maitland

city council

WALKA WATER WORKS

ECOLOGY

1.0 INTRODUCTION

The Lower Hunter Valley has been covered by a number of wetland surveys, none of which have mentioned the Walka Lake, although they serve to place it in context with respect to size and other characteristics. In 1970, Goodrick prepared a report on the State's Coastal Wetlands but dealt with only sites of natural origin. The only man-made wetland covered by later work of NSW Planning and Environmental Commission (1977) was Grahamstown Reservoir, which with Lake Liddell, near Muswellbrook, was discussed by Waterhouse (1981), together with the main natural wetlands of the Lower Hunter floodplain (below the 10 metre contour) and included the description and evaluation of several wetlands adjacent to the Walka site.

However, the Walka Lake has been included in a number of published limnological surveys by Brian Timms (see below). In addition, a group associated with the Shortland Wetlands Centre has formed a wetlands site assessment committee to evaluate wetlands as waterbird habitat and for other purposes. The group's records cover the Walka site and relevant comments are summarised below.

Information is this section of the report is drawn mainly from site inspections on 11th, 17th and 18th July 1986 and from previous reports by TRESEV. Other sources are acknowledged in the text and Brian Gilligan of the Shortland Wetlands Centre is thanked for information and discussion on management.

2.0 MORPHOLOGY OF THE LAKE

The present lake was created from a small, natural lagoon with the construction of a stone dam wall across the broad, shallow valley about a century ago. With an area of about 18 ha, the lake is larger than most of the natural wetlands on the Lower Hunter floodplain (Pressey 1981).

Measurements by TRESEV indicate that the lake has a maximum depth of about 7.5 metre below the level of the spillway with only a very small proportion of its area shallower than 1 metre due to the relatively steep slope of the bed.

The lake's outline has been changed slightly by the construction of a circulation channel along the northern shore from which cooling water was drawn for a small power station operated by the Electricity Commission. The long peninsula enclosing the circulation channel greatly extends the shoreline length relative to the area of the lake, a beneficial change for the waterbirds.

The general morphology of the lake's shoreline is summarised below in terms of the eight (8) shoreline sections shown in Figure 1. The level of the lake was quite low when these notes were made (see following section).

Section 1: Below the stone wall is a gently sloping littoral zone (5-10°), widest at its northern end, composed of highly organic mud. This part of the shoreline is exposed to waves generated by strong westerlies.

Section 2: The main stone wall forming the south eastern shore of the lake. No littoral mud was apparent and the wall drops into the water at about 20°.

Section 3: Littoral zone with a slope of about 10° below a step in the bank and a level, grassed terrace.

Section 4: Irregular shoreline, littoral zone generally about 10° slope, greater in places, below a ½ - 1 metre near vertical step to hillside pasture. Mostly vegetated by Typha.

Section 5: As for Section 4 except that most of the littoral zone is bare mud.

Section 6: As for Section 4 except that stands of emergent plants are discontinuous in the littoral zone with large areas of bare mud between, and slope of the littoral zone up to 20° in places.

Section 7: The 'peninsula' enclosing the circulation channel extended about 2 metres above the lake level when seen and about 1 metre above the Juncus zone. It slopes fairly steeply (20°+) into the lake.

The bed of the circulation channel was mainly exposed wet med when seen and is lined with Typha.

Section 8: Very steep slope (30-45°) down to water and a very narrow littoral zone.

3.0 HYDROLOGY AND LIMNOLOGY

Since the closure of the waterworks in the 1930's, the lake has received water only from its immediate catchment. As the catchment is relatively small, only about four times the size of the lake area, significant drops in water level can be expected during dry periods. When seen on 18.7.86 the water level was about 1.5 metres below the level of the spillway and about 1 metre below the marginal band of Juncus which usually delineates high water level in wetlands. An earlier report on the area for TRESEV by George McFarlane, following a site visit some three (3) years ago, includes a mention of water level being about 1 metre below maximum. However, in July 1986, the thick fringing band of Typha, a plant typically of persistently flooded areas, was generally above lake level, indicating that higher levels are common.

The lake previously received wash water and runoff from holding yards of an adjacent abattoir. At that time nutrient and bacterial levels in the lake were very high (Hunter District Water Board, pers.comm.) These sources of pollution have now been diverted elsewhere and only rainfall drains off the southern catchment (State Pollution Control Commission, pers.comm).

