
1.11 Is the age class of fish appropriate for the nominated waterway?	Yes/No		

1.12 Is the stocking level appropriate for the nominated waterway?	Yes/No	If "No", stocking cannot proceed	Another waterway must be nominated, or a change in the stocking level for the identified waterway must be nominated
1.13 Does the proposal include a previously unstocked waterway?	Yes/No	If native species & "Yes", must adopt Conservation Stocking protocols If salmonid & "Yes", stocking cannot proceed	Native stock will need to be sourced from an accredited hatchery where Conservation Stocking protocols are applied
Comments regarding issues raised in Part 1:			

Part 2: Translocation of Live Aquatic Organisms

Issue	Response	Significance of potential impacts	Comments – Action required to mitigate impacts (e.g. further assessment required; special conditions; consideration of threatened species)
2.1 Will the transport medium and equipment be disinfected before and after transport?	Yes/No		
2.2 Is the source area and/or hatchery subject to any disease surveillance programs?	Yes/No		
2.3 Will the consignments be reliably certified free of known diseases under the Hatchery Quality Assurance program?	Yes/No	If "No", stocking cannot proceed	Consignments of fish should be sourced from a certified disease free source
2.4 Are there any disease, parasites or unexplained mortality issues in the source area?	Yes/No	If "Yes", stocking cannot proceed	Another source of stock must be nominated or controls must be imposed to ensure the disease, parasite or unexpected mortality is not spread by the stocking event
2.5 Are there undesirable species (eg. non-target fish, parasites, blue green algae) likely to be translocated with the consignment that are not currently found in the target location?	Yes/No	If "Yes", stocking cannot proceed	Another source of stock must be nominated
2.6 Is the consignment subject to any quarantine processes and/or treatments?	Yes/No		

2.7 Will the consignment be reliably certified free of undesirable and non-target species under the Hatchery Quality Assurance Program?	Yes/No	If "No", stocking cannot proceed	Another source of stock must be nominated
2.8 Are any non-target species, diseases or parasites likely to escape, and if so at what scale?	Yes/No		
2.9 In the event of an escape, what life stages (eg. gametes, fertilised eggs, juveniles, adults etc) are likely to escape?			
2.10 Based on the outcomes from the above is there a likelihood of escape?	Yes/No		
2.11 Is further assessment of translocation issues required?	Yes/No	<i>If yes, refer to the National Translocation Assessment Guidelines (stocking open waters) before proceeding to Part 3</i>	
Comments regarding issues raised in Part 2:			

Part 3: Local Environmental Issues

Issue	Response	Significance of potential impacts	Comments – Action required to mitigate impacts (e.g. further assessment required; special conditions; consideration of threatened species)
3.1 Is the nominated site subject to any local management plan or action that would preclude stocking?	Yes/No	If "Yes", stocking cannot proceed	Another waterway area must be nominated
3.2 Are any terrestrial threatened species recovery plans in force in the area?	Yes/No		
3.3 Are any aquatic threatened species recovery plans in force in the area?	Yes/No		
3.4 Is the recovery of a threatened species likely to be adversely impacted by the stocking event?	Yes/No	If "Yes", stocking cannot proceed	Event must be amended
3.5 Is the possible distribution of the species following stocking of concern?	Yes/No	If "Yes", stocking cannot proceed	Another waterway and/or species must be nominated
3.6 Is the event likely to impact on cultural, heritage or aesthetic values?	Yes/No		

3.7	Are the waters suitable for stocking the nominated species in terms of climate and location?	Yes/No	If "No", stocking cannot proceed	Another waterway and/or species must be nominated
3.8	Will the activity impact on adjoining land use?	Yes/No		
3.9	Are any endangered or vulnerable species listed under the TSC Act or FM Act known to be present within 5km of the release site?	Yes/No	If "Yes", stocking cannot proceed	Another waterway and/or species must be nominated for harvest stocking
3.10	Is a loss of the aesthetic, cultural, recreational or other environmental quality of the locality likely?	Yes/No		
3.11	Is the release site either upstream or downstream of a barrier to fish passage where, according to official records, the species has not been previously stocked?	Yes/No		
3.12	Does the nominated site provide suitable access to anglers?	Yes/No		
3.13	Is the area subject to and compliant with a NPWS Plan of Management	Yes/No		
Comments regarding issues raised in Part 3:				

Part 4: Review of the Stocking Proposal and Permits

4.1	Taking into account information under Part 1 and Part 2 of this review, is the event consistent with the Fish Stocking FMS?	Yes/No
4.2	Taking into account information under Part 3 of this review and proposed permit conditions, is the event likely to have unacceptable impacts on the local environment given the expected benefits to the angling public?	Yes/No
4.3	Does the event require further review? (e.g. an eight part test for threatened species) (If yes, provide details and course of action in the 'Conditions' box below)	Yes/No
4.4	Having weighed up all the factors, in the delegated officer's opinion should the stocking event proceed?	Yes/No
4.5	Are special conditions required to mitigate any potential negative impacts and ensure the event satisfies the requirements of FMS? (If yes, provide necessary conditions)	Yes/No

Conditions required:

- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____
- G. _____

APPROVAL

Name of delegated Authorising Officer: _____

Position of Authorising Officer: _____

Signature of Authorising Officer: _____

Date: ____ / ____ / ____

Name of delegated Conservation Officer: _____

Position of Conservation Officer: _____

Signature of Conservation Officer: _____

Date: ____ / ____ / ____

If approved, forward papers to Permits Officer

Date received by Permits Officer: ____ / ____ / ____

Appendix 2

Species profiles

A profile of each species to be stocked is detailed in the following tables. The profiles give a synopsis of the species, and where and how it is to be utilised within the NSW DPI Fish Stocking Program.

Native species

Australian bass

Waters to be stocked	Suitable public impoundments and coastal rivers
Conservation status	Not listed under the FM Act but known to comprise three populations
Protection status	Protected from commercial fishing under section 20 of the FM Act
Translocation status	This species will not be translocated outside its natural range (including genetic regions)
Stocking programs	NSW DPI' Native Fish Stocking Program Dollar-for-Dollar Native Fish Stocking Program Applications for private stocking under s. 216 of the Act
Broodstock collection zones	Three broodstock collection zones - north, central and south (see Chapter B of the EIS)
Hatcheries	Port Stephens Fisheries Centre (PSFC) Private Hatcheries
Production capacity	PSFC capacity maximum 300,000 fry per season. Only 96,000 in 2002. Private Hatcheries capacity unquantifiable. Dollar-for-Dollar production reached 183,500 in 2002.
Stocking rates	Large impoundments: stocked by NSW DPI on average every two years or on application. Rates dependent on production capacity, appropriate stocking density and number of events. Rivers: stocked upon application following stocking assessment.
Stocking methods	Stock transported in tankers to designated area. Broadcast stocking of fry or fingerlings or single point release
Likelihood of establishing self sustaining populations	Impoundments: Nil (catadromous species) Regulated rivers: Low. Barriers restrict breeding cycle Unregulated rivers: High. The species is endemic to the zone and may complete the breeding cycle in unregulated systems

