Department for Environment and Heritage
Murraylands Region

Eckert Creek Wide Water Ecological Monitoring Report

2009

Government of South Australia
Department for Environment and Heritage

FRIENDS OF RIVERLAND PARKS

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Introduction

Location

Katfish Reach; a Demonstration Reach for Native Fish under the Murray-Darling Basin Native Fish Strategy is located within the Katarapko-Eckert Creek anabranch system between Berri and Loxton on the River Murray in South Australia (Figure 1). The total area of the Katfish Reach is nearly 9,000 hectares. While the majority of the site lies within the River Murray National Park, (Katarapko), or on other crown land, it also includes land held by the Gerard Aboriginal Community and a number of small private holdings (Katfish Reach Investment Proposal 2008).

The Eckert Creek Wide-Waters is an ancestral oxbow approximately 45.8 hectares in area with an average depth of 80cm. Riparian vegetation is dominated by unhealthy Black Box and Cooba with patches of River Red Gum which are dead or unhealthy. Spike Rush and Water Couch dominate the littoral zone with salt scolding along the northern arm. The aquatic vegetation is diverse with Ribbon Weed and Curly Pondweed dominating with large patches of Cumbungi along the bank margins. Other species include Floating Pond Weed, Giant Sedge and Three-cornered Bulrush (Harper 2008).

The Eckert Creek system has diverse floodplain and wetland habitat, with relatively healthy vegetation providing a significant habitat for a range of terrestrial and aquatic animals. The Eckert Creek system is situated on the Western side of the River Murray and currently receives permanent flows due to the high level of the upstream pool of Lock 4 (Lloyd 2008).

