

Fish Habitat Code of Practice FHC 003
Prepared in accordance with Section 119 of the *Fisheries Act 1994*

CANE GROWERS ON-FARM MAINTENANCE OF DRAINS WITH MARINE PLANTS

**Fish Habitat Code of Practice for use with
Strategic Permits issued under Section 51
of the *Fisheries Act 1994***

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See also the audiovisual presentation *Healthy Waterways – Everybody Profits. An introduction to the Fish Habitat Code of Practice for Cane Growers* (running time 12 mins, VHS PAL) and Fish Habitat Management Operational Policy Series and Fish Habitat Guideline Series.

Information contained in this publication is provided as specific advice for accredited cane growers authorised under Section 51 of the *Fisheries Act 1994*.

The Queensland Department of Primary Industries has taken all reasonable steps to ensure the information contained in this publication is accurate at the time of publication.

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Foreword

The Fish Habitat Code of Practice (the Code) represents a major achievement for both the sugar and fishing industries in Queensland. It demonstrates in a tangible way the acceptance by the sugar industry of the importance of fish habitats to sustaining fish stocks, and the willingness of cane growers to embrace new ways of doing things to reduce impacts on fish habitats while undertaking on-farm maintenance involving protected marine plants.

The Code reflects provisions under Section 119 of the *Fisheries Act 1994* which states that the Fisheries Agency (Chief Executive, Department of Primary Industries) may prepare a code of practice for persons to whom the *Act* applies, and that reasonable steps must be undertaken to engage in consultation in preparation of the code.

Development of this Code has involved extensive consultation with industry and other stakeholders. In particular, the CANEGROWERS organisation, officers of the Bureau of Sugar Experiment Stations and the Department of Primary Industries are commended on their efforts which have made the implementation of the new Strategic Permit / Fish Habitat Code of Practice system possible.

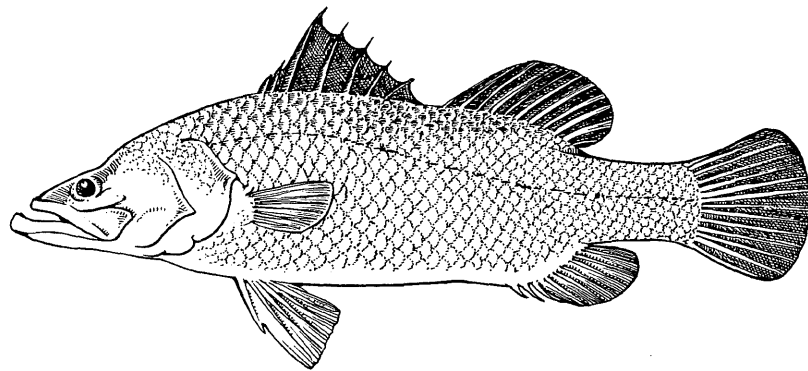
The new system will potentially benefit both growers and fisheries through the reduction in time and costs involved in farm-by-farm assessment and permit issue, a shared understanding of fisheries values and improved drainage practices and fish habitats.

I urge all cane growers with farms in the coastal zone to seek accreditation and adopt the Fish Habitat Code of Practice when undertaking maintenance works in on-farm drains involving marine plants. The Code represents a practical approach to farm and fish habitat maintenance.

While not always fully understood or appreciated, the roles of fish habitats in supporting fish and fisheries are strongly promoted by industry, researchers, managers and the general public. The management of fish habitats will be enhanced as more people and organisations understand, support and participate in the processes that lead to effective natural resource management decisions.



John Pollock
Executive Director
Fisheries Group
January 2000



Barramundi

(Lates calcarifer)

“Barramundi can be found in all river systems of the peninsular and far north of Queensland. They can be found throughout the entire length of a river, tolerating a wide range of habitats. Beds of submerged aquatic plants, lagoons, large deep-water snags and the bottom of riffles appear to be their preferred ‘hangouts’.”

(Herbert, B. & Peeters, J., 1995 *Freshwater Fishes of Far North Queensland*, QDPI IS Q195018 74p)

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WITH MARINE PLANTS

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Purpose of the Fish Habitat Code of Practice FHC 003

The Fish Habitat Code of Practice FHC 003 for Cane Growers Maintenance of Drains with Marine Plants has been developed to specifically address the requirements of the *Fisheries Act 1994* for the statutory protection of fish habitats and marine plants on cane farms. The Fish Habitat Code of Practice is a condition of any Strategic Permit issued to a CANEGROWERS District Executive under Section 51 of the *Fisheries Act*.

The Fish Habitat Code of Practice has been prepared under Section 119 of the *Act*.

The Strategic Permit/Code of Practice has been developed as an alternative to the issue of permits on an individual basis. Accredited growers potentially benefit from the reduction in time and costs involved in the individual assessment of permit applications for on-farm drain maintenance, while fisheries potentially benefit from a shared understanding of fisheries values, improved drainage practices and fish habitats.

Compliance with the Fish Habitat Code of Practice FHC 003 is for the purposes of the *Fisheries Act 1994*. Compliance with this Code of Practice may not mean that there has been compliance with the 'general environmental duty' under the *Environmental Protection Act 1994*.

1.0 Introduction

The *Queensland Fisheries Act* has given protection to marine plants, in particular mangroves, for at least 85 years. The *Act* provides the legislative framework for management, use, development and protection of fisheries resources and fish habitats. Management includes permit requirements from the Department of Primary Industries Fisheries Group for any activity that may result in the disturbance of marine plants.

Fish and fish habitats are building blocks for commercial, recreational and traditional fishing, aquaculture, tourism and diverse leisure activities. Commercial and aquaculture fisheries form Queensland's 5th largest primary industry. Additionally is its value to local economies with marinas, slipways, boating and tackle accessories, product processing, transporting and marketing having 20,000 people directly dependant on income from commercial fishing alone. Queensland's fisheries resources also support more than 800,000 recreational fishers and 120,000 private vessels, with flow-on benefits to tourism and other service industries.

Sugar, one of Australia's five most economically important primary industries, is Queensland's principal crop, contributing about 20% of the State's gross value of rural production and producing 95% of Australian sugar. Queensland is among the world's largest raw sugar exporters, accounting for about 16% of the world sugar trade. The industry directly employs 19,000 people in the growing, harvesting, milling, storage and marketing areas with a further 26,000 people providing related support services.

The fisheries and sugar cane sectors are primary producers crucial to this State's economic and social well being. Both sectors, as with other industries, place high values on coastal regions, and potential for conflict within these regions is growing as available resources are utilised. DPI Fisheries continues to work with industry and community groups to ensure sustainable economic and social benefits from fisheries resources while ensuring these resources are, protected and enhanced with access managed fairly and equitably.

Biological Considerations (Values of Fisheries Habitat)

Tidal habitats are among the most productive fisheries environments. These habitats support a rich diversity of fauna that are a valuable natural resource, offering many opportunities for traditional, recreational and commercial fishing.

About 75% by weight and 80% by value of the commercial catch in Queensland are derived from species that spend part of their life cycle in shallow marine and estuarine habitats. In areas such as the Great Sandy Straits/Tin Can Bay region up to 90% of the fish landings are derived from these habitats.

Shallow marine and estuarine habitats provide key environments for the production of food organisms as well as nursery and shelter. Flood plains are critical to many freshwater fish species that rely on the intensive, but rapid, plankton production, during times of flood, to sustain fish larvae and juveniles.

To complete life cycles, many fish species such as mangrove jack and barramundi migrate up and downstream at different stages of maturity. Specific flood cycles are required for many species such as banana prawns, where flood events determine catches available to fishers.

Issues to be Considered

Potential Impacts

Untimely and insensitive on-farm works can lead to degradation of fish habitats on and off farm and negatively impact on water quality. Direct removal of habitats has an obvious impact for fisheries resources. Even small areas of removal or degradation at individual sites can lead to large incremental changes over time. Direct loss of habitats, within agricultural areas and from urban and industrial pressures, reduces fisheries production.

Incorporation of artificial wetlands, retention and sedimentation ponds into on-farm drainage schemes provides valuable replacement habitats. Appropriate management, enhancement and protection of remnant on-farm fisheries values, as well as of created on-farm habitats, ensures fisheries resource sustainability.

Time/seasonality

Traditionally the rainfall and on-farm duties such as harvesting have determined the timing of maintenance works. DPI Fisheries identifies two other factors critical to planning maintenance works: the flowering/fruiting cycle of marine plants and the migration patterns of local fish species. Appendix 2 illustrates the four factors and

work periods on a northern, central and southern regional basis. Details for a particular marine plant or fish species should be confirmed with local DPI Fisheries staff.