Golden perch

Waters to be stocked	Suitable public impoundments and rivers of the western drainages and Glenbawn and Glennies Creek Dams (Hunter catchment) on the east coast
Conservation status	Not listed under schedules 4 or 5 of the FM Act
Protection status	Not protected under sections 19 or 20 of the FM Act
Translocation status	This species will only be translocated outside its natural range in the Hunter River Catchment for recreational stocking in Glenbawn Dam and Glennies Creek Dam where the species has been historically stocked
Stocking programs	NSW DPI' Native Fish Stocking Program Dollar-for-Dollar Native Fish Stocking Program Applications for private stocking under s. 216 of the Act
Broodstock collection zones	Broodstock collection zones to be established under FMS. Policy requires broodstock to be sourced from area to be stocked

Hatcheries	Narrandera Fisheries Centre (NFC) Private Hatcheries
Production capacity	NFC capacity maximum 2,000,000 fry per season. 1,012,000 in 2002. Private Hatcheries capacity unquantifiable. Dollar-for-Dollar production reached 601,897 in 2002
Stocking rates	Large impoundments: stocked by NSW DPI on average every two years or on application. Rates dependent on production capacity, appropriate stocking density and amount of applications. Rivers: stocked upon application following stocking assessment
Stocking methods	Stock transported in tankers to designated area. Broadcast stocking of fry or fingerlings or single point release
Likelihood of establishing self sustaining populations	Impoundments: Nil. Conditions in impoundments not suitable for breeding Regulated rivers: Medium. Unregulated rivers: High. The species is endemic to the zone and may complete the breeding cycle other than in eastern drainage within thermal limits

Eastern cod

Waters to be stocked	Waters within the Richmond and Clarence catchments
Conservation status	Schedule 4 of the FM Act; Endangered IUCN
Protection status	Protected from fishing under section 19 of the FM Act
Translocation status	This species will not be translocated outside its natural range
Stocking programs	Eastern (freshwater) Cod Recovery Plan
Broodstock collection zones	Waters within the Richmond and Clarence catchments as nominated under broodstock collection permit only
Hatcheries	Private hatchery - Mr Mike Gilbert - Booma Fisheries
Production capacity	Average 35,000 per annum (currently)
Stocking rates	Determined under recovery plan
Stocking methods	Broadcast stocking of fry or fingerlings with assistance from volunteers
Likelihood of establishing self sustaining populations	High: Species is being stocked back into its natural range and managed under recovery plan. Measures to mitigate other impacts include an exclusion from stocking Australian bass into same area and protection from taking the species by section 8 fishing closures under the FM Act.

Murray cod

Waters to be stocked	Suitable public impoundments and rivers
Conservation status	Not listed under schedules 4 or 5 of the FM Act
Protection status	Seasonal fishing closure under section 8 of the FM Act
Translocation status	This species will not be translocated outside its natural range
Stocking programs	NSW DPI' Native Fish Stocking Program Dollar-for-Dollar Native Fish Stocking Program Applications for private stocking under s. 216 of the Act
Broodstock collection zones	No broodstock collection zones established under FMS. Policy requires broodstock to be sourced from area to be stocked
Hatcheries	Narrandera Fisheries Centre (NFC) Private Hatcheries
Production capacity	NFC capacity maximum 500,000 fry per season. 311,000 in 2002. Private Hatcheries capacity unquantifiable. Dollar-for-Dollar production reached 154,000 in 2002
Stocking rates	Large impoundments: stocked by NSW DPI on average every two years or on application. Rates dependent on production capacity, appropriate stocking density and number of applications. Rivers: stocked upon application following stocking assessment
Stocking methods	Stock transported in tankers to designated area. Broadcast stocking of fry or fingerlings or single point release
Likelihood of establishing	Impoundments: Medium. Conditions in impoundments generally not suitable for

self sustaining populations	breeding Regulated rivers: Medium. Unregulated rivers: High. The species is endemic to the zone and may complete the breeding cycle in areas within thermal limits
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Silver perch

Waters to be stocked	Public impoundments and rivers subject to assessment
Conservation status	Schedule 5 of the FM Act; Vulnerable IUCN
Protection status	Protected from commercial fishing under section 20 of the FM Act
Translocation status	This species will only be translocated outside its natural range into the Hunter River Catchment for recreational stocking in Glenbawn Dam and Glennies Creek Dam where the species has been historically stocked
Stocking programs	NSW DPI' Native Fish Stocking Program (Dams only) Conservation Stocking (pending implementation of recovery plan)
Broodstock collection zones	Broodstock collection zones to be established under FMS. Policy requires broodstock to be sourced from area to be stocked (river stocking only)
Hatcheries	Narrandera Fisheries Centre (NFC) and Grafton Aquaculture Centre (GAC)
Production capacity	NFC capacity maximum 2,000,000 fry per season. 451,000 in 2002. GAC capacity approximately 500,000 per year. 509,000 in 2002,
Stocking rates	Large impoundments: stocked by NSW DPI on average every two years. Rates will dependent on production capacity and appropriate stocking density. Rivers: stocked as a conservation measure where necessary
Stocking methods	Stock transported in tankers to designated area. Broadcast stocking of fry or fingerlings or single point release
Likelihood of establishing self sustaining populations	Impoundments: Nil. Conditions in impoundments not suitable for breeding Regulated rivers: Medium. Unregulated rivers: High. The species is endemic to the zone and may complete the breeding cycle (other than in the eastern drainage)

Trout cod

Waters to be stocked	Upper reaches on the Macquarie, Murrumbidgee and Murray rivers and their tributaries
Conservation status	Schedule 4 of the FM Act; Endangered IUCN
Protection status	Protected from fishing under section 19 of the FM Act
Translocation status	This species will not be translocated outside its natural range
Stocking programs	Conservation Stocking by NSW DPI pending implementation of recovery plan
Broodstock collection zones	No broodstock collection zones - stock collected from known wild populations
Hatcheries	Narrandera Fisheries Centre (NFC)
Production capacity	NFC capacity maximum 129,000 fry per year. 17,000 in 2002.
Stocking rates	Subject to availability of stock and as determined under recovery plan
Stocking methods	Stock transported by tanker to designated area. Broadcast stocking of fry or fingerlings
Likelihood of establishing self sustaining populations	Medium - low. There has been little to no evidence of the species establishing self-sustaining populations despite extensive stocking for 15 years

Macquarie perch

Waters to be stocked	Macintyre, upper Murray, Murrumbidgee, Hawkesbury, Lachlan and Shoalhaven rivers and their tributaries
Conservation status	Schedule 5 of the FM Act; Endangered IUCN
Protection status	Protected from fishing under section 19 of the FM Act
Translocation status	This species will not be translocated outside its natural range
Stocking programs	Conservation Stocking by NSW DPI pending implementation of recovery plan
Broodstock collection	No broodstock collection zones - stock collected from known wild populations.

zones	
Hatcheries	Narrandera Fisheries Centre (NFC), although not producing this species at present Private Hatcheries
Production capacity	Private hatchery production not quantifiable
Stocking rates	Subject to availability of stock and as determined under recovery plan
Stocking methods	Stock transported by tanker to designated area. Broadcast stocking of fry or fingerlings
Likelihood of establishing self sustaining populations	High

Salmonid species

Atlantic salmon

Waters to be stocked	Lake Jindabyne and Khancoban Pondage only
Protection status	Protected from commercial fishing under section 20 of the FM Act
Stocking programs	NSW DPI Salmonid Stocking Program Applications for private stocking under s. 216 of the Act
Broodstock collection zones	No broodstock collection zones - broodstock held on-site at Gaden Trout Hatchery
Hatcheries	Gaden Trout Hatchery (and private accredited hatcheries if necessary)
Production capacity	Capacity not determined. 463,000 produced in 2002.
Stocking rates	Subject to availability of stock and allocation procedures
Stocking methods	Stock transported by tanker to designated area. Broadcast stocking of fry or fingerlings or single point release
Likelihood of establishing self sustaining populations	Impoundments: Nil. Atlantic salmon is an anadromous species requiring passage to the sea to complete the breeding cycle. Rivers: Low. Species would need to traverse temperature ranges exceeding their tolerance to reach ocean waters