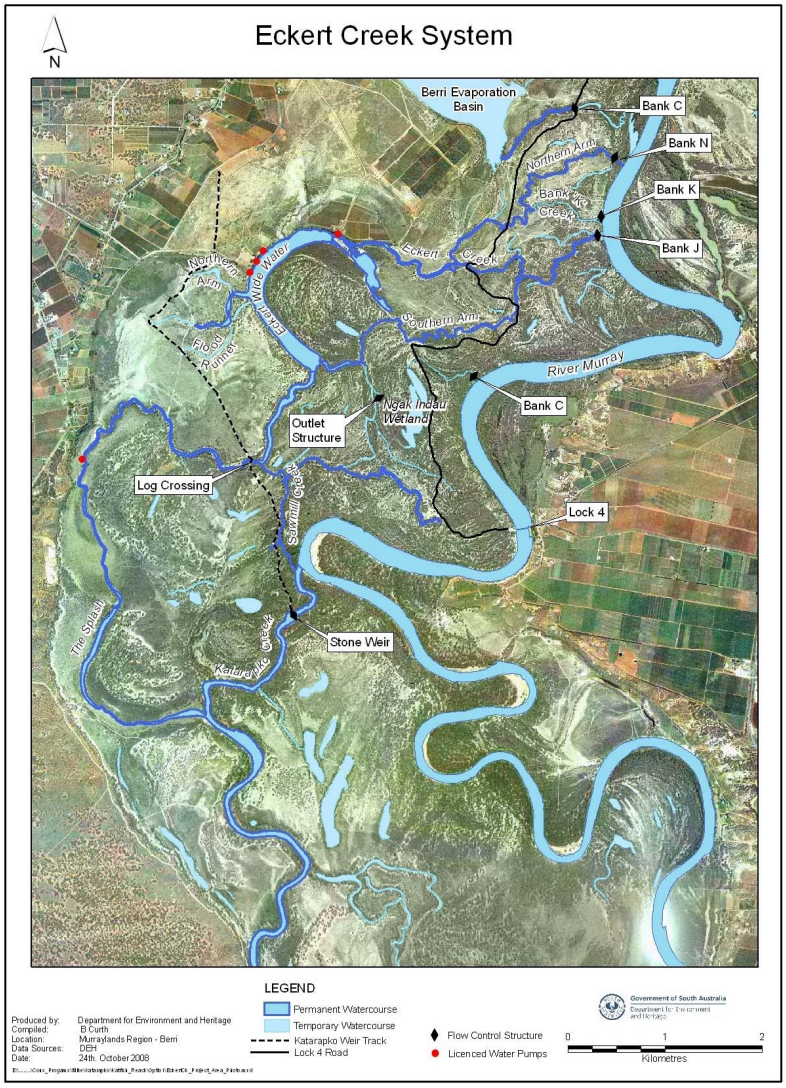

Figure 1. Eckert Creek System

Background

The purpose of the demonstration reach is to show, by example, how river and floodplain rehabilitation can be achieved by well-integrated management intervention such as riparian zone rehabilitation, alien/pest species management, re-snagging, improvements to water quality, providing environmental flows, improved fish passage and enhanced aquatic vegetation. The successful rehabilitation of a reach or floodplain is designed to: enhance community awareness, support and involvement in management providing models which can be used elsewhere in the Basin. It is also hoped this project will attract the attention of funding agencies and boost scientific knowledge of rivers and fish populations.
The vision for the Katfish Reach project is: "A healthier and more productive aquatic and floodplain ecosystem that everyone can enjoy" (Katfish Reach Investment Proposal 2008).

Ecological monitoring provides information to measure progress towards meeting the project's objectives, and results are used to modify or refine management strategies if objectives have not been met. In addition, monitoring and ecological data provides information that can be used to further refine the requirements and level of monitoring needed.

Ecological monitoring has been undertaken at six sites within the Eckert Creek Wide Waters. Parameters that have monitored on a regular basis are water quality, including electrical conductivity (salinity uS/ms) Turbidity (NTU) and pH, water birds and frogs. Both water quality and water birds have been monitored on a monthly basis since the beginning of 2007 and frog monitoring has been undertaken in spring and summer since 2007.

Water Quality

Water Quality parameters EC (electrical conductivity uS/cm), pH and turbidity (turbidity is measured in Nephelometric Turbidity Units (NTU) which is a measure of light scattering) have been monitored on twenty six occasions at six sites within the Eckert Creek Wide Water since the beginning of 2007.

EC across sites has ranged from 1842 uS/cm (December 2007) to 504 uS/cm (March 2008). The highest salinity has been recorded at site 1 (salt swamp) and site 4 (south western arm of wide water), this is to be expected as both of the sites occur either side of the main channel where water is shallow and flow is minimal to enable mixing and dilution, groundwater intrusion may also be contributing to the higher salinities in this area. The lowest ECs recorded have been at site 2 which is in the narrow neck where Eckert Creek joins the wide waters this area is deeper and has more flow allowing for mixing and dilution. All EC levels recorded at sites one and four exceed the default triggers recommended by ANZECC (2000) for wetlands (300-1,000 µS/cm) in south central Australia on a number of sampling events.

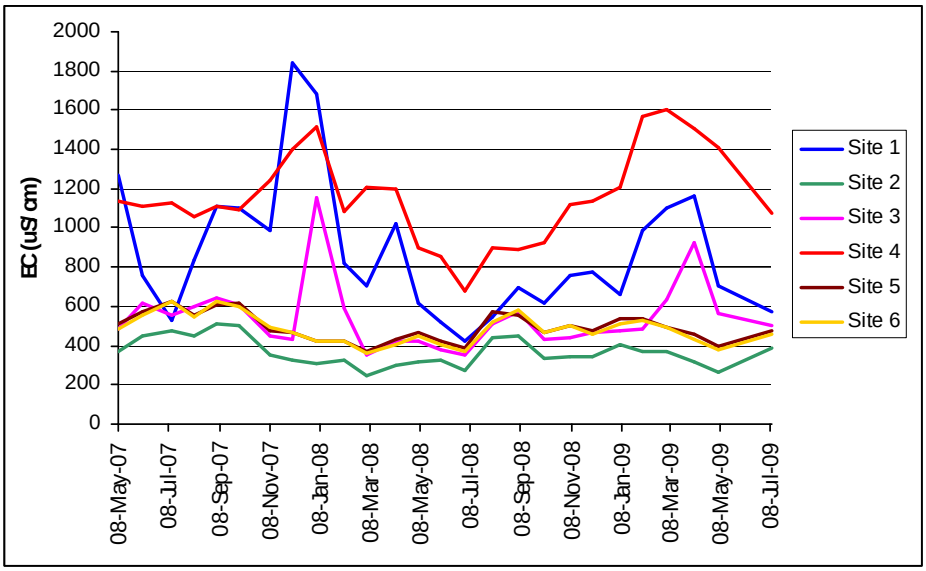

Figure 2. Electrical conductivity levels (uS/cm) in Eckert Creek wide water from May 2007 to July 2009

pH values across sites ranged from 9.2 (October 2007) to 6.5 (August 2008) (Figure 2). To date pH measurements have fallen outside the range of ANZECC (2000) trigger levels for lowland rivers and freshwater lakes (<6.5 – >9) on two sampling events. High pH levels were recorded in the warmer months of September to January (Figure 2) possibly resulting from high primary productivity in the wetland. As carbon dioxide functions like carbonic acid in water, algae and aquatic vegetation present in the wetland may have reduced water acidity by consuming carbon dioxide through photosynthesis.