On-farm activities covered by the Strategic Permit/Code of Practice

Fish habitats are protected under the *Fisheries Act 1994*. Section 51 of the *Act* provides for permits to authorise disturbance of marine plants. Marine plants, defined under Section 8 of the *Act*, include but are not limited to mangroves, saltcouch, seagrasses and those *Melaleuca* and *Hibiscus* spp., adjacent to or within tidal lands.


Under the individual permit system anyone seeking authority to disturb a marine plant must make an application to DPI Fisheries for a permit. These applications are assessed individually and where appropriate, authority will be granted with specific conditions.

As an alternative to the individual permit system, The Fish Habitat Code of Practice FHC 003 was developed for cane growers who may routinely disturb marine plants as part of on-farm drain maintenance. By carrying out activities in accordance with FHC 003 the potential negative impacts of farm maintenance activities on fisheries habitat will be minimised. However, only accredited cane growers registered with a CANEGROWERS District Executive that holds a Strategic Permit are authorised to use the FHC 003.

Strategic permits are only for maintenance of tidal drains on a producing farm within a Cane Production Area.

To distinguish the potential impacts of on-farm practices on fish habitats, a hierarchy of 4 maintenance levels has been developed (Table 1). Specific maintenance works criteria for activities within each level are detailed in Section 2. Notification for Levels 1 and 2 is not required. However, notification is required for Levels 3 and 4 activities through contact with the DPI.

Table 1: Maintenance levels for on-farm activities based on potential impacts on fish habitats authorised under a Strategic Permit/Code of Practice

Impact	Level	Examples of Activity
Low  High	1	Slashing/mowing of existing roads and headlands.
	2	Use of salt water (floodgate operation) and target spraying to manage exotic grasses/weeds.
	3	Trimming of trees alongside existing on-farm roads and headlands.
	4	Maintenance of existing drains which involves higher impact activities such as removal of marine plants and/or de-silting, flood gate maintenance etc.

Emergency situations

It is recognised that, under certain circumstances (e.g. following major storm damage), emergency maintenance works may be required which are outside the

activities defined in this Code of Practice. Section 79 of *the Fisheries Regulation 1995* allows for a person to remove, damage or destroy a marine plant in an emergency situation if that marine plant is or may be a danger to public health and safety. In this situation a Permit is not required, however the nearest office of the Queensland Boating and Fisheries Patrol (or the After Hours Emergency number 1800 017 116) must be advised by telephone of the location, nature and extent of marine plant disturbance required to overcome the emergency situation.

Formal written advice stating that works have been carried out under Section 79 of the *Fisheries Regulation 1995* and justifying the use of this legislation must be forwarded to the relevant Industry Manager within five (5) working days of the completion of emergency works.

Activities Outside of the Strategic Permit/Code of Practice

For effective on-farm drainage, associated drainage activities may be required upstream or downstream of individual farms under cane assignment. Drainage maintenance outside of farm boundaries is not covered by the Strategic Permit/Code of Practice. These works are often the jurisdiction of other agencies, e.g. Department of Natural Resources, local government, drainage boards and irrigation boards.

The development of new land, reassignment of land and altering the design of existing on-farm structures, are classified as “new works” and are not covered by the Strategic Permit/Code of Practice.

Where works are required but are proposed to be undertaken in a manner different to those prescribed within the Fish Habitat Code of Practice as detailed below, cane growers are to contact the local DPI Fisheries office and apply for an individual permit with its associated assessment.

Where activities are undertaken without a permit or outside the conditions prescribed, the person undertaking these works may be in breach of the *Fisheries Act 1994*. Legal action may be taken including the issuing of ‘Restoration Notices’.

Table 2: Examples of activities which fall outside of the Strategic Permit/Code of Practice

Examples of Activities Requiring Individual Permits
Major excavations works of existing facilities, e.g. redirection or enlarging drains, either on-farm or off-farm.
New works for on-farm activities, e.g. new drains or flood gates.
New land clearing, e.g. for new or reassignment.

Education/Accreditation

Cane growers and contractors within a District seeking authorisation under the Strategic Permit/Code of Practice are to attend an accreditation session outlining the issues and requirements of fisheries legislation, management of fisheries resources and best practice on-farm maintenance. Attendance is mandatory for accreditation and authorisation under the Strategic Permit/Code of Practice.

Monitoring

Industry monitoring such as peer review is strongly encouraged within each District to assist with information exchange and compliance.

DPI Fisheries may undertake site inspections where activities are under way and/or completed to ensure compliance with all conditions of the Strategic Permit/Code of Practice. These inspections are carried out by the Queensland Boating and Fisheries Patrol for compliance and by fisheries officers for the Strategic Permit/Code of Practice review and renewal.

Should the situation arise where the QBFP has identified an activity undertaken not in accord with the Strategic Permit/Code of Practice, the activity may be contrary to the *Fisheries Act 1994*. In such a situation the activity will be the subject of a breach investigation. Successful prosecution for non-compliance with the Code of Practice may also lead to loss of accreditation held by a grower under the Strategic Permit system.

Reporting

Each CANEGROWERS District Executive, as the Permit holder, is required to submit annual reports on level 3 and 4 activities for a particular district within 15 days of each anniversary of the date of the issue of the Strategic Permit (Section 3). Alternately CANEGROWERS may forward completed Notification Sheets as these Sheets are completed by growers. Notification Sheets are required for Level 3 and 4 maintenance activities.

2.0 Criteria for authorised on-farm maintenance activities

General works considerations

- **No removal of marine plants for aesthetic reasons.**
- **Remove/prune marine plants only as necessary for on-farm operations.**
- **Remove as little vegetation as possible.** The amount to be removed should be determined prior to commencement of works.
- **Minimise disturbance to the soil.** If changes are necessary to the original drain profile or design, individual permits for “new works” are required.
- **Regularly maintain the drainage system.** Large-scale maintenance is more costly and has greater off-site impacts to regular small-scale maintenance.
- **Maximise dry season maintenance effectiveness.** Maintenance control of para grass and other weed species within drains can be maximised by dry season slashing, periodic inflows of saline waters and limited application of non-residual herbicides.
- **Remove all spoil and or cleared/trimmed vegetation at least 5 metres from drains.** If decaying organic matter enters a still waterway, this may result in a high biological oxygen demand. Loss of oxygen can lead to fish death.

Maintenance Activity Level 1 - Low Impact

- 2.1.1 Maintain drain access roads, grassed headlands and spoon drains by mowing or slashing.**

2.1.2 Clean machinery of weeds and weed seeds to prevent introduction of weeds from area to area.

Maintenance Activity Level 2 – Floodgate / Chemical Control

From a fisheries perspective, the operation of floodgates to allow periodic inflow of salt water to kill freshwater weeds in drains, is preferred to the use of herbicide. The extent of tidal flow needed should be calculated prior to opening of the floodgate. Excessive flows, e.g. during larger tidal events, may impact on soil structure and crop growth. Tidal inundation is not suitable in permanent freshwater drains as these may be adversely impacted.

While chemical control is effective for weeds, it is considered a last resort, short-term solution, providing the least benefits for fish habitats.

- 2.2.1 **Operate floodgates to allow periodic inflow of salt water to kill freshwater weeds in drains.** The extent of tidal flow needed should be calculated prior to opening of the floodgate. Excessive flows, e.g. during larger tidal events, may impact on soil structure and crop growth. Tidal inundation is not suitable in permanent freshwater drains as these may be adversely impacted.
- 2.2.2 **Minimise use of chemical control because of potential impacts on non-target organisms.** Employ spot spraying in preference to blanket spraying in and adjacent to drains especially where marine plants are present.
- 2.2.3 **Use low impact products.** Water sensitive and low residual spray products are available and are required if spraying is to be undertaken.
- 2.2.4 **Use registered (by the National Registration Authority) products only as per label and the material safety data sheets.**
- 2.2.5 **Only spray the drains in the dry periods, where practical (Refer Appendix 2).** Breakdown of dead weeds, when flushed into the waterways during wet periods, lowers dissolved oxygen levels leading to a reduction in water quality.
- 2.2.6 **Remove weeds from the drain with a weed rake.** Regular maintenance including debris removal can greatly reduce the need for sediment removal.
- 2.2.7 **Deposit all extracted plant material etc from the drain at least 5 metres from the bank, to prevent material washing back in.** Rotting vegetation can release phosphate and nitrogen that can impact on water quality.

Maintenance Activity Level 3 - Pruning

Pruning for the following reasons:

- **Clearances for headland roads, overhead wires and to facilitate access for other maintenance tasks.**
- **Prevention of hazards such as sighting of oncoming traffic.**
- **Removal to minimise disturbance to fish habitats** (refer to Australian Standard AS4373-1996 *Pruning of Amenity Trees* and Department of Natural Resources Tree Facts, *T18 Pruning for wood production* and *T45 Care of trees whilst building or landscaping*).

