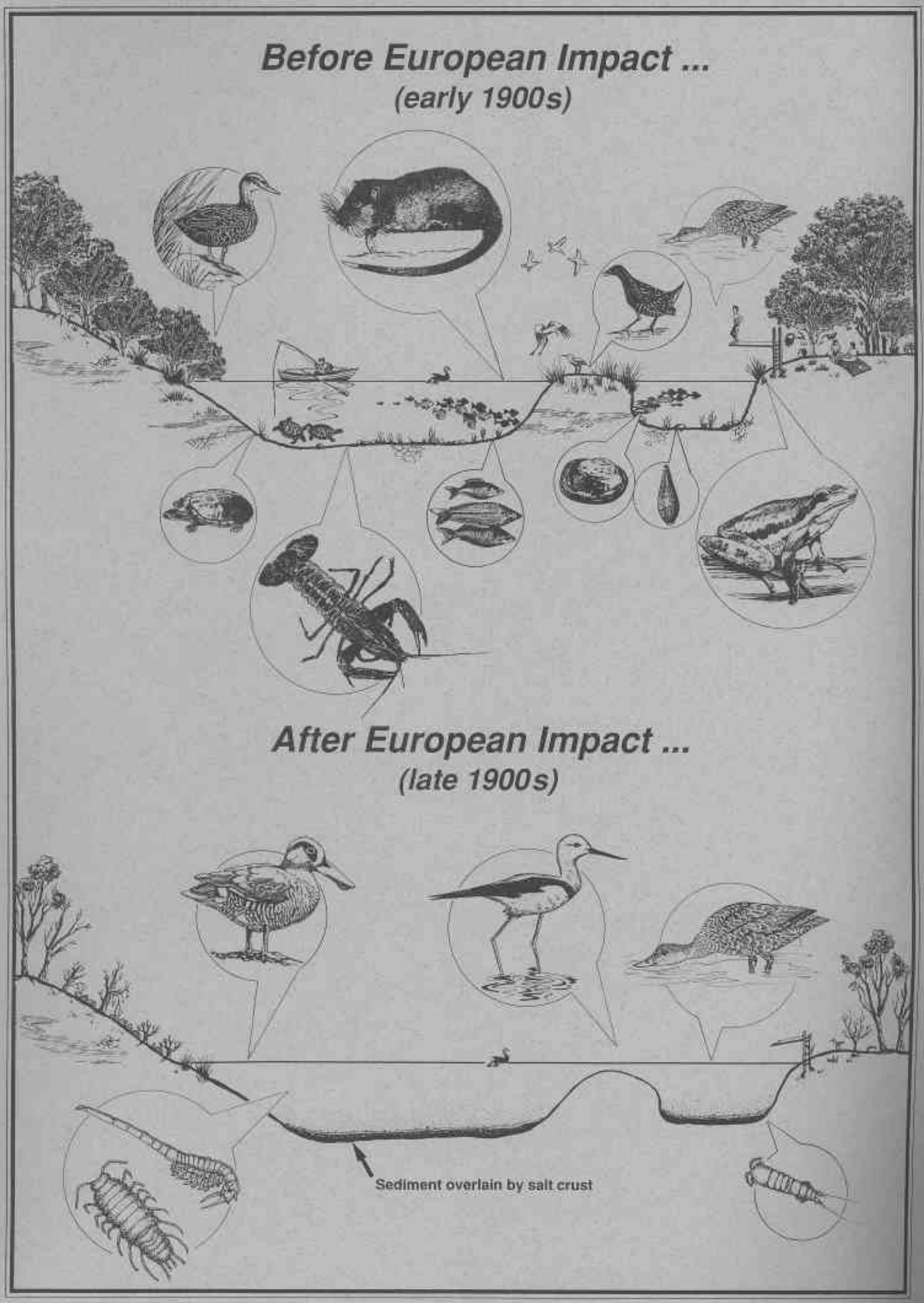
Oral Histories Documenting Changes In Wheatbelt Wetlands

By Angela Sanders

Occasional Paper 2/91 May 1991

Department of Conservation and Land Management


Before European Impact ...
(early 1900s)
After European Impact ...
(late 1900s)
Sediment overlain by salt crust

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NOTE TO THE READER

The information contained in this report is based solely on oral history memoirs. Every attempt has been made to interpret each transcript as the interviewee intended, however, the author is not responsible for the factual accuracy of the memoirs, nor for the views expressed therein.

Original voice tapes and verbatim transcripts are available in the Battye Library Oral History Unit, 3rd Floor, Alexander Library Building, Perth, Western Australia.

Abstract

Oral Histories recorded from 17 people, together with additional anecdotal notes, were used to document environmental changes in wetlands of the Western Australian wheatbelt. Most of the wetlands documented lie in the Avon and Blackwood River catchments. Environmental changes have occurred in most wheatbelt wetlands. These include salinisation, increased inundation, siltation, eutrophication, changes in biota and introduction of exotic species. All these changes followed European settlement and land clearing for agriculture. Recording oral histories has documented these changes and helps us to understand what our wheatbelt wetlands used to be like and why they changed. This understanding will assist us in predicting the impact on wetlands of changes in land management practices and thus contributes to future planning.

INTRODUCTION

Clearing of vegetation for agriculture in the Western Australian wheatbelt occurred mainly during two periods. Firstly, 1900-1930 and, after a lull, began again with the end of World War II and the advent of bulldozers in about 1950 and continued until 1980 (Schofield *et al.* 1988). ('The wheatbelt' refers to that part of Western Australia in which wheat is the predominant cereal crop.) The rise of saline groundwater occurred as a result of land clearing and this process has been well documented throughout agricultural areas. The wetlands in the wheatbelt suffered enormous changes owing to salinisation, increased run-off, siltation and eutrophication, but the history of their degradation remains largely in the unrecorded memories of people over 45 years of age. It was obvious, therefore, that this valuable source of historical information would be lost to future generations unless it was documented. It was thought that recording oral history memoirs would provide the best method of documenting these changes. Although there have been many oral history projects covering social and political change, very little work has been done specifically on environmental change. A method, therefore, was devised to record oral histories of environmental changes in wheatbelt wetlands. A detailed description of the methods used to record, transcribe and process the oral histories is described below. A register of historical photographs relating to changes in wetlands has also been compiled through inquiries made with each participant in this project.

Through detailed analysis of each transcript a summary of environmental changes in some wetlands in the Avon River and Blackwood River catchments has been compiled. Species changes and the sequence of those changes for these catchments are also presented. Figures 1 and 2 show the wetlands documented in oral histories. Notes on other wetlands in the wheatbelt are included. It is hoped that this report will provide the basis for further work as there are many more wetlands in the wheatbelt and other areas of the State that have undergone enormous changes since European settlement.

It is recognised that to properly manage our wetlands and predict the continuing impact of agricultural practices we must understand the history of the wetlands.

METHODS

Getting started

When I first started research for this project it became apparent that very few oral histories of environmental change in Western Australia had been collected. The first stage of the project was therefore to devise a method of collecting oral histories of environmental changes in wheatbelt wetlands. Constraints governing the scope of the project were:

- to gather information only on wetlands in the wheatbelt;
- to collect oral histories from persons over 40 years of age having personal recollections of wetlands.

The names of a few people known to have an interest in wetlands were provided by K. Wallace (Department of Conservation and Land Management). Press releases were sent to various media outlets and the project was also promoted through relevant government publications, the Western Australian Museum's Country Program and the Wetlands Conservation Society newsletter. Potential interviewees were listed together with their area of knowledge. A priority list was then compiled and I attempted to include at least three people who could provide information on the same wetland or wetland chain. This enabled dates of events to be cross referenced for greater accuracy when collating information. This list was adjusted as other names were suggested during the course of interviews. After compiling the priority list it became apparent that the two areas where most information was available were the Avon and Blackwood River catchments. I therefore concentrated on these areas, although some oral histories of wetlands in other catchments were collected. Appendices I and II list wetlands covered and the names of informants. Appendix III lists all interviewees.

Interviewing techniques were researched in conjunction with compiling a list of potential interviewees. The staff of the Battye Library Oral History Unit provided valuable guidance on techniques for interviewing, transcribing and editing transcripts (see reference list).

Each potential interviewee was contacted by telephone and the aims of the project were explained. Ideally the next step should have been a preliminary visit to each interviewee, but as most interviewees involved in this particular project live in country areas, preliminary interviews were conducted only with people living in Perth. In future oral history projects involving country dwellers I recommend that in addition to an introductory 'phone call a letter is sent to each participant. The letter should include aims of the project, a reminder that the interview will be taped, the date and time of the interview and an outline of the type of questions that will be asked.

The next stage was to prepare an outline for each interview. In practice this outline was used as a guide only. Flexibility was necessary because topics were often not covered in any sequence and each person provided different information depending on their own field of knowledge and special interests. An interview outline is given in Appendix IV.

