

**Impacts of Motorised Watercraft on the Aquatic Birdlife of  
Ross River and Ross Dam**

**Literature Review**

**ACTFR Report No. 02/02**

Prepared by Dominica Loong  
Australian Centre for Tropical Freshwater Research  
James Cook University  
Townsville QLD 4811  
Phone: 07 47814262  
Fax: 07 47815589  
Email: [actfr@jcu.edu.au](mailto:actfr@jcu.edu.au)

## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION.....</b>	<b>1</b>
<b>2</b>	<b>IMPACTS FROM MOTORCRAFT ON WATERBIRDS .....</b>	<b>2</b>
2.1	NOISE POLLUTION .....	3
2.2	BREEDING/RECRUITMENT INHIBITION .....	4
2.3	INADEQUATE ENERGY INPUT.....	5
2.4	INDUCED FLIGHT .....	7
2.5	LOSS OF HABITAT .....	8
<b>3</b>	<b>INDIRECT EFFECTS OF MOTORCRAFT ON WATER BIRDS.....</b>	<b>10</b>
<b>4</b>	<b>WATER BIRDS OF ROSS RIVER .....</b>	<b>11</b>
4.1	BIRDS OF SPECIAL INTEREST .....	19
4.2	NATIONAL AND INTERNATIONAL CONSERVATION OF MIGRATORY BIRDS .....	21
<b>5</b>	<b>MANAGEMENT ISSUES.....</b>	<b>24</b>
<b>6</b>	<b>CONCLUSIONS AND RECOMMENDATIONS.....</b>	<b>25</b>
<b>7</b>	<b>REFERENCES.....</b>	<b>26</b>

## 1 INTRODUCTION

The Ross Dam is a major artificial wetland created by the damming of a valley of the Ross River about 25 km from the mouth, with a catchment basin containing numerous creeks and rivers. It comprises deep water and lacustrine wetlands and small areas of palustrine forested wetlands in the seasonally flooded margins. Located in a dry monsoonal region Ross Dam is the largest fresh water body within a radius of about 100km. The wetland is included in the *Directory of Important Wetlands in Australia* (Australian Nature Conservation Agency 1996), being vitally important as a drought refuge for many migratory waterbirds that rely on the permanent freshwater reserve. It has provided water for large numbers of waterbirds at times when many other wetlands in the district have dried up (Wieneke 2000).

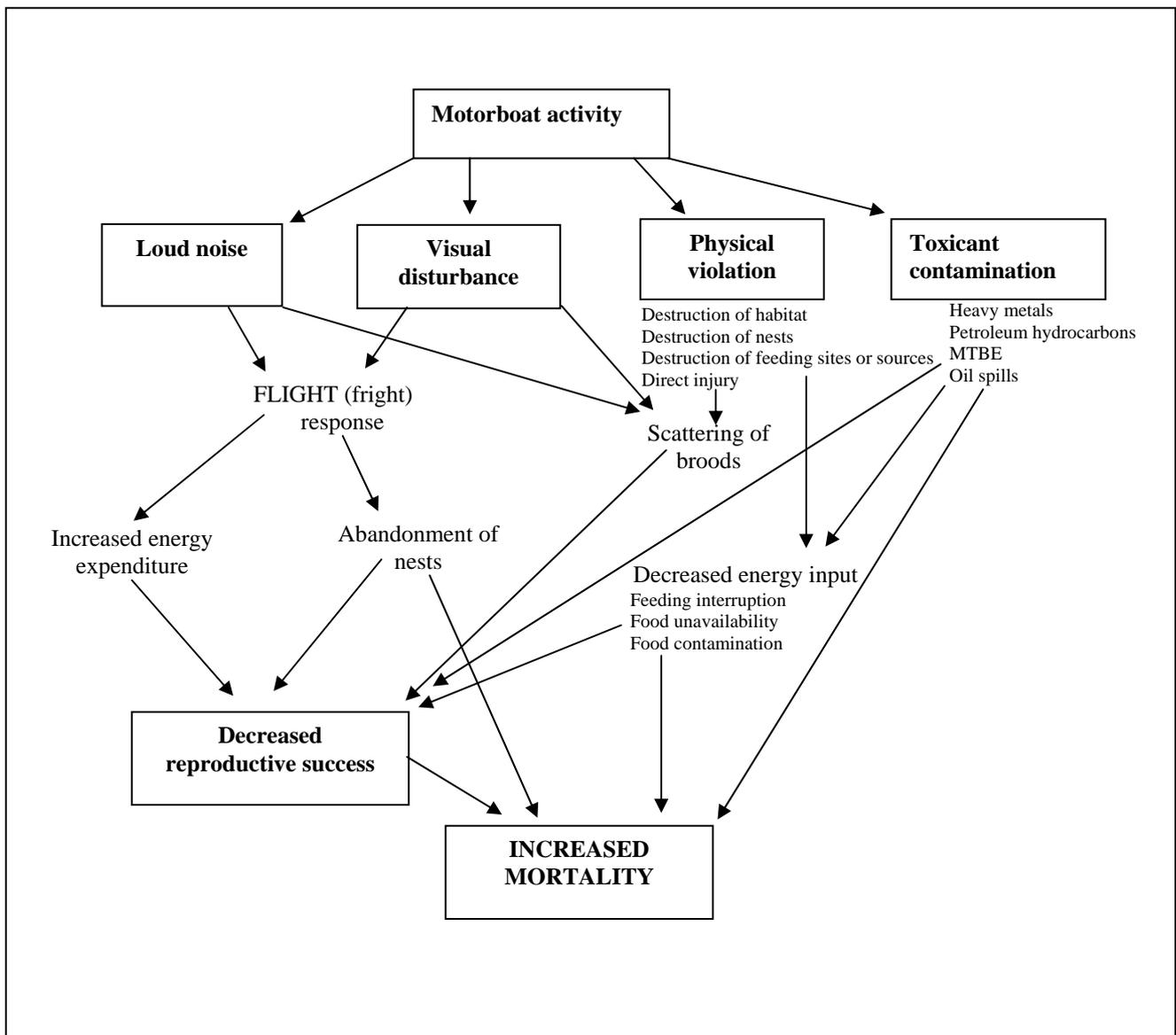
Resident bird species and both dry and wet season migrants have been recorded in north Queensland. The dry climate of Townsville allows inland birds to reach the coast, and during the wet season thousands of waterbirds are attracted to the wetlands. Bird-watching groups active in Townsville have reported sightings of a variety of waterbirds in the area, including the near threatened Cotton Pygmy Goose (*Nettapus coromandelianus albipennis*) and other species of special interest such as the vulnerable Black Throated Finch (*Poephila cincta cincta*). With the option of using the Ross Dam for ecotourism ventures (Townsville Bulletin 2002), including low impact ecotourism activities such as birdwatching, conflicts of interest between users can become a significant issue. For example, the opening of Ross Dam for public water-skiing has created controversy over potential environmental impacts.

There are many documented instances in which areas of environmental significance have necessitated the imposition of human use restrictions. Many human disturbances, intentional or otherwise, act to disrupt the natural habitat and adversely affect the survival of birds. Disturbances by motorboats specifically can displace waterbirds from their feeding grounds, reduce feeding time, increase energy use associated with flight, and hinder reproduction. Motor-boating has been shown to be a major activity disturbing waterbirds in many areas, with birds warily seeking refuge from disturbances, particularly those associated with loud noise and rapid movement (Korschgen and Dahlgren 1992; Korschgen *et al.* 1985; Mathews 1982). In this review it is intended to compile available information on studies and reports of motorcraft disturbance to birds and to provide a listing of the type and status of birdlife to be found in the Ross Dam wetlands. This will allow an assessment of the potential impact from motorcraft to birds in the district and the identification of management options.

## 2 IMPACTS FROM MOTORCRAFT ON WATERBIRDS

Disturbances from boats or other watercraft can manifest themselves in a variety or in a combination of ways on waterbirds. These can be observed by a change in, or interruption of, behaviour or activity, including increased alertness, fright, flight, swimming, or other displacements, disablement or death (Korschgen and Dahlgren 1992). Repeated and cumulative disturbance can lead to decreased fitness or mortality of individuals on a short-term or local scale, or of entire populations on a long-term or extensive scale. Obviously different species of birds will have varying sensitivity to different types of disturbances – for example northern hemisphere diving ducks (canvasbacks *Aythya valisineri* and lesser scaups *Aythya affinis*) and geese (brants *Branta bernicla* and snow geese *Chen hypoborea*) are especially vulnerable to disturbance (Korschgen and Dahlgren 1992). Flock size may also influence behavioural response to disturbance, with large flocks of waterfowl generally more susceptible than small flocks (Korschgen and Dahlgren 1992). Specific responses to disturbances can only be determined through intensive observation, with complex and cumulative influences making causative assumptions difficult. General disturbance cues and interactions between impacts and responses are schematically represented in Figure 1.

**Figure 1 Schematic representation of the potential impacts of motorised watercraft on aquatic birds**



A British report from a technical meeting on migratory bird management (Mathews 1982), ranked aquatic recreational activities that caused disturbance to birds, in order of decreasing disturbance, as:

- o those that involve loud noise and rapid overwater movement (e.g. power-boating, water-skiing, cruising),
- o those that create overwater movement with little noise (e.g. non-powered boating),
- o those that create little overwater movement or noise (e.g. swimming, wading),
- o those that are shore based (e.g. fishing, bird-watching, hiking, traffic).

However in a conflicting observation Tuite *et al.* (1984) ranked the relative disturbance of different recreational activities, and rowing, sailing and fishing were regarded as most disruptive. Although power-boating and water-skiing ranked as least disturbing, the authors explain that this is more likely the result of the relatively small proportion of sites at which such activities occur, and that the season of such sporting activity does not coincide with bird occurrence. In Townsville the skiing season is not restricted by cold weather conditions and therefore the occurrence of waterbirds and skiers is more likely to coincide.