Retention of riparian vegetation is encouraged to act as a biological buffer between cane growing and drain habitats. Vegetated buffers reduce erosion, limit drain siltation and maintain water quality within drains.

Incorrect tree pruning and earthworks adjacent to trees may lead to tree death. Tree death may not occur till several years after completion of works. If precautions are undertaken mortalities can be prevented. Mangrove species have limited capacity to regenerate compared to that of many terrestrial species. Certain mangroves, e.g. some *Rhizophora* (Red mangrove) species, are unlikely to survive excessive pruning.

- 2.3.1 **Prune during the more dormant season.** Works should be conducted in the cooler months. Other times should be avoided, particularly in late spring when plant growth is most vigorous (Appendix 2).
- 2.3.2 **Cut back mangroves by no more than 1/3 of their original height OR remove no more than half the original foliage within a 12-month period.**
- 2.3.3 **Remove only smaller branches (maximum diameter of 25mm) of mangrove vegetation rather than removing larger limbs.** Most cut mangrove branches or stems greater than 25mm do not reshoot successfully, producing only short-lived 'water shoots'. Cuts to larger diameter branches allow entry of insect pests and fungal diseases. Decay of plant tissue leads to tree death.
- 2.3.4 **Prune branches of a diameter greater than 25mm only:**
- **when other options have been exhausted;**
 - **by cutting back to the trunk or to lateral branches so that no bare stubs remain.**
- 2.3.5 **For more detailed information on pruning techniques** refer to Australian Standard *AS4373-1996 Pruning of Amenity Trees* and Department of Natural Resources Tree Facts, *T18 Pruning for wood production* and *T45 Care of trees whilst building or landscaping*.
- 2.3.6 **Do not break or rip branches from trees.** This increases entry of the damaged areas to insect pests and fungal diseases. When cutting branches avoid splitting or tearing of the branch collar or trunk by pre-cutting or undercutting branches, the remaining stub is removed with a final cut.
- 2.3.7 **Employ appropriate type and size of equipment to minimise disturbance to vegetation.** Over-use of machinery encourages weeds, destroys useful native plants, compacts the soil and damages tree roots.
- 2.3.8 **Ensure all cutting equipment is sharp.** This minimises damage to trees.
- 2.3.9 **Use high-speed blade versions of the slashing machines for 'hedging'.** This prevents tearing and hacking often associated with slower or blunt slashing machinery. Shaking the trees through this process may also lead to tree death.
- 2.3.10 **Prune at regular intervals.** A maximum of 3 years between trimmings will help to ensure that the diameter of timber to be trimmed would not have grown over 25mm.
- 2.3.11 **Chip/mulch felled native vegetation and place on bank or use in rehabilitation works.**
- 2.3.12 **Leave vegetation with hollows whole.** If the vegetation contains hollows, it may ideally be used as on-site habitat or in a nearby riparian strip.
- 2.3.13 **Do not chip or mulch environmental or noxious weeds.** Disposal of these at least 5 metres from bank by drying and burial or burning to prevent re-introduction to drain.

Maintenance Activity Level 4 - Works in drains (marine plant removal, de-silting, floodgate maintenance etc.)

General considerations

- 2.4.1 **Careful pruning of overhanging branches reduces the need for removal of entire trees.**
- 2.4.2 **Fell vegetation in direction that minimises damage to surrounding vegetation.**
- 2.4.3 **Retention of marine plants, including trees, to shade the drain bed increases water quality through lower temperatures and higher oxygen saturation.**
- 2.4.4 **Maintain low flow velocities.** Average water velocities of less than 0.3m/s facilitate normal fish migrations. Many fish have 'burst speeds' that allows fish movement only over very short distances at higher velocities (up to 1m/s) (refer to FHG001). To prevent soil erosion however, velocities of 0.6m/s in loams and silts and of 1m/s in clays and gravels should not be exceeded.
- 2.4.5 **Retain stumps, dead trees and understorey on banks for drain stability benefits.**
- 2.4.6 **Depths should relate to original design but shallower depths will avoid Acid Sulphate Soil exposure.** Maintain the original drain profile. Wider and shallower drains are preferred as these reduce the energy within the drain and minimise the possibility of potential acid sulphate soil exposure. Alternate profiling of drains should be undertaken in consultation with relevant agencies such as DPI Fisheries, Department of Natural Resources and Environmental Protection Agency.
- 2.4.7 **Encourage natural regeneration/revegetate drains with shade producing tree species.** This can reduce erosion, reduce water temperatures and shade out and control growth of exotic grasses in drains. Where space adjacent to the drain is limited, utilisation of fast-growing, single-trunk trees reduces interference with farm operations. Trees planted in the beds of ephemeral drains instead of on the bank conserve space

Acid Sulfate Soil (ASS)

Fish kills are often associated exposure of acid sulphate soils. Impacts include export of iron leading to lower dissolved oxygen levels, aluminium attaching to fish gills in preference to oxygen, and prolonged small acid discharges causing diseases and deformities in aquatic species. Awareness of potential Acid Sulphate Soils (PASS), avoidance of this soil type where possible and implementation of management measures where ASS disturbance is unavoidable can significantly reduce ASS impacts on fish habitats and resources. Testing and treatment to be carried out following Queensland Acid Sulphate Soils Investigation Team Guidelines.

- 2.4.8 **Acknowledge risk of potential ASS in areas with a contour of 5m AHD and below.**
- 2.4.9 **Acknowledge possibility that organic material from standing waters has a significant acid producing potential in the form of mono-sulfides, which oxidise readily to form highly acidic leachate.**

- 2.4.10 **Carry out soil testing for potential ASS prior to excavation of drains in areas indicated as having potential ASS** and ensure that maximum excavation depth does not intersect pyrite layer.
- 2.4.11 **Disturbance of less than 5m³ of potential ASS within drainage structure, requires only low level of treatment and does not necessarily warrant thorough investigation.** Addition of lime to the spoil is encouraged to ensure acid sulfate does not leach to adjacent waterways.
- 2.4.12 **Calculate lime or other treatment method needed if potential ASS is identified and the disturbance is greater than 5m³.**
- 2.4.13 **Maintain drains at minimum rather than maximum depth.** Drainage channels in areas of potential ASS are to be as shallow as possible (ideally above any PASS or ASS layer) to avoid disturbance of potential ASS layers. Shallow and regular silt removal avoids the need for deep drain maintenance.

Drainage Sediment Removal

- 2.4.14 **Clear drain during the dry periods.** Drains are easier and safer to work at this time. The volume of sediment lost and the extent of turbid water entering adjacent, off-farm waterways are lower, reducing the need for sediment removal in downstream areas. Wet periods are usually of major importance for fish migrations and marine plant flowering and fruiting times (Appendix 2).
- 2.4.15 **Dispose of sediment spoil onto already cleared land at least 5 metres away from drains and not onto tidal lands and other wetlands.**
- 2.4.16 **Treat sediment spoil as appropriate.** Spoil can often have a high acid sulphate potential that requires treatment.
- 2.4.17 **Start cleaning works downstream where stream flow cannot be avoided.** Work upstream so that stream flow will not cloud excavation areas. Works conducted in the reverse limit the ability to observe any changes in soil profiles. Note that in areas of tidal action this can be the upstream area on an incoming tide.
- 2.4.18 **Utilise sediment control techniques; e.g. hay bundles, where turbidity plumes are expected.** These reduce off-site impacts.
- 2.4.19 **Keep floodgates closed until all disturbed material has settled.** This prevents turbid sediment flowing from the drain to adjacent waterways. Floodgate closure enables drain water to be treated in instances of acidic drainage.

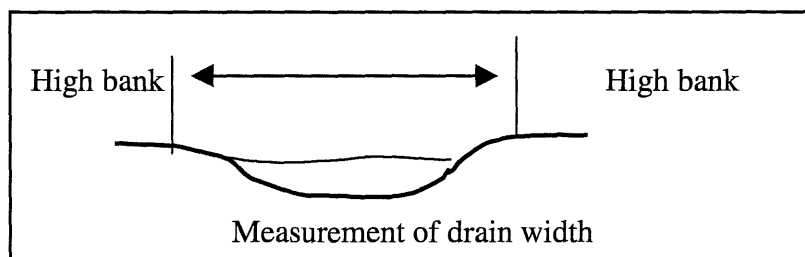
Maintenance Activity Level 4 – Drain size and impact level allowed

Complete marine plant removal is a level 4 maintenance activity that requires notification. The following information is specifically aimed at determining the level of marine plant removal allowed for different drain widths under the Fish Habitat Code of Practice. The measurement of bank width is generally from the high bank to the high bank of the drain (Figure 1).