Brook trout

Waters to be stocked	Lake Jindabyne, Three Mile Dam and Dry Dam
Protection status	Protected from commercial fishing under section 20 of the FM Act
Stocking programs	NSW DPI Salmonid Stocking Program Applications for private stocking under s. 216 of the Act
Broodstock collection zones	No broodstock collection zones - broodstock held on hand at the Gaden Hatchery
Hatcheries	Gaden Trout Hatchery (and private accredited hatcheries if necessary)
Production capacity	Capacity not determined. 110,500 produced in 2002.
Stocking rates	Subject to availability of stock and allocation processes
Stocking methods	Stock transported by tanker to designated area. Broadcast stocking of fry or fingerlings or single point release
Likelihood of establishing self sustaining populations	Impoundments: Low. Brook trout need cold running streams to complete the breeding cycle but may breed in the headwaters of impoundments Rivers: Low. Evidence has shown that very few if any brook trout have established self-sustaining populations in NSW

Brown trout

Waters to be stocked	Suitable waters (dams and some rivers) with a temperature range between 5° to 25°
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Protection status	Protected from commercial fishing under section 20 of the FM Act
Stocking programs	NSW DPI Salmonid Stocking Program Applications for private stocking under s. 216 of the Act
Broodstock collection zones	No broodstock collection zones - stock collected from known wild populations
Hatcheries	Gaden Trout Hatchery Dutton Trout Hatchery (and private accredited hatcheries if necessary)
Production capacity	Government Hatchery capacity not determined, 692,000 produced in 2002. private hatchery production capacity not determined
Stocking rates	Subject to availability of stock and allocation processes
Stocking methods	Stock transported by tanker to designated area. Broadcast stocking of fry or fingerlings or single point release
Likelihood of establishing self sustaining populations	Impoundments: High. Brown trout have shown the ability to develop self-sustaining populations in any area offering suitable habitat requirements following stocking Rivers: High (as above)

Rainbow trout

Waters to be stocked	Suitable waters (dams and some rivers) with a temperature range between 5° to 25°
Protection status	Protected from commercial fishing under section 20 of the FM Act
Stocking programs	NSW DPI Salmonid Stocking Program Applications for private stocking under s. 216 of the Act
Broodstock collection zones	No broodstock collection zones - stock collected from known wild populations
Hatcheries	Gaden Trout Hatchery Dutton Trout Hatchery (and private accredited hatcheries if necessary)
Production capacity	Government Hatchery capacity not determined, 2,040,000 produced in 2002. private hatchery production capacity not determined
Stocking rates	Subject to availability of stock and allocation procedures
Stocking methods	Stock transported by tanker to designated area. Broadcast stocking of fry or fingerlings or single point release
Likelihood of establishing self sustaining populations	Impoundments: High. Rainbow trout have shown the ability to develop self-sustaining populations in any area with suitable habitat requirements Rivers: High (as above)

Appendix 3

Stocking zones

The following sections describe the activities that may take place in each of the stocking zones under the FMS. The stocking events within each stocking zone are subject to the controls outlined in Tables 2, 3 and 4 of the FMS and the details provided in the following sections.

The East Coast Stocking Zone

Area of the zone

The East Coast Stocking Zone encompasses the eastern seaboard, commencing at the Queensland border and includes all coastal catchments south to the Victorian border and west to the western extremity of the nominated catchments (Figure 1 - for brevity, not every river catchment has been listed, rather they have been encompassed within other river basins, e.g. Nambucca lies within Bellinger basin). Note: The Montane Zone overlaps certain areas of this zone and salmonid species stocked in the Montane Zone are considered in that stocking zone's program.

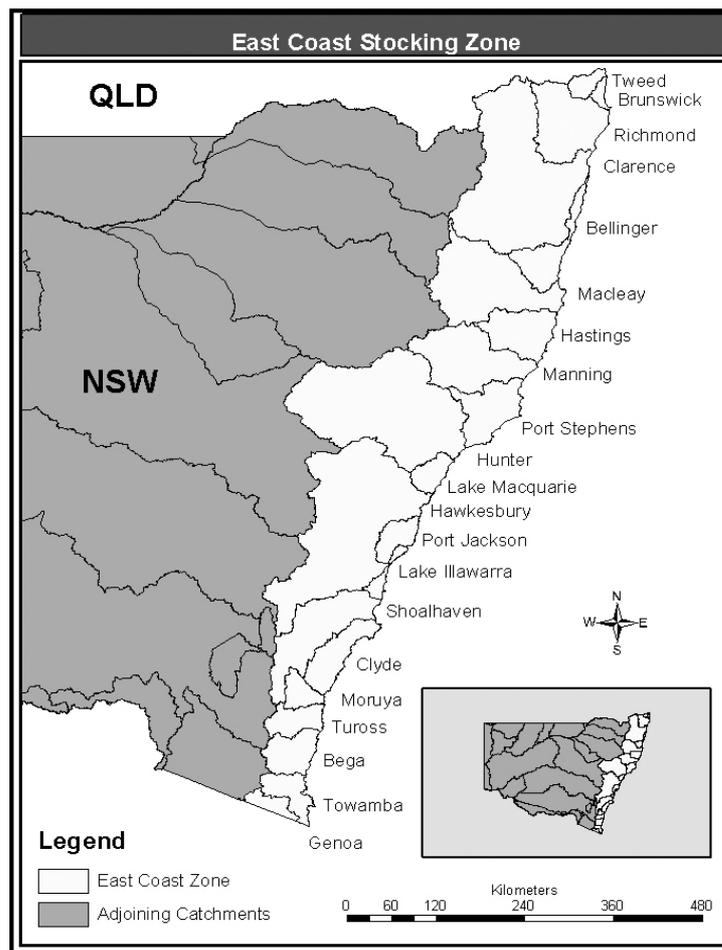


Figure 1. Catchments within the East Coast Stocking Zone.

Objectives of the stocking activity within the zone

Stocking will be carried out to service *Harvest Stocking* and *Conservation Stocking* objectives. Specific objectives for stocking within the zone include:

- providing adequate quantities of quality stocks of native species (Australian bass, golden perch, silver perch) to provide and enhance excellent freshwater recreational fishing opportunities
- providing adequate quantities of quality stock of eastern cod to support the Conservation Stocking of that species
- providing a service for one-off stocking proposals by organisations or individuals, and
- protecting existing naturally occurring populations of the above species.

Waters to be stocked

Stocking can occur in any suitable waters in each catchment of the zone, subject to the general provisions of this FMS and the stocking review process.

Species to be stocked

Species nominated for stocking in this zone are Australian bass, golden perch and silver perch for *Harvest Stocking* and eastern freshwater cod for *Conservation Stocking*. Other native species of the eastern drainage such as Macquarie perch (eastern strain) may be considered subject to the provisions of the FMS or any threatened species recovery plan.

Table 1. Species permitted to be stocked in the East Coast Stocking Zone.