## 2.1 Noise pollution

Engine noise from motorboats can be aggravating and obtrusive, affecting physiological and behavioural responses in birds. Nervous and chronic stress can contribute to decreased reproductive fitness; panic or escape behaviours may result from severe or alarming noise.

It has been argued that birds will adjust to noise levels (UK Marine SACs online). Black Brant (*Branta bernicla*) have been shown to become partially habituated to the proximity of people and some loud noises (Owens 1977). Realistically the sensitivity to disturbance differs among different bird species and responses and the ability to habituate will reflect the susceptibility of the species or the individual to change. Rodgers and Smith (1995, 1997) found significant variation in flushing distances between different bird species upon being disturbed. Generally, birds such as terns (*Sterna* spp.) and gulls (*Larus* spp.) that were more habituated to human interference exhibited less flushing distances. Hansson (1966) found that mallards (*Anas platyrhynchos*) living in urbanised areas adapted to increased boat traffic and ignored it completely. Birds that are habituated to some noise may have an initial reaction following a change, particularly an exaggeration of, noise level and pitch (Kutt and Pearson 1995). Significantly, the birds of Ross Dam have had limited exposure to human disturbances and are thus more likely to be highly susceptible to low levels of noise pollution.

Flushing of birds from nests occurs at a greater distance and with more complex behavioural responses with personal watercraft (PWCs) than other motorboats (The Conservancy 1999). Some claim PWCs are no noisier than other motorised boats (Derricks, 2000), but this opinion is debateable. Derricks (2000) reported a recent study that demonstrated that when there was a significant difference between flush distances on exposure to PWC versus an outboard motor, the outboard exhibited the larger flush distance. This finding is in contrast to Burger (1998) who found that PWCs were both noisier (at high speed) and elicited stronger flight responses than motorboats. Noise levels from PWCs are quoted as  $\leq 80$ dB measured at 50ft (15.2 m) from the boat, at “wide open throttle” (PWIA 2002), and 85 to 105 dB per unit (Martin 1999). It has been suggested that although the noise levels of PWCs may not be much greater than other motorcraft, the variability in sound levels and the higher pitch may be more aggravating (Asplund 2000). A 75dB exposure at 100ft (30.5 m) distance from a PWC consists of sound that is inconsistent in acceleration and direction and could be more detrimental than constant sounds at  $> 90$ dB. To put these noise levels into some perspective, hearing protection for humans is recommended for noise levels for even occasional sounds at  $> 85$ dB by the American Hospital Association. As a consequence of such concerns PWC manufacturers have introduced less noisy technologies with 1999 watercraft developed that were 50-70% quieter than similar 1998 models (PWIA 2002). PWCs also have engines that are quiet under water and lack a low-frequency long-distance sound such that they may not provide subsurface warnings to surfacing birds, making collisions a potential hazard (Martin 1999; NQCC 2000).

PWCs have been banned or restricted in many parks and reserves as a direct consequence of this noise pollution (Davis 1999; National Parks 1996; National Parks 1997; Voyageurs National Park 1999).

*Case studies - incidences of disturbance to birds by noise*

Bird/species	Disturbance Cue	Response	Reference
Crested terns ( <i>Sterna bergii</i> )	Noise levels greater than 85dB	Roosting and breeding terns in the Great Barrier Reef (GBR) showed most significant response at these noise levels by increasing flying time	(Brown 1990)
Common goldeneyes ( <i>Bucephala clangula</i> )	Sudden loud noises	Took flight and left the bay, with few returning before 2 hours	(Campbell and Milne 1977)
Canada geese ( <i>Branta canadensis minima</i> )	The sound of an approaching boat	Canada goose families would flee	(Mickelson 1975)
Birds (unspecified species)	Noise	Eggs broken and young birds injured when birds abandon nests	(NPC online)
Brant ( <i>Branta bernicla</i> )	Aircraft noise	Noise rather than visual cues interrupted feeding and increased flying	(Ward and Stehn 1989)
Snow geese ( <i>Chen hypoborea</i> ) Tundra swans ( <i>Cygnus columbianus</i> )	Noise from sound simulators	Birds broke their flight formations, flared, increased flight altitude, increased calling behaviour, changed speed and/or landed	(Wisely 1974)

## 2.2 Breeding/recruitment inhibition

Boating disturbance can interfere with reproductive success of birds by discouraging or hindering nesting, disrupting pair bonds, increasing desertion of nests, damaging or swamping shoreline nests, reducing hatching success from egg exposure and predation, and decreasing duckling survival by scattering of broods and separation of young from their parents making them more vulnerable to predation.

*Case studies – Negative impacts of boating on waterbird breeding*

Bird/species	Disturbance Cue	Response	Reference
Eider ( <i>Somateria mollissima</i> ) ducklings	Boating disturbance	Predation rate on ducklings increased by up to 18%	(Åhlund and Götmark 1989)
White-winged scoters ( <i>Melanitta fusca</i> )	Recreational boating on lakes preferred by scoters for breeding	Disruption of nesting by recreational boaters stopping at islands. Hens and broods run over by power-boats and water-skiers	(Brown 1981)
Common terns ( <i>Sterna</i> )	Personal watercraft (PWC) activity around a nesting	Nests with chicks or eggs were run over. In most colonies the entire	(Burger 1998)

<i>hirundo</i> )	island in Barnegat Bay, New Jersey. PWCs were observed to skim over the edge of the island at high tide	breeding population took flight when a PWC approached the island																						
Mallard ( <i>Anas platyrhynchos</i> )	People in motorboats intentionally running down broods and beating them with paddles	Death of ducklings	(Heusmann and Burrell 1974)																					
Canada geese ( <i>Branta canadensis minima</i> )	Approaching boats near brood rearing areas	Desertion of young by parents; reductions in nesting density; increased predation of young birds	(Mickelson 1975)																					
Velvet scoter ( <i>Melanitta fusca</i> )	Disturbance to broods from boats on an average of 8.5 times/day in 1990 and 3.5 times/day in 1993	Swimming distances of ducklings increased and less time was spent foraging; smaller broods were disturbed more frequently; $\geq 60\%$ of ducklings died younger than 3 weeks old, being predated on by gulls ( <i>Larus</i> spp.) which attacked 3.5 times more often in disturbed vs undisturbed situations	(Mikola <i>et al.</i> 1994)																					
Breeding waterfowl (various species)	Motorboat disturbance	Decline in breeding success; exposed nests swamped by boat's bow waves	(Reichholf 1976)																					
Southern crested grebe ( <i>Podiceps australis</i> )	Motorised boating and PWCs	Disappearance of the crested grebe from lakes; the wake from motorcraft can flood nests and swamp chicks; birds killed by boats; disappearance of all grebe chicks in 1998	(Royal forest and Bird Protection Society 2001)																					
Canvasbacks ( <i>Aythya valisineria</i> ) Redheads ( <i>Aythya americana</i> )	Opening of Ruby Lake National Wildlife Refuge to power-boat use	Nest success declined in boating areas following their introduction. Below is a table of % nest success of waterbirds (sample size of nests in parentheses).	(US Fish and Wildlife Service 1976)																					
		<table border="1"> <thead> <tr> <th></th> <th>Before boating</th> <th>With boating</th> </tr> </thead> <tbody> <tr> <td><b>Boating Area</b></td> <td></td> <td></td> </tr> <tr> <td>Canvasback</td> <td>91 (33)</td> <td>57 (7)</td> </tr> <tr> <td>Redhead</td> <td>92 (13)</td> <td>83 (12)</td> </tr> <tr> <td><b>Control Area</b></td> <td></td> <td></td> </tr> <tr> <td>Canvasback</td> <td>95 (21)</td> <td>90 (10)</td> </tr> <tr> <td>Redhead</td> <td>100 (73)</td> <td>92 (12)</td> </tr> </tbody> </table>		Before boating	With boating	<b>Boating Area</b>			Canvasback	91 (33)	57 (7)	Redhead	92 (13)	83 (12)	<b>Control Area</b>			Canvasback	95 (21)	90 (10)	Redhead	100 (73)	92 (12)	
	Before boating	With boating																						
<b>Boating Area</b>																								
Canvasback	91 (33)	57 (7)																						
Redhead	92 (13)	83 (12)																						
<b>Control Area</b>																								
Canvasback	95 (21)	90 (10)																						
Redhead	100 (73)	92 (12)																						

### 2.3 Inadequate energy input

Life efficiency for birds is generally modelled as energy balances between flight, feeding and reproduction. When migratory birds are preparing for a migration they increase their fat reserves at productive estuaries or wetlands where maximal time is spent in feeding relative to flight; disturbances that interrupt feeding and increase flight times deprive birds of precious foraging time and burden birds

with energy expenditure and the concomitant depletion of fat reserves. Repeated or extensive disturbances encourage large numbers of waterbirds to leave their preferred habitat and move elsewhere, changing flyway migration patterns (Harrington, 1998; Korschgen and Dahlgren 1992).