In summary, drains less than 2 metres in width can be cleared on both banks and the bed. Drains between 4 and 8 metres wide can be cleared on one bank only and the bed. Always leave one bank of continuous vegetation (preferably the one which provides most shade).

Large drains over 8 metres wide can only be cleared from the bed with minimal disturbance to the bank for access. Keep all disturbance to the same bank (where practicable) for future maintenance works.

Figure 1: Measurement of drain width



Shallow spoon-drains and narrow drains [1 – 4 metres wide]

While marine plants and other vegetation should be retained where possible, a limited area of marine plants may be removed to restore drain function within the existing available space.

2.4.20 Complete removal of bed and bank vegetation is permitted from drains less than 2 metres in width.

2.4.21 Removal of marine plants is permitted from only one (1) bank and the bed for drains between 2 and 4 metres in width during a 12-month period. The bank selected for clearing should where possible be the bank that provides least shade over the drain. This will retain the maximum amount of shade for fish habitats and will reduce water temperatures and provide higher oxygen levels.

Continuous vegetation provides low stream velocity and other habitat values to many small and juvenile species that live and migrate in drains and adjacent waterways. Many of these values are lost when these habitats are cleared. Movement of fish is interrupted by changes in the extent of habitat cover and light intensity. Discontinuous vegetation cover constitutes a threat to fish movement. Vegetation of the opposite bank (uncleared) of the drain is to be retained as fish habitat.

2.4.22 Establish vegetation such as native grasses (and trees where space permits) in cleared drains as soon as possible after construction to minimise future erosion and water turbidity.

Medium drains [4 - 8 metres wide]

2.4.23 Remove vegetation from one (1) continuous bank and bed of the drain only. The bank selected for clearing should be where possible the bank that provides least shade over the drain. Bank vegetation provides shading of fish habitats and will reduce water temperatures and provide higher oxygen levels.

- 2.4.24 **Where larger vegetation must be removed due to space requirements, the opposite bank may be cleared on alternate maintenance times.** Bank vegetation may be cleared every 3 years but only every 6 years from each bank. By implementing this opposite bank clearing cycle, continuous fish habitat is maintained

Clearing of opposite banks reduces establishment of larger plants that may restrict available space and the time between maintenance allows for a degree of habitat maturity.

Mangrove species such as *Rhizophora* generally fruit annually once 4 years old. A minimum 6-year clearing regime allows mangrove reproductive cycles to provide seed for regenerating the opposite bank while not allowing plants to become excessively large.

Although cyclical clearing is allowed, it is preferable to retain one bank in an undisturbed, vegetated state where possible and restrict disturbance to same bank each maintenance period.

Large drains [>8 metres wide]

- 2.4.25 **Remove vegetation necessary for drain maintenance from bed of drain only.** All future access for maintenance and marine plant disturbance is to be confined to that access point
- 2.4.26 **No removal of marine plants from the banks other than for access.**
- 2.4.27 **Excavation only from within bed of the drain, on lower tide cycles.** Access is through cleared access points, identified prior to bed clearing, to prevent unnecessary disturbance on either bank.
- 2.4.28 **All vegetation surrounding the access point is to remain undisturbed.**

3.0 Works Notification and Signage

Information to be provided to QBFP prior to commencement of works

- 3.1 **Five (5) working days notification is required for maintenance Levels 3 and 4.** Notification is not required for maintenance Levels 1 and 2. The notification can be extended up to a month to allow for factors such as bad weather. A second notification is possible within the month period, this notification restarts the one-month clock. Once the month after the notification has passed without any further notifications works will be considered completed. If works have not been started at the end of the month, another notification is required at least 5 working days prior to the commencement of any works.

Information to be provided by cane grower to the Permit Holder (District CANE GROWERS Executive) 5 working days prior to commencement of works

- 3.2 Provide to the permit holder a completed Notification Sheet with the following:-
- Name of person (contractor/cane grower) who carried out the works

- Accreditation Number.
 - District Permit number.
 - Approximate location of the works site in relation to farm (address and possibly a map).
 - Distance, direction and slope (if relevant) to the nearest off-farm waterway.
 - Types of marine plant disturbed, e.g. *mangrove*, *salt couch* or *succulent*.
 - Maintenance Activity Level undertaken e.g. *pruning* or *complete removal*, *de-silting*
 - Type of equipment used, e.g. ... *an excavator with a weed rake*.
 - Estimate of extent of disturbance to marine plants:
 1. area (square metres),
 2. or length of drain,
 3. or number/size of plants.
 - Reason for works undertaken, e.g. drainage bank maintenance.
 - Mitigation techniques employed e.g. *partial rather than total clearing of drain bank*, *spoil treated to manage ASS*, *mangroves pruned rather than removed*.
 - Date when QBFP notified.
 - Notification Number provided by QBFP to cane grower.
- 3.3 **Notification by calling or faxing the local Queensland Boating and Fisheries Patrol Office and providing details of the completed Notification Sheet.** Notification is incomplete until QBFP has provided a 'Notification Number' to a cane grower as 'registration' of the Notification.
- 3.4 **Area of works must be clearly indicated by signage when complete removal is undertaken** (maintenance Level 4 only). Signs, quoting the Permit number being used, must be displayed on nearest access road while works are in progress.
- 3.5 **Cane grower to advise Permit Holder (District CANEGROWERS Executive) of completed works within 15 working days of completion.** Permit Holder to advise Queensland Boating and Fisheries Patrol of works completion.

Information to be provided to DPI Fisheries by Permit holder (District CANEGROWERS Executive)

- 3.6 **Permit Holder to advise Queensland Boating and Fisheries Patrol of works completion.**
- 3.7 **Annual summary reports on works conducted under authority of Strategic Permit/Code of Practice are to be sent to DPI Fisheries.** Submitted information to include: when, where, how and the size of the area affected, reasons for works, summarising works undertaken at individual sites. The report to also provide information on any mitigation techniques employed at these sites.

Alternately a copy of the cane growers' notification sheets completed throughout a year for a District, with a monthly summary coversheet, can be submitted.

Annual summary reports or completed Notification Sheets are forwarded to the Industry Manager at the Northern Fisheries Centre, Cairns or the Southern Fisheries Centre, Deception Bay.

Notification Sheet

1. Accreditation Number (e.g. MKY001) _____

2. Name & address of cane grower /contractor undertaking work

Name: _____

Address: _____

phone: _____

3. District Strategic Permit Number _____

4. Date of works commencement: ___/___/___ Duration (No days): _____

5. Location of maintenance works Map attached: Y N

Farm location in the district: _____

Name of nearest off-farm waterway (distance/direction/slope if relevant): _____

6. Type of Marine Plant to be disturbed (please tick)

Mangrove Salt couch Succulent Other

7. Maintenance activity level /type (e.g. pruning, complete removal, de-silting)

8. Type of equipment used (e.g. excavator with weed rake, hand pruning)

9. Estimate of extent of disturbance to marine plants

Area (square metres) _____ AND/OR length of drain (metres) _____

AND/OR number/size of plants to be disturbed _____

10. Reason for works to be undertaken (e.g. drain or floodgate maintenance, weed removal)

11. Mitigation techniques employed to reduce impacts to fish habitats (please tick)

partial rather than total clearing of drain bank sediment control practices

treatment of spoil for ASS/ salinity works done in dry time

Other (please state): _____

12. Qld Boating & Fisheries Patrol notified Date ___/___/___

13. Notification Number (provided by Qld Boating & Fisheries Patrol) _____

PERMIT HOLDER USE ONLY

Date provided by cane grower for completion of works

Date ___/___/___

DPI Fisheries Contact Numbers

Northern Fisheries Centre

(Sarina North)

Cairns

Phone (07) 4035 0100

Fax (07) 4035 1401

PO Box 5396, Cairns Qld 4870

Mackay

Phone (07) 4951 8035

Fax (07) 4951 4509

PO Box 668, Mackay Qld 4740

Southern Fisheries Centre

(Sarina South)

Deception Bay

Phone (07) 3817 9500

Fax (07) 3817 9555

PO Box 76, Deception Bay Qld 4508.

Bundaberg

Phone (07) 4153 7833

Fax (07) 4153 7895

PO Box 1143, Bundaberg Qld 4670.

Qld Boating and Fisheries Patrol

Bowen

Phone (07) 4786 3141

Fax (07) 4786 3444

PO Box 1080, Bowen, Qld 4805.