Species	Where	Purpose
Australian bass	Dams and rivers	Harvest Stocking
Golden perch	Hunter catchment only	Harvest Stocking
Silver perch	Hunter catchment only	Harvest Stocking
Eastern cod	Areas specified by Eastern Cod Recovery Plan	Conservation Stocking

Note: Salmonid species are considered in the Montane Zone Stocking Proposal.

Stocking programs

Table 2. Programs permitted in the East Coast Stocking Zone.

Program	Species	Released by
NSW DPI' Harvest Stocking Program*	Australian bass Golden perch** Silver perch**	NSW DPI or nominated volunteers
Dollar-for-Dollar Native Fish Stocking Program*	Australian bass	Angling Clubs and volunteers
Eastern Cod Conservation Stocking*	Eastern cod	Project Big Fish*** or NSW DPI
Private stocking event	Australian bass	Person(s) authorised by permit

*These programs are described in Chapter B of the EIS

**These species are stocked into the Hunter Catchment only in this zone

***Project Big Fish is a community-based stocking group engaged in the Eastern Cod Recovery Plan.

Stock production

The production of stock in NSW will be carried out by accredited hatcheries only and produced in-line with the Broodstock Collection and Management Policy incorporating Genetic Resource Guidelines for hatcheries. Where stock is sourced from an interstate hatchery, the senior manager conducting the review may require the proponent to provide further information on the source of stock.

Threatened species management

Certain areas within the East Coast Zone will not be stocked with fish so as to minimise any effects of stocking on listed threatened species residing within the zone (refer to Tables 3 and 4 of the FMS). Other conditions may be imposed on the activity during the stocking review process if they are considered necessary for threatened species management.

The Montane Stocking Zone

Area of the zone

The Montane Stocking Zone encompasses the area with an elevation generally between 700 and 1500 metres ASL or where water temperatures range between 5°C and 25°C. The zone traverses along the Great Dividing Range of NSW between the Queensland and Victorian state borders (Figure 2). Note: The Montane Stocking Zone overlaps certain areas of catchments within other zones, however, the Montane Zone relates only to salmonid species stocked within those zones.

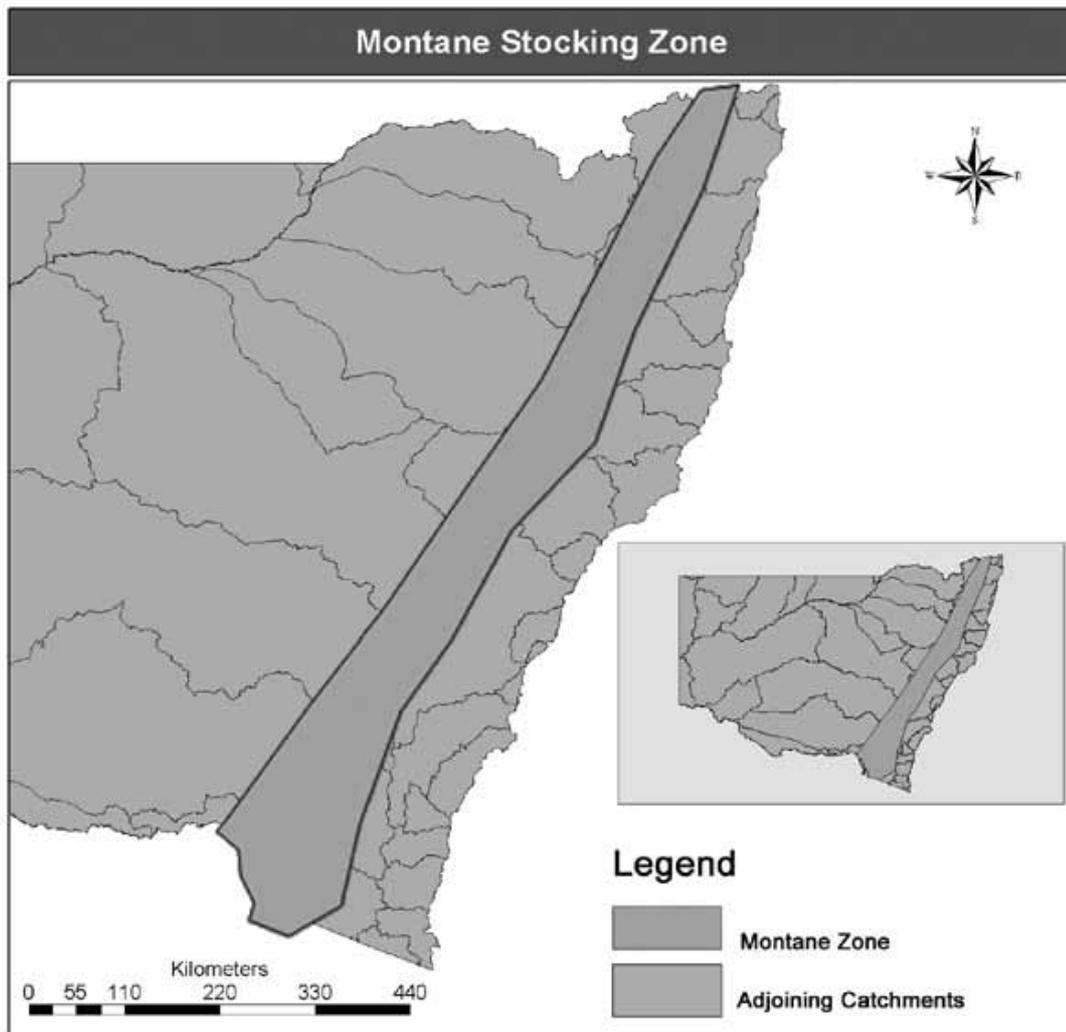


Figure 2. Approximate area of the Montane Stocking Zone.

Objectives of the stocking activity within the zone

Stocking will be carried out to service *Harvest Stocking* objectives as defined in the FMS (see salmonid stocking policy in section 3). Specific objectives for stocking within the zone include:

- providing adequate quantities of quality stocks of salmonid species to provide and enhance excellent freshwater recreational fishing opportunities

- providing a service for one-off stocking proposals by organisations or individuals, and
- protecting existing naturally occurring populations of species in areas such as pristine alpine habitats.

Species and waters to be stocked

All waters within the zone can be stocked with brown trout and rainbow trout, subject to the general provisions of this FMS and the stocking review process. Atlantic salmon and brook trout will be stocked only in the waters specified.

Table 3. Species and general locations permitted to be stocked in the Montane Stocking Zone.

Species	Where
Atlantic salmon	Lake Jindabyne and Khancoban Pondage only.
Brook trout	Lake Jindabyne, Three Mile Dam at Kiandra, Dry Dam only.
Brown trout	Dams, lakes and rivers historically stocked with this species (see stocking records in Chapter B), except Lake Jindabyne and Lake Eucumbene (see following section on programs making up the activity).
Rainbow trout	Dams, lakes and rivers historically stocked with this species except Tantangara Reserve (see stocking records in Chapter B of the EIS).

Stocking programs

Table 4. Programs permitted in the Montane Stocking Zone.

Program	Species	Released by
NSW DPI' Trout Stocking Program*	Salmonids (see Table 3 above)	NSW DPI, acclimatisation societies and/or nominated volunteers
Snowy Mountains Trout Strategy <i>Lake Eucumbene</i> <i>Lake Jindabyne</i>	Atlantic salmon (Lake Jindabyne only), brook trout and rainbow trout	NSW DPI (With some use of volunteers)
Private stocking applications	Australian bass	Person(s) authorised by permit

*These programs are described in Chapter B of the EIS.