The only published limnological studies on the lake are those by Brian Timms. Timms (1970 a) found that the lake had a relatively high salinity but a small range between minimum and maximum readings relative to two colliery dams nearby and Ellalong lagoon, near Cessnock. Sodium and chlorine were the dominant ions, in common with the other sites. Data from the four sites showed a close correlation between the range of salinity fluctuations and water renewal (ratio of catchment area to water area).

The Walka lake was also included in a very broad limnological investigation in north eastern New South Wales by Timms (1970 b). The results put the lake into a broad perspective with respect to ionic dominances – sodium and chloride dominance is typical of sites on the coastal lowlands – and add information on the plankton.

The Walka lake and two other sites, Mardi Dam near Wyong and Grahamstown Reservoir north of Newcastle, are significant as the only records during Timms' study of the calanoid copepod (a planktonic crustacean). Gladioferens Spinsus – This species is generally known to occur either at the freshwater end of a continuous saliuity gradient or in closed freshwater lakes close to the sea. None of the three sites where it occurred is close to the sea but their water is, or was in the case of Walka, withdrawn from a river just upstream of the saltwater limit. Thus, Timms believed that G. Spinosus was introduced by pipelines to the reservoirs. In a later paper, Timms (1974) made the point that the crustacean can apparently maintain itself in such a new environment once introduced since the Walka lake had not been filled from the river for many years previously.

Gladioferens was still present in the lake in 1983 according to Brian Timms (pers.comm.) who also reports that the lake has a high standing cropof benthic invertebrates. Sampling indicated a very dense population of chironomid larvae, possibly due to previous nutrient inputs from the abbatoir. This population is likely to persist for some years and it is notable that at least some chironomids are an important food source for waterfowl.

4.0 WETLAND PLANTS

Eighteen species of wetland plants were found on the Walka site in 3 different habitats; around the shore of the lake, in a small gully dam at the north west corner of the lake, and in a small quarry on the hilltop to the north of the lake. Additions to this number could be expected in the warmer months and during changes in water level in the lake and the gully dam. Notes on the distribution and condition of the recorded species are given below:

Alisma plantago – aquatica: A few plants in the gully dam above the railway embankment.

Alternanthera denticulate: A few plants on the upper littoral of Section 6.

Bolboschoenus fluviatilis: A relatively stand on the embankment in Section 7, extending from near water level to a metre or more above, partly burnt; a very small and heavily grazed patch in Section 5.

Eleocharis spacelata: Occurs in isolated patches in Sections 3,4,5,6 and 7; in all cases the patches are damaged by grazing and trampling; a large patch in Section 6 ranged over about 60cm elevation from 20-30cm below water level to the same above; also occurs in the gully dam and in the quarry on the north boundary.

Juncus usitatus: Occurs commonly throughout Sections 3-7, delineating high water levels in a dense or discontinuous cand generally about ½ metre below spillway level, occasionally higher, in Sections 3-6 it typically grows along the step in the bank between the hillside pasture and the littoral zone; generally not grazed except in Section 3 where the clumps are heavily eaten down (this appears to be the main watering point for dairy cattle).

Ludwigia peploides: One plant seen in Section 5, otherwise confined to the gully dam.

Persicaria hydropiper: The main occurences are around a small ambayment in the northern part of Section 6 and in the gully dam.

Persicaria lapathifolia: A few small scattered specimens in the gully dam, and in Section 6.

Persicaria orientalis: Small scattered plants around the lake perimeter.

Polygonum phebeium: On exposed littoral areas in Sections 4 and 5 and particularly dense and widespread in Section 6.

Ranunculus inundates: Only found in the gully dam.

Ranunculus sceleratus: Flowering specimen taken from Section 4; dense non-flowering buttercups at the western ends of Sections 4 and 6 may also be this species; introduced and can be poisonous to stock.

Rumex? Crispus: Only non-flowering plants seen throughout the lake margins on exposed littoral areas; introduced.

Schoenoplectus litoralis and S.validus: Very heavily grazed schoenoplectus occurred in three small patches on the lower littoral and could not be identified to species; however, the western patch in Section 6 was mainly ungrazed and culms were flowering; both litoralis and validus were identified from samples; the presence of litoralis is interesting since this species is generally found in brackish areas in the upper parts of estuarine wetlands; the relative proportions of the two species were not determined.

Triglochin procera: Limited to a few small specimens in the gully dam but well developed in the hilltop quarry.