Bundaberg

Phone (07) 4153 7851

Fax (07) 4153 7895

PO Box 1143, Bundaberg Qld 4670

Cairns

Phone (07) 4052 7404

Fax (07) 4035 1603

PO Box 7453, Portsmith Qld 4870

Ingham

Phone (07) 4776 1611

Fax (07) 4776 3637

PO Box 1213, Ingham Qld 4850

Mackay

Phone (07) 4951 8031

Fax (07) 4951 4509

PO Box 668, Mackay Qld 4740

Mooloolaba

Phone (07) 5444 4599

Fax (07) 5444 2653

PO Box 199, Mooloolaba Qld 4557

Pinkenba

Phone (07) 3860 3506

Fax (07) 3860 3550

PO Box 10, Pinkenba Qld 4008

Port Douglas

Phone (07) 4099 5160

Fax (07) 4099 5172

PO Box 412, Port Douglas Qld 4871

Townsville

Phone (07) 4772 4729

Fax (07) 4721 5458

P O Box 2239, Townsville Qld 4810

Whitsunday

Phone (07) 4946 7003

Fax (07) 4946 5186

PO Box 851, Airlie Beach Qld 4802

A/H EMERGENCY CONTACT NO: (QBFP) 1800 017 116

CANEGROWERS Executive Contact Numbers

Bundaberg
Phone (07) 4151 2555
Fax (07) 4153 1986
PO Box 953
Bundaberg, Qld, 4670

Cairns
Phone (07) 4056 1251
Fax (07) 4056 3669
PO Box 514
Gordonvale, Qld, 4865

Tully
Phone (07) 4068 1077
Fax (07) 4068 2351
PO Box 514
Tully, Qld, 4854

Isis
Phone (07) 4126 6166
Fax (07) 4126 6336
PO Box 95
Childers, Qld, 4660

Maryborough
Phone (07) 4121 4441
Fax (07) 4121 6115
PO Box 172
Maryborough, Qld, 4650

Proserpine
Phone (07) 4945 1844
Fax (07) 4945 2721
PO Box 374
Proserpine, Qld, 4800

Burdekin
Phone (07) 4783 1144
Fax (07) 4783 4702
PO Box 933
Ayr, Qld, 4807

Innisfail
Phone (07) 4061 1133
Fax (07) 4061 4577
PO Box 32
Innisfail, Qld, 4860

Herbert River
Phone (07) 4776 5350
Fax (07) 4776 5380
PO Box 410
Ingham, Qld, 4850

Mackay
Phone (07) 4957 2381
Fax (07) 4951 1167
PO Box 117
Mackay, Qld, 4740

Mossman
Phone (07) 4098 2377
Fax (07) 4098 2233
PO Box 100
Mossman, Qld, 4873

Southern
Phone (07) 5441 2223
Fax (07) 5441 2944
CANEGROWERS Building, Lowe St
Nambour, Qld, 4560

4.0 Mitigation Techniques

The following mitigation techniques on how to improve farm drains are provided for cane growers interested in developing more fish friendly farm drains and gives guidance as to designs likely to be approved by DPI Fisheries should an individual permit be sought. Mitigation techniques are utilised to minimise impacts on fish habitats from on-farm activities.

Some of the proposed improvements and mitigation techniques outlined below constitute 'new works' and are outside the intent of the Strategic Permit/Code of Practice and may require individually assessed permits from DPI Fisheries, Department of Natural Resources and/or Environmental Protection Agency.

Drainage Works Preventative Actions

4.1.1 Planting trees for shade-out over and alongside drains gives the following benefits:

- prevents weeds, grasses and other nuisance plants
- prevents animals (e.g. rats) from establishing nests
- improves water quality
- maintains high dissolved oxygen (DO) levels
- reduces the growth of unwanted algae
- reduces water temperatures
- controls erosion, and
- reduces turbidity.

4.1.2 Utilise a batter no steeper than 1:1 for drains less than 4 metres wide when total drain clearing is required, unless otherwise stabilised.

4.1.3 Maintain a batter no steeper than 2.5:1 for drains over 4 metres wide. Banks with a steeper batter cause excess erosion and discourage bank-stabilising plants.

4.1.4 In areas of permanent water, increased water depth is a natural deterrent for many introduced, pest grasses that occur in drainage systems. However deeper drains are not recommended where drains do not have permanent water as this can lower ground water levels and increase the chances of potential ASS oxidation. Spoil treatment is also an issue requiring consideration.

Drain Crossings

4.1.5 Ideally crossings should allow flows for fish migration. Culverts to be constructed or replaced should be:

- of a box type
- as large as practical, and
- placed with either end at bed level.

Pipe culverts should be avoided where possible. For more information refer to FHG001 Fish Passage in Streams (Cotterell, 1998).

Drainage Works Involving Flood Gates

An effective technique for the removal of freshwater weeds established in drains above floodgates is by occasional flooding with tidal waters. Introducing operating

inefficiencies or partially opening floodgates during certain tidal events can have similar weed control benefits to spraying drains (refer Section 2.2.1).

Prior to inundation, site conditions (including the presence of permanent areas of freshwater, unlined drains and potential for saline intrusion into arable land), should be observed to calculate extent of inundation required.

Benefits of this technique may include increased fish passage, enhanced native vegetation, improved water quality and buffering of acid leachate. One-off tidal flows provide short-term benefits, where regular inundation gives longer-term benefits.

For drains containing permanent freshwater habitats, tidal inundation can lead to freshwater fauna becoming stressed and potentially result in fish kills. For expert advice contact your local DPI Fisheries Office.

Retention Ponds

Retention ponds increase habitat diversity (e.g. varying depths, greater shoreline complexity), provide shelter during dry periods, lower temperatures and allow for trapping of silt and other sediments as well as functioning as a nutrient stripper enhancing water quality.

- 4.1.6 Consider minimum depths when designing retention ponds. Water storages (not regularly flowing) less than 1-2 metres deep undergo extreme temperature fluctuations that stress fish. Shallow storages generally have excessive weed growth requiring additional maintenance. Water storages should therefore have areas that maintain 2-metre minimum depth all year, especially during dry seasons. These deeper holes should extend over a third of the storage area.
- 4.1.7 Consider installing drainage pipes with valves that assist with drainage and maintenance works such as weed control, bank maintenance and fish removal.
- 4.1.8 Encourage ponds with longer, more complex shorelines that are more productive for fisheries purposes than simple, square or circular shapes.
- 4.1.9 Consider direction of the prevailing wind when designing ponds. Increased wind and wave action increases mixing and aeration of water.
- 4.1.10 In smaller drainage systems with permanent water consider including deep holes for fish to shelter during dry periods. Consider constructing deep holes at a minimum of 1 hole per 500 metres of drain. Length of hole should be at least 1.5 times the bed width. The holes are also effective for sediment collection and bait collection. In drains with high sediment loads, more holes would be an advantage.

5.0 Ultimate Farm Drains

The following information on how to improve farm drain design and construction is provided for cane growers interested in developing more fish friendly farm drains and gives guidance as to designs likely to be approved by DPI Fisheries should an individual permit be sought.

Features of drains that would provide maximum benefits from a fisheries perspective are outlined below. If it is possible to satisfy all the features listed below in designing and constructing drains, the habitats provided by these on-farm drains would be of direct value to fish and local fisheries. Retention of riparian vegetation enhances water quality within drains and prevents terrestrial and aquatic weeds establishing along banks and on drain bed. Shade from riparian vegetation along the northern bank over the drain bed increases water quality through lower temperatures and higher oxygen saturation, thereby ensuring growth of the type of algae preferred by aquatic invertebrates and fish.

5.1 Spoon Drains and Small Drains [<4 metre wide]

- Banks:** Large vegetation cleared with native grasses on cleared areas.
- Batters:** Gentle sloping batters, enough for vehicles to utilise as headland roads. Two headland roads and a narrow, deep drain can be changed to two gently, centre-sloping headland roads used as a wide, shallow drain with increased arable area.
- Depth:** Dependant on the width of the headland road banks.
- Bottom:** Vegetated with native grasses if dry or native reeds.
- Cleaning:** *Tidal* - regular tidal inundation to kill terrestrial weeds.
Non-tidal - spot spraying weeds when bed is dry.
Physical - cleared banks maintained regularly by mowing/slashing will reduce the need for soil disturbance; use of a blade on farm equipment, only when no other option is available every 5 years.
- Timing of Works:** In dry season to prevent downstream impacts such as elevated turbidity from works and bare soil after works completion.
- Soil Deposition:** Soil movement for maintenance of these drains should be minimal. Spoil not to be placed on tidal lands/other wetlands.
- Crossing:** Spoon drain design facilitates vehicle and machinery access across whole drain when dry.