Figure 1

Wetlands in the Avon River catchment documented in oral histories
INSET: Location of the Avon River catchment

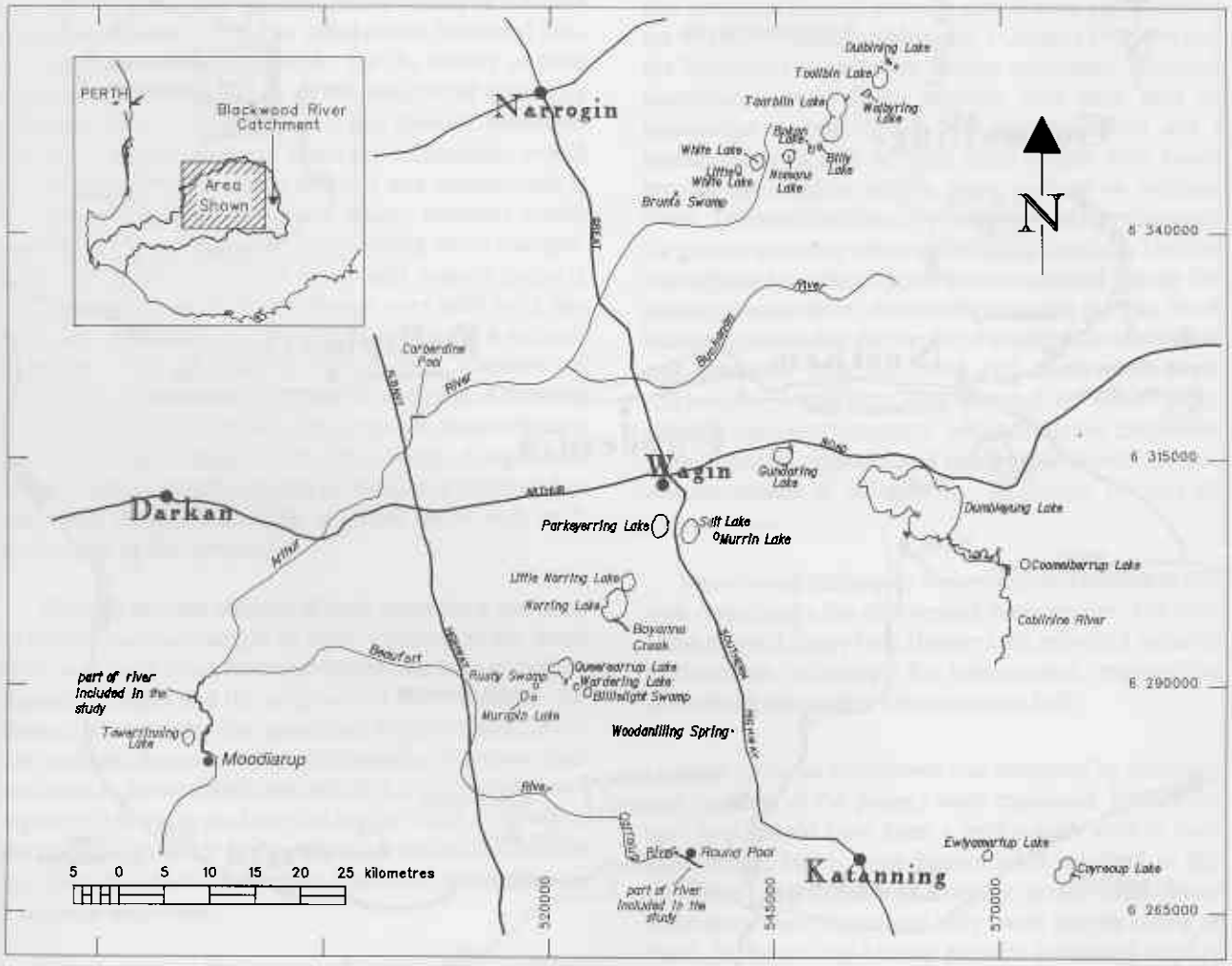

Figure 2

Wetlands in theBlackwood River catchment documented in oral histories
INSET: Location of the Blackwood River catchment

Equipment

The following list includes items that were used for each interview:

Tape recorder	*Piece of carpet*
Microphone	*Reference books*
Lead and transformer	*Travellers Atlas*
Double adaptor	*Interview outline*
Extension cord	*Pad and pencil*
Spare batteries	*Tapes,already labelled*

As a member of The Oral History Association of Australia I was able to borrow a tape recorder, microphone, transformer and lead from the Battye Library Oral History Unit. Spare batteries were carried at all times as a back-up in case of power failure during an interview. I found it useful to carry an extension lead and double adaptor. The microphone was placed on a small carpet to improve the quality of recording. Reference books and a Travellers Atlas were taken to each interview so that identification of species, and location and names of wetlands could be confirmed. As suggested by the Battye Library, tapes used for recording were good quality, 60 minute tapes and a separate tape was used for each interview.

Tape Processing

Prior to each interview a tape was labelled with the date of interview, name of interviewee and interviewer, number, and project title. The tape was then moved forward to leave enough space at the beginning for an introduction. After the interview a Master Control Sheet was filled out for each tape and kept with the tape at all times. This was particularly important when interviewing and transcription were done by different people. A sample Master Control Sheet is given in Appendix V. An introduction was added to each tape giving the names of the interviewee and interviewer, the date of interview and the subjects covered. If the interview continued on Side B, or on a second tape, this was also recorded along with 'end of interview' at the end of the dialogue. The lugs at the back of the tape were then removed to prevent accidental erasure.

Interviewing

On arrival at the interviewee's house I found it best to begin recording as soon as possible. Most interviewees were keen to relate their experiences and to save them having to repeat it again on tape I began recording promptly. Ideally a quiet part of the house was chosen where background noise and interruptions were minimal. A brief biography of each person was recorded prior to the main questions. For pitfalls to avoid and hints on interviewing see Appendix VI. After finishing the main part of the interview I left the equipment set up because often the interviewee relaxed and other memories came back to them. These were then added on at the end of the main interview. It was more successful to limit interviews to one person as transcription became difficult when two or more people were involved.

Transcribing

Transcribing of interviews was carried out using a transcription machine and word processor. This stage of the project was the most time-consuming with each ten minutes of interview taking 20 to 45 minutes to transcribe. The Battye Library provided guidelines for transcribing and processing transcripts (see reference list). The interviews were transcribed verbatim with only minor editorial changes in line with recommendations by the Battye Library. Excerpts from two transcripts are given in Appendix VII.

Draft transcript and copyright document

After the draft transcript was completed a copy was sent to the interviewee for editing (a self-addressed, stamped envelope was provided). A letter accompanied each transcript reassuring the interviewee that the spoken word is very different from the written word and that the aim was to reflect the person being interviewed and the way that person speaks. A copyright document was attached to each transcript to be signed by the interviewee. This document enabled the transcript to be used in the production of this report and gave authority to the Battye Library to receive a copy of each interview for use by other bona fide researchers. A sample copyright document is included in Appendix VIII.

Final transcript

After the edited transcripts were returned corrections, changes and additions were made as interviewees requested. These were marked on the transcript as follows:

- [square brackets] identify additions not on the original interview tape;
- *italics* identify changes from the original interview tape;
- (round brackets) are used in the usual way.

Each transcript was then indexed using key words appropriate to the purpose of the project e.g. fresh water, salt, salinity and 'reedbeds'. Indexes to all transcripts are given in Appendix IX. A copy of the final transcript was sent to the interviewee along with a thankyou note informing them that all voice tapes are available at the Battye Library.

Photograph register

In addition to recording oral histories a register of historical photographs of wetlands was compiled. This register is included as Appendix X and gives the subject and date (if known) of the photograph and the name of the person it is held by.

Standards for names

As is common in oral history, names different from the accepted standard names were often used by interviewees. Where possible these have been converted into standard common names.

It was not possible to accurately determine generic or specific names from the vernacular terms reeds, rushes, sedges and bulrushes (e.g. bulrush did not strictly refer to *Typha*). Plant taxonomists classify reeds as *Phragmites, Arundo* and some species of *Cyprus* and *Scirpus* (Smith 1980). True reeds are uncommon in south-western Australia and the 'reedbeds' referred to by interviewees could have been either rushes (*Juncus*), sedges (*Lepidosperma* and *Baumea*), or bulrushes (*Typha*). Because of difficulties in translating these vernacular names and for ease of reference to transcripts the terminology used for emergent vegetation in this report remains consistent with that given by interviewees.

The standards used for names are as follows:

Wetlands	- Travellers Atlas of Western Australia (Department of Lands and Surveys 1986) and 1:50 000 Topographical Map Series
Mammals	- Strahan (1983)
Birds	- Blakers *et al.* (1984)
Snakes	- Storr *et al.* (1986)
Turtles	- Cogger (1986)
Amphibians	- common names used are those popular in the south-west of W.A. Scientific names based on Tyler *et al.* (1984)
Fish	- Allen (1982)
Molluscs	- Kendrick (1976)
Aquatic plants	- Smith and Marchant (1961)
Decapods	- Shipway (1951)

SUMMARY OF CHANGES IN WETLANDS OF THE AVON AND BLACKWOOD RIVER CATCHMENTS

The oral histories collected during this project describe many changes in wheatbelt wetlands. These changes consist mainly of salinisation and changes in biota. Although each wetland has its own story there are consistent trends throughout the two catchment areas, both in biotic changes and the sequence of those changes (Tables 1 and 2; Fig. 3). Many species can be classed as indicators of environmental change, particularly water quality changes, in wetlands. Indicators include aquatic, fringing and emergent vegetation, birds associated with 'reedbeds', frogs, freshwater fishes, molluscs, decapod crustaceans and leeches.

The first documented appearance of salt was in the East Mortlock River catchment in 1920 (Masters 8). The first visual sign of degradation in the freshwater wetlands was the death of semi-aquatic and aquatic vegetation. These changes coincided with a rise in salinity levels (in the wetlands) that occurred around 1930 in the Avon River catchment and about 1945 in the Blackwood River Catchment (Fig. 3). Waterlogging has been identified by some informants as another cause of death of fringing vegetation around some wetlands.

Ribbonweed (*Ruppia maritima*) has appeared or increased in some wetlands and this change coincided with increased salinity. Since salinisation of the Avon River, *R. maritima* has taken the place of nardoo (*Marsilea* sp).

Following the death of fringing vegetation, samphire (Chenopodeae) started to colonise the bare lake shores and lake beds. Samphire seems to have been increasing around some lakes since the early 1940s.

The rise in salinity levels and subsequent changes in vegetation immediately preceded and almost certainly caused many vertebrate and invertebrate species to disappear from wetlands, or become greatly reduced in numbers (Fig. 3). These include mammals, birds, reptiles, amphibians, fish, crustaceans, molluscs and the leech. Many informants remembered suffering from 'swimmer's itch' after swimming in the wetlands in the early days and it was thought that the causative organism (Cercaria) may be an indicator of fresh water. It has since been established, however, that these organisms are present in both fresh and saline waters (Stevenson and Hughes 1988).

Although the majority of species changes have been disappearances there are some species that have been favoured by the environmental changes. During the late 1930s and early 1940s the maned duck appeared in the wheatbelt. Wading birds (Charadrii) and silver gulls have also been seen on wetlands where they had not been recorded by informants prior to salinity changes.

Following environmental changes on wheatbelt wetlands, there has been a change in the relative abundance of species of ducks. This change was owing to a decline in the abundances of species which favour freshwater and an increase in the abundances of the Australian shelduck and maned duck. Overall, the total number of ducks using the wetlands has declined.

Concurrent with salinity changes, siltation of some river pools and creeks occurred. This was caused by erosion resulting from increased run-off after clearing and increased flow-rates in rivers owing to the removal of vegetation from river channels to control flooding.