Stock production

The production of stock in NSW will be carried out by accredited facilities only and produced in-line with this FMS. Where stock is sourced from an interstate hatchery, the Senior Manager conducting the review may require the proponent to provide further information on the source of stock.

Threatened species management

Certain areas within the Montane Coast Zone will not be stocked with fish so as to minimise any effects of stocking on listed threatened species residing within the Zone (refer to Tables 3 and 4 of the FMS). Other conditions may be imposed on the activity during the stocking review process if they are considered necessary for threatened species management.

The Murray Stocking Zone

Area of the zone

The Murray Stocking Zone encompasses an area including the Peacock Creek, Lachlan, Murrumbidgee (excluding reaches within the ACT), Murray and Lake Hume catchments (Figure 3). Note: The Montane Zone overlaps certain areas of this zone and salmonid species stocked in the Montane Zone are considered in that stocking zone's program.

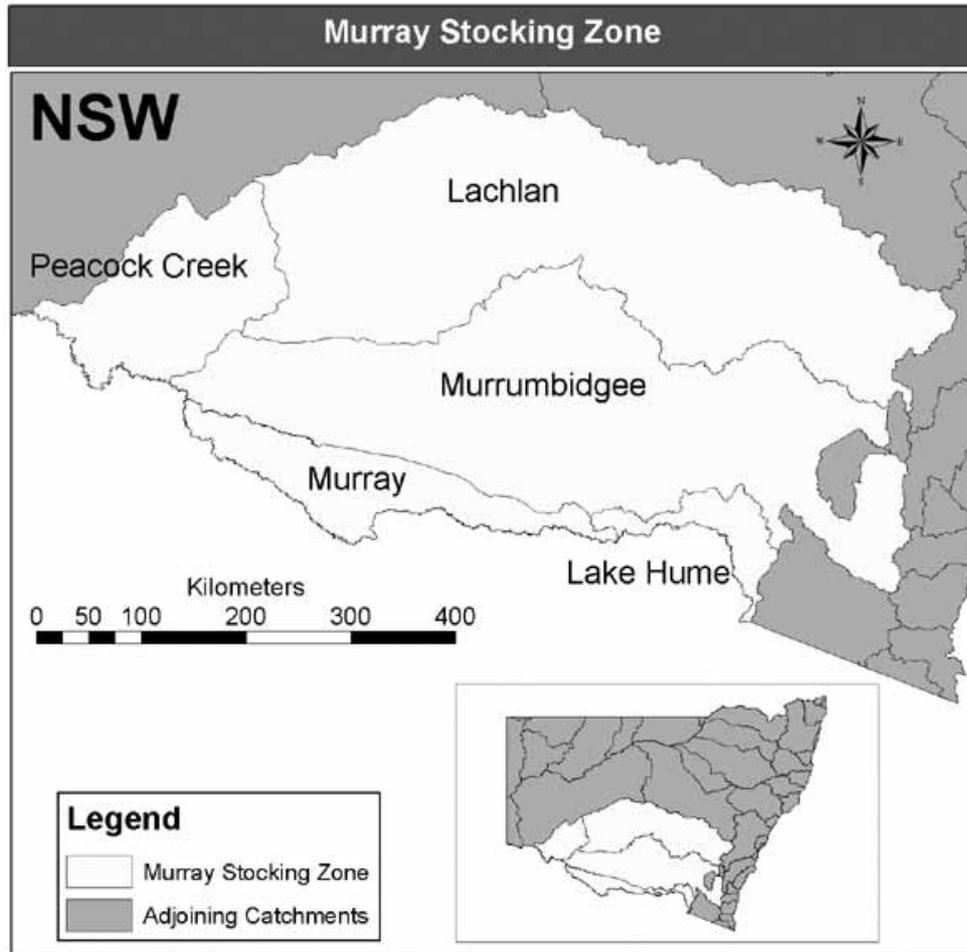


Figure 3. Catchments within the Murray Stocking Zone.

Objectives of the stocking activity within the zone

Stocking will be carried out to service *Harvest Stocking* and *Conservation Stocking* objectives as defined in the FMS. Specific objectives for stocking within the zone include:

- providing adequate quantities of quality stocks of native species (golden perch, silver perch, Murray cod) to provide and enhance excellent freshwater recreational fishing opportunities
- providing adequate quantities of quality stock of trout cod and Macquarie perch to support the Conservation Stocking of those species

- providing a service for one-off stocking proposals by organisations or individuals, and
- protecting existing naturally occurring populations of the above species.

Waters to be stocked

Stocking can occur in any suitable waters of the zone including public water storage areas, creeks and rivers, subject to the general provisions of this FMS and the stocking review process.

Species to be stocked

Species used for stocking will be restricted to native species of the western drainage of NSW (Table 5).

Table 5. Species permitted to be stocked in the Murray Stocking Zone.

Species	Where	Purpose
Golden perch	Dams and rivers	Harvest Stocking
Macquarie perch	TBA (no programs established yet)	Conservation Stocking
Murray cod	Dams and rivers	Harvest Stocking
Silver perch	Dams and rivers	Conservation Stocking Harvest Stocking
Trout cod	Rivers	Conservation Stocking

Note: It is proposed to use golden perch, silver perch (in dams only) and Murray cod for Harvest Stocking; and trout cod, Macquarie perch, and silver perch (in rivers) for Conservation Stocking. Other native species of the western drainage may be considered subject to the general provisions of the FMS.

Stocking programs

Table 6. Harvest Stocking programs permitted in the Murray Stocking Zone.

Program	Species	Released by
NSW DPI' Harvest Stocking Program*	Golden perch, Murray cod	NSW DPI
Dollar-for-Dollar Native Fish Stocking Program*	Golden perch, Murray cod	Angling Clubs
Private stocking applications	Golden perch, Murray cod	Person(s) authorised by permit

*Note: Stocking of Murray cod and golden perch into the Lower Murray River Catchment will be carried out in accordance with recommendation 17 of the Lower Murray Species Impact Statement whereby rivers will be stocked with Murray cod and golden perch in small numbers into rivers so as to ensure that overstocking will not result in artificially bred fish dominating the area while larger releases of these species are proposed in major water storages and lakes to alleviate pressure on stocks from recreational fishing.

Stock production

The production of stock in NSW will be carried out by accredited facilities only and produced in-line with the FMS. Where stock is sourced from an interstate hatchery, the Senior Manager conducting the review may require the proponent to provide further information on the source of stock.

Threatened species management

Certain areas within the Murray Stocking Zone will not be stocked with fish so as to minimise any effects of stocking on listed threatened species residing within the Zone (refer

to Tables 3 and 4 of the FMS). Other conditions may be imposed on the activity during the stocking review process if they are considered necessary for threatened species management.

The Darling Stocking Zone

Area of the zone

The Darling Stocking Zone encompasses an area including the Darling, Macquarie, Castlereagh, Namoi, Gwydir, Macintyre, Moonie and Lake Victoria catchments within NSW (Figure 4). Note: The Montane Zone overlaps certain areas of this zone and salmonid species stocked in the Montane Zone are considered in that stocking zone's program.