*Case studies – effects of motorboat disturbance on feeding*

Species	Disturbance Cue	Response	Reference
Brant ( <i>Branta bernicla</i> )	Continual high-speed boating activity	Disruption of feeding. Birds were displaced to small elbows off the main channel in Mission Bay but were prevented from foraging or occupying open water by continual boat traffic	(Einarsen 1965)
Ducks and Eurasian coot ( <i>Fulica atra</i> )	Sportsmen in boats	One or two powered punts can disturb feeding waterfowl that eventually abandon the area. Motorboats can flush waterfowl and disrupt feeding for much longer than poled punts. Ducks are regularly displaced from Koronisia Bay as a result of fishing boats	(Joensen and Madsen 1985)
Canvasbacks ( <i>Aythya valisineria</i> )	Fishing and hunting boats at feeding areas	The flock flushed on disturbance and spent less time at feeding areas. About 50% of daylight hours were spent away from feeding as a result of disturbance	(Kahl 1991)
Green-backed heron ( <i>Butorides striatus</i> )	Human activity particularly travelling canoes and boats	Hérons were displaced from the main river channel where most foraging occurred. Birds in backwaters were not as disturbed, however backwaters had inadequate carrying capacity for the birds displaced from the channel so that backwaters did not serve as an area for escape	(Kaiser and Fritzell 1984)
Diving ducks ( <i>Aythya</i> spp.)	Boat traffic on the inner Bay at Long Point, Lake Erie	Birds disturbed in spring flew away from the disturbance but immediately returned and continued feeding after the boat passed. Some birds in fall flew away from the foraging area and were not noted to resume feeding	(Knapton <i>et al.</i> 2000)
Coot ( <i>Fulica atra</i> ), widgeon ( <i>Anas penelope</i> ) and mute swan ( <i>Cygnus olor</i> )	Disturbance by boats	Repeated boating disturbance through the day reduced foraging time by 13-33%	(Madsen 1998)
Tufted ducks ( <i>Aythya fuligula</i> )	High boat traffic for hunting, fishing and sport	Fishermen at night disturbed feeding ducks; decrease in bird numbers; increase in feeding times with increasing boat traffic (a consequence of more flight activity from disturbance that cost energy; movement of ducks towards other feeding areas	(Reichholf 1976)

## 2.4 Induced flight

Flying is the most energy intensive activity for birds. Birds disturbed while breeding or preparing for migration lose valuable energy supplies through additional flights of fright or avoidance, depleting their performance ability in other vital life activities.

### *Case studies – effects of motorboat disturbance on flight behaviour*

Bird/species	Disturbance Cue	Response	Reference
Tundra swans ( <i>Cygnus columbianus</i> )	Barge and boat traffic	750 resting swans took flight on the approach of a barge on the Mississippi River. About 2500 swans in the Weaver Bottoms took flight following disturbance by 2 small boats	(Berry 1988)
Common terns ( <i>Sterna hirundo</i> )	Reduction in PWC activity and speed around a nesting island in Barnegat Bay, New Jersey	The number of birds in flight from PWC disturbance declined dramatically	(Burger and Leonard 2000)
Common terns ( <i>Sterna hirundo</i> )	Motorboat and PWC activity around a nesting island in Barnegat Bay, New Jersey	Increased flight - racing boats disturbed nesting birds most dramatically; boats travelling closer to the nesting colonies caused more disturbance than those remaining in the channel; PWCs elicited stronger responses than motorboats	(Burger, 1998; Burger and Leonard 2000)
Common goldeneyes ( <i>Bucephala clangula</i> )	Active powerboats	Almost instantaneous flight of the majority of birds. If the boat continues to traverse the length of Chasewater all remaining birds follow suit within minutes	(Hume 1976)
Canvasbacks ( <i>Aythya valisineria</i> )	Average of 17.2 boats/day approached diving ducks on Lake Onalaska	An average of 5.2 disturbances/day (measured as interruption of performance by flight). Disturbance flights may add up to 1 hour/day	(Korschgen <i>et al.</i> 1985)
Coot ( <i>Fulica atra</i> ), widgeon ( <i>Anas penelope</i> ) and mute swan ( <i>Cygnus olor</i> )	Disturbance by boats	Moving boats caused most disturbance in terms of flushing frequency (average of 2 times/day) and disruption duration (75 minutes). Windsurfing had the highest flushing distance (450-700m)	(Madsen 1998)
Waterfowl (various species)	A small boat was used to elicit a disturbance result in order to measure flight distance	Flight distances were longer for waterbird species that were using the area for foraging rather resting	(Mori <i>et al.</i> 2001)

## 2.5 Loss of habitat

Boats will displace birds directly by occupying their foraging areas as well as frightening them away from their preferred habitat. They can also degrade important habitat and food sources of waterbirds, such as shoreline nesting sites, roosting sites and macrophyte beds. Different species of birds will respond differently to disturbance. A study on the response of waterbirds to the activities of a model boat club (Bamford 1988) found that some Black Swans left the lake on boating days, while others moved away from the boating area but didn't leave the lake altogether. Eurasian Coots moved to another lake area away from boating activity, while Pacific Black Ducks left the lake entirely. Musk Swans likely took refuge in the reeds and Great Crested Grebes did not fly from the lake but moved to areas where model boats were not active.

The Ross River Reservoir is an important drought refuge for birds (Australian Nature Conservation Agency 1966), with many other natural deep-water habitats in the region being lost to coastal development and from infrastructure such as the reservoir itself. Consequently disturbance of, or displacement from, these important habitats may be detrimental to the survival of many reliant species, particularly extensive numbers of migrating birds that have a rapid turn-over rate.

As a party to international conventions and agreements respecting the significance and importance of migratory birds and their habitats (see Section 4.2) it is a management responsibility to respect the wetland values of the Ross River and to provide for the conservation of seasonal species as well as more permanent residents that are limited by alternative roosting and/or breeding sites.

### *Case studies – changes in habitat use as a result of boating disturbance*

Bird/species	Disturbance Cue	Response	Reference
Lesser scaup ( <i>Aythya affinis</i> )	Boating activity	Many of the normal feeding areas were not used while boats were active	(Cronan 1957)
Canvasbacks ( <i>Aythya valisineria</i> ) Redheads ( <i>Aythya americana</i> ) Common mergansers ( <i>Mergus merganser</i> )	Extensive boat traffic	Birds abandoned habitat for a poorer site	(Dennis <i>et al.</i> 1984)
Brant ( <i>Branta bernicla</i> )	Pleasure boaters with high-powered outboard motors	Together with pressure by hunters, harassment by boaters eliminated the brant population from Humboldt Bay	(Denson 1964)
	High boating activity on Humboldt Bay, California	Brant were displaced at night to the ocean because of boating activity. They were killed by drifting unconsciously while sleeping and being beaten to the ocean floor by sandy breakers	(Einarsen 1965)
Breeding ducks (unspecified species)	Human activity including fishing and boating	Breeding waterfowl are discouraged from using otherwise suitable habitat	(Jahn and Hunt 1964)
Mute swans ( <i>Cygnus olor</i> )	Increase in water sports including pleasure boating on many English river	Loss of security of many mute swan resting places	(Ogilvie 1981)

	and canal systems		
Waterfowl (various species)	Increased use of shallow water habitats in Chesapeake Bay by humans for fishing, hunting and boating	Reduction in use of shallow water habitats by ducks in Chesapeake Bay that depend almost exclusively on these habitats	(Perry and Deller 1996)
Wintering waterfowl (various species)	Increased recreational boating dispersed throughout Llangorse Lake in South Wales	Limitation of carrying capacity for birds	(Tuite <i>et al.</i> 1983)

### 3 INDIRECT EFFECTS OF MOTORCRAFT ON WATER BIRDS

The contamination of the environment by petroleum pollutants is detrimental to bird health. This can be from direct ingestion of water, deterrence from drinking tainted water and assimilation of toxic prey flesh intensified by biomagnification. Reliance upon food sources that may be even more threatened or sensitive to toxicant contamination puts additional stress on, and increases energy requirements of, birds that may now have the additional burden of reduced or lower quality food sources. This is another example of the cumulative impacts - where alone each may be bearable, concurrently they may adversely test the resilience of individual animals or populations. Birds may already be aggravated and weakened by the stressors described in the sections above so that even normally tolerable levels of contaminants such as hydrocarbons, metals and methyl tertiary-butyl ether (MTBE) may be deleterious. This report serves only to mention these implications and make the reader aware of the issue. For a more thorough review of potential water quality impacts by motorised watercraft (although not specific to birds) refer to Loong *et al.* (2001).

Oil spills are another potential threat and there are many reports on the impact of oil slicks on birds, with oil on feathers hindering their water-repellency, and again the possibility of toxin ingestion. Although most reports refer to major incidences in marine waters, at intensified times of skiing or boating surface oil slicks are easily observable on water reservoirs and there is always the risk of a spill. Dispersion and mixing of placid waters is also less intense.

#### **4 WATER BIRDS OF ROSS RIVER**

A bird survey conducted by the Townsville Bird Observers Club of Australia (BOCA) for NQ Water on 16-12-01 provided a list of birds at the Ross Dam (Table 1). Sites are indicated in Figure 2. It should be noted that this is an indication only of the birds to be found in a limited portion of the whole dam area, and the species and numbers will be very variable depending on season, time of day, current conditions, habitat type, etc. Further monitoring of birds in the area will be conducted and a database of the birds developed and maintained. A list of birds (Table 2) collated by Townsville Birds Australia Atlas (BAA) was kindly provided by Jo Wieneke who compiled it from various sources for a previous dam manager. Most of the sightings from this list were within the last five years.