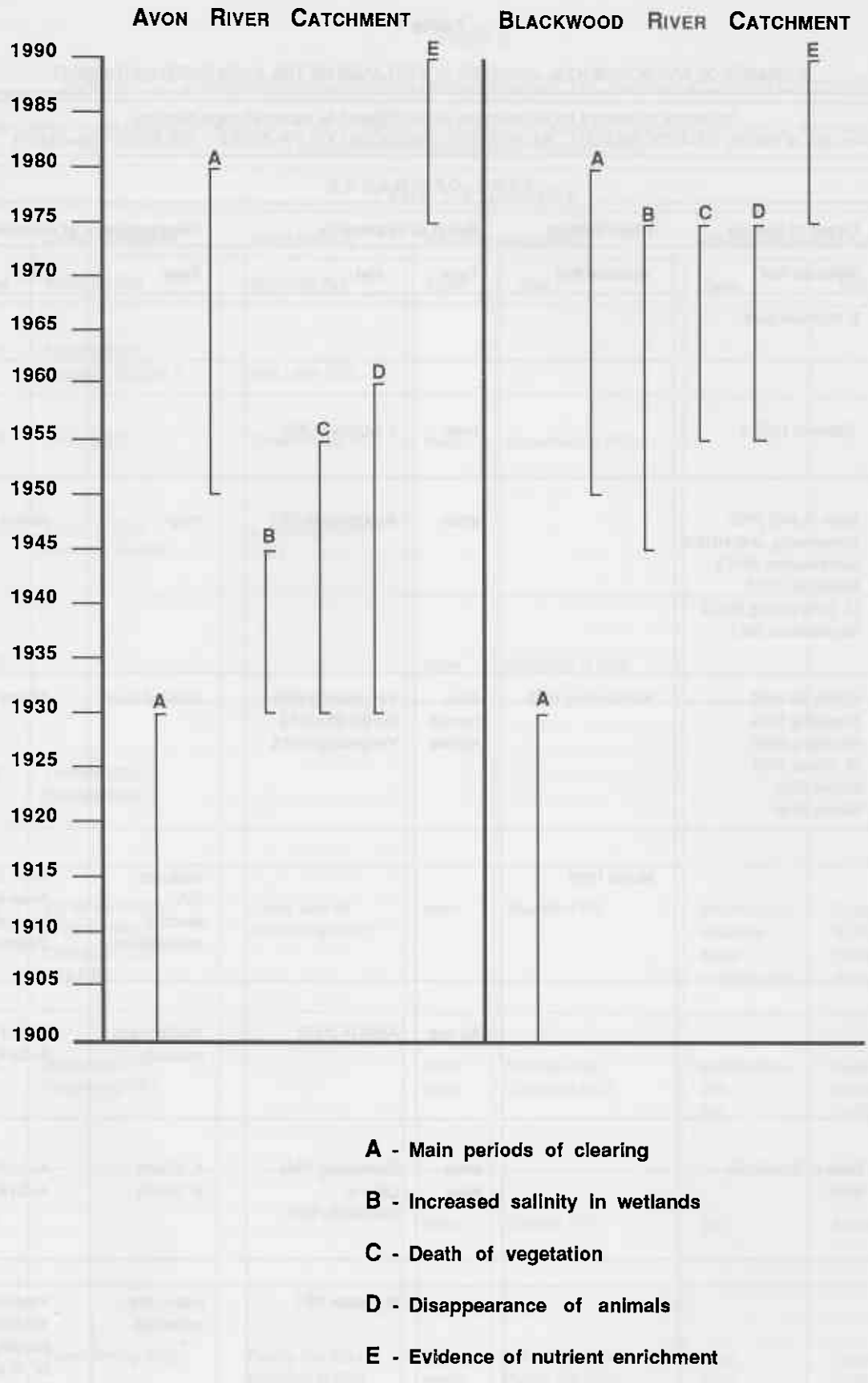

Figure 3
Trends in environmental changes in wetlands of the Avon and Blackwood River catchments

Table 1

SUMMARY OF ENVIRONMENTAL CHANGES IN WETLANDS OF THE AVON RIVER CATCHMENT

Informant references for all tables are initials followed by transcript page numbers.
Informant codes are as follows: NF=FOX; HH=HALL; JM=MASTERS; PM=MCMILLAN; PP=PAULEY; RR=RIGBY; BS=SMITH

	TYPE OF CHANGE					
Date of Change	**Onset of Salinity**	**Hiigh Salinity**	**Death of Vegetation**		**Disappearance of Animals**	
	Wetland Ref	**Wetland Ref**	**Type**	**Ref**	**Type**	**Ref**
1916-20	E Mortlock JM8					
1926-30	Channel HH2,3		trees	E Mortlock JM8		
1931-35	Avon R JM3;PM2 Yenyenning JM9;HH4,5 Kurrenkutten HH13 Baandee HH13 Lk Yenyenning HH13 Koombekine BS1		trees	Koombekine BS1	frogs	Mears HH2
1936-40	Kunjin Bk HH6 Yealering RR9 Nonalling RR2 W. Water RR2 Brown RR2 Mears HH6	Yenyenning HH5	trees nardoo nardoo	Yenyenning HH5 Kunjin Bk HH13 Yenyening HH13	freckled duck	Mears HH6
1941-45		Mears HH5			molluscs fish leeches crustaceans	Avon R JM3 Avon R JM18 Yealering RR2 Yealering RR2
1946-50			Aq veg	Avon R JM10	crustaceans mussels	Avon R JM3 Avon R JM3
1951-55	Lake nr Cunderdin NF3		trees trees	Damboring PM4 Lake nr Cunderdin NF3	A. bittern B. bittern	Avon R JM4 Avon R JM4
1956-60			trees	W. Water PP1	water-rats waterfowl " " "	Yealering RR4 Yealering RR3 Nonalling RR3 W. Water RR3 Brown RR3
1961-65		Paradise PP1 Nonalling PP1				

Table 2

SUMMARY OF ENVIRONMENTAL CHANGES IN WETLANDS OF THE BLACKWOOD RIVER CATCHMENT

Informant codes are as follows: NB=BEECK; LC=COCHRANE; BD=DURELL; RG=GARSTONE; FM=MITCHELL; PP=PAULEY; BSc=SCOTT; GW=WARREN; VW=WATSON

	TYPE OF CHANGE					
Date of Change	Onset of Salinity	Hligh Salinity	Death of Vegetation		Disappearance of Animals	
	Wetland Ref	Wetland Ref	Type	Ref	Type	Ref
1931-35	Norring FM1 Narrogin Bk GW 2	Salt Lake BD2				
1936-40	Norring BD1	Queerearrup RG1	trees	Queerearrup RG1		
1941-45	Arthur R BD3 Carrolup R NB5	L. Norring FM1; VW5				
1946-50			trees	Coblinine R NB8		
1951-55	Toolibin BD6 Taarblin BD7					
1956-60	Big White PP2,3 L. White PP2,3 Coyrecup RG2 Billy PP2	Lakes east of Dulbinning PP1,2	trees	Taarblin PP2	crustaceans mussels frogs crustaceans	ArthurR BD3 Arthur R BD7 Carrolup R NB5 Beaufort R RG3
1961-65	Walbyring PP2 Dulbinning PP1		trees trees	Norring RG2 Coyrecup RG2	crustaceans fish fish	Carrolup R NB5 Carrolup R NB4 Dulbinning PP4
1966-70			trees	Toolibin PP1	fish	Arthur R BSc8
1971-75	Towerrinning RG2	Rushy Sw RG4 Carrolup R NB4 Murapin RG4	reeds reeds trees reeds	L. Murapin RG4 Rushy Sw RG4 Coomelberrup RG2 Towerrinning RG2	birds frogs	Rushy Sw RG4 Rushy Sw RG4

A major flood throughout the wheatbelt in February 1955 caused siltation and other changes in the wetlands. Permanent water level changes, as opposed to seasonal changes, have occurred in some wetlands. These seem to have resulted from: increased run-off resulting from clearing; the destruction of natural levees by major floods; and deliberate damming or draining by humans.

A few cases of eutrophication, made apparent by increased growth of algae and other aquatic plants, have been documented in wheatbelt wetlands. This is a relatively recent phenomenon and was first noticed in 1975.

SPECIES CHANGES AND SEQUENCE OF CHANGES

The way the wetlands used to be

Most of the wetlands of the Avon River catchment documented in this project were fresh or near fresh until the early 1930s, and in the Blackwood River catchment until the 1940s (Tables 1 and 2). It was not established why there was a difference of ten to 15 years between the onset of salinisation of wetlands in these catchments but further research may identify different patterns and timing of clearing as being responsible. Many of the lakes, creeks and river pools provided water for stock and some informants remember drinking the water as children. McMillan (2) recalls horses, cattle and sheep drinking the water in the Avon River pools up to the early 1930s. Masters (3) noticed that the milking cows were producing less milk during the early 1930s owing to rising salinity. Prior to that they drank the river water with no ill effects. Lake Yealering was fresh in the early 1930s and sheep used to drink directly from the lake (Rigby 2).

Prior to changes in salinity the wetlands were either surrounded or covered by living *Casuarina obesa* (sheoak), *Melaleuca* spp. (paperbark) and *Leptospermum* spp. (tea-tree) (Tables 3 and 4). Hall (1) described Lake Mears in the early 1930s as an idyllic place that was totally surrounded by sheoak and paperbarks, with a 'low scrub' growing across it in dry years. Lake Nonalling was described by Rigby (1) and Pauley (1) as having dense sheoak and paperbark right through the lake. Rigby (1) remembers that the trees in the lake formed a dense canopy and walking underneath it on a hot summer's day was like walking into a refrigerator. In the early 1930s the Coblinine River had tea-tree flats where it was 'virtually impossible to see through the canopy' (Beeck 3). When shooting ducks during the late 1930s and early 1940s, Durell (6) recalls that, on Toolibin and Gundaring, it was possible to become lost in the heavy undergrowth. Many of the wetlands supported 'reedbeds' and rushes and some had nardoo and other freshwater aquatic vegetation growing in them (Tables 3 and 4). Warren (1) recalls rushes and nardoo growing in the Narrogin Brook in the 1920s and Durell (5) remembers 'reedbeds' and nardoo in Lake Toolibin during the 1930s and 1940s. Hall (13) describes great blankets of nardoo growing in the Kunjin Brook in the late 1920s.