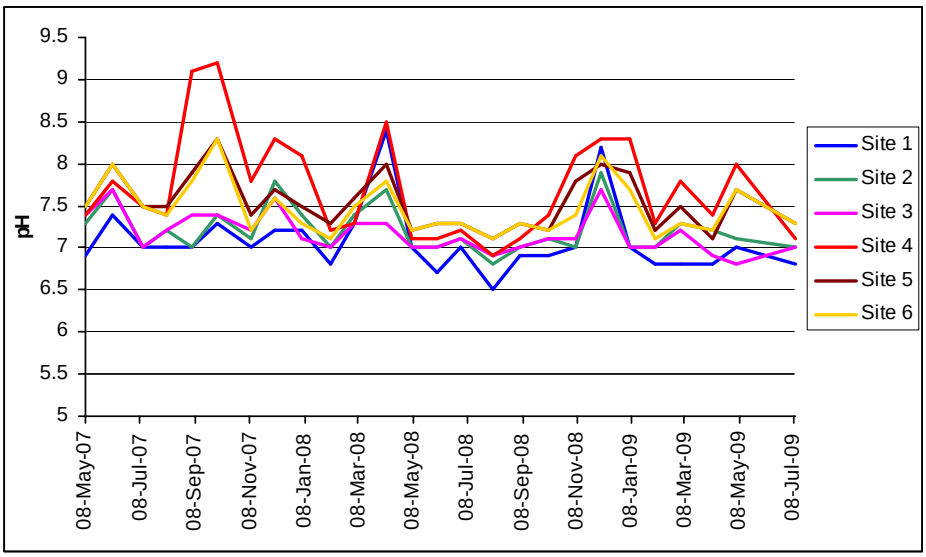

Figure 3. pH levels in Eckert Creek wide water from May 2007 to July 2009

Turbidity levels to date have ranged from 0 NTU during mid 2007 up to 250 NTU during April 2008 (Figure 3). Lower Turbidity readings have been recorded at sites two and three, site one has constantly recorded the highest turbidity measurements (Figure 3). Turbidity levels recorded at Site one have exceeded ANZECC (2000) threshold levels (1-100 NTU) for lowland rivers and wetlands on most sampling events, levels at all other sites have remained below threshold levels

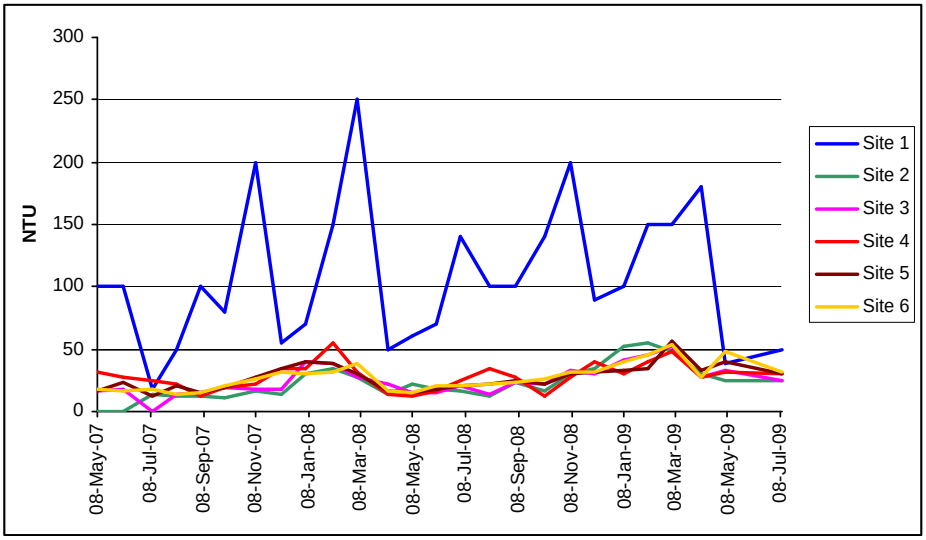

Figure 4. Turbidity levels (NTU) in Eckert Creek wide water from May 2007 to July 2009