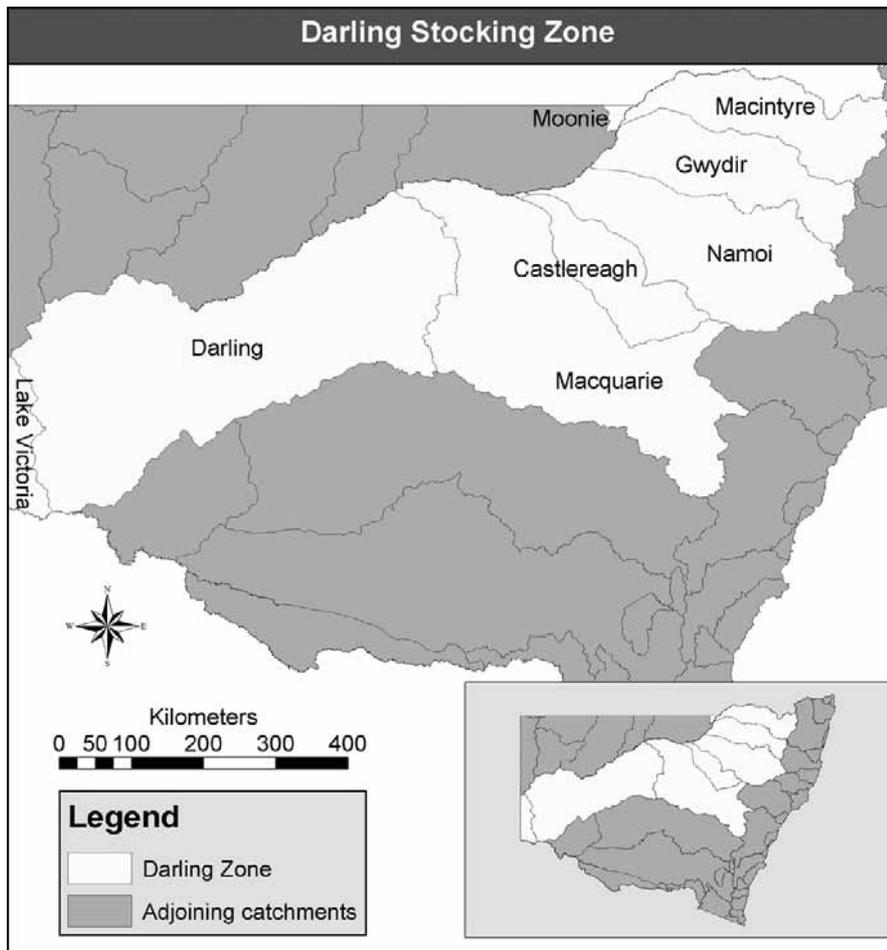


Figure 4. Catchments within the Darling Stocking Zone.

Objectives of the stocking activity within the zone

Stocking will be carried out to service *Harvest Stocking* and *Conservation Stocking* objectives as defined in the FMS. Specific objectives for stocking within the zone include:

- providing adequate quantities of quality stocks of native species (golden perch, silver perch, Murray cod) to provide and enhance excellent freshwater recreational fishing opportunities
- providing adequate quantities of quality stock of silver perch and Macquarie perch to support the Conservation Stocking of those species
- providing a service for one-off stocking proposals by organisations or individuals, and

- protecting existing naturally occurring populations of the above species.

Waters to be stocked

Stocking can occur in any suitable waters of the zone including public water storage areas, creeks and rivers, subject to the general provisions of this FMS and the stocking review process.

Species to be stocked

It is proposed to use golden perch, silver perch (in dams only) and Murray cod for Harvest Stocking; and trout cod, Macquarie perch, and silver perch (in rivers) for Conservation Stocking. Other native species of the western drainage may be considered for stocking subject to the provisions of the FMS and the stocking review process.

Table 7. Species permitted to be stocked in the Darling Stocking Zone.

Species	Where	Purpose
Golden perch	Dams and rivers	Harvest Stocking
Macquarie perch	(No programs established yet)	Conservation Stocking
Murray cod	Dams and rivers	Harvest Stocking
Silver perch	Dams and rivers	Conservation Stocking and Harvest Stocking
Trout cod	Rivers	Conservation Stocking

Stocking programs

Table 8. Harvest Stocking programs permitted in the Darling Stocking Zone.

Program	Species	Released by
NSW DPI' Harvest Stocking Program*	Golden perch, Murray cod	NSW DPI
Dollar-for-Dollar Native Fish Stocking Program*	Golden perch, Murray cod	Angling Clubs
Private stocking applications	Golden perch, Murray cod	Person(s) authorised by permit

* Note: these programs are described in Chapter B of the EIS.

Table 9. Conservation stocking programs permitted in the Darling Stocking Zone.

Program	Species	Released by
Macquarie Perch Conservation Stocking	Macquarie perch	NSW DPI
Silver Perch Conservation Stocking	Silver perch	NSW DPI
Trout Cod Conservation Stocking	Trout cod	NSW DPI

Stock production

The production of stock in NSW will be carried out by accredited facilities only and produced in-line with the NSW DPI' Broodstock Collection Policy and genetic resource guidelines for hatcheries to be established under the FMS. Where stock is to be sourced from an interstate hatchery, or where conservation stock is to be sourced from a private hatchery, the Senior Manager conducting the review may require the proponent to provide further information on the source of stock to allow for a thorough assessment.

Threatened species management

Certain areas within the Darling Stocking Zone will not be stocked with fish as they are thought to contain unique faunal assemblages and/or to minimise any effects of stocking on listed threatened species residing within the Zone (refer to Tables 3 and 4 of the FMS). Other conditions may be imposed on the activity during the stocking review process if they are considered necessary for threatened species management.

The Far West Stocking Zone

Area of the zone

The Far West Stocking Zone encompasses an area including the Bulloo, Lake Frome, Cooper, Lake Bancannia, Paroo, Warrego, and Condamine catchments (Figure 5).