The animal life in and around the wetlands was varied and very different from the depauperate state of these wetlands today (Tables 3 and 4). Warren (1) described part of the Narrogin Brook in spring during the 1920s as 'seething with water creatures; tadpoles, cyclops, boatman, daphnia and many others'. She remembers watching ducks in the Brook teaching their ducklings to feed and purple swamphens wading about with their chicks. Durell (2) remembers that on Murrin Lake in the 1930s there were between 2 000 and 4 000 swans that, when they took off, 'laced the water to foam with their feet as they ran'. Beeck (4) recalls catching redfin perch in the Carrolup River pools in the 1930s and McMillan (1) remembers his father fishing for cobbler and redfin perch in the Avon River (between Northam and York) in the 1920s. The Arthur River (near Moodiarrup) also had redfin perch in the 1930s to the 1950s (Durell 2,3). Durell (2) also remembers seeing freshwater shrimps, marron and mussels in the river at Carberdine Pool up until 1940. Redfin perch were still in Carberdine Pool up until the late 1950s or early 1960s (K. Wallace personal communication).

Changes in vegetation

Fringing and emergent vegetation

Environmental changes in wetlands began with the rise in the saline water table that followed the 'opening up' of the wheatbelt in the early 1900s. The earliest occurrence of salinisation was noticed by Masters (8) in the East Mortlock River, where in 1920 salt was seen on the land in the river catchment. Salinity of streams started to increase in the Avon River catchment between 1931 and 1935. Rises in salinity levels in the Blackwood River catchment began around 1940 (Fig. 3). These salinity changes were followed by death of fringing, emergent and freshwater aquatic vegetation. These deaths seemed to occur within five years of the rise in salinity levels. In the Avon River catchment Masters (8) observed the tea-tree in the East Mortlock River dying in 1928. Smith (1) noticed that in Lake Koombekine the sheoak and tea-tree started to die when salinity levels increased in the late 1920s. Sheoak and paperbarks died around Lake Mears in the early 1940s (Hall 5). Of the lakes documented in the Blackwood River catchment it appears that Lake Queerearrup was the first lake to lose its vegetation. When Garstone (1) visited it in the early 1940s the sheoak and paperbark around the lake were already dead.

Table 3

SPECIES RECORDED IN THE WETLANDS OF THE AVON RIVER CATCHMENT

The dates given in this table are the periods in which informants observed each species. The dates do not denote when each species disappeared. Where these dates have been established they are included in Table 1.

Informant codes are as follows: NF=FOX;HH=HALL;JM=MASTERS;PM=MCMILLAN;PP=PAULEY;RR=RIGBY;BS=SMITH

	WETLAND													
	KOOMBEKINE	DAMBORING	CUNDERDIN	EAST MORTLOCK	AVON R	SPENCER BK	CULHAM BK	YENNING	MEARS	CHANNEL	NONALLING	WHITE WATER	BROWN	YEALERING
FRINGING VEGETATION (including tea-tree, flooded gum, paperbark, sheoak)														
DATE														
1920-1925				JM8	JM1 PM2	PM3								
1921-1930	BS1	PM4		JM8 PM3	JM1 PM2	PM3	PM4	HH2	HH1					
1931-1935	BS1			JM8	JM1 PM2		PM4		HH1		RR1			
1936-1940					JM1 PM2		PM4				RR1	RR1		
1941-1945					JM1 PM2		PM4				RR1 PP1	PP1 RR1	PP1	RR8
1946-1950					JM1 PM2		PM4				RR1 PP1			
1951-1989				PM3	JM1	PM3	PM4				RR1			
EMERGENT VEGETATION (including rushes and bulrushes)														
1936-1940			NF1											RR9
1941-1945														RR9
FRESHWATER AQUATIC VEGETATION (including duckweed and nardoo)														
1921-1925					JM10									
1926-1930					JM10									

Table 3 (Continued)

DATE	KOOMBEKINE	DAMBORING	CUNDERDIN LK	EAST MORTLOCK	AVON R	SPENCERS BK	CULHAM BK	YENYENING	MEARS	CHANNEL	NONALLING	WHITE WATER	BROWN	YEALERING
FRESHWATER AQUATIC VEGETATION (Continued)														
1931-1935					JM10			HH13						
1940-1945					JM10									
1946-1950					JM10									
1951-1955					JM10									
1956-1960					JM10									
SALT TOLERANT WATERWEED *(Ruppia maritima)*														
1931-1935								HH2						
1961-1965					JM10									RR5
1966-1989					JM10									
WATER-RAT *(Hydromys chrysogaster)*														
1921-1960					JM17				HH4					RR4
1961-1989					JM17				HH4					
OBLONG OR LONG-NECKED TURTLE *(Chelodina oblonga)*														
1921-1930					HH8									
1931-1940									HH8		RR1	RR1	RR1	
1941-1950									HH8					
1951-1960									HH8					

Table 3 (Continued)

DATE	WETLAND													
	KOOMBEKINE	DAMBORING	CUNDERDIN LK	EAST MORTLOCK	AVON R	SPENCERS BK	CULHAM BK	YENYENING	MEARS	CHANNEL	NONALLING	WHITE WATER	BROWN	YEALERING
OBLONG OR LONG-NECKED TURTLE (Continued)														
1961-1970									HH8				RR1	
1971-1980									HH8					
1981-1989									HH8					
SPOTTED BURROWING FROG *(Heleioporus albopunctatus)*														
1930-1989														RR6
BANJO FROG OR BULL FROG *(Limnodynastes dorsalis)*														
1925-1935									HH2					
GREEN TREE FROG *(Litoria moorei)*														
1984														RR6
UNIDENTIFIED FROGS														
1931-1940														RR6
1941-1950											PP4	PP4	PP4	
WESTERN MINNOW *(Galaxias occidentalis)*														
1920-1930					JM17 PM3									
FRESHWATER COBBLER *(Tandanus bostocki)*														
1920-1930					JM17 PM1									
1981-1989					JM18									
NIGHTFISH *(Bostockia porosa)*														
1920-1930					PM1									

Table 3 (Continued)

	WETLAND													
	KOOMBEKINE	DAMBORING	CUNDERDIN LK	EAST MORTLOCK	AVON R	SPENCERS BK	CULHAM BK	YENYENING	MEARS	CHANNEL	NONALLING	WHITE WATER	BROWN	YEALERING
SWAN RIVER GOBY *(Pseudogobius olorum)*														
DATE														
1920-1989					JM18									
MOSQUITOFISH *(Gambusia affinis)*														
1989					JM10									
REDFIN PERCH *(Perca fluviatilis)*														
1920-1930					JM17 PM1									
1940-1950													PP4	RR9 PP5
CARP														
1920-1930					JM17,18									
UNIDENTIFIED FISH														
1920-1930							PM4		HH1					
1931-1940							PM4		HH1					RR3
1941-1989							PM4							
GILGIES *(Cherax quinquecarinatus)* **KOONACS** *(C. preissii)*														
1921-1930					JM2		PM4							
1931-1940					JM2 HH1		PM4	HH1	HH1					RR2
1941-1950					JM3		PM4							
1951-1960					JM3		PM4							
1961-1970							PM4							

Table 3 (Continued)

	WETLAND													
	KOOMBEKINE	DAMBORING	CUNDERDIN LK	EAST MORTLOCK	AVON R	SPENCERS BK	CULHAM BK	YENYENING	MEARS	CHANNEL	NONALLING	WHITE WATER	BROWN	YEALERING
GILGIE AND KOONAC (Continued)														
1971-1980							PM4							
FRESHWATER SHRIMP (including fairy shrimp and shield shrimp)														
1921-1930		PM4			JM2									
1955-1956		PM4												
AQUATIC MOLLUSCS including Freshwater Mussels *(Anticorbula amara)*														
1945-1955					JM3									
LEECHES														
1931-1940			NF2											RR2
1941-1950													PP4	

Table 4

SPECIES RECORDED IN WETLANDS OF THE BLACKWOOD RIVER CATCHMENT

The dates given in this table are the periods in which informants observed each species. The dates do not denote when each species disappeared. Where these dates have been established they are included in Table 2.

Informant codes are as follows: RA=AITKEN;NB=BEECK;MC=MRS COCHRANE;LC=COCHRANE;BD=DURELL;RG=GARSTONE PM=MCMILLAN;FM=MITCHELL;PP=PAULEY;BSc=SCOTT;GW=WARREN;VW=WATSON

	WETLAND																			
	DULBININ G	TOOLIBIN	TAARBLIN	WHITE	NARROGIN BK	ARTHUR R	DUMBLEYUNG	COBLININE	EWLYAMARTUP	COOMELBERRUP	COYRECUP	PARKERRING	NORRIN	TOWERRINNING	QUEERREARUP	LMURAPIN	WARDERING	RUSHYSW	BOYERINE CK	CARROLUP R
FRINGING VEGETATION (including tea-tree, paperbark, sheoak)																				
DATE																				
1916-1920					GW1															
1921-1925					GW1								VW6							
1926-1930			BD6		GW1								VW6 FM1							
1931-1935		RA3	BD6		GW1			RA2 NB2	NB2			PM5	VW6 FM1							
1936-1940			BD6 PP2		GW1							PM5	VW6 FM1		RG1					
1941-1945			BD6 PP2										VW6 FM1				RG3			
1946-1950			BD6 PP2										VW6 FM1							
1951-1955			PP2 PP2 BD6,7										VW6 FM1							
1956-1960			PP2 PP2										VW6 FM1							
1961-1965											RG2		VW6 FM1							
1966-1970										RG2			VW6 FM1							
1971-1989													VW6	FM1						

Table 4 (Continued)

DATE	DULBIMNING	TOOLIBIN	TAARBLIN	WHITE	NARROGIN BK	ARTHUR R	DUMBLEYUNG	COBLININ E	EWLYAMARTUP	COOMELBERRUP	COYRECUP	PARKEYERRIN G	NORRIN G	TOWERRINN ING	QUEERREARUP	LMURRAPIN	WARDERIN G	RUSHY SW	BOYERINE CK	CARROLUP R
EMERGENT VEGETATION (including rushes and bulrushes)																				
1916-1920					GW1															
1921-1925					GW1															NB5
1926-1930					GW1															NB5
1931-1935		BD5			GW1	BD7			NB2											
1936-1940		BD5			GW1	BD7								LC1						
1941-1945		BD5												LC1			VW2 RG3			
1946-1950		BD5												LC1			VW2			
1951-1955		BD5															VW2			
1956-1960																	VW2			
1961-1965	PP2																VW2 RG3			
1966-1970														PP6						
1971-1975														RG2		RG4		RG4		
FRESHWATER AQUATIC VEGETATION (including duckweed and nardoo)																				
1916-1920					GW1															
1921-1925					GW1															
1926-1935		BD7,8			GW1															