Frogs

Frog surveys have been undertaken on four occasions during spring and summer in 2007 and 2008 at six sites within the Eckert Creek Wide Water, Five frog species were recorded during all sampling events, (Table 1) all of which may be found in wetland and floodplain habitats (Table 1). The Southern Bell Frog (Litoria raniformes) which is listed as vulnerable, and protected under the Federal Environment Protection and Biodiversity Conservation (EPBC) Act (1988) and South Australian National Parks and Wildlife Act (1972) and was recorded in moderate to high numbers in the Eckert Creek wide water. The other species recorded were the Peron's Tree Frog (*Litoria peronii*), Eastern Sign Bearing Froglet - *Crinia parinsignifera,* Eastern Banjo Frog - *Limnodynastes dumerili* and Spotted Grass Frog (*Limnodynastes tasmananiensis*). All species except the Eastern Banjo Frog were recorded in moderate to high abundances on all occasions (Table 1) indicating that suitable frog habitat was available during these times. Peron's Tree Frog was recorded at the wetland in September and November in 2007 but was only recorded during November 2008 (Table 1), the species can be found in most forested habitats but will also forage in grasslands and other open areas and calls between September and January (Robinson 2002). The Spotted Grass Frog is the only species recorded in September and November of both 2007 and 2008 (Table 1), it can be found in woodland, shrubland and grassland from the coast to inland waters (Robinson 2002), the males call from the water in either concealed or exposed sites, throughout the year and particularly after rain (Robinson 2002). Additional species may still have been present at the wetland during these times but were not recorded at the sites surveyed. Frog species found in the Eckert Creek wide water are reasonably diverse. This may be a reflection of the available aquatic and littoral habit the wide water supports.

Table 1: Frog species and abundances identified at Eckert Creek Wide Water 2007 - 2008

Survey Date	24-Sep-07						26-Nov-07					
SITE	1	2	3	4	5	6	1	2	3	4	5	6
Peron's Tree Frog - *Litoria peroni*		Few					Few	Few	Few	Few	Many	Few
Southern Bell Frog - *Litoria raniformis*									Many		Many	
Eastern Sign Bearing Froglet - *Crinia parinsignifera*	Few	Few	Few	Many	Many	Many						
Eastern Banjo Frog - *Limnodynastes dumerili*					One							
Spotted Grass Frog - *Limnodynastes tasmaniensis*	Few	Few	Many	Few	Many	Few		Few		Few		

Survey Date	18-Sep-08						18-Nov-08					
SITE	1	2	3	4	5	6	1	2	3	4	5	6
Peron's Tree Frog - *Litoria peroni*							Few	Few	One		Many	Many
Southern Bell Frog - *Litoria raniformis*									Few		Few	
Eastern Sign Bearing Froglet - *Crinia parinsignifera*	One	Few	One	One	Few	Many	Few	Few		Few	Many	Lots
Eastern Banjo Frog - *Limnodynastes dumerili*				One	Few							
Spotted Grass Frog - *Limnodynastes tasmaniensis*		Few	Few	Few	Few	Few	Many	Few	Many	Few	Many	Many

Few (2-9); Many (10-50); Lots (>50)

Water Birds

Water bird surveys have been undertaken monthly at Eckert Creek wide water since mid 2007. A total of 38 species of waterbirds (7,623 individuals) have been observed over this time (Table 2). The highest number of birds 4261 was recorded during 2008-2009 (Figure 5) average species abundance of birds was 16 during (Figure 6) 2007-2008 and 2008-2009 (Figure 6). The highest species abundance of twenty bird species was recorded in April 2009 (Figure 6). Nineteen bird species were recorded on four different survey occasions during 2007-2008 (Figure 6) and on two survey occasion during 2008-2009 (Figure 6). The most abundant species observed in the Eckert Creek wide water to date is the Grey Teal Duck (2,418 individuals), other abundant species included the Australian Shelduck (1491 individuals, and several young have also been recorded) and Hardhead (629 individuals). Two species of state significance were detected: the Australasian Shoveler (Anas rhynchotis) and the Little Egret (*Egretta garzetta*) listed as rare in South Australia under the National Parks and Wildlife Act 1972 (Table 2). Thirteen species protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as migratory species were also identified in the Eckert Creek wide water. Species diversity on all survey events has ranged from moderate to high with at least 10 species recorded on each monitoring occasion. Both diversity and abundance has peaked during the summer months, species abundance and bird numbers are significantly higher between the months of October and May (Figures 5 and 6).