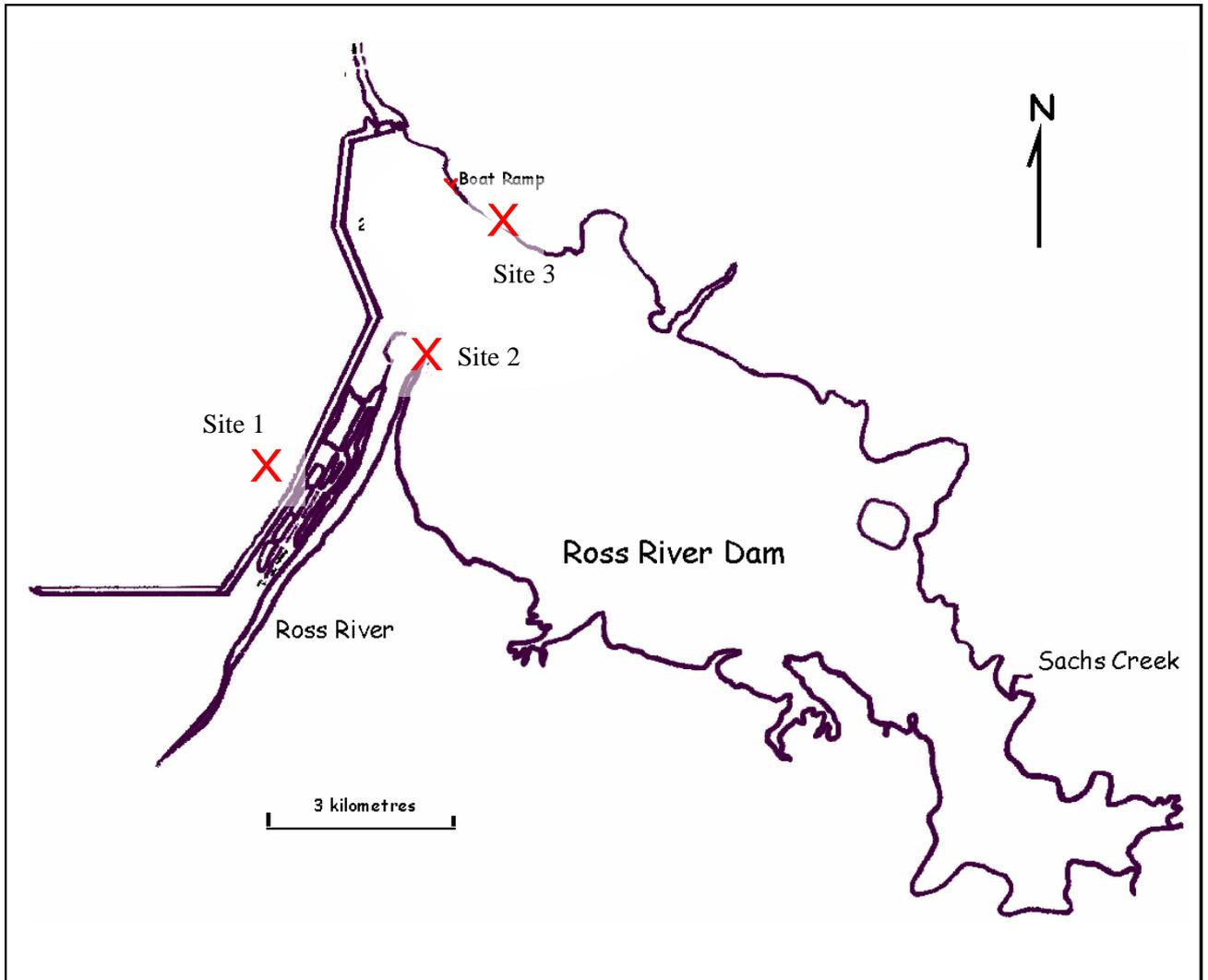
**Table 1 Ross River bird survey conducted by the Townsville BOCA for NQ Water on 16-12-01 at 0745 hrs. Birds covered by International Treaties are marked 3**

**Key:** B (breeding), D (diving), F (feeding), H (heard), L (loafing), R (roosting), P (preening), S (sleeping), SW (swimming), FLY (flying over), \*species of special interest

Site	Common name	No.	Activity	Treaties	
				CAMBA	JAMBA
<b>Site 1</b>	Double-barred Finch	7	F		
<b>Upper Ross River</b>	*Black Throated Finch	8	F		
<b>Riparian vegetation</b>	Whistling Kite	1	FLY		
<b>and access track</b>	Black Kite	3	FLY		
	Australian Magpie	2			
	Magpie Lark	4	F		
	Fan-Tailed Cuckoo	1			
	Brush Cuckoo	1	H		
	Pheasant Coucal	1	H		
	Spangled Drongo	1			
	Great Egret	1		3	
	Golden-headed Cisticola	1			
	Blue-winged Kookaburra	1			
	Yellow Honeyeater	2	F		
<b>Site 2</b>	Little Egret	1	F		
<b>Mouth of</b>	Darter	3			
<b>Upper Ross River</b>	Comb-crested Jacana	1	FLY		
	Rainbow Beeeater	2	F		
	Royal Spoonbill	3	F		
	Little Pied Cormorant	2	R		
	Little Black Cormorant	4	R		
	*Cotton Pigmy Goose	4	F/B		
	Wedge Tailed Eagle	1	FLY		
	Wood (maned) Duck	2	F		
	Intermediate Egret	1	F		
	Grey Teal	1380	F/S/L		
	Glossy Ibis	20	F	3	
	Pacific Black Duck	76	F/S/L		
	Black-winged Stilt	25	F		
	Wandering Whistling Duck	778	P/L		
	Plumed Whistling Duck	37	P/L		
	Hardhead	322	F/SW		
	Wood(maned) Duck	24	F		
	Little Egret	4	F		
	Great Egret	9	F	3	
	Intermediate Egret	4	F		
	Cattle Egret	9	L	3	3
	Magpie Goose	620	F/L/P/B		
	Cotton Pygmy Goose	4	F*		
	Green Pygmy Goose	18	F/ SW		

Greenshank	2	F	3	3
Sharp-tailed Sandpiper	5	F	3	3
Great Cormorant	2	R		
Pied Cormorant	3	L		
Little pied Cormorant	64	L		
Little Black Cormorant	25	F/R/L		
Australian Grebe	7	F		
Caspian Tern	3	L/P	3	
Gull-billed Tern	28	L/P		
Crested Tern	13	L/P/S		3
Whiskered Tern	59	L/P/S		
Australian Ibis (White)	1	FLY		
Straw-necked Ibis	2	F		
Black Swan	164	SW/ P/L/B		
Royal Spoonbill	2	F		
Masked Lapwing	3	F		
Black-fronted Dotterel	3	F		
Red-kneed Dotterel	1	F		
Osprey	2	B		
<hr/>				
<b>Site 3</b>	Pelican	4	R	
<b>Ramp &amp; Ski site</b>	Little Pied Cormorant	4		
	Cotton Pigmy Goose	15		
	White faced Heron	1		
	Black-winged Stilt	3		
	Little Black Cormorant	2		
	Pacific Black Duck	31		
	Black-fronted Dotterel	2		
	Darter	7		
	Australian Grebe	2		
	Hardhead	108		
	Wandering Whistling Duck	1		
	Grey Teal	6		
	Caspian Tern	3	D	3
	Whiskered Tern	17	F	
	Gull-billed Tern	2		
	Royal Spoonbill	1		
	Comb-crested Jacana	1		
	Intermediate Egret	2		
	Pied Cormorant	2		
	Whistling Kite	2		
	Blue-winged Kookaburra	1		
	Red-backed fairy Wren	8		
	Forest Kingfisher	1		
	Golden-headed Cisticola	2		
	Yellow Honeyeater	5		
	White-throated Honeyeater	4		
	Channel-billed Cuckoo	1	H	
	Golden-headed Cisticola	2		

**Figure 2** Townsville Bird Observers Club of Australia (BOCA) bird survey sites on Ross Dam, surveyed on 16-12-01



**Table 2 Birds of Ross Dam. List provided by Jo Wieneke, NQ Regional Co-ordinator for Birds Australia Atlas (BBA)**

Common Name	Scientific Name	TREATIES	
		CAMBA	JAMBA
Stubble Quail	<i>Coturnix pectoralis</i>		
Brown Quail	<i>Coturnix ypsilophora</i>		
Magpie Goose	<i>Anseranas semipalmata</i>		
Plumed Whistling-Duck	<i>Dendrocygna eytoni</i>		
Wandering Whistling-Duck	<i>Dendrocygna arcuata</i>		
Freckled Duck	<i>Stictonetta naevosa</i>		
Black Swan	<i>Cygnus atratus</i>		
Australian Wood Duck	<i>Chenonetta jubata</i>		
Cotton Pygmy-goose	<i>Nettapus coromandelianus</i>		
Green Pygmy-goose	<i>Nettapus pulchellus</i>		
Pacific Black Duck	<i>Anas superciliosa</i>		
Grey Teal	<i>Anas gracilis</i>		
Pink-eared Duck	<i>Malacorhynchus membranaceus</i>		
Hardhead	<i>Aythya australis</i>		
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>		
Great Crested Grebe	<i>Podiceps cristatus</i>		
Darter	<i>Anhinga melanogaster</i>		
Little Pied Cormorant	<i>Phalacrocorax melanoleucos</i>		
Pied Cormorant	<i>Phalacrocorax varius</i>		
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>		
Great Cormorant	<i>Phalacrocorax carbo</i>		
Australian Pelican	<i>Pelecanus conspicillatus</i>		
Great Frigatebird	<i>Fregata minor</i>	3	3
White-faced Heron	<i>Egretta novaehollandiae</i>		
Little Egret	<i>Egretta garzetta</i>		
White-necked Heron	<i>Ardea pacifica</i>		
Great Egret	<i>Ardea alba</i>	3	
Intermediate Egret	<i>Ardea intermedia</i>		
Cattle Egret	<i>Ardea ibis</i>	3	3
Nankeen Night Heron	<i>Nycticorax caledonicus</i>		
Black Bittern	<i>Ixobrychus flavicollis</i>		
Glossy Ibis	<i>Plegadis falcinellus</i>	3	
Australian White Ibis	<i>Threskiornis molucca</i>		
Straw-necked Ibis	<i>Threskiornis spinicollis</i>		
Royal Spoonbill	<i>Platalea regia</i>		