Table 4 (Continued)

DATE	WETLAND																				
	DULBININGUP	TOOLIBIN	TARBLIN	WHITE	NARROGIN BANK	ARTHUR RIVER	DUMBLEYUNG	COBLINE	EWLYAMARTUP	COMELBERRUP	COYRECUP	PARKERYERING	NORRINUP	TOWERRINING	QUEERUP	LMURAPIN	WARDERING	RUSHYSW	BOYERINE CK	CARROLUP RIVER
SALT TOLERANT AQUATIC VEGETATION (including *Ruppia maritima*)																					
1920-1974													FM2								
1975-1989						VW8							FM2 VW7,8								
WATER-RAT (*Hydromys chrysogaster*)																					
1921-1930													VW4						VW4		
1931-1940						BSc7 BD2							FM3	LC4					NB15		
WESTERN TIGER SNAKE (*Notechis scutatus occidentalis*)																					
1930-1940						BSc7 BD7															
1945-1950														LC2							
OBLONG OR LONG-NECKED TURTLE (*Chelodina oblonga*)																					
1921-1930																			VW3		
1931-1940						BD2													VW3		
1941-1975													VW3	RG2 LC3					VW3		
1976-1989														LC3					VW3		
BANJO FROG OR BULLFROG (*Limnodynastes dorsalis*)																					
1920-1960																				NB5	
GREEN TREE FROG (*Litoria moorei*)																					
1920-1950 1970s																RG12		RG12		NB5	

Table 4 (Continued)

	WETLAND																				
	DULBINNING	TOOLIBIN	TABLIN	WHITE	NARROGIN BK	ARTHUR R	DUMBLEYUNG	COBLINE	EWLYAMARTUP	COOMELBERUP	COYRECUP	PARKEYERRING	NORRING	TOWERRINNING	QUEERARRUP	L MURAPIN	WARDERING	RUSHY SW	BOYERINE CK	CARROLUP R
UNIDENTIFIED FROGS																					
DATE																					
1916-1920					GW2																
1921-1930					GW2								FM4	LC14						NB5	
1941-1960													FM4	LC14						NB5	
1961-1989													FM4								
WESTERN MINNOW *(Galaxias occidentalis)*																					
1920-1930																			VW3	NB4	
1931-1940								NB4												NB4	
FRESHWATER COBBLER *(Tandanus bostocki)*																					
1950-1960						PP6															
MOSQUITOFISH *(Gambusia affinis)*																					
1950																				NB5	
REDFIN PERCH *(Perca fluviatilis)*																					
1921-1930																				NB4	
1931-1940	PP4	BD6 PP4				BD2,3 BSc7,8														NB4	
1941-1950	PP4	BD6 PP4				BSc7,8														NB4 VW3	
1951-1960	PP4	PP4				BSc7,8								LC3						NB4 VW3	
1961-1970	PP4	RG5 PP4				BSc7,8														NB4	

Table 4 (Continued)

	WETLAND																					
	DULBININING	TOOLIBIN	TAABLIIN	WHITE	NARROGIN BK	ARTHUR R	DUMBLEYUNG	COBBLININE	EWLYAMARTUP	COOMELBERRRUP	COYERECUP	PARKERRIN G	NORRIING	TOWERRIN G	QUEERAARUP	LMURRAPIN	WARDERIN G	RUSHYSW	BOYERINE CK	CARROLUP R
UNIDENTIFIED FISH																						
DATE																						
1921-1930																				VW3	NB4	
1931-1940																					NB4	
1941-1950															RG1						NB4	
1951-1960																					NB4	
1961-1989															RG1							
MARRON *(Cherax tenuimanus)*																						
1925-1970						MC11 (1920-1940) BD3 (to late '60s) BSc7 (no times) PP6 (to late '60s) RA5 (1937)																NB5	
GILGIE *(Cherax quinquecarinatus)* **KOONAC** *(C. preissii)*																						
1916-1920					GW2																	
1921-1930					GW2	BD3														VW3		
1931-1940					GW2			NB3														
1941-1950																	NB4				NB3	
FRESHWATER SHRIMP																						
1936-1960						BD7																
MUSSELS																						
1936-1960						BD7																

Table 4 (Continued)

WETLAND																			
DULBININGING	TOOLIBIN	TABLIN	WHITE	NAROGIN BK	ARTHUR R	DUMBLEYUNG	COBLININE	EWLYAMARTUP	COOMELBERRUP	COYRECUP	PARKEYERRING	NORRING	TOWERRINNING	QUEERARRUP	L MURAPIN	WARDERING	RUSHY SW	BOYERINE CK	CARROLUP R
LEECHES																			
DATE																			
1941-1950													MC10		NB4 RG4		NB4 RG4		
1951-1960	PP12	RA5 PP12															NB4 RG4		
1961-1974																	RG4		

Table 5

RECORDS OF FLOODS AND DRY PERIODS 1911-1974

	Avon River Catchment		Blackwood River Catchment	
Year/s	Flood	Dry Period	Flood	Dry Period
Before 1900	RK1			
Before 1910	JM8			
1911-1914		JM8		
1915-1917	JM8;RK1			
1926	JM1			
1935-1944		JM3,9;RK1		LC2;NB5,22 VW1
1945-1946	JM3,9		NB5	
1948		RK1		
1955	HH10;JM5		BD4;RA2;NB3; LC2;VW3	
1963-1966	HH10;JM6;RK1			
1967		RK1		
1974			RG4	

Salinity levels increased in the unnamed lake 16 km north-west of Cunderdin in the early 1950s and within five years the trees had died (Fox 3). In Lakes Towerrinning, Wardering and Little Murapin and Rushy Swamp death of 'reedbeds' coincided with floods in the early 1970s (Garstone 4; D. Munro, Dept. CALM, personal communication). Although dates for the disappearance of 'reedbeds' are not given for other wetlands Tables 3 and 4 show that 'reedbeds' were no longer present after the early 1970s, with the exception of the Channel Lakes. Hall (8) notes that 'reedbeds' (possibly *Typha*) still grow in these lakes where fresh water is running in.

A further cause of tree deaths around some of the lakes was waterlogging. When clearing first occurred run-off increased and water levels rose in some wetlands causing death of vegetation by waterlogging (Durell 10). Beeck (9) recalls that waterlogging was the cause of many tree deaths before salt became a serious problem. The death of sheoak and paperbark around Lake Norring has been attributed by Watson (6) to waterlogging. When, during dry years, the water receded fresh water seepage appeared around the perimeter of the lake and many plants germinated. When water levels rose to their more normal levels the trees died. Watson (6) has observed this process happening on Lake Norring since his earliest memories (mid-1920s). Garstone (6) recalls seeing thousands of young sheoaks growing around the margins of Lake Dumbleyung. When they were 2 m high the lake filled and the trees died (no date given). The waterlogging process may occur naturally and it was not established whether death of vegetation owing to waterlogging was a result of natural intermittent inundation or increased run-off owing to clearing.

Aquatic vegetation

Nardoo disappeared as salinity levels increased in Kunjin Brook in the early 1940s (Hall 5, 13) and freshwater aquatic weed had disappeared from the Avon River by the late 1940s (Masters 10) (Table 1). Although these are the only dates for the disappearance of aquatic vegetation, Tables 3 and 4 show that freshwater aquatic vegetation occurred at many of the wetlands but no longer occurs there. Ribbonweed (*Ruppia maritima*) has been observed in the Avon River (Masters 10), Morrel Pool in the Yenyening Lakes (Hall 2) and Brown Lake (Rigby 5). This species withstands wide fluctuations in salinity (Smith and Marchant 1961) and Masters (10) considers that *R. maritima* has almost taken the place of nardoo in the Avon River. Hall (2) observed *R. maritima* for the first time in Morrel Pool on the Yenyening Lakes after the pool became clear (probably a result of increased salinity) in the late 1920s.

Samphire

It appears that samphire has successfully colonised large areas around some wetlands where previously it grew only in isolated patches. Pauley (10) first noticed samphire around the edges of the lakes in the Yealering area in the mid-1960s. He noticed it was colonising the bare salt areas in paddocks and around the lakes. Rigby (10) noticed samphire growing around parts of Brown and White Water Lakes that were once cleared but never used to grow crops (no date given). He has also noticed samphire increasing in the Yealering area since the late 1930s. Samphire has also colonised large areas around Lake Mears, Channel Lakes and the Yenyening Lakes. Hall (3) noticed samphire increasing around these lakes in the mid-1970s and colonising areas where previously there had been trees and scrub. There is one record of samphire decreasing and this is on the Coblinine River flats. Aitken (3) notes that there is less samphire around the river now than there used to be.

Changes in animal species

Mammals

The only mammal identified during the interviews to be associated mainly with wetlands was the water-rat (*Hydromys chrysogaster*). The water-rat was noted as being present at Lakes Mears (Hall 4), Yealering (Rigby 4), Norring (Watson 4; Mitchell 3) and Towerrinning (Cochrane 4), also the Arthur (Scott 4; Durell 2) and Carrolup Rivers (Beeck 15) and Boyerine Creek (Watson 4) (Tables 3 and 4). It may still be present around Lake Mears (Hall 4), the Carrolup River (Beeck 15) and Boyerine Creek (Watson 4). According to Rigby (5), the water-rat disappeared from the Yealering area around 1960. No other dates on the disappearance of the water-rat are available. The decline in the abundance of the water-rat was probably related to declines in the abundance of its prey (large crustaceans, fish and frogs) which occurred with increased salinity in wetlands.

When discussing changes in fauna in the wheatbelt it is important that the rabbit (*Oryctolagus cuniculus*) is mentioned. Information gained from the oral histories suggests that the presence of large numbers of rabbits both directly and indirectly had an effect on wetland degradation. Informants first noticed rabbits on their farms in the early 1920s which built up to plague proportions over the following ten to 15 years. Masters (4) recalls that the undergrowth along the banks of the Avon River was thinned out by rabbits. Native bushland harbored rabbits and Hall (10) and Smith (2) remember bush being cleared to help keep the rabbit population down. It seems that not only did rabbits have a direct effect on the vegetation but they also indirectly contributed to the salinity problem when more bushland was cleared in an attempt to control their numbers.