Table 2: Bird species identified at Eckert Creek Wide Water 2007 – 2009

Species	**Species**
Australian Grebe - *Tachybaptus nuovaehollandiae*	Australian Shelduck - *Tadorna tadornoides*
Hoary -Headed Grebe - *Poliocephalus poliocephalus*	Pacific Black Duck - *Anas superciliosa*
Australian Pelican - *Pelecanus conspicillatus*	Australasian Shoveler - *Anas rhynchotis*
Great Cormorant - *Phalacrocorax carbo*	Hardhead - *Aythya australis*
Little Black Cormorant - *Phalacrocorax sulcirostris*	Australian Wood Duck - *Chenonetta jubata*
Pied Cormorant - Phalacrocorax *varius*	Swamp Harrier - *Circus approximans*
Little Pied Cormorant - *Phalacrocorax melanoleucos*	Black-tailed Native-hen - *Gallinula ventralis*
Australian Darter - *Anhinga novaehollandiae*	Purple Swamphen - *Porphyrio porphyrio*
White-necked Heron - *Ardea pacifica*	Eurasian Coot - *Fulica atra*
Great (Large) Egret - *Egretta alba*	Black-winged Stilt - *Himantopus himantopus*
White-faced Heron - *Egretta novaehollandiae*	White-headed Stilt - *Himantopus leucocephalus*
Little Egret - *Egretta garzetta*	Masked Lapwing - *Vanellus miles*
Australian Ibis - *Threskiornis molucca*	Black Fronted Dotterel - *Elseyornis melanops*
Straw-necked Ibis - *Carphibis spinicollis*	Red-kneed Dotterel - *Erythrogonys cinctus*
Yellow-billed Spoonbill - *Platalea flavipes*	Silver Gull - *Larus novaehollandiae*
Black Swan - *Cygnus atratus*	Whiskered Tern - *Childonias hybridus*
Pink-eared Duck - *Malacorhynchos membranaceus*	Caspian Tern - *Hydroprogne caspia*
Grey Teal - *Anas gibberifrons*	Clamorous Reed Warlber - *Acrocephalus stentorrus*
Chestnut Teal - *Anas castanea*	Little Grassbird - *Megalurus gramineus*

Table 3. Wetland bird species recorded breeding in Eckert wide water 2007-2008

Species	**Clutches of Young**
Black Swan *Cygnus atratus*	6 clutches of young
Australian Shelduck *Tadorna tadornoides*	2 clutches of young
Pacific Black Duck *A. superciliosa*	1 clutch of young