Yellow-billed Spoonbill	<i>Platalea flavipes</i>		
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>		
Osprey	<i>Pandion haliaetus</i>		
Pacific Baza	<i>Aviceda subcristata</i>		
Black-shouldered Kite	<i>Elanus axillaris</i>		
Letter-winged Kite	<i>Elanus scriptus</i>		
Black Kite	<i>Milvus migrans</i>		
Whistling Kite	<i>Haliastur sphenurus</i>		
Brahminy Kite	<i>Haliastur indus</i>		
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	3	
Swamp Harrier	<i>Circus approximans</i>		
Brown Goshawk	<i>Accipter fasciatus</i>		
Wedge-tailed Eagle	<i>Aquila audaz</i>		
Little Eagle	<i>Hieraaetus morphnoides</i>		
Brown Falcon	<i>Falco verigora</i>		
Australian Hobby	<i>Falco longipennis</i>		
Peregrine Falcon	<i>Falco peregrinus</i>		
Nankeen Kestrel	<i>Falco cenchroides</i>		
Brolga	<i>Grus rubicunda</i>		
Purple Swamphen	<i>Porphyrio porphyrio</i>		
Dusky Moorhen	<i>Gallinula tenebrosa</i>		
Eurasian Coot	<i>Fulica atra</i>		
Australian Bustard	<i>Ardeotis australis</i>		
Latham's Snipe	<i>Gallinago hardwickii</i>	3	
Little Curlew	<i>Numenius minutus</i>	3	
Marsh Sandpiper	<i>Tringa stagnatilis</i>		
Common Greenshank	<i>Tringa nebularia</i>		
Wood Sandpiper	<i>Tringa glareola</i>	3	3
Common Sandpiper	<i>Actitis hypoleucos</i>	3	3
Red-necked Stint	<i>Calidris ruficollis</i>	3	3
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	3	3
Painted Snipe	<i>Rostratula benghalensis</i>	3	
Comb-crested Jacana	<i>Irediparra gallinacea</i>		
Bush Stone-curlew	<i>Burhinus grallarius</i>		
Black-winged Stilt	<i>Himantopus himantopus</i>		
Black-fronted Dotterel	<i>Elsayornis melanops</i>		
Red-kneed Dotterel	<i>Erythrogonys cinctus</i>		
Australian Pratincole	<i>Stiltia isabella</i>		
Gull-billed Tern	<i>Sterna nilotica</i>		

---

Caspian Tern	<i>Sterna caspia</i>	3	
Whiskered Tern	<i>Chlidonias hybrida</i>		
Flock Bronzewing	<i>Phaps histrionica</i>		
Crested Pegeon	<i>Ocyphaps lophotes</i>		
Squatter Pigeon	<i>Geophaps scripta</i>		
Deamond Dove	<i>Geopelia cuneata</i>		
Peaceful Dove	<i>Geopelia placida</i>		
Bar-shouldered Dove	<i>Geopelia humeralis</i>		
Red-tailed Black-Cockatoo	<i>Calyptorhynchus banksii</i>		
Galah	<i>Cacatua roseicapilla</i>		
Little Corella	<i>Cacatua sanguinea</i>		
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>		
Cockatiel	<i>Nymphicus hollandicus</i>		
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>		
Scaly-breasted Lorikeet	<i>Trichoglossus chlorolepidotus</i>		
Red-winged Parrot	<i>Aprosmictus erythropterus</i>		
Pale-headed Rosella	<i>Platycercus adscitus</i>		
Budgerigar	<i>Melopsittacus undulatus</i>		
Pallid Cuckoo	<i>Cuculus pallidus</i>		
Brush Cuckoo	<i>Cacomantis variolosus</i>		
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>		
Black-eared Cuckoo	<i>Chrysococcyx osculans</i>		
Horsfield's Bronze-Cuckoo	<i>Chrysococcyx basalis</i>		
Common Koel	<i>Eudynamis scolopacea</i>		
Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>		
Pheasant Coucal	<i>Centropus phasianinus</i>		
Rufous Owl	<i>Ninox rufa</i>		
Barking Owl	<i>Ninox connivens</i>		
Tawny Frogmouth	<i>Podargus strigoides</i>		
White-throated Needletail	<i>Hirundapus caudacutus</i>	3	
Fork-tailed Swift	<i>Apus pacificus</i>	3	3
Little Kingfisher	<i>Alceo pusilla</i>		
Laughing Kookaburra	<i>Dacelo novaeguineae</i>		
Blue-winged Kookaburra	<i>Dacelo leachii</i>		
Forest Kingfisher	<i>Todiramphus macleayii</i>		
Red-backed Kingfisher	<i>Todiramphus pyrrhopygia</i>		
Sacred Kingfisher	<i>Todiramphus sancta</i>		
Rainbow Bee-eater	<i>Merops ornatus</i>		
Dollarbird	<i>Eurystomus orientalis</i>		
Brown Treecreeper	<i>Climacteris picumnus</i>		

---

---

Red-backed Fairy-wren	<i>Malurus melanocephalus</i>
Striated Pardalote	<i>Pardalotus striatus</i>
Weebill	<i>Smicromis brevirostris</i>
White-throated Gerygone	<i>Gerygone olivacea</i>
Helmeted Friarbird	<i>Philemon buceroides</i>
Noisy Friarbird	<i>Philemon corniculatus</i>
Little Friarbird	<i>Philemon citreogularis</i>
Blue-faced Honeyeater	<i>Entomyzon cyanotis</i>
Yellow-throated Miner	<i>Manorina flavigula</i>
Yellow Honeyeater	<i>Lichenostomus flavus</i>
Fuscous Honeyeater	<i>Lichenostomus fuscus</i>
White-throated Honeyeater	<i>Melithreptus albogularis</i>
Brown Honeyeater	<i>Lichmera indistincta</i>
Brown-backed Honeyeater	<i>Ramsayornis modestus</i>
Bar-breasted Honeyeater	<i>Ramsayornis fasciatus</i>
Rufous-throated Honeyeater	<i>Conopophila rufogularis</i>
Dusky Honeyeater	<i>Myzomela obscura</i>
Jacky Winter	<i>Minroeca fascinans</i>
Lemon-bellied Flycatcher	<i>Minroeca flavigaster</i>
Rufous Whistler	<i>Pachycephala rufiventris</i>
Leaden Flycatcher	<i>Myiagra rubecula</i>
Restless Flycatcher	<i>Myiagra inquieta</i>
Magpie-lark	<i>Grallina cyanoleuca</i>
Grey Fantail	<i>Rhipidura fuliginosa</i>
Willie Wagtail	<i>Rhipidura leucophrys</i>
Spangled Drongo	<i>Dicurus bracteatus</i>
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>
White-bellied Cuckoo-shrike	<i>Coracina papuensis</i>
White-winged Triller	<i>Lalage sueurii</i>
Olive-backed Oriole	<i>Oriolus sagittatus</i>
Figbird	<i>Sphecotheres viridis</i>
White-breasted Woodswallow	<i>Artamus leucorhynchus</i>
Masked Woodswallow	<i>Artamus personatus</i>
White-browed Woodswallow	<i>Artamus superciliosus</i>
Black-faced Woodswallow	<i>Artamus cinereus</i>
Little Woodswallow	<i>Artamus minor</i>
Grey Butcherbird	<i>Cracticus torquatus</i>
Pied Butcherbird	<i>Cracticus nigrogularis</i>
Australian Magpie	<i>Gymnorhina tibicen</i>
Pied Currawong	<i>Strepera graculina</i>

---

---

Australian Raven	<i>Corvus coronoides</i>
Torresian Crow	<i>Corvus orru</i>
Great Bowerbird	<i>Chamydera nuchalis</i>
Singing Bushlark	<i>Mirafrja javanica</i>
Richard's Pipit	<i>Anthus novaeseelandiae</i>
Zebra Finch	<i>Taeniopygia guttata</i>
Double-barred Finch	<i>Taeniopygia bichenovii</i>
Black-throated Finch	<i>Poephila cincta</i>
Crimson Finch	<i>Neochmia phaeton</i>
Plum-headed Finch	<i>Neochmia modesta</i>
Nutmeg Mannikin	<i>Lonchura punctulata</i>
Chestnut-breasted Mannikin	<i>Lonchura castaneothorax</i>
Yellow-bellied Sunbird	<i>Nectarinia jugularis</i>
Mistletoebird	<i>Dicaeum hirundinaceum</i>
Welcome Swallow	<i>Hirundo neoxena</i>
Tree Martin	<i>Hirundo nigricans</i>
Fairy Martin	<i>Hirundo ariel</i>
Clamorous Reed-Warbler	<i>Acrocephalus stentoreus</i>
Tawny Grassbird	<i>Megalurus timoriensis</i>
Rufous Songlark	<i>Cinclorhamphus mathewsi</i>
Brown Songlark	<i>Cinclorhamphus cruralis</i>
Golden-headed Cisticola	<i>Cisticola exilis</i>

---

#### 4.1 Birds of special interest

Two bird species recorded by the BOCA on 16-12-01 and listed by BAA, the Cotton Pygmy Goose (*Nettapus coromandelianus albipennis*) and the Black-throated Finch (*Poephila cincta cincta*), and two additional species listed by BAA, the Australian Painted Snipe (*Rostratula benghalensis australis*) and the Southern Squatter Pigeon (*Geophaps scripta scripta*), are of conservation significance and are listed in the Action Plan for Australian Birds 2000 (Garnett and Crowley 2000). The Red Goshawk (*Erythrotriorchis radiatus*) and Eastern Star Finch (*Neochmia ruficauda ruficauda*) are suggested by the EPBC database as having ‘species or species habitat likely to occur’ in the Ross Dam area. These birds are listed as vulnerable and endangered, respectively, under the EPBC Act 1999.