Typha orientalis: The best developed and most conspicuous macrophyte on the lake, covering a large proportion of the perimeter; its typical vertical distribution was from water level or just below to about ½ metre above (i.e. for 1/3 metre to 1 metre below the Juncus zone); in Sections 1, 2 and 8, sparse plants were regenerating from cutting during clean up operations and scattered plants were growing back between stones in Section 2; two small patches in Section 3 were severely damaged by grazing and trampling; in Sections 4, 5 and 6 a thick, tall and collapsed band occurred along the exposed littoral but had not been obviously damaged by stock; below this thick

band were sparser, smaller plants showing some signs of damage was much less apparent along the lake side of the embankment in Section 7 although some Typha had been burnt here.

Vallisneria gigantean: This submergent occurred discontinuously around most of the perimeter, generally in a band about ½ metre deep (1.5 metres below the Juncus zone) parallel to the shore; the width of the band varied with shoreline slope and was very narrow along the steep easterly part of Section 7; also occurred in a narrow band in Section 2, although broader at the western end perhaps due to more shelter from wave action.

5.0 WETLAND FAUNA

Of the sixty three (63) species of birds recorded for the Walka site, thirty nine (39) were wetland birds. This number is likely to be enlarged with further observations, particularly suring summer.

The site assessment committee associated with the Shortland Wetlands Centre regards the lake as a relatively important bird habitat because of the general scarcity of deep open water in the district (Nigel Walker, pers.comm). The survey of the Hunter Wetlands by Pressey (1981) showed that deep open water made up only 2% of the total wetland area of the Lower Hunter floodplain.

Nigel Walker has seen Great Crested Grebes on the lake during every visit. Ten were present in July 1986 and were recorded previously by George McFarlance. This regular occurrence has considerable significance since the lake is only one of three sites in the Hunter Valley where the species can be regularly observed. In an earlier report, George McFarlane observed moorhen chicks on the lake and suggested that the area might be used for breeding by Great Crested Grebes and other birds.

Some woodland and grassland birds also use the wetlands margins. For example, Magpie-larks forage on the muddy edges and Superb Fairy-Wrens move through stands of Typha.

The most abundant waterbirds seen in July 1986 were Eurasion Coots (about 100), Pacific Black Duck and Grey Teal (each about 100) and small grebes, both Australian and Hoary-headed (totalling about 50).

When the area was seen in July 1986, most waterbirds were concentrated in the western arms of the lake (Sections 4-6). This area would generally be favourable habitat because of the irregular, more gently sloping shoreline with emergent and submergent macrophytes. The Great Crested Grebes, other grebes and White-Eyed Ducks, all of which dive for food, were seen in the north west arm and in deep water in the centre of the lake. Large numbers of Eurasian Coots and small grebes were feeding at the far eastern end of the lake near Section 1, possibly because of stirring of bottom material by wave action and concentration of broken Vallisneria leaves. Numbers of Coots were also feeding on Vallisneria along the stone wall of Section 2.

Virtually no birds were seen in the circulation channel (Section 7) but it is very likely that this area would be valuable habitat when the water level was higher or during low water levels in summer (for waders). The high proportion of cover in the form of Typha next to open water or mud would also favour secretive species like Crakes.

In a previous report on the area by TRESEV it was mentioned that a large colony of tortoise occurs in the lake. The long necked tortoise, Chelodina longicollis, is the most common species in the Hunter Region with the short necked tortoise, Emydura signata, much less common (Waterhouse 1981).

No frogs have been recorded in the Walka area but several species are likely to occur there. It should be noted that retention and expansion of the woodland and planting trees on the wetland margins will be important in maintaining and diversifying the local frog fauna. Some frogs may live in forested country some distance from water, moving to it occasionally for breeding and others would be favoured by tress and leaf litter on the lake shore (Waterhouse 1981).

There are no definite records of fish in the lake although in an earlier TRESEV report it was noted that eels are likely to occur there.