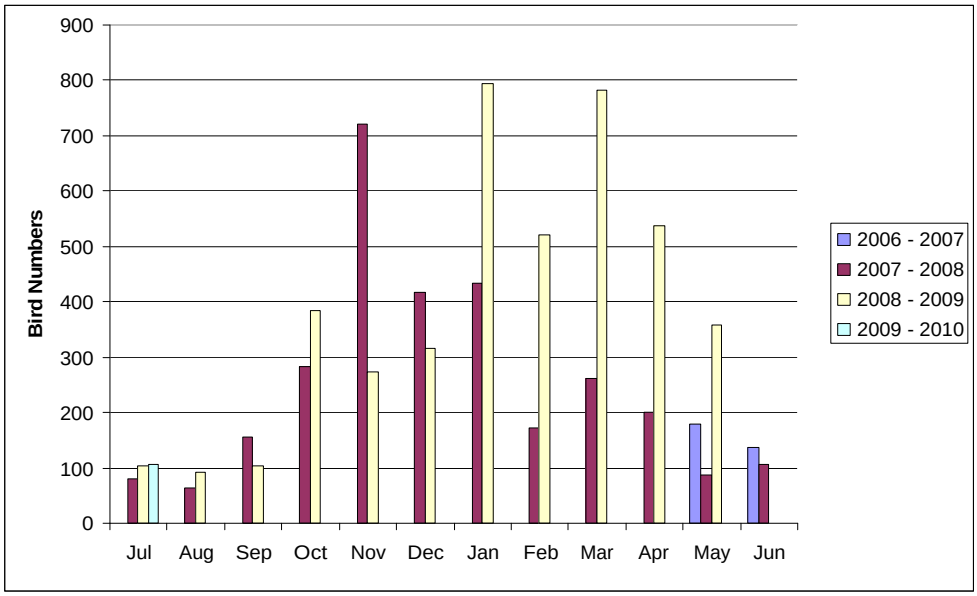

Figure 5. Bird abundance in Eckert Creek Wide Water

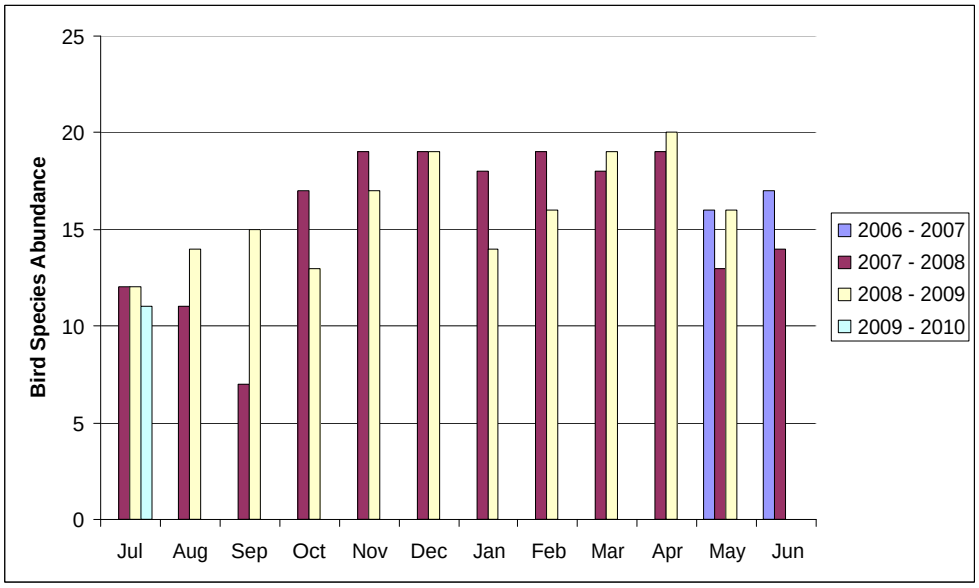

Figure 6. Bird species abundance in Eckert Creek Wide Water

Summary

Water quality parameters are constantly changing over diurnal periods and are influenced by other factors, such as temperature, flow and biological activity. Permanent inundation of a wetland such as Eckert Creek wide water can contribute to increasing salinity as water exchange is occurring at a lower rate and therefore salts aren't always able to be flushed out. EC threshold levels for aquatic biota vary with individual species life cycles, as well as larvae and juveniles.

Within wetlands pH varies diurnally with higher values during the day because algae and other plants remove CO_2 while they photosynthesize and pH decreases during the night when CO_2 is released. Productive wetlands i.e. wetlands with high densities of aquatic vegetation will use more CO_2 during the day than less productive wetlands, thereby increasing the pH.

High turbidity levels can be influenced by wind which can cause re-suspension of sediments. Turbidity levels may have been caused by low water circulation through Eckert Creek wide water and sediments were able to flocculate and settle out.

Frog species recorded within the Eckert Creek wide water are quite diverse, five species were heard calling over Spring and Summer of 2007 and 2008. The Southern Bell Frog (Litoria raniformes) which is listed as vulnerable, and protected under the Federal Environment Protection and Biodiversity Conservation (EPBC) Act (1988) and South Australian National Parks and Wildlife Act (1972) and was recorded in moderate to high numbers in the Eckert Creek wide water during November only of 2007 and 2008, which is to be expected as the species generally breed between November and March.

Water birds recorded in high numbers within the Eckert Creek wide water are species which are suited to open water i.e., Australian Pelican, Hardhead Duck, Grey Teal Duck and Australian Shelduck which reflects the large areas of open water available at the wetland. Species suited to shallower water or wet mud (for example, stilts, dotterels and plovers) were recorded in lower numbers, most likely due to the absence of these habitats. The Australasian Shoveler (Anas rhynchotis) and the Little Egret (*Egretta garzetta*) listed as rare in South Australia under the National Parks and Wildlife Act 1972 were recorded within the wetland, the Australasian Shoveler on two occasions the Little Egret on one occasion. Abundance and diversity increased between October and May indicating that suitable habitat and resources were available during these times.

References

Harper, M. 2008 Katfish Reach Conservation Asset Condition Report. Published by the Department for Environment and Heritage, Berri, South Australia.

Katfish Reach Steering Group, (2008) Katfish Reach Implementation Plan.

Lloyd, L.N. 2008. Draft Eckert Creek Water Management Options. Lloyd Environmental Report to S.A. Department of Environment and Heritage (LE0842), Syndal, Victoria.