

# Lake developments

## What are lake developments?

A lake development is a constructed waterway, usually created for a residential and/or tourist development, in which a predetermined water level is maintained. The lake can be wholly constructed, or involve modification of existing waterways. Such lakes may be created to provide a source of fill during the construction of the development, a drainage detention basin, an area for recreation and visual amenity, and a habitat for aquatic plants and animals.



This information sheet covers both the construction and operation of lake developments. It is intended to help those responsible for lakes (e.g. local and state governments, developers and the general public) achieve the best possible management outcomes. The principles outlined apply to lakes that contain fresh, brackish or marine water.

## Why is DPI&F involved with the assessment of lake developments?

The Department of Primary Industries and Fisheries (DPI&F) is responsible for managing fish habitats to ensure that fisheries resources remain productive and sustainable for current and future generations.

The *Fisheries Act 1994* and the *Integrated Planning Act 1997* (IPA) provide controls for dealing with impacts to fish habitats and fisheries resources associated with the construction and approval of lake developments in coastal areas. These controls include:

1. Protection of marine plants

The *Fisheries Act 1994* protects all intertidal vegetation (e.g. saltmarsh plants, mangroves and seagrasses). Under provisions of the IPA, disturbance to marine plants may require a fisheries development approval.

2. Declaration of Fish Habitat Areas (FHAs)

FHAs are declared by regulation under the *Fisheries Act 1994*. Declared FHAs protect all types of high-quality fish habitats from development impacts.

3. Issuing restoration notices

DPI&F may issue a notice to restore fish habitat under the *Fisheries Act 1994* if a lake development creates off-site or on-site impacts on fish habitats or fisheries resources. Fish Habitat Management Operational Policy FHMOP 009: *Restoration notices for fish habitats – Formulation and implementation: Departmental procedures* provides information on DPI&F restoration notices.

4. Waterway barrier works approvals

Waterway barriers can impact on fish stocks by restricting the movement of fish species between critical fish habitats. Many species of fish need to move between freshwater and marine areas to complete their lifecycle. An approval from DPI&F may be required to build a waterway barrier. This approval may require a fish way to be incorporated into the design.

DPI&F also seeks to ensure that off-site impacts (see below) from developments do not harm fish habitats and dependent fisheries resources. This is particularly relevant where declared FHAs may be impacted. In this regard, DPI&F provides input and advice to planning processes such as local government planning schemes, regional management plans and coastal management plans.

## What impacts can lake developments have on fish and fish habitats?

Inappropriate location, construction and management of lake developments can lead to impacts on fisheries resources such as:

- fish habitat removal or degradation
- introduction of pest fish and plants
- water quality degradation (turbidity, contamination, salt water intrusion, etc)
- exposure of acid sulfate soil
- restriction of fish movement
- downstream flow of poor-quality water, changes in hydrology, erosion etc.
- use of mosquito control measures (e.g. pesticides).

## How can the impacts of new and existing lake developments on fish and fish habitats be reduced?

The impacts of lake developments on fish and fish habitats can be reduced by considering the following:

### 1. Appropriate location

Lake developments should be located to avoid the potential impacts on fish habitats and fisheries resources.

Selected locations **should**:

- a. exclude fish habitats
- b. avoid disturbing acid sulfate soils
- c. have a direct connection with a healthy waterway to maintain an optimal source of tidal exchange.

Selected locations **should not**:

- a. alter tidal flows
- b. require modification of existing waterways
- c. restrict public access to fisheries resources.

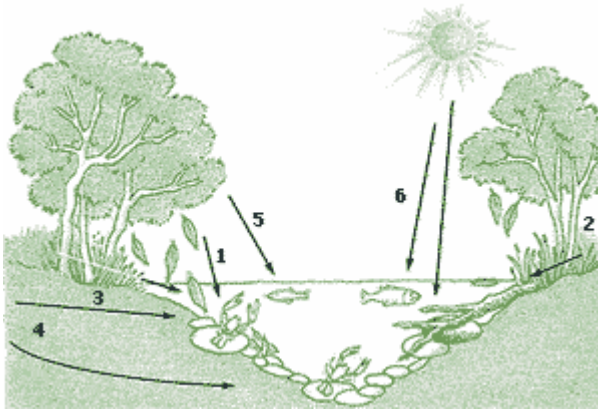
In certain cases, a “sacrificial” lake may be designed to manage degraded water quality and protect the water quality of the adjacent natural waterways from polluted runoff.

### 2. Timing of works

**Works** in tidal areas should be scheduled to avoid periods of flowering/fruitletting (plants) and migration (fish, prawns, crabs, etc.).

### 3. Buffer zones

Implementation of an appropriate vegetated **buffer zone** between a lake developments and adjacent fish habitats will improve: flood control, water quality, erosion control and shoreline stabilisation, and help protect fish habitats. Refer to Fish Habitat Guideline FHG 003: *Fisheries guidelines for fish habitat buffer zones*.



1. Inputs of leaf litter and fruits from buffer vegetation.
2. Inputs of logs and branches that provide habitat for fish and plants.
3. Leaves and organic matter washed in from surrounding catchment.
4. Sub surface flow and groundwater.
5. Insects falling from buffer vegetation.
6. Microalgae and other aquatic plants stimulated by sunlight.

Source: Lovett, S, Price, P & Lovett J 2003, Managing riparian lands in the cotton industry, Cotton Research and Development Corporation, p. 5.

#### 4. Fish movement

Access to a broad range of fish habitats is important for the many fish, prawns and crabs that migrate through different habitats to complete their life cycles.