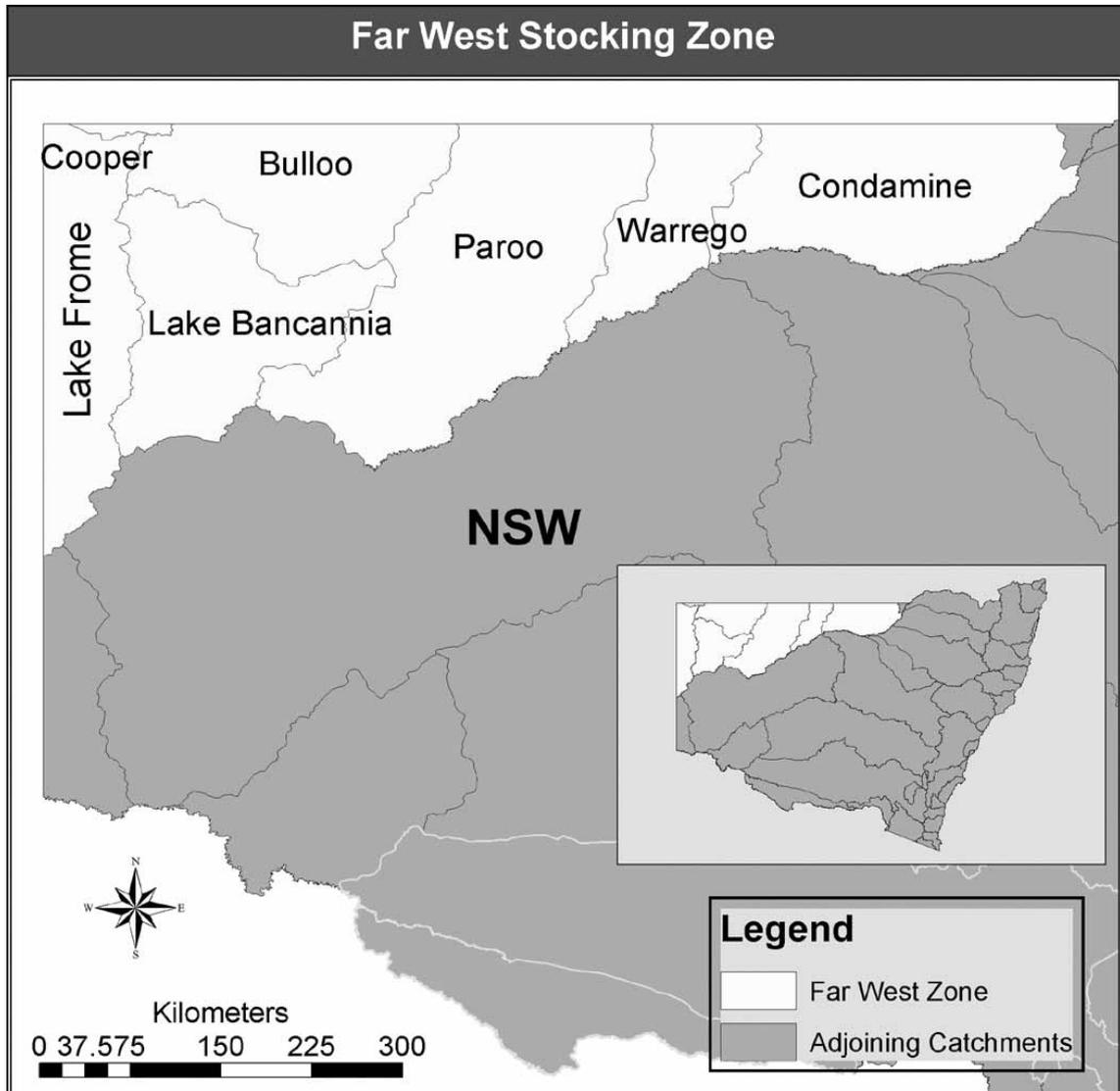


Figure 5. Catchments of the Far West Stocking Zone

Objectives of the stocking activity within the zone

Fish will not be stocked for Harvest Stocking into the Far West Stocking Zone as these areas have not previously been stocked for such purposes and cover environments with unique environmental attributes. Conservation Stocking may be considered on a case-by-case basis, subject to the requirements of the FMS.

Appendix 4

Implementation of management responses

The following tables outline the time periods within which each management response is to be implemented. The table also provides information relating to the head of power for implementation and who has the lead responsibility for carrying out the action(s). A general description of the terms used in the table with respect to timeframes is as follows:

Term	Description
Immediate	Upon the date of approval of the strategy
Short term	Within one year of the date of approval of the strategy
Medium term	Within three years of the date of approval of the strategy
Long term	In excess of three years of the date of approval of the strategy
As required	Whenever the circumstances warrant action
Ongoing	Continuing into the future

Where an implementation date (e.g. a particular month) has been included for a management response instead of the terms above, the date represents a specific target time within which the management response is to be implemented.

Goal 1. To manage the activity in a manner that minimises impacts on aquatic biodiversity including threatened species and genetic resources						
OBJECTIVES	MANAGEMENT RESPONSES	CONTRIBUTE TO GOALS	TIMEFRAME	RESPONSIBILITY	AUTHORITY	PAGE
1.1 To develop and maintain a framework to guide appropriate review of stocking activities	a) Utilise "Stocking Review Guidelines" for the ongoing assessment of stocking events	2,3,4,5	Ongoing	NSW DPI	Policy	39
	b) Use reliable and current information resources to support the stocking review framework	2,3,4,5	Ongoing	NSW DPI	Policy	39
	c) Map the activity in a Geographic Information System (GIS)	2,3,4,5	Medium term	NSW DPI	-	39
	d) Implement a schedule of restricted waters where stocking events are limited or prohibited, and review the schedule every five years in light of new information. The applicability of the length of the review period should be reviewed after the first review	2,3,4,5	Immediate	NSW DPI	Regulatory	40
1.2 To minimise and/or eliminate any negative impact from the activity on threatened species, populations and ecological communities (including mammals, birds, reptiles, amphibians, fish, invertebrates and vegetation), and where possible promote their recovery	a) Appropriately manage stocking in areas where the activity may adversely affect a threatened species	5	Ongoing	NSW DPI	Policy	40
	b) Maintain and improve the management of Conservation Stocking programs to promote the recovery of species that are threatened or of conservation concern	3,4	Ongoing	NSW DPI	Policy	40
1.3 To provide reliable genetic resource management in the activity	a) Develop and implement genetic resource management guidelines for fish stocking in NSW	2,3,4,5	Short term	NSW DPI Fish hatcheries	Policy	41
1.4 To implement the FMS in a manner consistent with related Commonwealth and State endorsed programs designed to protect aquatic environments and biodiversity	a) Manage the activity having regard to cross-jurisdictional management arrangements	2,3,4,5,6	Ongoing	NSW DPI	-	42
	b) Recognise and where appropriate incorporate regionally based environmental management arrangements in the stocking review framework	2,3,4,5,6	Ongoing	NSW DPI	Policy	42
1.5 To appropriately manage the risks associated with translocation of live aquatic organisms during stocking activities	a) Manage the activity consistently with State and national policies governing the translocation of live aquatic organisms	2,3,4,5,6	Ongoing	NSW DPI	Policy	42

Goal 2. To enhance fishing opportunities through cost-effective stocking programs that maximise economic benefits and provide social equity from the activity for recreational fishing and Aboriginal cultural fishing purposes						
OBJECTIVES	MANAGEMENT RESPONSES	CONTRIBUTE TO GOALS	TIMEFRAME	RESPONSIBILITY	AUTHORITY	PAGE
2.1 To provide sufficient quantities of quality stock to support enhanced recreational fisheries	a) Continue to provide for the stocking of sufficient quantities of fish to provide or enhance quality recreational fishing opportunities in inland rivers and freshwater public waterways	3,4	Ongoing	NSW DPI	-	44
	b) Recognise region-specific fishery management arrangements where appropriate, such as the Snowy Lakes Trout Strategy	5	Ongoing	NSW DPI	As required	44
	c) Broaden the consultation with acclimatisation societies and angling clubs to formulate and implement stocking programs with a view to providing greater equity, access and education about the resource	3,4	Short term	NSW DPI	Policy	44
2.2 To minimise any negative impacts of the activity on cultural heritage values and provide opportunities for Aboriginal communities to participate in stocking activities and to support cultural fishing practices	a) Provide for the stocking of native fish for Aboriginal cultural fishing and moiety purposes	1,3,4,5,6	Ongoing	NSW DPI, stockists	Policy	45
	b) Ensure that new information about areas or objects of cultural significance is taken into account in the stocking review framework	1,3,4,5	Ongoing	NSW DPI	Policy	45
	c) Consult with relevant Aboriginal groups in the assessment of any new sites proposed to be stocked	1,3,4,5	Ongoing	NSW DPI	Policy	45
2.3 Maximise economic benefits and provide social equity from the activity	a) Develop a classification scheme for NSW waters to evaluate the potential viability of a stocking event based on the most appropriate species, class of stock for particular waters	1,3,4,5,6	Long term	NSW DPI	Policy	310
	b) Continue to develop the Dollar-for-Dollar Native Fish Stocking Program to enhance recreational fishing opportunities, including hatchery development, and provide an avenue for private enterprises to benefit from the activity	1,3,4,6	Ongoing	NSW DPI	Policy	46
	c) Continue to provide opportunities for religious and ceremonial stocking and increase awareness of the legislative and policy requirements with the groups involved	1,3,4,5	Ongoing	NSW DPI	Policy	46