5.2 Medium Drains [4 - 8 metres wide]

- Banks:** *Natural side:* Maintaining natural vegetation to provide shade over the drain and maximum bank stability.
Disturbed Side: Vegetation cleared at maintenance time to facilitate access of excavation machinery. Where possible vegetation is left intact to provide additional habitat and reduce erosion in high flow areas.
- Batters:** *Natural Side:* Batter to encourage vegetation growth.
Disturbed Side: Batter slightly steeper than natural side to discourage vegetation re-establishment, unless to be utilised as a headland road.
- Depth:** Shallow. Depth reduced from the widening and shallowing of the batters, hydraulic capacity unchanged.
- Bottom:** Limited vegetation growing due to shading
- Cleaning:** Largely self-cleaning in flood events due to lack of grasses in drain. Tidal inundation when available.
Use of weed rake excavators where necessary to assist self-cleaning. Small regular maintenance as opposed to large infrequent maintenance events.

Excavation with standard bucket to be kept to a minimum with works every 5 years maximum.

- Timing of Works: Winter is period of lower fish migrations and mangrove fruiting and flowering.
- Soil Deposition: Soil to be appropriately tested/treated for potential ASS. Spoil not to be disposed on tidal lands.
- Mitigation: Partial clearing rather than total clearing on the disturbed bank.
- Crossing: Drain crossings for vehicles and machinery to be constructed according to design criteria described in *Fish Passage in Streams* (Cotterell, 1998) to ensure that flow velocities are not greater than 1metres/second, the maximum tolerable for native fish species to migrate.

5.3 Large Drains [>8 metres]

- Banks: To be left in natural state.
- Batters: Batter to encourage vegetation growth.
- Depth: Relative to size and capacity of drain. In areas of permanent water, the drain is to be deep enough to prevent nuisance vegetation and blockages from cane trash on flood events. Deep holes every 500 metres (length being at least 1.5 times the width of drain) to form a shelter for fish in dry periods and also for sediment collection, thereby reducing frequency of maintenance and improving water quality.
- Cleaning: Largely self-cleaning in flood events due to lack of grasses growing in drain and deep hole formation. Works to be focused around clearing deep holes but where other works are required they are to be preferably cleared from within the drain, either by a small floating dredge or by temporary drain obstruction and standard equipment removal. Though excavation to be kept to a minimum, the need for maintenance should be investigated every 5 years maximum.
- Timing of Works: Winter is the period of lower rainfall, fish migrations and mangrove fruiting and flowering. Works are appropriate at this time especially if drain obstruction is required.
- Soil Deposition: All spoil to be tested and treated as required for potential ASS and not disposed on tidal lands.
- Mitigation: Impacts to fisheries resources can often be mitigated at a site by contacting local DPI Fisheries staff for information prior to commencement of works.
- Crossing: Drain crossings for vehicles and machinery should be constructed according to design criteria described in *Fish Passage in Streams* (Cotterell, 1998) to ensure flow velocities are not greater than 1 metres/second, the maximum tolerable for native fish species to migrate.

6.0 Glossary

- ASS:** Acid Sulfate Soils, soils containing iron sulfides, when exposed to air these soils produce sulfuric acid.
- BCTB:** Burnt Cane Trash Blanketing - process of spreading cane tops and leaf residue on the ground after harvesting a burnt cane crop.
- BSES:** Bureau of Sugar Experiment Stations.
- Cane Production Area:** Entitles cane grower to enter a supply agreement with a mill for the supply of cane grown on a specified number of hectares.
- Drainage System:** A system of gully inlets, pipes, overland flow paths, open channels, culverts and detention basins used to convey runoff to its receiving waters. (Queensland Urban Drainage Manual Volume 1:Text)
- Drainage Waterway:** An on-farm structure designed to convey runoff to its receiving waters.
- Dunder:** Waste liquid from the production of ethanol; used as fertiliser in cane fields.
- Ephemeral:** When waterways and drains are temporary or intermittent e.g. streams and creeks that dry up.
- Exotic plant:** Not native to an area (introduced from elsewhere)
- Filter Mud:** The insoluble matter (mud) extracted from cane juice. A useful soil ameliorant consisting of 25% solids and 75% water.
- Fisheries Resources:** Fish and marine plants.
- Fish Habitat:** Land, waters and plants associated with the life cycle of fish and include land and waters currently occupied by fisheries resources.
- GCTB:** Green Cane Trash Blanketing - process of spreading a thick layer of cane leaves and tops on the ground after harvesting a cane crop green (without burning).
- Grower:** Person who holds an entitlement called a cane production area.
- Headland:** Regularly maintained strip of approximately 5 metres wide that provides access around the crop. Provides room for harvester to manoeuvre and prevents growth of trees, which would shade out and compete with cane. Widths usually kept to a minimum to maximise arable area for the grower.
- HAT:** Highest Astronomical Tide - predicted highest level that can occur under average meteorological conditions and any combinations of astronomical conditions. This level will not be reached every year and is not the extreme level that can be reached, as storm surges may cause considerably higher and lower levels to occur.
- Marine Plant:** A plant that usually grows on or adjacent to tidal land, whether living dead standing or fallen (*Fisheries Act 1994*).
- Mitigate:** To make moderate the severity of impacts on fisheries resources.
- Non-Producing Farm:** Includes properties that have never been cultivated for cane production or has been cultivated for cane production but has ceased producing in the past for an extended period (other than for a 1 year fallow)(refer Producing Farm).
- PAD:** Present Assignment Description - real property description of land assigned to a mill and contained in an assignment e.g. a grower may have 100ha of assignment on 200a of real property.

- PASS:** Potential Acid Sulfate Soil - soils that if disturbed and oxidised occurs can form Acid Sulfate Soils.
- Pest Boards:** In July 1991 the former Cane Pest and Disease Control Boards were replaced by Cane Protection and Productivity Boards.
- Producing Farm:** An area of a cane farm or a whole farm that is currently being cultivated or is actively being worked as a cane farm i.e. includes short term (1 year) fallow and harvested crops. A non-producing farm can include properties that have never been cultivated for cane production or has been cultivated for cane production but has ceased producing in the past (other than for a 1 year fallow) for an extended period.
- Productivity Board:** Constituted by the Minister with three grower representatives from the area, two mill owner representatives and one BSES officer. Funded by levies paid by growers and millers on all cane received at the mill/s. Functions include pest and disease control, assisting BSES with research into production, transport and processing of cane and providing advice and assistance to growers.
- QASSIT:** Queensland Acid Sulfate Soils Investigation Team at Department of Natural Resources.
- Season:** For statistical and accounting purposes the Australian season is from 1 July to 30 June. The crushing season usually begins in early June and ends in December, typically running for 20 – 22 weeks.
- Tidal Land:** Includes reefs, shoals, and other permanently or periodically submerged by water subject to tidal influence (refer to *Queensland Fisheries Act 1994*). A measure of the extent of tidal land commonly used is Highest Astronomical Tide (HAT)(refer above).
- Waterway:** A river, creek, stream, watercourse or inlet of the sea.
- Weeds:** A plant species not endemic to that area (see exotic plant), usually a pest species but not a protected marine plant.

7.0 Selected Reading

BSES (1989) *BSES Bulletin No. 28, Weeds in Australian Cane Fields*, Bureau of Sugar Experimental Stations, Brisbane, 84pp.

Cotterell, E. (1998) *Fish Passage In Streams, Guidelines for Stream Crossings in Queensland*, Queensland Department of Primary Industries Fisheries Habitat Guideline FHG001, 62pp.

Couchman, D., Mayer, D. and Beumer, J. (1996) *Departmental Procedures for Permit Applications Assessment and Approvals for Marine Plants*, Queensland Department of Primary Industries, Fish Habitat Management Operational Policy FHMOP 001, 62 pp.

Hopkins, E. and White, M. (1998) *Dredging, Extraction and Spoil Disposal Activities: Departmental Procedures for Provision of Fisheries Comments*; Queensland Department of Primary Industries, Fisheries Group FHMOP004, 79pp.

Lovelock, C. (1993) *Field Guide to Mangroves of Queensland*, Australian Institute of Marine Science, 72pp.

QASSIT (1998) *Sampling and Analysis Procedure for Lowland Acid Sulfate Soils (ASS) in Queensland*. Queensland Acid Sulfate Soils Investigation Team, 1998, 27pp.

Queensland Department of Environment and Heritage (1998) *Fish Kill Reporting and Investigation Manual*, 28pp.

Queensland Department of Natural Resources (1996) *Tree Facts*; T18, T23, T33, T42, T45.

Queensland Department of Natural Resources (1998) *River Facts*; R30, R31, R34.

Queensland Department of Natural Resources (1995) *Water Facts*; W43.


Queensland Department of Transport (1999) *The Official Tide Tables and Boating Safety Guide 1999*, 220pp.


Sainty, G. and Jacobs, S. (1994) *Water Plants in Australia, Third Edition*. CSIRO Division of Water Resources, 327pp.

Standards Australia (1996) *Australian Standard Pruning of Amenity Trees AS 4373-1996*, Standards Australia, Homebush NSW.