The fox (*Vulpes vulpes*) also had an effect on wetland fauna. Many informants were of the opinion that the fox

predated small mammals, turtles, and the eggs and young of ground-nesting birds (Aitken 2; Beeck 3; Cochrane 18; Durell 10, Hall 2, Mitchell 3; Pauley 8).

Birds

The information in the oral histories on changes in the numbers of waterbirds is less conclusive than on changes in the numbers of other taxa. The mobility of birds means that their abundance at a site may be dependent not upon the characteristics of that site, but upon events at sites hundreds or even thousands of kilometres away. Beeck (13), Watson (2) and Rigby (3) all note that birds can appear in an area when they are just passing through, but the oral histories provide little information of the changing patterns of usage, which are more significant than presence or absence. Bird observations are not included in Tables 3 and 4 because there are very few changes in the presence of waterbirds that are worthy of note. Significant trends that were identified from the oral histories are outlined below.

The disappearance of at least four bird species from wetlands coincided with the loss of 'reedbeds'. The birds that seem to have disappeared from wetlands that once supported 'reedbeds' include Baillon's Crake *(Porzana pusilla)* (Pauley 3), Spotless Crake *(P. tabuensis)* (Garstone 6), Purple Swamphen *(Porphyrio porphyrio)* (Garstone 6) and Little Grassbird *(Megalurus gramineus)* (Garstone 2). The Clamorous Reed-Warbler *(Acrocephalus stentoreus)* seems to have disappeared from the Narrogin Brook (Warren 1, 2) and Lake Towerrinning (Garstone 2) but is still present at Brown Lake. Rigby (5) has observed the Reed-Warbler constructing nests out of the ribbonweed that now grows in Brown Lake, but has also observed their numbers decreasing since the 1930s.

The Australasian Bittern *(Botaurus poiciloptilus)* and Black Bittern *(Dupetor flavicollis)* have disappeared from some wetlands (Garstone 6; Masters 2). Masters (3,4) suggests that the disappearance of the Black Bittern was related to changes in abundance of their prey (gilgies) and decline in numbers of trees along the Avon river.

Pauley (3) noticed a general decrease in duck numbers, with the exception of the Australian Shelduck or mountain duck *(Tadorna tadornoides)* and the Maned Duck *(Chenonetta jubata)*. Aitken (4), however, feels that duck populations have not decreased but changes in the relative abundance of species have occurred. Durell (7,8) remembers that it was difficult to get a 'bag' of ducks when he was duck shooting on the lakes in the Blackwood River catchment during the late 1930s and early 1940s. He noticed that duck numbers increased during the 1950s (this coincides with increasing salinity in this catchment). Following the death of emergent and aquatic vegetation, however, Durell noticed that the duck numbers decreased in the early 1960s.

The Pacific Black Duck *(Anas superciliosa)* seems to have declined in numbers in the wheatbelt since the environmental changes occurred in the wetlands (Aitken 2; Beeck 10; Masters 1; Mitchell 1; Pauley 3, 12; Rigby 4; Watson 1). Excluding the Australian Shelduck and Maned Duck, the Grey Teal *(A. gibberifrons)* now appears to be the most abundant duck (Aitken 4,5; Beeck 10; Masters 1; Pauley 3; Watson 1), whereas before environmental changes occurred the Pacific Black Duck was very abundant (Masters 1; Pauley 12). Beeck (9,10) made the observation that over the last 15 to 20 years there has been an increase in Grey Teal bringing their ducklings to farm dams. He feels the teal are changing their habits in a small way by coming more often onto farm dams with their young.

Other species of duck that seem to have declined in numbers include the Freckled Duck *(Stictonetta naevosa)* (Beeck 9,10; Hall 1,6; Rigby 3), Australasian or blue-winged Shoveler *(Anas rhynchotis)* (Aitken 4; Beeck 9,10; Pauley 3; Rigby 4), Hardhead or white-eyed duck *(Aythya australis)* (Hall 12,13; Rigby 3,4), and Musk Duck *(Biziura lobata)* (Cochrane 5; Hall 12; Rigby 3). Rigby (4) is of the opinion that the Pink-eared Duck *(Malacorhynchus membranaceus)* has declined but Beeck (10,11) notes that this is not a rare bird. He has seen flocks of up to five hundred in recent times.

The Great Crested Grebe *(Podiceps cristatus)* seems to have diminished in numbers on some wetlands. Rigby (4) recalls that he hasn't seen the Great Crested Grebe on Lake Yealering since the late 1970s. Pauley (3) and Garstone (6) also note a reduction in numbers of this bird on the lakes generally. Rigby (4) has observed that both Hoary-headed Grebes *(Poliocephalus poliocephalus)* and Australasian Grebes *(Tachybaptus novaehollandiae)* have disappeared from Lake Yealering. Hall (12) notes that the Australasian Grebe has disappeared from Lake Mears where it used to breed. Masters (15) has noticed an increase in the Australasian Grebe in the Avon Valley where it mainly uses farm dams. Cochrane (14) made the observation that the Australasian Grebe still occurs on Lake Towerrinning and that it uses farm dams to breed.

Information contained in the transcripts indicates that the above mentioned species have suffered a general decline in numbers from the specific wetlands included in this project. It is not clear, however, if these species have moved to other wetlands or if their numbers have indeed decreased. Information is not available in the transcripts as to the status of the Blue-billed Duck *(Oxyura australis)* or Chestnut Teal *(Anas castanea)*. The reader is directed to the transcripts for records of birds on individual wetlands.

The most conspicuous appearance of a bird in the wheatbelt was the Maned Duck. Its arrival was noted during the early 1930s to 1950s (Aitken 4; Beeck 1;

Cochrane 6; Durell 9,10; Garstone 6,7; Hall 7; Pauley 11; Rigby 11). It seems that its expansion across Australia from east to west was owing to opportunities provided by the establishment of pasture and farm dams rather than salinity changes in natural wetlands (Blakers *et al.* 1984).

Another duck that has been greatly advantaged by the environmental changes in the wheatbelt is the Australian Shelduck. It has increased greatly in numbers since the early 1900s (Cochrane 7; Durell 9; Hall 6,7,11; Masters 1; Mitchell 1; Pauley 3). Some informants are of the opinion that a factor that has contributed to the success of this duck is that it is not a popular eating bird and duck shooters avoid the shelduck and concentrate on the more popular eating birds, such as the Pacific Black Duck and the Grey Teal (Beeck 10; Durell 9; Hall 6,7; Rigby 11).

The Silver Gull *(Larus novaehollandiae)* is now using some inland wetlands. Cochrane (6) noticed that the Silver Gull first appeared at Lake Towerrinning in the 1980s in groups of 20 or 30. Pauley (3) recalls seeing Silver Gulls at Wagin in the 1960s and Cochrane (6) has also seen them there recently.

Wading birds have also made an appearance at some wetlands since salinity changes have occurred. Masters (9) saw Sharp-tailed Sandpipers *(Calidris acuminata)*, Red-necked Stints *(C. ruficollis)* and Greenshanks *(Tringa nebularia)* at the East Mortlock River for the first time during the 1930s. The Banded Stilt *(Cladorhynchus leucocephalus)* was first seen around the Yealering area by Pauley (3) when salinity levels became high in the 1960s. The Banded Stilt has also become more common on Queerearrup Lake since it became saline, with large numbers observed for the first time in 1988 (Beeck 12,13). The Black-winged Stilt *(Himantopus himantopus)* has fared less well and was present on wetlands in the Yealering area only before they went saline (Pauley 3). Garstone (12) noted Black-winged Stilts and Red-kneed Dotterels *(Erythrogonys cinctus)* on Lakes Towerrinning and Murapin in the early 1980s after an unusually wet year. Their presence was unusual and both are usually associated with freshwater (Serventy and Whittell 1976).

The abundance of one other wading bird has changed in the wheatbelt. The Banded Lapwing *(Vanellus tricolor)* is generally believed to have been favoured by the expansion of grasslands created by clearing (Serventy and Whittell 1976), but Cochrane and Scott (17,18) noted that it occurred in flocks of hundreds up to the 1950s but now only the occasional pair is seen.

Reptiles

The western tiger snake *(Notechis scutatus occidentalis)* seems to have disappeared from many wetlands, probably owing to the disappearance of frogs which are their main food source (G. Harold, wildlife consultant, personal communication). Cochrane (2) remembers that in the early 1920s part of Lake Towerrinning on their property had to be fenced off to exclude cattle as each year up to ten per cent of their herd would be lost because of snakebite. He recalls seeing approximately thirty tiger snakes under a pile of fence posts when he was fencing the lake. Durell (7) and Scott (7) remember seeing tiger snakes in the 'reedbeds' along the Arthur River in the 1930s. Masters (19) is of the opinion that the carpet python *(Morelia spilota imbricata)* has diminished along the banks of the Avon River because of the loss of old trees with hollow limbs which provided shelter for them.

The occurrence of the oblong or long-necked turtle *(Chelodina oblonga)* was noted at wetlands in both catchment areas (Tables 3 and 4). They appear to have survived up to the present time in some of the wetlands. Hall (8) saw a large turtle in 1984 in Lake Mears but he notes that they are not as common as they used to be. Garstone (2) recalls seeing a lot of dead turtle shells on the banks of Lake Towerrinning in the early to mid-1970s, which coincides closely with the death of the 'reedbeds'. Cochrane (3) noted, however, that he has seen the long-necked turtle in Lake Towerrinning recently.

Amphibians

Frogs have also disappeared since the increase in salinity levels in the wetlands. Hall (2) described the sound of the bullfrog or banjo frog *(Limnodynastes dorsalis)* around the overflow of Lake Mears in the late 1920s as a 'low thunder' that could be heard over half a mile away. He notes that these frogs are no longer there. Frogs were also prevalent in the Carrolup River pools where Beeck (5) remembers the 'five o'clock chorus', which consisted of three or four species of frog, during the late 1920s up until about 1950.