Goal 3. To ensure the consistent production and release of appropriate quality stock						
OBJECTIVES	MANAGEMENT RESPONSES	CONTRIBUTE TO GOALS	TIMEFRAME	RESPONSIBILITY	AUTHORITY	PAGE
3.1 Ensure stock is of the highest standard in terms of fish health	a) Develop and implement quality assurance standards and an accreditation system for hatcheries supplying fish for stocking	1,2,6	Medium term	NSW DPI	Regulatory	47
	b) Ensure that any fish, fish eggs or larvae procured from interstate hatcheries for import into NSW for the activity of fish stocking meets quality assurance standards	1,2,4,6	Ongoing	NSW DPI	Regulatory	47
	c) Participate in the development of FISHPLAN, the NSW component of AQUAVETPLAN	1,2	As required	NSW DPI	-	48
	d) Link the fish stocking activity to the Aquatic Disease Watch Hotline to enable early reporting of disease outbreaks	1,2	Short term	NSW DPI	Regulatory	48
3.2 To promote the use of appropriate technology for genetic resource management in all hatcheries involved in the activity	a) Promote the use of appropriate technology in genetic resource management	4,2	Short term	NSW DPI	-	48
	b) Require, where necessary, the mandatory use of microchip technology (PIT-tag system) in broodstock management arrangements	1,2,4,5,6	Medium term	NSW DPI	Regulatory	48
	c) Investigate the feasibility of developing a cryogenic gene bank of NSW species to ensure the retention of genetic material for Harvest Stocking and Conservation Stocking programs	1,5	Medium term	NSW DPI	-	49
3.3 Implement best practice in broodstock collection and management	a) Develop a broodstock policy and guidelines that address collection, husbandry and management arrangements for hatcheries engaged in the activity	1,2,5,6	Medium term	NSW DPI	Policy	49
	b) Integrate broodstock collection information with the NSW Aquaculture Information Database	1,2,4,5,6	Short term	NSW DPI	-	50
	c) Continue to provide for the issue of permits under section 37 of the <i>Fisheries Management Act 1994</i> for broodstock collection purposes consistent with the vision and goals of the FMS	1,2,5,6	Ongoing	NSW DPI	Regulatory	50
3.4 Implement best practice in broodstock collection and management	a) Develop a stocking Code of Practice that defines and promotes best practice	1,2,4,5,6	Short term	NSW DPI	Various	50
	b) Issue a copy of the Code of Practice to each stockist before a stocking event proceeds	1,2,4,5,6	Short term	NSW DPI	Various	51

Goal 4. To provide efficient administrative services, information management and reporting systems

OBJECTIVES	MANAGEMENT RESPONSES	CONTRIBUTE TO GOALS	TIMEFRAME	RESPONSIBILITY	AUTHORITY	PAGE
4.1 To provide a clear administrative framework for reviewing stocking events	a) Develop stocking event forms in plain English	1,2,3,5,6	Short term	NSW DPI	-	52
	b) Develop a policy and procedures manual for NSW DPI' staff	1,2,3,5,6	Short term	NSW DPI	Policy	52
	c) Widely distribute advisory material on stocking policy and procedures in NSW	2,5	Medium term	NSW DPI	-	52
	d) Develop interactive self-assessment and education resource	1,2,3,5,6	Ongoing	NSW DPI	-	52
	e) Provide an efficient enquiry/advisory service for the activity	1,2,3,5,6	Ongoing	NSW DPI	-	53
	f) Provide stocking data to other information resources	1,2,3,5	Short term – ongoing	NSW DPI	-	53
4.2 To maintain and report accurate information relating to the activity	a) Maintain records of all stocking events centrally	1,2,5	Short term – ongoing	NSW DPI	-	53
	b) Periodically report on the activity to clients and stakeholders	1,2,3,5	Biennially	NSW DPI	-	53
	c) Require hatcheries to report annually on production and other factors relevant to the activity	2,5	Short term – ongoing	NSW DPI	Regulatory	54
	d) Conduct client satisfaction surveys	2,6	Medium term - ongoing	NSW DPI	-	54
	e) Provide advice to stocking volunteers on appropriate stocking methods, legal implications and other information	2,6	Medium term - ongoing	NSW DPI	-	54

Goal 5. To provide efficient administrative services, information management and reporting systems						
OBJECTIVES	MANAGEMENT RESPONSES	CONTRIBUTE TO GOALS	TIMEFRAME	RESPONSIBILITY	AUTHORITY	PAGE
5.1 To initiate research relating to the activity	a) Facilitate research programs to fill information gaps identified in the risk assessment of the existing activity, as provided for in the Research Plan	1,2,3,4	Short term	NSW DPI	-	55
	b) Publish results of research programs	2,4,6	Ongoing	NSW DPI	-	55
5.2 To monitor quality and quantity of catches in enhanced fisheries	a) Develop reliable marking techniques for hatchery reared stock and introduce the technology to all hatcheries involved in the activity	1,2,3,6	Long term	NSW DPI	Various	55
	b) Continue conducting angler-catch surveys at major inland fishing competitions and gather other relevant information to the management of the activity	2,3,6	Ongoing	NSW DPI	-	56
	c) Monitor the level of socio-economic benefit from fish stocking using surveys undertaken on an episodic basis	2,3	As required	NSW DPI	-	56
	d) Monitor the level of participation in fish stocking using information gathered through the general recreational fishing licensing system and other appropriate avenues	2,3,6	Ongoing	NSW DPI	-	56
5.3 Use research to develop better stocking practices	a) Having regard to the research priorities identified in the Research Plan, initiate research into the distribution of stocked native species, including any sub-populations	1,2,3,4,6	Long term	NSW DPI	-	56
	b) Apply empirical methods to determine optimum stocking density rates (in terms of efficacy and effectiveness), and assess the feasibility of developing and applying an established formulae in the longer term	1,2,3,4,6	Long term	NSW DPI	-	57
	c) Continually update the Stocking Review Guidelines and assessment resources to accurately review potential impacts from the activity	1,2,3,4,6	Ongoing	NSW DPI	Policy	57

Goal 6. To maximise community understanding and voluntary compliance through education and support services while providing effective deterrence against illegal activity

OBJECTIVES	MANAGEMENT RESPONSES	CONTRIBUTE TO GOALS	TIMEFRAME	RESPONSIBILITY	AUTHORITY	PAGE
6.1 To improve community understanding and public perception of the activity through an education strategy	a) Develop and implement a culturally appropriate educational (communication) plan	1,2,3,4,5	Medium term	NSW DPI	Policy	58
	b) Develop an information kit for NSW DPI staff to convey accurate information on fish stocking to clients	1,2,3,4,5	Medium term	NSW DPI	Policy	58
6.2 To develop and deliver an effective compliance program	a) Develop a Fish Stocking Compliance Plan	1,2,3,4,5	Medium term	NSW DPI	Policy	59
	b) Require persons involved in stocking to verify stocking events when complete	1,2,3,4,5	Short term - ongoing	NSW DPI	Regulatory	59