Pacific Reef Fisheries Guthalungra Farm
Draft Property Management Plan – Predator Management

Applicant: Pacific Reef Fisheries (Bowen) Pty Ltd - ACN 092 330 553,
PO Box 200, Ayr, Qld, 4807, a wholly owned subsidiary of Pacific Reef Fisheries (Australia) Pty Ltd – ACN 084 456 931.

Activity location: Lot 8 SB 298 and Lot 370 K124643, Parish of Curlewis, County of Salisbury, Coventry Road, Guthalungra.

Activity type: Prawn farming

Relevant licences: Aquaculture license tba
Environmental Authority tba
Development Permit number tba

Previous Damage Mitigation Permits held by Pacific Reef Fisheries (Australia) Pty Ltd:
Damage Mitigation Permit under the Nature Conservation Regulation 1994
No. WIMP03308205
No. WIMP02289004.
No. WIMP02935505
No. WIMP02289004

Farmed Species: *Penaeus monodon* – Black tiger prawns

Predatory species: Great cormorant, *Phalacrocorax carbo*
Little black cormorant, *Phalacrocorax sulcirostris*
Pied cormorant, *Phalacrocorax varius*

Predicted interaction:

- Cormorants can cause significant mortality and injury to prawns with large (up to 100%) consequential loss of the crop if unchecked.
- The risk of the interaction is very high. In the prawn production history of Pacific Reef Fisheries, predation by cormorants has occurred in every crop.
- Prawn farming is a seasonal activity. Prawns are stocked from July each year and are generally not of sufficient size to be attractive to cormorants until October. Prawns may be harvested up until June each year. Thus, predation by cormorants generally occurs between October and harvest (June). Recorded observations reveal that cormorants may appear at any time during this period.
- Cormorants usually leave their roosts at daybreak and may feed at any time during the day. We are not aware of any predation by cormorants at night.
- The numbers of birds in any one flock can vary from single animals to flocks of hundreds of birds.

Description of integrated management plan:

Introduction

Prawn farms generally suffer from impacts of predation by cormorants. Predatory birds can consume enormous quantities of prawns and compromise the commercial viability of the

company if not controlled. Cormorants are known to take large amounts of food (400 g/day/bird) (Lekuona et al, 2002), have been described as consuming 53% of the production of a fish farm in the Netherlands (Lekuona et al, 2002) and are known to cause significant economic loss to Australian fish farms.

On the other hand, wide-spread culling of birds appears to be not acceptable to regulators on the basis of perceptions of opinions in the broader community, largely on animal welfare grounds. Evidence for resilience of the populations to culling is present on the literature. Great cormorant populations were reported to increase by 20 fold in Europe between 1970 to the late 1990s (Frederiksen *et al*., 2001). Those authors found that culling 15% of the total population of great cormorants, *Phalacrocorax carbo*, in Europe would have a limited effect on the total population. Coutin and Reside (2003) described increases in great cormorant populations in Victoria of a similar magnitude to those observed in Europe indicating that a similar resilience of the population to culling is likely to be present.

In order to manage predation on prawns by cormorants while limiting culling, Pacific Reef Fisheries has developed techniques of control that take account of the social and behavioural characteristics of the species.

Cormorant behaviour

Cormorants feed both singly and in flocks (Moerbeck et al, 1987; Lekuona et al, 1997) with those feeding singly being more resistant to predator deterrents than those feeding in flocks (Moerbeck et al, 1987). A comparison of deterrent methods including detonators, light flash cartridges, aircraft and helicopters and overhead lines by Moerbeck et al (1987) showed that cormorants were easily able to learn and avoid such deterrents.

At Pacific Reef Fisheries' Alva Beach farm, it has been observed that single cormorants will often appear around the farm early in the crop. If these birds are frightened way from the farm and not allowed to settle on the ponds, then the numbers of cormorants observed remains at a relatively low level. If the single birds are allowed to settle and subsequently feed in the ponds, then it is likely that larger flocks will begin to appear. It is much more difficult to subsequently frighten them away if any birds are allowed to settle and feed in the ponds.

Accordingly, we have developed a behaviour management plan for dealing with cormorants to avoid them settling on the ponds.

Behaviour management

Pacific Reef Fisheries has been utilising a product called Bird Fright Cartridges fired from a 12 gauge shotgun. The basis of the deterrent is to prevent the cormorants alighting on a pond and discovering the presence of food. The Bird Fright is fired into a flock or ahead of a cormorant as it flies over the farm where it explodes producing a loud report and a smoke cloud. In most cases this has the effect of scaring the flock and preventing them settling. Follow-up with non-lethal shots from the shotgun encourages the birds to continue to move on.