##### Cotton Pygmy Goose

The Ross Dam is one of the most important habitats for the ‘near-threatened’ Cotton Pygmy Goose (Australian Nature Conservation Agency 1996) whose small population has declined in density, having disappeared from the southern part of its breeding range in northern New South Wales (Garnett and Crowley 2000). This species is now confined to a greatly reduced area in north-east Queensland. The Cotton Pygmy Goose (Australian), one of the rarest ducks in Queensland (Garnett 1988) and claimed to be one of the rarest waterfowl species in Australia (Kingsford 1994), was sighted at all Ross Dam sites by the BOCA on 16-12-01. One of the largest recent counts (*ca* 300) of this species was on Ross Dam. Cotton Pygmy Geese congregate in flocks on permanent water-bodies during the dry season and move further inland to ephemeral swamps to breed during the wet. During dry years their stay at permanent waterbodies may be extended, so that the laying of eggs in the hollows of trees that stand in or beside water at sites such as Ross Dam would make them extremely vulnerable to disturbance by boat wash and

shore-side activity. Changes in habitat from the introduction of introduced weeds, particularly water hyacinth *Eichhornia crassipes* and ponded pasture grasses *Echinochloa polystachya* and *Hymenachne amplexicaulis* has adversely affected the Cotton Pygmy-Goose (Garnett and Crowley 2000). Although exotic weed species are not yet as great a problem in the Ross Dam reservoir as in the river, they are becoming increasingly prevalent in some areas (NQ Water 2001) and their introduction from boats is an increased threat. Washing facilities for boats are available at the dam and it is a requirement that boats are clean upon access to the water body, however vigilant monitoring of this activity would need to be ascertained.

#### Black-throated Finch

The Black-throated Finch is listed as an ‘endangered’ species in NSW on Schedule 1 of the Threatened Species Conservation Act (1995) (NSW NPWS 1999) having disappeared from the southern two-thirds of its range (northern NSW to Cape York), and as ‘vulnerable’ under the Environment Protection and Biodiversity Conservation (EPBC) Act (1999). Since the mid-1960s only five sightings have been recorded in NSW. Populations began to decline in eastern Queensland early in the 20<sup>th</sup> century with clearing of land at an estimated rate of 20% every 10 years (Garnett and Crowley 2000). It is assumed that this decline is continuing, but sub-species remain locally common near Townsville throughout the year.

#### Painted Snipe

The Painted Snipe has a conservation status of ‘vulnerable’ in the Action Plan for Australian Birds 2000 (Garnett and Crowley 2000) and is protected under ‘Wetland species covered by migratory provisions of the EPBC Act 1999’ and ‘Species covered by marine provisions of the EPBC Act 1999’ (EPBC 2002). It is included in the compilation by the BAA. Numbers of this species have declined over the past 40 years with historical recordings from wetlands throughout Australia. Their range has remained stable in northern and eastern Australia but there have been less than 100 recordings since 1990. These birds are not often seen and generally only fly north during the winter (Kingsford 1994). The Painted Snipe inhabits shallow, vegetated, temporary or infrequently filled wetlands, feeding on seeds and invertebrates at wetland edges and mudflats. Loss of wetland habitats has attributed to their demise (Garnett and Crowley 2000).

#### Squatter Pigeon (southern)

The Squatter Pigeon is listed as ‘near-threatened’ in the Action Plan for Australian Birds 2000 (Garnett and Crowley 2000) and ‘vulnerable’ under the EPBC (EPBC 2002). Although it has disappeared from the southern half of its historical range, with no sightings in NSW since the 1970s, this trend does not appear to be continuing. Presently it occurs patchily in eastern Queensland north between Proserpine and Port Curtis on the coast, and west to Longreach and Charleville. Though this description would place Townsville north of its distribution, the Squatter Pigeon is listed by the BAA as occurring on Ross Dam, and the sub-species by the EPBC as likely to occur in the area.

#### Red Goshawk

The Red Goshawk has a conservation status of ‘vulnerable’ (EPBC 2002; Garnett and Crowley 2000). This is a naturally sparse raptor which has suffered through deforestation of its breeding and foraging habitat in coastal and sub-coastal regions, with most of this loss from coastal Queensland (Garnett 1992). Convincing circumstantial evidence suggests that this granivorous parrot and pigeon-eating raptor has declined as a result of egg shell thinning due to pesticide applications (Debus et al. 1993). Although there may be less than 1000 mature individuals there is little evidence of a continuing decline. Birds have been seen the length of eastern Queensland, with an estimated 30-35 pairs in the Wet Tropics. In winter birds move from nest sites in the ranges to coastal plains and wetlands where they may feed on waterbirds (Garnett and Crowley 2000). Though not listed as being sighted by the Townsville bird-watching groups it is considered likely to occur in the area by the EPBC. Large territories containing tall open forests and woodlands, tropical/subtropical savannas (medium-low grassy open forest/woodland)

traversed by wooded creeks, and edges of rainforest are utilised by this bird. It has particular breeding habitat requirements, needing a tree taller than 20m within 1km of a permanent watercourse or wetland.

#### Star Finch (eastern)

The Eastern Star Finch is listed as ‘endangered’ under the EPBC Act and the EPBC database report for Ross Dam cites it as a ‘*species or species habitat likely to occur within the area*’ although no sightings were reported by TRBOAC or the five year compilation by BAA. There have been very few sightings of the Eastern Star Finch over the last fifty years. In 1993 a two-month survey was conducted by the Royal Australian Ornithological Union in North Queensland with no sightings reported and according to Wieneke (2000) its local population is now extinct.

## 4.2 National and international conservation of migratory birds

Australia is a signatory to several international agreements and conventions that aim to conserve migratory birds and their habitats that are considered important natural resources. Australia has signed treaties with China and Japan, the China-Australia Migratory Bird Agreement (CAMBA) and the Japan-Australia Migratory Bird Agreement (JAMBA), to protect shared migratory birds in their own country. Additionally, Australia is party to the Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention) under which countries are expected to enter into agreements to protect species that migrate across international boundaries. Similarly, Australia is party to the Convention on Wetlands of International Importance (Ramsar Convention) that aims to promote the wise use of wetlands, the training of wetland managers and the education of the general public. The Environment Protection and Biodiversity Conservation Act (1999) is national legislation protecting the migratory birds listed under these agreements.

Seven species of birds from the BOCA survey are covered by JAMBA (1981) and CAMBA (1988). These are the Cattle Egret (*Ardea ibis*), the Great Egret (*Ardea alba*), the Sharp-tailed Sandpiper (*Calidris acuminata*), the Common Greenshank (*Tringa nebularia*), the Crested Tern (*Sterna bergii*), the Caspian Tern (*Sterna caspia*), and the Glossy Ibis (*Plegadis falcinellus*). A further ten species included in the BAA list are also covered by these treaties. These species and their status regarding these treaties are indicated in Tables 1 and 2.

The Asia-Pacific Migratory Waterbird Conservation (MWC) Strategy (MWCC 2001-2005) was developed in recognition of the threats to migratory waterbirds and is actively supported by the Australian government. Of the 20 families of waterbirds described as “*birds ecologically dependent on wetlands*” included in the MWC strategy, representatives of 11 have been listed as occurring in the Ross Dam area. These are: *Podicipedidae* (Grebes), *Phalacrocoracidae* (Cormorants), *Ardeidae* (Hérons, Egrets and Bitterns), *Ciconiidae* (Storks), *Threskiornithidae* (Ibises and Spoonbills), *Rallidae* (Coots), *Jacaniidae* (Jacanas), *Recurvirostridae* (Stilts), *Glareolidae* (Pratincoles), *Scolopacidae* (Sandpipers) and *Laridae* (Terns).

The Environment Protection and Biodiversity Conservation Act provides an online database (EPBC 2002) that permits the selection of an area of interest whereupon it accesses information from a number of sources to compile a report of threatened, migratory and selected species. The report created for the Ross River and Dam area is shown in Table 3. Birds that are included in the observer lists 1 and 2 are highlighted. The EPBC report specifies that it does not list some species that have been only recently listed, or migratory species that are very widespread, vagrant or only occur in small numbers. The Ross Dam report recognises three vulnerable species of bird and one endangered, two of which are included in the Townsville bird group lists (Squatter Pigeon *Geophaps scripta scripta* and Black-throated Finch *Poephila cincta cincta*). Eleven other species are listed for protection, six of which are included in the survey lists. If birds protected under the EPBC are considered threatened or there has been, or is likely to be, some breach of the Act, federal compliance and enforcement action may be taken by Environment Australia on assessment of the matter. This provides a legal means of ensuring the integrity of an ecosystem and vigilance of the processes imposed on it.

**Table 3 EPBC Online Database Report****Report created on:** Friday, Feb 1 2002**Report on:** Threatened species, marine protected species, and migratory species**Approx buffer:** 1km**Coordinates used: Long** 146.717, 146.717, 146.833, 146.810, 146.746**Lat** -19.33, -19.48, -19.49, -19.42, -19.39

NB. This is a list derived from a range of groups and there is no guarantee of complete accuracy. Birds that occur in the lists provided by Townsville bird groups (Tables 1 and 2) are highlighted.