Appendix 1 Summary – On-Farm Drain Maintenance Involving Marine Plants

Drains on Queensland cane farms are productive fisheries environments. The following practices are recommended when canegrowers carry out maintenance works for on-farm drains. With the application of these techniques, any short-term adverse impacts of farm maintenance on fisheries habitats may be offset by longer-term benefits. The following are seen as the minimum required for fisheries habitat protection. Further protection may be discussed by contacting the local DPI Fisheries office. Growers who wish to carry out maintenance works involving marine plants must first attend an accreditation workshop. Non-accredited growers must apply for individual permits from DPI Fisheries before carrying out any maintenance works involving marine plants.

Impact	Level	Activity	Action
Low  Higher	1 Lowest Impact	Slashing/mowing within spoon drains and adjacent to medium and large tidal drains.	<ul style="list-style-type: none"> ✓ Works over roads, headlands and spoon drains within existing farm boundaries.
	2 Floodgate/ Chemical Control	(a) Periodic inflow of salt water through floodgates	<ul style="list-style-type: none"> ✓ Use floodgates to manage weeds through inflows of saline water as preferred alternative.
		(b) Target spraying of weeds in and adjacent to tidal drains	<ul style="list-style-type: none"> ✓ Use non-residual products as per the instructions on the Label and the Material Safety Data Sheet. ✓ Use target spraying in preference to blanket spraying. ✓ Apply during optimal plant growth but on dry and still days whenever possible
3 Pruning	Pruning/trimming of marine plants, including mangroves.	<ul style="list-style-type: none"> ✓ Notify Queensland Boating and Fisheries Patrol (QBFP) at least 5 working days prior to anticipated works. ✓ Mangroves to be pruned only during period of lowest growth (late winter) where possible. ✓ Restrict pruning to branches no thicker than 2.5cm (thumb size) diameter if possible ✓ Cut mangroves by no more than 1/3 original height or remove no more than 1/2 foliage in any 12-month period. ✓ Fell vegetation in a direction that minimises damage to surrounding vegetation. ✓ Chipping and mulching are encouraged, but not for environmental or noxious weeds. 	

Impact	Level	Activity	Action
 Highest	4 Works in Drains Higher Impact	Maintenance works that may require removal of marine plants for cleaning, de-silting works, floodgate maintenance etc	<ul style="list-style-type: none"> ✓ Notify QBFP at least 5 working days prior to anticipated commencement of works. ✓ Display signage on nearest access road while work is in progress. ✓ Excavation works undertaken during dry periods where practical to avoid disrupting fish migrations. ✓ Spoil removed from drains to be appropriately managed (care should be given to potential acid sulfate soils, salinity and effects on tidal zones and habitats). ✓ Spoil to be placed at least 5 metres away from drains.
		Shallow spoon and narrow drains less than 2 metres wide	<ul style="list-style-type: none"> ✓ Complete removal of bank and bed vegetation for drains less than 2 metres wide.
		Shallow spoon and narrow drains 2 – 4 metres wide	<ul style="list-style-type: none"> ✓ Removal of vegetation from only one bank and bed for drains 2 –4 metres wide.
		Medium drains 4 - 8 metres wide	<ul style="list-style-type: none"> ✓ Remove vegetation from only one bank and bed of drain. Where large vegetation must be cleared due to space requirements, opposite bank may be cleared on subsequent maintenance occasion (every 3rd year). ✓ Preferable to keep bank which provides most shade and keep all maintenance activities to one bank
		Large drains >8 metres wide	<ul style="list-style-type: none"> ✓ Excavation from within bed of the drain only on lower tide cycles. Access through predetermined cleared access points.

The Strategic Permit/Fish Habitat Code of Practice does **NOT** cover **major works such as redirecting/enlarging drains, new works such as new drains and floodgates, or clearing new land.**

Contact your local QDPI Fisheries Office to apply for an individual works permit if the proposed works will involve protected marine plant disturbance. Each application is assessed on its own merits and approvals are not automatic.

Appendix 2 Regional Seasonal Considerations

Traditionally rainfall and extent of on-farm duties such as harvesting have determined the timing of maintenance works. DPI Fisheries identifies two other factors important to planning maintenance works: the flowering and fruiting cycle of marine plants and the migration patterns of local fish species. The flowering and fruiting cycles, fish migration patterns, monthly rainfalls and work units as measured on cane farms are shown for the Northern, Central and Southern cane growing regions in Figures 1,2 and 3.

The following recommendations have been developed based on an understanding of the four factors and work periods on a northern, central and southern regional basis. Details for a particular marine plant or fish species can be confirmed with local DPI Fisheries staff.

1.0 North

Rainfall precludes much of the on-farm maintenance works from January to April/May when access to farms is virtually not, if at all, possible. Traditionally harvesting begins around June and continues through to November. In the past, farm maintenance was conducted during drier times often post-harvest.

Mangrove fruiting and flowering is considerably less between April and August with a slight reduction during September to November. Fish migrations are at a lower level through September and October and considerably reduced during May to August (Figure 1).

Recommendation

September to October is preferred for major works in Innisfail and Tully due to the considerably higher rainfall in this area. The optimal period for Mossman, Cairns and Ingham is May with a possible alternative of October.

2.0 Central

Rainfall is below a monthly average of 200mm between April and December. On-farm drainage works are traditionally undertaken throughout the year but are at a lowest level in April, May, September and December.

Mangrove fruiting is minimal between April and October and fish migrations are lowest between May and August (September and October are low but not as low as other months).

Recommendation

April, May and September are optimal for major works to be undertaken on farm drains.

3.0 Southern

Mangrove fruiting and flowering is lowest between April and October and fish migrations lowest between April and August (Note: April is noticeably higher than May but considerably lower than the higher months and is not a preferred month for on-farm drainage maintenance works, Figure 3).

Recommendation

April to August is seen as the most suitable period for major works within the Bundaberg/Childers region.

Due the high rainfall in the Tewantin and Maroochy region, June to August is the recommended period for major works on-farm in this region.