Fish

The disappearance of fish from wetlands also coincided with increased salinity. Masters (18) recalls that carp (introduced in the 1900s) disappeared from the Avon River over a five-year period after the salinity change in 1945. Scott (8) and Pauley (6) remember catching redfin perch *(Perca fluviatilis)* (introduced in the 1900s, Allen 1982) in the Arthur River near Moodiarrup in the 1930s up until the mid-1960s. Lakes Dulbinning, Toolibin and Walbyring had redfin perch and carp up until the early 1960s (Pauley 4). Using oral histories of the Avon, Carrolup and Arthur Rivers and Lake Dulbinning (Tables 1 and 2) it appears that fish disappeared from ten to 25 years after salinity changes were first noticed.

Crustaceans

Decapod crustaceans have disappeared from many wetlands in both catchment areas. Rigby (2) cannot recall seeing

gilgies *(Cherax quinquecarinatus)* in Lake Yealering after the early 1940s. Salinity changes were first noticed in Lake Yealering by Rigby (9) in the late 1930s. Gilgies disappeared from the Avon River during the period 1945-1955 (Masters 3). This is ten to 15 years after salinity changes were first observed by Masters (3) and McMillan (2) but coincides with the sudden increase in salinity associated with the 1945 floods described by Masters (3). Marron *(C. tenuimanus)* were present in the Arthur (Cochrane 11; Durell 3; Scott 7; Pauley 6) and Carrolup Rivers (Beeck 5) up until the 1960s. Using oral histories of the Avon, Arthur and Carrolup Rivers and Lake Yealering it appears that crustaceans disappeared from ten to 20 years after the onset of salinisation was first noticed (Tables 1 and 2).

Molluscs

Few records of molluscs in the wetlands have been noted (Tables 3 and 4), although Masters (3) outlined changes in the mollusc fauna of the Avon River from 1945-1950 (see also Kendrick 1976). During this time the very common mollusc *(Plotiopsis australis)* virtually disappeared and the mollusc that occurs in brackish to saline waters *(Anticorbula amara)* (Kendrick 1976) increased. As with crustaceans this change coincided with salinity changes caused by the 1945 flood (Masters 3). Pauley (4) noted the presence of a little spiral shellfish in the saline lakes recently. Mussels were seen in the Arthur River by Durell (2, 7) during the period 1936 to the 1960s. Masters (3,4) saw mussels in the Avon River from 1945-1955.

Leeches

Leeches were well remembered by many informants as they were often bitten while wading through the water. The lake near Cunderdin (Fox 2,3) had leeches during the 1930s and 1940s. Lake Towerrinning had leeches in the 1940s (Cochrane 10) and Rushy Swamp had leeches in it before it went salty in 1974 (Garstone 4). Rigby (2) noticed that leeches disappeared from Lake Yealering in 1941, approximately five years after the onset of salinity changes. Leeches survived in Lakes Toolibin, Dulbinning and Walbyring up until the late 1950s (Pauley 12).

'Swimmer's itch'

It was thought at the beginning of this project that the presence of the organisms causing 'swimmer's itch' may have been useful as an indicator of fresh water. Many interviewees remember either themselves or their children contracting 'swimmer's itch' after swimming in some wetlands. Further research has established that Cercaria (the intermediate stage in the life-cycle of the bloodfluke) is the cause of 'swimmer's itch' and is represented in freshwater by *Cercaria parocellata* and in saltwater by *C. variglandis pyrazi* (Stevenson and Hughes 1988). Because *Cercaria* species are present in both fresh and saline water it is unlikely that their presence could be used to determine past water quality as records would probably not be available as to which species was the cause of 'swimmer's itch' contracted by people at that time.

SILTATION AND WATER LEVEL CHANGES

Following environmental changes siltation of some river pools occurred, generally following floods (Table 5). Masters (4,5) recalls that in February 1955 there was a severe summer flood and much damage to property occurred in the Avon Valley as a result. The 'Avon River Training Scheme' was initiated soon after the flood and large areas of tea-tree were removed from the riverbed between Northam and Toodyay with the goal of increasing the river's speed. The tea-tree removal was carried out in sections during the period 1958-1964. By 1970 siltation of the Avon River Pools started to occur (Master 6; McMillan 3). Siltation of the pools in the Narrogin Brook occurred after vegetation was cleared and a furrow was constructed in the brook during the early 1940s in the hope of draining away the salt. This furrow soon developed into a deep channel and the soil was washed away and deposited in the pools, filling them completely (Warren 2).

Hall (3) recalls that in the early 1930s, after rains in the eastern wheatbelt, the lakes near his property used to 'come down'. Each lake was connected to the next by a narrow channel and they used to fill slowly one after the other. After the trees started to die (late 1930s) the filling and overflowing process was accelerated because of the lack of vegetation. Hall (3) also mentions that since samphire has increased in the last 15 years the flood regime has reverted back to how it was in the early 1930s.

The '55 Flood' or 'February Flood' was also responsible for permanent water level changes in Lake Dumbleyung. Aitken (2) remembers the flood causing bank erosion on the Wagin (outlet) side of Lake Dumbleyung, followed by a serious fall in water level. Aitken remarks that after this flood event the lake never again reached its original depth. The Arthur River flats and pools also suffered damage from the 1955 flood. Durell (3,4) recalls that large banks of sand were placed across many favourite picnic areas and 'not much of the original river system remained'. As a result of the 1955 flood some of the pools on the Culham Brook were filled by sand (McMillan 4). Conversely McMillan (4) also remembers a little lake being created by scouring along Culham Brook and the whiskered tern *(Chlidonias hybrida)* and the bulrush (*Typha* sp.) appearing soon after. Beeck (3) is of the opinion that the 1955 flood was responsible for the disappearance of the tammar wallaby *(Macropus eugenii)* from the tea-tree flats around the lakes in the Katanning

area. He recalls tammars being present throughout the tea-tree flats prior to the flood and thinks many of them may have been drowned.

Permanent water level changes in other wetlands have been noticed by some informants. Beeck (22,23) described water level changes in the Carrolup River pools near his property in the Katanning Shire. He explained that some of the pools, at present, are 6 m deep and, in his memory, have never been dry, even when the river did not run in 1940. In 1893, however, Mr. Beeck's grandfather rode along the river system looking for water and found that only Round Pool had water. The local pioneers used to trap brumbies in Round Pool but the old fence is now well submerged. Lake Yealering has also increased in depth. Rigby (8) recalls that in the late 1930s to early 1940s Lake Yealering was about 2 m deep in the deepest part. The water level rose when, after a flood, it was decided to change the direction of flow of the creek running into Lake Yealering and a direct channel was constructed (date not given). The lake now holds more water and the water remains there for longer periods (Rigby 8).

The creation of wetlands caused by increased run-off was not documented during this project. The informants could not recall any wetlands that, in their memory, had not always been there. It is understood, however, that there are residents of the wheatbelt who were not interviewed for this project but who have information on the formation of new swamps or lakes.

EUTROPHICATION

Eutrophication is a well recognised process in wetlands on the Swan Coastal Plain but very few informants have noticed this process occurring in wheatbelt wetlands. Masters (10) first noticed algae growing in the Avon River pools in 1975 and describes three instances since then where the Glen Avon Pool has become deoxygenated. Masters (11) has also noticed ribbonweed and *Paspalum marginatum* growing more profusely in the Glen Avon Pool since the onset of nutrient enrichment in 1975. Lake Towerrinning also appears to be showing the effects of nutrient enrichment. Cochrane (7) describes a 'green slime' that floats on the lake towards the end of summer. Lake Norring has had an increase in weed growth over the past ten to 15 years (Watson 7,8). Watson describes the growth as weed, not algae, that grows very tall. Mitchell (2) describes two types of weed growing in Lake Norring, a 'tall grass' and a 'spongy' weed that grows on the bottom of the lake. Watson (8) mentions that Lake Dumbleyung also has problems with excessive weed growth (no date given).

NOTES ON OTHER WHEATBELT WETLANDS

In addition to the Avon and Blackwood River catchments information was collected on changes in wetlands in other areas of the wheatbelt. In the Yarra Yarra catchment, near Morawa, the oral history of a wetland called 'Dry Swamp' was recorded. This 'swamp' used to fill with fresh water in wet years and was vegetated throughout with *Eucalyptus* spp. in park-like formation (Yewers 1). The land was cleared around the 'swamp' in 1940 (Yewers 2) but the vegetation showed no sign of change until it started to die in the early 1980s. Yewers (2,3) attributes these deaths to salinisation of the groundwater.

The Lockier River tributaries, also in the Yarra Yarra catchment, had freshwater pools in them during the 1930s and many creeks in the Morawa area were fresh during this time (J. White, farmer and naturalist, Morawa, personal communication). The Yarra Yarra Lakes themselves were visited by McMillan (5) in the late 1950s and he recalls *Melaleuca* sp. and *Allocasuarina* sp. growing around the edge. In subsequent visits in the 1980s McMillan (5,6) observed that they did not look as healthy as in previous visits as there were dead trees around the edges and the lakebed was muddy. He also noticed *Typha* was growing in places.

CONCLUSIONS

The collection of oral history memoirs relating to environmental changes in wheatbelt wetlands has enabled a reconstruction of wetland condition during the earlier part of this century. It has also, for the first time, documented the broader biological changes that have occurred throughout catchments since clearing for agriculture began. This historical accent is valuable in that it is a point of reference for further research and also provides goals for future rehabilitation programs. The identification of indicator species and trends in changes contributes to future planning by assisting us in predicting the impact on wetlands of changes in land management practices.

The first stage of wetland degradation associated with increasing salinity, permanent water level changes and siltation became apparent with the death of semi-aquatic and aquatic vegetation. *Melaleuca* spp., rushes, sedges, bulrushes and freshwater aquatic vegetation no longer survive at most of the wetlands documented in this report. The most obvious animals to disappear from wetlands were freshwater fishes, molluscs, decapod crustaceans, frogs, birds associated with 'reedbeds', and leeches. The loss of these animals constitutes a severe diminution of biological diversity throughout wheatbelt wetlands. It may be argued that it is too late for rehabilitation of most

of these wetlands, but a greater understanding of how and why these wetlands changed will assist us to plan the management of other wetlands of this State.

There are many more wheatbelt wetlands whose history remains in the unrecorded memories of older people. It is important that these memoirs are documented before they are lost to future generations. Further oral history projects would add to the documentation of our State's history, trends and indicator species identified during this project would be confirmed and further trends in environmental changes may be discovered.