Works that create barriers to **fish movement** should be avoided. Examples of such works may include:

- i. construction of waterway barriers
- ii. channelisation and armouring of meandering waterways
- iii. removal of riparian and in stream vegetation
- iv. the use of fish exclusion screens to prevent the movement of selected sizes of fish. For example, barriers for problem species such as bull sharks can inhibit the movement and survival of other fish species (e.g. barramundi).

In some cases, it may not be appropriate for fish to have access to lake developments. This could apply where the lake environment can not be managed to provide a suitable habitat (e.g. too shallow) for fish and other aquatic species and can lead to fish kills. Unwanted fish can be encouraged to exit the lake through the use of fish bypass channels. Fish Habitat Guideline FHG 005: *Fisheries guidelines for managing ponded pastures* contains more information.

#### 5. Environmental management plans

Many potential fisheries impacts can be reduced through carefully designed **environmental management plans** (EMPs) for the construction and operation of a lake developments. EMPs should be formulated for both public and private lake developments. Occasionally, there can be a problem in uncoordinated public and private lakes which may not have aligned management objectives. Coordinated ongoing management is required within a lake development, (e.g. between the developer and local government), and with surrounding lake developments to achieve holistic management and ensure protect fisheries resources. This will ensure that management issues in one lake will not affect adjacent lakes.

Use the table below to assess how effective your EMP is.

Does the EMP incorporate:	✓
1. Best quality of discharge water, whether channelled or through overtopping, under different flow events	
2. Suitable controls (e.g. erosion and sediment control) to minimise water pollution occurring from the construction and operation of the lake development	
3. A monitoring program (usually water quality in lake and discharge)	
4. An acid sulfate soils management plan as per State Planning Policy 2/02: <i>Planning and managing development involving acid sulfate soil.</i>	
5. Management of dredge spoil and other waste resulting from maintenance activities	
6. Lake water quality that complies with appropriate national water quality objectives	
7. Pollution control measures that use of existing or constructed systems based on natural processes (e.g. wetlands or vegetated floodways)	
8. Minimisation of erosion of lake edge through measures such as bank stabilisation, revegetation and the use of energy dissipating structures	
9. Establishment of any permanently ponded areas (including wetlands) designed to minimise public health risks	
10. Removal of pest fish, weeds and accumulated vegetation from upstream creek lines	
11. Exotic fish management, specifically targeting the illegal introduction of <i>Tilapia</i> and other noxious species	
12. Regular assessment of native fish populations and restocking where appropriate	
13. Litter cleanup on the lake edge and within the lake	
14. A lake and foreshore community education program	

Check your Environmental Management Plan rating:

Number of ✓	Star rating	Fisheries rating
1 – 3	*	poor
4 – 6	**	average
7 – 9	***	good
10 -12	****	excellent
13 – 14	*****	outstanding

## Restrictions in declared Fish Habitat Areas (FHAs)

Declared Fish Habitat Areas are spatially defined areas containing key fish habitats that are vital to sustaining fish stocks and fisheries. Key fish habitats such as those in declared FHAs need to be protected from potential impacts of lake developments to ensure suitable commercial, recreational and traditional fisheries. Lake developments are not permitted in declared FHAs, although there may be exceptions for certain types of infrastructure associated with lake operations (e.g. inlet and outlet pipes may be permitted in Management 'B' FHAs).

## Fish kills

Despite the appropriate design, location and management of lake developments, fish kills may still occur. For example, fish kills in Robina Lakes on the Gold Coast have been related to 'lake turnover'. Lake turnover is caused by seasonal temperature changes bringing nutrient rich water to the surface and oxygen rich water to the bottom of the lake. The oxygen deficient conditions at the top of the lake cause the fish kills. Consequently, Gold Coast City Council has placed electric water mixers in the lake to maintain the temperature throughout the water column to prevent future fish kills. Early reporting may allow for remedial action, for example, the relocation of surviving fish, to be undertaken.

The Environmental Protection Agency is lead agency for reporting and investigation of fish kills. The Hotline number is 1300 130 372.

## Where can I get more information?

The following sources provide additional information on how to implement and manage lake developments:

- Coastal development guidelines are available through Ecoaccess on the Environmental Protection Agency's website ([www.epa.qld.gov.au](http://www.epa.qld.gov.au)). The guidelines provide guidance for proposed development in tidal areas under the *Coastal Protection and Management Act 1995* and the Integrated Development Assessment System (IDAS).
- The Environmental Protection Agency is the lead agency for reporting and investigating fish kills. The Hotline number is 1300 130 372.
- The Queensland acid sulfate soil technical manual is produced by the Department of Natural Resources and Water (NRW) and outlines the best practice management guidelines for acid sulfate soils. These guidelines are available on the NRW website at: [www.nrm.qld.gov.au](http://www.nrm.qld.gov.au)
- For copies of the Fisheries Guidelines 'Fish habitat buffer zones' (FHG 003) or the 'Managing ponded pastures' (FHG 005) or the Fish habitat management operational policy: 'Restoration notices for fish habitats: Departmental procedures' (FHMOP 009) or other policies, visit [www.dpi.qld.gov.au/fishweb](http://www.dpi.qld.gov.au/fishweb) or call the DPI&F on 13 25 23.
- Your local council may have guidelines and laws that apply to managing lake developments and development that are adjacent to wetlands.
- More information about the management of FHAs can be found at [www.dpi.qld.gov.au](http://www.dpi.qld.gov.au) ■