On occasions, either when a cormorant enters the farm unobserved or is not deterred by the Bird Fright, they may then be subsequently seen feeding on the ponds. Moerbeek et al. (1987) considered these birds to be "fish farm specialists", a small part of the total population and more adept at avoiding other deterrents such as lines than the majority of the population. At Pacific Reef Fisheries, we have found that it is necessary to cull these particular birds, as no other action will deter them. In view of the relatively small portion of the population that they form, however, the impact on the total population is negligible.

Additional activities

Pacific Reef Fisheries supplements the behaviour management strategy with additional actions.

1. Staff actively chase some birds on bikes, in vehicles or on foot. Cormorants rapidly learn that vehicles and staff without a weapon are not a threat, however, and this strategy has little effect after a short time.
2. A number of hides will be distributed about the farm and some shooting of bird-frite will be undertaken from these hides to reinforce the hides as a potential source of threat to the cormorants. The hides probably serve to concentrate the attention of the cormorants on some sections of the farm instead of others.
3. Pacific Reef Fisheries is investigating attracting raptors to the farm by provision of nesting sites. The presence of raptors, usually osprey, has been described by some as providing deterrent to cormorants. Other anecdotal evidence indicates that raptors and cormorants may engage in fatal interactions indicating a potential competition between the species that may be utilised to prevent cormorant invasion of the prawn farm.

Previous activities:

The use of gas-guns has been previously investigated at Pacific Reef Fisheries Alva Beach farm. These were used for a period of one season but were found to be ineffective. As with chasing, the cormorants rapidly learn the limitations of the threat. In some cases, birds have been seen alighting on gas guns whilst they are in use.
This experience matches well with the experience of Moerbeck et al (1987) who compared detonators, light flash cartridges, aircraft and helicopters and overhead lines and found that cormorants were easily able to learn and avoid such deterrents.

Planning and development management:

Pacific Reef Fisheries Guthalungra farm development includes rehabilitation of a series of wetland areas. Anecdotal reports indicate that where cormorants have alternative habitat close by, they will prefer to utilise that habitat over a prawn farm where they are continually disturbed. Thus the adjacent wetlands at Guthalungra are thought to provide a preferred refuge for cormorants travelling through the region.

Consultation:

An extensive literature search was undertaken during the preparation of this Property Management Plan. One hundred and seventy eight references were identified in the Aquatic Sciences and Fisheries Abstracts database using the search terms [“cormorant” AND (“behaviour” OR “social”)]. Ninety-four references were identified in the Aquatic Sciences and Fisheries Abstracts database using the search terms [“cormorant” AND “aquaculture”]. A number of these sources were duplicated. The complete lists of these references are shown in Appendix 1 below. Those sources deemed relevant were reviewed in the preparation of this plan. The majority of the work referred to studies of great cormorants, *Phalacrocorax carbo*, in Europe and Australia and double-crested cormorants, *Phalacrocorax sauritus*, in North America. In general, populations of these species of cormorants have increased in Australia (Coutin and Reside, 2003), Europe (Frederiksen *et al*., 2001) and North America (Mott and Brunson, 1997).

A workshop was organised by the Qld Dept of Primary Industries and Fisheries in Innisfail, Qld, on September 27, 2005, to discuss methods for managing predators in aquaculture specifically in relation to conditions in Queensland. The workshop was attended by:

- Barramundi, prawn and redclaw farmers
- Officers of DPIF
- Officers of The Environmental Protection Authority Operations Section
- Officers of Qld National Parks and Wildlife
- Officers of the Department of State Development and Innovation.

At that workshop, it was agreed to prepare a number of generic Property Management Plans for Predator Control for each sector of the industry.

This document has been prepared as part of the process for the preparation of a generic Property Management Plans for Predator Control in prawn farming.

Hygeine Management:

Culled birds will be removed to an isolated area on the property and allowed to undergo natural decomposition.

Wildlife Education Strategy:

All staff will be involved in chasing using vehicles or on foot and in recording sightings of predators on the farm. General discussions will be undertaken within the workplace regarding the problems of predation by cormorants.

Use of firearms is restricted to either Senior Managers or specific staff recruited for the task. All staff permitted to use firearms will be:

- Registered with Qld National Parks and Wildlife in accordance with the requirements of any permits
- Instructed in the principles of the Predator Management Plan
- Instructed in bird identification which is supported by free access to an identification manual
- Instructed in the conditions of any permit
- Instructed in the need for and process of record keeping

Wildlife Monitoring Plan:

All staff will be involved in recording sightings of predators on the farm. These sightings will be recorded on a whiteboard and then transferred regularly into a diary maintained by the farm manager.

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Plan of farm:


LEGEND
PACIFIC REEF FISHERIES
TEST LOCATION PLAN
PRELIMINARY

Appendix 1. List of sources retrieved from literature searches.

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