6.0 FLORA AND FAUNA OF THE WOODLAND AND GRASSLAND

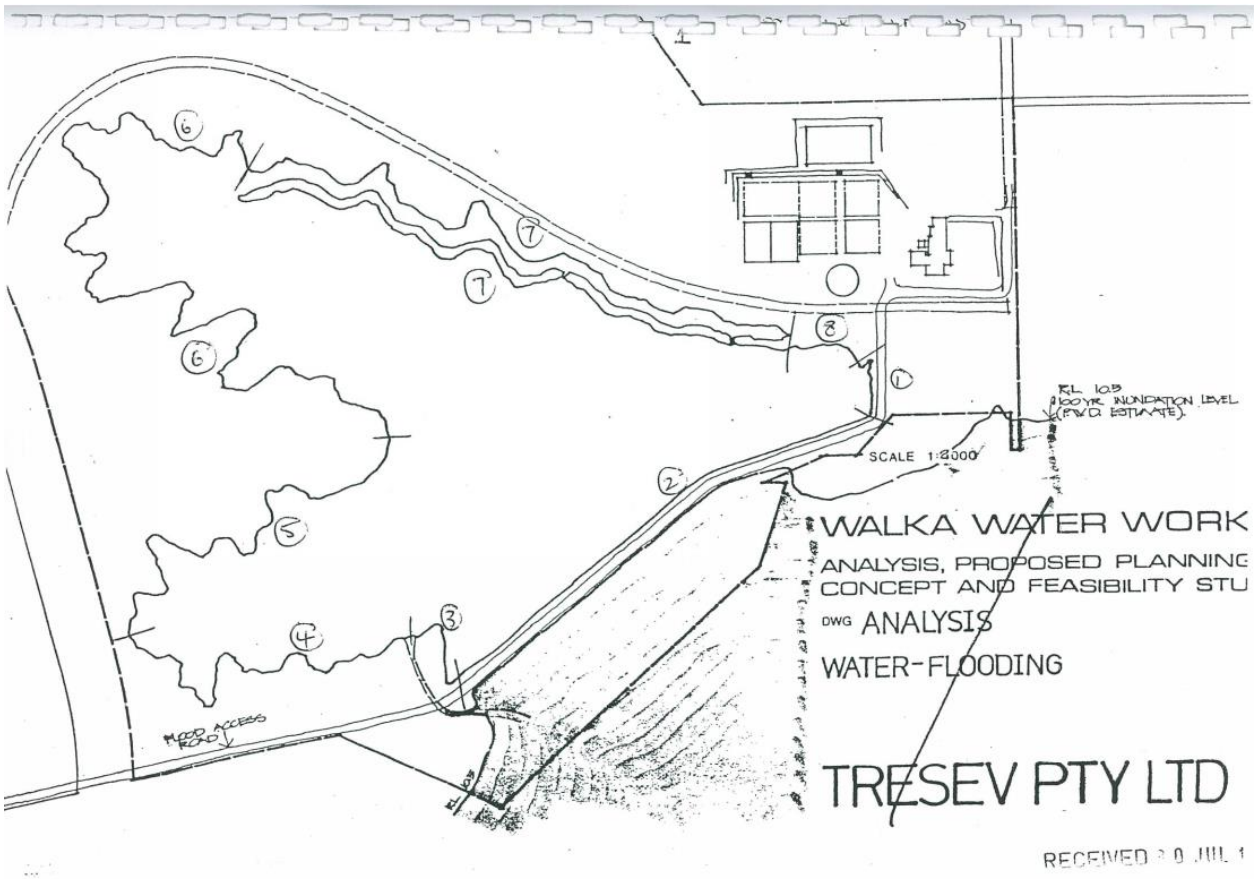
The nature of the terrestrial parts of the Walka area is significant for its own conservation and management, but it is also relevant to the lake since there are inputs of water and materials from the catchment and important interchanges of fauna between the two environments.

George McFarlane has recorded four species of eucalypts in the woodland area in the north west of the Walka area: grey ironbark (Eucalyptus paniculata), spotted gum (E. maculata), yellow box (E. melliodora) and silver topped stringy bark (E. laevopinea). Casuarinas also occur as canopy trees and melaleucas, callistemons and acacias occur in the understorey.

McFarkane also recorded thirty (30) species of grasses and other ground flora in the area, many of which are introduced. He listed thirteen (13) species or genera of trees which have been introduced to the site, although some of these, for example silky oak, are Australian natives.

The twenty four (24) species of birds so far covered in woodland and grassland are listed in the Appendix. Additional species would be expected with furher sampling particularly when the trees are in flower and during the warmer months.

The movement of frogs between terrestrial habitats and wetlands has been mentioned above, as has the use of wetland margins by some birds typical of terrestrial habitats. Other examples of the complementary nature of wetland and dryland habitats could certainly be gathered with further observations.



This study by R.L Pressey has been extracted from *'Specialist Reports for Walka Waterworks Conservation Plan'* Tresev Pty Ltd 1986