Figure 1: Northern Seasonal Comparison of Fisheries, Weather and Farming Issues

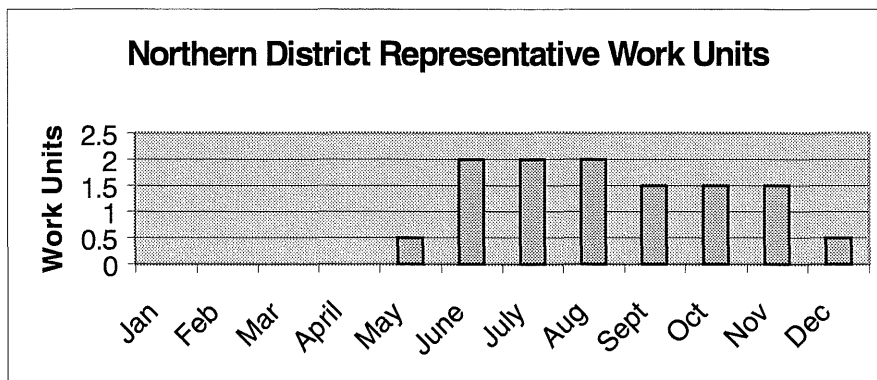
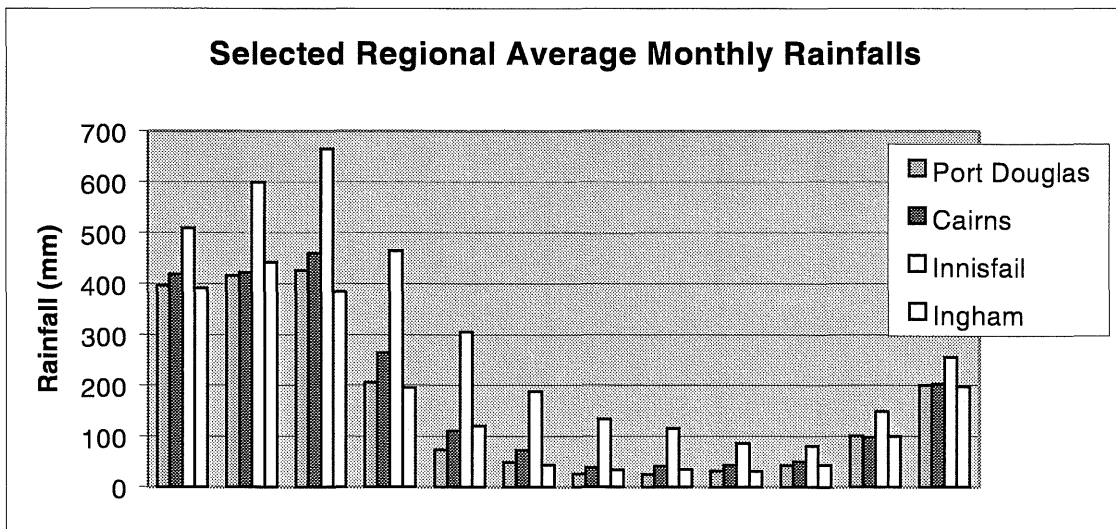
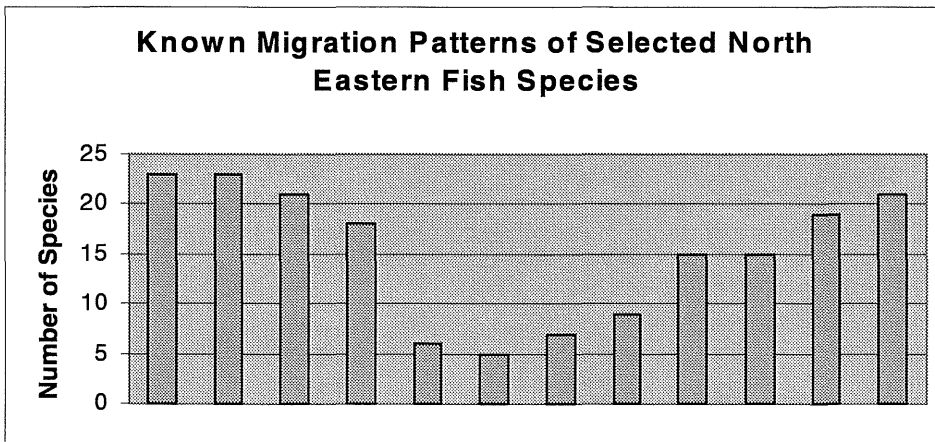
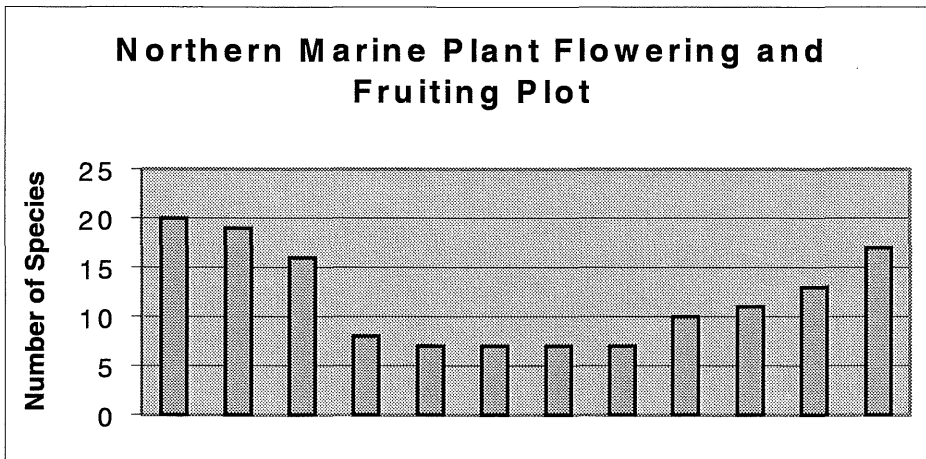


Figure 2: Central Seasonal Comparison of Fisheries, Weather and Farming Issues

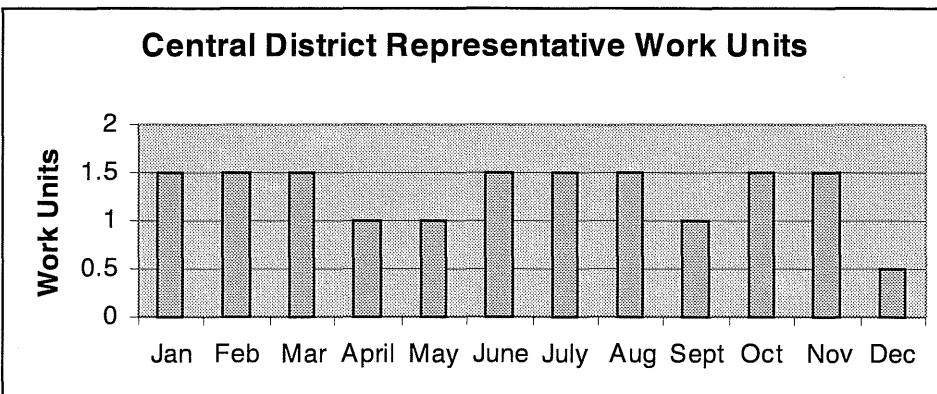
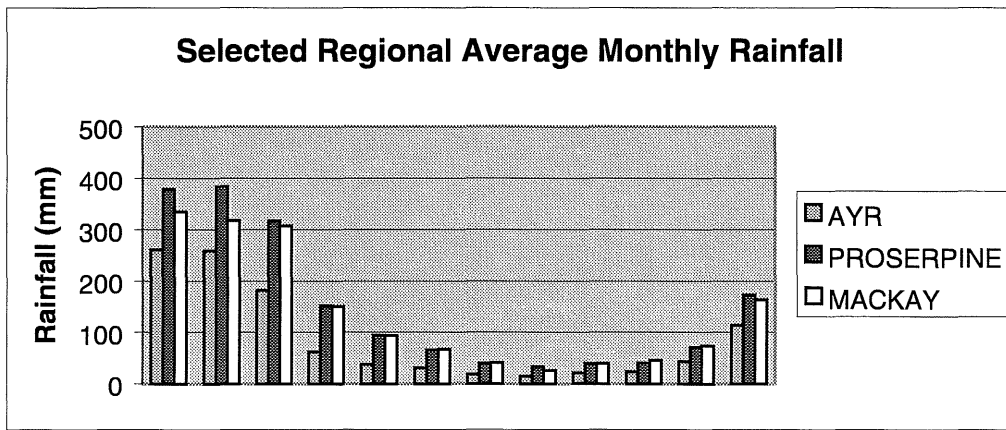
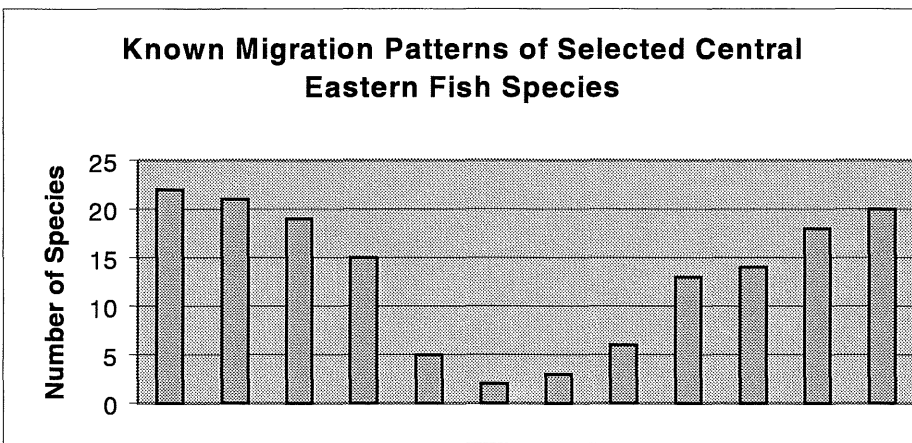
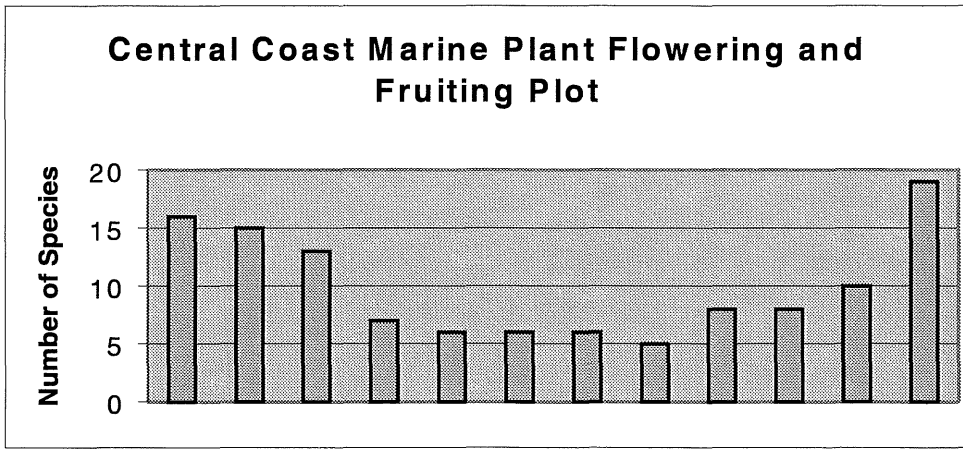


Figure 3: Southern Seasonal Comparison of Fisheries, Weather and Farming Issues