SCIENTIFIC NAME	Common Name	Type of Presence	Status
<i>Erythrotriorchis radiatus</i>	Red Goshawk	Species or species habitat likely to occur within area	Vulnerable
<i>Geophaps scripta scripta</i>	Squatter Pigeon (southern)	Species or species habitat likely to occur within area	Vulnerable
<i>Neochmia ruficauda ruficauda</i>	Star Finch (eastern)	Species or species habitat likely to occur within area	Endangered
<i>Poephila cincta cincta</i>	Black-throated Finch (southern)	Species or species habitat likely to occur within area	Vulnerable

**Marine species covered by migratory provisions of the EPBC Act 1999**

SCIENTIFIC NAME	Common Name	Type of Presence
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Species or species habitat likely to occur within area
<i>Hirundapus caudacutus</i>	White-throated Needletail	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree
<i>Hirundo rustica</i>	Barn Swallow	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree
<i>Monarcha melanopsis</i>	Black-faced Monarch	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree
<i>Monarcha trivirgatus</i>	Spectacled Monarch	Breeding or breeding habitat likely to occur within area
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	Species or species habitat likely to occur within area
<i>Rhipidura rufifrons</i>	Rufous Fantail	Breeding or breeding habitat likely to occur within area – derived from a general distribution map > 1 degree

**Wetland species covered by migratory provisions of the EPBC Act 1999**

SCIENTIFIC NAME	Common Name	Type of Presence
<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree
<i>Nettapus coromandelianus albipennis</i>	Australian Cotton Pygmy-goose	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree
<i>Numenius minutus</i>	Little Curlew, Little Whimbrel	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree
<i>Rostratula benghalensis</i>	Painted Snipe	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree

**Species covered by marine provisions of the EPBC Act 1999**

SCIENTIFIC NAME	Common Name	Type of Presence	Status
<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree	Overfly**
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Species or species habitat likely to occur within area	Listed
<i>Hirundapus caudacutus</i>	White-throated Needletail	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree	Overfly**
<i>Hirundo rustica</i>	Barn Swallow	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree	Overfly**
<i>Monarcha melanopsis</i>	Black-faced Monarch	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree	Overfly**
<i>Monarcha trivirgatus</i>	Spectacled Monarch	Breeding or breeding habitat likely to occur within area	Overfly**
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	Species or species habitat likely to occur within area	Overfly**
<i>Nettapus coromandelianus albipennis</i>	Australian Cotton Pygmy-goose	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree	Overfly**
<i>Numenius minutus</i>	Little Curlew, Little Whimbrel	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree	Overfly**
<i>Rhipidura rufifrons</i>	Rufous Fantail	Breeding or breeding habitat likely to occur within area – derived from a general distribution map > 1 degree	Overfly**
<i>Rostratula benghalensis</i>	Painted Snipe	Species or species habitat likely to occur within area – derived from a general distribution map > 1 degree	Overfly**

\*\*Predominantly non-marine but known to overfly or occasionally visit the Commonwealth marine area.

## 5 MANAGEMENT ISSUES

Management of human activity often occurs to protect birdlife. Disturbance effects may be temporary and short term, impacting on feeding, resting and energy intake of a bird, or significant population impacts on local and national populations of particular species may result. Disturbance at a local level is relevant to site-specific management, with options including:

- o **Buffer zones.** These are a common recommendation, although the extent of buffering proposed is variable. Examples of recommended buffering include:
  - o Buffer zones of 100m to protect most bird species, in which all human activity would be banned (Burger 1998; Rodgers and Smith 1995; Rodgers and Smith 1997)
  - o Buffer zones of 100 to 180m to accommodate a variety of bird species (Asplund 2000)
  - o A 400m buffer for boat traffic to protect eagles (Stalmaster and Kaiser 1998)
  - o Screened buffer zones around important roosting and feeding areas (Korschgen and Dahlgren 1992)
- o **Zones of reduced speed.**
- o **Provision of increased food quality and quantity** to counteract the loss of energy from fright flight and distraction from foraging
- o **Inviolate sanctuaries** particularly at critical breeding times and critical locations
- o **Boating restrictions** (temporal and spatial).

Political and public pressure often dictate decisions made regarding public use areas. In the US 42 National Wildlife Refuges (NWR) were opened to motor-boats and water-skiing following public demand (Braun 1978) with documented impacts of high-speed boating such as shoreline degradation, disruption of nesting and feeding, loss of production, and bird displacement.

Some actions taken in the interests of waterbird protection are presented in the following case studies:

- o **The management of Bullock Creek Conservation Park in southeast Queensland** (QPWS 1999). Tidal areas within the park are a significant component of the Moreton Bay Ramsar site that has been designated as a wetland of international importance. As such, the park is managed in accordance with the Ramsar Convention on Wetlands of International Importance, JAMBA, CAMBA and the Bonn Convention for the Protection of Migratory Birds and their Environments. To adhere to international treaties the park is not accessible for recreation.
- o **A technical meeting on managing wetlands and their birds to consider issues relating to the control of recreational disturbance** (Mathews 1982). Major management considerations comprised the outfitting of wetland display educational centres, limiting boating to areas at least 300m from waterfowl areas and keeping bird areas strictly off-limit to anglers.
- o **Open public education forums** (Burger & Leonard 2000). These were held to resolve conflict between PWC users and breeding Common terns (*Sterna hirundo*) in Barnegat Bay, New Jersey. Public education and discussions were conducted with the emphasis on avoiding intimidating scientific and law-enforcing approaches. Education of the effects their actions had on the environment, exemplified by the vulnerability of the terns, allowed recreational users of the bay to make informed decisions as to their performance in nesting areas. Actions encouraged included avoidance of critical bird breeding areas and reduced motorcraft speeds.

## 6 CONCLUSIONS AND RECOMMENDATIONS

Ross Dam, a nationally recognised wetland, provides habitat to a wide variety of birds. Some species of birds that have been observed in the area (such as the Cotton Pygmy Goose and the Black-throated Finch) are of conservation significance, and some threatened species listed by the EPBC are likely to occur in the area.

Australia is party to several international agreements and conventions that act to conserve migratory birds and their habitats. Under national legislation (EPBC Act 1999) migratory birds listed in these agreements are protected. Consequently, whilst recognising the attraction of the area for ecotourism ventures (ie. bird-watching from the reservoir) and other recreational activities (eg. water-skiing) consideration needs to be given to the protection of birds and habitat.

Management recommendations include:

- Protected areas in which defined activities, including boating of any kind, are banned. Areas would need to be determined following relevant research on the species of special concern and the seasons of importance (eg. breeding season, foraging season).
- Buffer zones of 150 - 200m around the assigned protected areas. These would place restrictions on activities allowed in this zone, with no powered boating or no-wake limits.
- Allocation of designated boating areas (particularly for water-skiing).
- The issuing of permits under the requisite of newer, quieter and more energy efficient motors.
- Informative signage to ensure public awareness of the threats to fauna, obligations for the protection of migratory birds, and recreational behaviour appropriate to placed restrictions.
- Maintenance of bird watching records to monitor the effectiveness of management and to ensure early detection of any impact on bird numbers or behaviour.
- Monitoring of habitat to gauge adherence to and effectiveness of protected areas and buffer zones.

## 7 REFERENCES

- Åhlund, M., and Götmark, F. (1989)** Gull predation on eider ducklings *Somateria mollissima*: effects of human disturbance. *Biological Conservation* **48**: 115-127.
- Asplund, T. R. (2000)** *The effects of motorized watercraft on aquatic ecosystems*. 19pp. Wisconsin Department of Natural Resources, Bureau of Integrated Science Services and University of Wisconsin, Madison, Wisconsin.
- Australian Nature Conservation Agency (1996)** *A Directory of Important Wetlands in Australia*. Commonwealth of Australia, Canberra.
- Bamford, M., S. Davies, and R. van Delft (1988)** Model boats: their effects on waterbirds at Herdsman Lake. Royal Australasian Ornithologists Union, Moonee Ponds, Victoria. RAOU Report No. 48. 39pp.
- Berry, R. F. (1988)** Disturbance to tundra swans by barge and boat traffic. *Loon* **60**: 92.
- Braun, C. E., K. W. Harmon, J. A. Jackson, and C. D. Littlefield (1978)** Management of National Wildlife Refuges in the United States: its impacts on birds. *Wilson Bulletin* **90**: 309-321.
- Brown, P. W., and M. A. Brown (1981)** Nesting biology of the white-winged scoter. *Journal of Wildlife Management* **45**: 38-45.
- Burger, J. (1998)** Effects of motorboats and personal watercraft on flight behaviour over a colony of common terns. *The Condor* **100**: 528-534.
- Burger, J., and Leonard, J. (2000)** Conflict resolution in coastal waters: the case of personal watercraft. *Marine Policy* **24**: 61-67.
- CAMBA (1988)** China-Australia Migratory Bird Agreement. Department of Foreign Affairs and Trade. Australian Treaty Series 1988 No 22. Australian Government Publishing Service, Canberra.
- Campbell, L. H., and Milne, H. (1977)** Goldeneye feeding close to sewer outfalls in winter. *Wildfowl* **28**: 81-85.
- Cronan, J. M. (1957)** Food and feeding habits of the scaups in Connecticut waters. *Auk* **74**: 459-468.
- Davis, C. (1999)** Personal watercraft use to be regulated in the parks. In *Natural Resource Year in Review - 1998*. National Park Service, US Department of the Interior.
- Debus, S. J. S., McAllan, I. A. W. and D. A. Mead (1993)** Museum specimens of the Red Goshawk *Erythrotriorchis radiatus* II: Morphology, biology and conservation status in eastern Australia. *Sunbird* **23**(3):75-89.
- Dennis, D. G., McCullough, G. B., North, N. R., and R. K. Ross (1984)** An updated assessment of migrant waterfowl use of the Ontario shorelines of the southern Great Lakes. In S. G. Curtis, D. G. Dennis, and H. Boyd (Eds.) *Waterfowl studies in Ontario, 1937-81*. Occasional Paper No. 54, pp. 37-42. Canadian Wildlife Service.
- Denson, E. P. (1964)** Comparison of waterfowl hunting techniques at Humboldt Bay, California. *Journal of Wildlife Management* **28**:103-120.
- Derricks, H. (2000)** Personal watercraft facts. Heytrack Australia, Melbourne.
- Einarsen, A. S. (1965)** *Black brant, sea goose of the Pacific coast*. University of Washington Press, Seattle.

- EPBC (2002)** Environment Protection and Biodiversity Conservation Act Online Database. Environment Australia. [www.ea.gov.au/epbc/interactivemap/index.html](http://www.ea.gov.au/epbc/interactivemap/index.html)
- Garnett, S. (1988)** *Birds of the Townsville Town Common*. Queensland National Parks and Wildlife Service, Townsville.
- Garnett, S. (1992)** *The Action Plan for Australian Birds*. Australian National Parks and Wildlife Service Endangered Species Program Project No. 121, ANPWS, Canberra. 262pp.
- Garnett, S. T., and Crowley, G. M. (2000)** *The action plan for Australian birds 2000*. Environment Australia, Canberra.
- Hansson, L. (1966)** Studies on the adaptation of the mallard (*Anas platyrhynchos*) to urban environments. *Vår Fågelvärld Supplementum 4*: 95-140.
- Harrington, B. (1998)** Effects of chronic recreational disturbance on shorebirds. In *The environmental impacts of boating; proceedings of a workshop held at Woods Hole Oceanographic Institution, Woods Hole MA USA December 7 to 9, 1994*. WHOI. [www.whoi.edu/coastalresearch/boatingimpact/TitleAcknContents.html](http://www.whoi.edu/coastalresearch/boatingimpact/TitleAcknContents.html). Woods Hole Oceanographic Institution, Woods Hole.
- Heusmann, H. W., and Burrell, R. G. (1974)** Park mallards. In *A symposium on wildlife in an urbanising environment, 27-29 Nov. 1973*. 182pp. Massachusetts Cooperative Extension Service, Amherst, Mass., Springfield, Massachusetts.
- Hume, R. A. (1976)** Reactions of goldeneyes to boating. *British Birds 69*: 178-179.
- Jahn, L. R., and Hunt, R. A. (1964)** Duck and coot ecology and management in Wisconsin. 164pp. Wisconsin Conservation Department, Madison.
- JAMBA (1981)** Japan-Australia Migratory Bird Agreement. Department of Foreign Affairs and Trade. Australian Treaty Series 1981 No 6. Australian Government Publishing Service, Canberra.
- Joensen, A. H., and Madsen, J. (1985)** Waterfowl and raptors wintering in wetlands of western Greece, 1983-85. *Natura Jutlandica 21*: 169-200.
- Kahl, R. (1991)** Boating disturbance of canvasbacks during migration at Lake Pygan, WI. *Wildlife Society Bulletin 19*: 242-248.
- Kaiser, M. S., and Fritzell, E. K. (1984)** Effect of river recreationists on green-backed heron behaviour. *Journal of Wildlife Management 48*: 561-567.
- Kingsford, R. (1994)** *Australian Waterbirds - a field guide*. Kangaroo Press, Kenthurst, NSW.
- Knapton, R. W., Petrie, S. A., and Herring, G. (2000)** Human disturbance of diving ducks on Long Point Bay, Lake Erie. *Wildlife Society Bulletin 28*: 923-930.
- Korschgen, C. E., and Dahlgren, R. B. (1992)** Human disturbances of waterfowl: causes, effects, and management. *Fish and Wildlife Leaflet*, Vol. 13.2.15. United States Department of the Interior Fish and Wildlife Service, Washington DC.
- Korschgen, C. E., George, L. S., and Green, W. L. (1985)** Disturbance of diving ducks by boaters on a migrational staging area. *Wildlife Society Bulletin 13*: 290-296.

- Kutt, A. S., and Pearson, R. G. (1995)** Impacts of the tenth terminal relocation on roosting birds on the south bank of the Ross River. Australian Centre for Tropical Freshwater Research, Townsville.
- Loong, D., Faithful, J., and Brodie, J. (2001)** An assessment of potential water quality impacts by motorised watercraft in Ross Dam: a literature review. 29pp. Australian Centre for Tropical Freshwater Research, James Cook University, Townsville.
- Madsen, J. (1998)** Experimental refuges for migratory waterfowl in Danish wetlands. 1. Baseline assessment of the disturbance effects of recreational activities. *Journal of Applied Ecology* **35**: 386-397.
- Martin, L. C. (1999)** Caught in the wake. The environmental and human health impacts of personal watercraft. [www.iwla.org/reports/pwc.html](http://www.iwla.org/reports/pwc.html). The Izaak Walton League of America.
- Mathews, G. V. T. (1982)** The control of recreational disturbance. In D. A. Scott (Ed.) *Managing wetlands and their birds, a manual of wetland and waterfowl management. Proceedings 3rd Technical Meeting on Western Palearctic Migratory Bird Management* pp. 325-330, Biologische Station Rieselfelder Münster, Federal Republic of Germany.
- Mickelson, P. G. (1975)** *Breeding biology of cackling geese and associated species on the Yukon-Kuskokwim Delta, Alaska*. The Wildlife Society, Washington DC.
- Mikola, J., Miettinen, M., Lehtikoinen, E., and Lehtilä, K. (1994)** The effects of disturbance caused by boating on survival and behaviour of velvet scoter *Melanitta fusca* ducklings. *Biological Conservation* **67**: 119-124.
- Mori, Y., Sodhi, N. S., Kawanishi, S., and Yamagishi, S. (2001)** The effect of human disturbance and flock composition on the flight distances of waterfowl species. *Journal of Ethology* **19**: 115-119.
- MWCC (2001-2005)** Asia-Pacific Migratory Waterbird Conservation Strategy: 2001-2005. Asia-Pacific Migratory Waterbird Conservation Committee.
- National Parks (1996)** Use of personal watercraft banned. *National Parks* **70**: 23-25.
- National Parks (1997)** PWCs out of place in parks. *National Parks* **71**: 17-18.
- NQCC (2000)** Current campaign spotlight jet skis. [www.nqcc.org.au/jetski.htm](http://www.nqcc.org.au/jetski.htm). North Queensland Conservation Council.
- NQ Water (2001)** Waterweeds cull in Ross River. NQ Water Latest News. NQ Water, Townsville. [http://www.nqwater.com.au/news/2001\\_05\\_24.htm](http://www.nqwater.com.au/news/2001_05_24.htm)
- NSW NPWS (1999)** Threatened species information. NSW National Parks and Wildlife Service, Hurstville.
- Ogilvie, M. A. (1981)** The mute swan in Britain, 1978. *Bird Study* **28**: 87-106.
- Owens, N. W. (1977)** Responses of wintering brent geese to human disturbance. *Wildfowl* **28**: 5-14.
- Perry, M. C., and Deller, A. S. (1996)** Review of factors affecting the distribution and abundance of waterfowl in shallow-water habitats of Chesapeake Bay. *Estuaries* **19**: 272-278.
- PWIA (2002)** Personal watercraft and the environment. [www.pwia.org/Env\\_PWC.htm](http://www.pwia.org/Env_PWC.htm). Personal Watercraft Industry Association.

- QPWS (1999)** Bullock Creek Conservation Park Management Plan. Queensland Parks and Wildlife Service, Brisbane.
- Reichholf, J. (1976)** The influence of recreation activities on waterfowl. In M. Smart (Ed.) *Proceedings of the international conference of wetlands and waterfowl*. International Waterfowl Research Bureau, Limbridge (Glos), England, Heiligenhafen, Federal Republic of Germany.
- Rodgers, J. A., and Smith, H. T. (1995)** Set-back distances to protect nesting bird colonies from human disturbance in Florida. *Conservation Biology* **9**: 89-99.
- Rodgers, J. A., and Smith, H. T. (1997)** Buffer zone distances to protect foraging and loafing waterbirds from human disturbance in Florida. *Wildlife Society Bulletin* **25**: 139-145.
- Royal forest and Bird Protection Society (2001)** Motor boats threaten southern crested Grebe. [www.forest-bird.org.nz/SpeciesatRisk/Grebe/motorboats.asp](http://www.forest-bird.org.nz/SpeciesatRisk/Grebe/motorboats.asp). Royal forest and Bird Protection Society of New Zealand, Christchurch.
- Stalmaster, M. V., and Kaiser, J. L. (1998)** Effects of recreational activity on wintering bald eagles. *Wildlife Monographs* (137): 46.
- The Conservancy (1999)** Position Statement - Personal watercraft. p6. The Conservancy of Southwest Florida, Naples.
- Townsville Bulletin (2002)** Dam could be tourist mecca. *The Townsville Bulletin*, Saturday, February 2, 2002, p5.
- Tuite, C. H., Hanson, P. R., and Owen, M. (1984)** Some ecological factors affecting winter wildfowl distribution on inland waters in England and Wales, and the influence of water-based recreation. *Journal of Applied Ecology* **21**: 41-62.
- Tuite, C. H., Owen, M., and Paynter, D. (1983)** Interaction between wildfowl and recreation at Llangorse Lake and Talybont Reservoir, South Wales. *Wildfowl* **34**:48-63.
- UK Marine SACs (online)** Environmental impacts of port and harbour operations. [www.ukmarinesac.org.uk/](http://www.ukmarinesac.org.uk/). UK Marine Special Areas of Conservation.
- US Fish and Wildlife Service (1976)** Environmental impact assessment: effect of boating on management of Ruby Lake national Wildlife Refuge. US Fish and Wildlife Service, PO Box 3737, Portland, OR 97208.
- Voyageurs National Park (1999)** Voyageurs National Park closed to personal watercraft use. In *News Press Releases 1999*.
- Wieneke, J. (2000)** *Where to find birds in north-east Queensland*. Jo Wieneke, Townsville.