RECOMMENDATIONS FOR FUTURE PROJECTS

The collation of clearing dates for the Avon and Blackwood River catchments would enable the time between clearing and the onset of environmental changes in wetlands to be determined with greater accuracy. I recommend this as a priority for future work. The documentation of fertilizer use in these catchments would also be useful for the same reason given above. Although few occurrences of eutrophication were documented in oral histories further work may identify that it is a more common problem or, alternatively, that the use of fertilizer in these catchments has not caused eutrophication in these wetlands. This information would be useful in predicting the ongoing and future impacts on wetlands of agricultural development.

There are many other wetlands in the Avon and Blackwood River catchments and elsewhere in the wheatbelt whose story has yet to be told. This includes documentation of lakes and swamps that have been created by increased run-off. Taking into consideration the results achieved from this project I recommend that collecting oral histories of other wetlands in these catchments would be useful in building a more comprehensive picture of changes in wetlands throughout the wheatbelt.

In addition to information on wetlands, most informants, particularly those over 65 years of age, were able to recall changes in mammal fauna. This information is included in the oral history transcripts but has not yet been collated. I feel that collation of this information would establish whether it would be useful to collect further oral histories of this type. Collating the oral histories of mammal disappearances may also add to the knowledge already documented in papers such as Burbidge and McKenzie (1989).

Many early explorers noted the presence of fresh waterbodies during their travels and some also commented on their constituent flora and fauna. Collation of this type of information may be useful in contributing to the picture of what our wetlands used to be like before clearing took place. Also, wetlands are often mentioned in books documenting local histories of districts, towns and families. Many wheatbelt wetlands were used for recreation and the photographs of picnic parties published in these books may provide clues to the state of wetlands at the time photographs were taken. Collation of this material would further add to the story of environmental change in wheatbelt wetlands.

During the course of this project I discovered that some informants have kept records of species occurrences, particularly birds, and various other events. It would be useful to collate this information to add to the documentation provided by this oral history project.

In view of the results of this project and the sources of further information discussed above I make the following recommendations for future projects:

- collate information on clearing dates and fertilizer use for the catchments documented in this project;
- document oral histories of other wetlands in the Avon and Blackwood River catchments;
- document oral histories for areas of the wheatbelt not covered by this project;
- collect and collate information, possibly in the form of oral histories, relating to changes in mammal fauna in Western Australia;
- collate information contained in the diaries of early explorers that relates to observations of wetlands before clearing began;
- collate information relating to environmental change contained in records kept by people with an interest in natural history.

ACKNOWLEDGMENTS

This project was funded jointly by the National Estate Program of the Western Australian Heritage Committee and the Western Australian Department of Conservation and Land Management.

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REFERENCES

Allen, G.R. (1982). *Inland Fishes of Western Australia.* Western Australian Museum, Perth.

Blakers, M., Davies, S.J.J.F. and Reilly, P.N. (1984). *The Atlas of Australian Birds.* Melbourne University Press, Melbourne.

Burbidge, A.A. and McKenzie, N.L. (1989). Patterns in the decline of Western Australia's vertebrate fauna: causes and conservation implications. *Biological Conservation* **50**, 143-198.

Cogger, H.G. (1986). *Reptiles and Amphibians of Australia.* 4th edn. A.H. & A.W. Reed, Sydney.

Department of Lands and Surveys Western Australia (1986). *Travellers Atlas of Western Australia,* 3rd edn.

*Jamieson, R.J. (1987). Oral history projects: hints on organising and financing. *Oral History Association of Australia Journal* **9**, 85-96.

*Jamieson, R.J. (n.d). *Oral History: How to Interview: A step by step guide to successful interviewing.* A one-hour tape available at the Battye Library Oral History Unit. Perth.

Kendrick, G.W. (1976). The Avon: faunal and other notes on a dying river in south-western Australia. *The Western Australian Naturalist* **13**, 97-114.

*Moss, W.W. (1974). *Oral History Programme Manual.* Praegar Publishers, New York.

Schofield, N.J., Ruprecht, J.K. and Loh, I.C. (1988). The Impact of Agricultural Development on the Salinity of Surface Water Resources of South-West Western Australia, Report No. WS 27. Water Authority of Western Australia.

Serventy, D.L. and Whittell, H.M. (1976). *Birds of Western Australia.* University of Western Australia Press, Perth, W.A.

Shipway, B. (1951). The natural history of the marron and other freshwater crayfish of south-western Australia: Part 2. *The Western Australian Naturalist* **3**, 27-34.

Smith, G. G. (1980). Rushes, Sedges and Reeds. *The Western Australian Naturalist* **14**, 169-174.

Smith, G.G. and Marchant, N.G. (1961). A census of aquatic plants of Western Australia. *The Western Australian Naturalist* **8**, 5-18.

Stevenson, W.J. and Hughes, K.L. (1988). *Synopsis of Zoonoses in Australia,* 2nd edn. Commonwealth Department of Community Services and Health. A.G.P.S. Canberra.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1986). *Snakes of Western Australia.* Western Australian Museum, Perth.

Strahan, R. (Ed) (1983). *The Australian Museum's Complete Book of Australian Mammals.* Angus & Robertson, Sydney.

Tyler, M.J., Smith, L.A. and Johnstone, R.E. (1984). *Frogs of Western Australia.* Western Australian Museum, Perth.

* These publications were used in formulating the method for collecting and processing oral histories during this project.

APPENDIX I

Wetlands in the Avon River Catchment Documented in Oral Histories

All wetlands are lakes unless otherwise specified.

WETLAND	1:50 000 MAP REF	SHIRE	INFORMANT
AVON RIVER	2134-I & 2234-IV	TOODYAY & NORTHAM	HALL;MASTERS;MCMILLAN;RIGBY
BAANDEE	2434-I	KELLERBERRIN	HALL
BROWN	2432-IV	CORRIGIN	PAULEY;RIGBY
CHANNEL	2333-I	QUAIRADING & BROOKTON	HALL
CULHAM BROOK	2235-III	TOODYAY	MCMILLAN
16 km NE CUNDERDIN	2334-I	CUNDERDIN	FOX
DAMBORING	2236-IV	WONGAN-BALLIDU	MCMILLAN
E MORTLOCK R	2334-I	TAMMIN & CUNDERDIN	MASTERS;HALL
GILMAN SWAMP	2432-IV	WICKEPIN	DURELL
KOOMBEKINE	2335-IV	DOWERIN	SMITH
KUNJIN BROOK	2333-I	BROOKTON	HALL
KURRENKUTTEN	2533-IV	CORRIGIN	HALL
LAKE YENYENING	2333-I	QUAIRADING	HALL
MEARS	2333-I	BROOKTON	HALL
NONALLING	2432-IV	CORRIGIN	PAULEY;RIGBY
PARADISE	2432-IV	"	PAULEY
SPENCER'S BROOK	2234-IV	NORTHAM	MCMILLAN
WALYORMOURING	2235-I	GOOMALLING	KING
WHITE WATER	2432-IV	CORRIGIN	PAULEY;RIGBY
YEALERING	2432-IV	WICKEPIN	" "
YENYENING LAKES	2333-IV	BEVERLEY & BROOKTON	HALL;MASTERS

APPENDIX II

Wetlands in the Blackwood River Catchment Documented in Oral Histories

All wetlands are lakes unless otherwise specified.

WETLAND	1:50 000 MAP REF	SHIRE	INFORMANT
ARTHUR RIVER	2230-I	WEST ARTHUR	COCHRANE;DURELL;PAULEY;SCOTT; WATSON
BEAUFORT RIVER	2330-IV	WOODANILLING	GARSTONE;WATSON
BILLIELIGHT	2330-I	"	GARSTONE
BILLY	2432-III	NARROGIN	PAULEY
BOKAN	"	"	"
BOYERINE CREEK	2331-II	WOODANILLING	WATSON
BRUNTS SWAMP	2331-I	NARROGIN	WARREN
CARBERDINE POOL	2331-III	WEST ARTHUR	DURELL
CARROLUP RIVER	2330-I	KATANNING	BEECK;WATSON
COBLININE RIVER	2431-II & III	DUMBLEYUNG & KATANNING	AITKEN;BEECK;WATSON
COOMELBERRUP	2431-II	DUMBLEYUNG	BEECK;GARSTONE;HALL
COYRECUP	2430-I	KATANNING	"
DULBINNING	2432-III	WICKEPIN	PAULEY
DULBINNING EAST	"	"	"
DUMBLEYUNG	2431-III	WAGIN & DUMBLEYUNG	AITKEN;BEECK;DURELL;GARSTONE; PAULEY;WATSON
EWLYAMARTUP	2430-IV	KATANNING	BEECK
FLAGSTAFF	2330-I	WOODANILLING	GARSTONE;WATSON
GUNDARING	2331-II	WAGIN	AITKEN;DURELL
LITTLE MURAPIN	2330-IV	WOODANILLING	GARSTONE
LITTLE NORRING	2331-II	WAGIN	DURELL;MITCHELL;WATSON
LITTLE WHITE	2331-I	NARROGIN	PAULEY
MURRIN	2331-II	WAGIN	DURELL
NARROGIN BROOK	2331-I	NARROGIN	WARREN
NOMANS	2332-II	"	PAULEY
NORRING	2331-II	WOODANILLING	BEECK;DURELL;GARSTONE;HALL; MITCHELL;WATSON
PARKEYERRING	"	WAGIN	DURELL;GARSTONE;MCMILLAN

Appendix II (Continued)

WETLAND	1:50 000 MAP REF	SHIRE	INFORMANT
QUARBING	2331-II	WOODANILLING	WATSON
QUEEREARRUP	2330-IV	WAGIN & WOODANILLING	BEECK;GARSTONE;WATSON
RUSHY SWAMP	2330-I	WOODANILLING	BEECK;GARSTONE
SALT	2331-II	WAGIN	DURELL
TAARBLIN	2432-III	NARROGIN	AITKEN;DURELL;GARSTONE;PAULEY
TOOLIBIN	"	WICKEPIN	AITKEN;DURELL;GARSTONE;PAULEY; RIGBY
TOWERRINNING	2230-I	WEST ARTHUR	COCHRANE;DURELL;GARSTONE; PAULEY
WALBYRING (OR MUD HUT)	2432-III	WICKEPIN	DURELL;PAULEY
WARDERING	2330-IV	WOODANILLING	BEECK;GARSTONE;WATSON
WHITE	2331-I	NARROGIN	PAULEY
WOLWOLLING POOL	"	"	DURELL;WARREN
WOODANILLING SP	2330-I	WOODANILLING	GARSTONE

APPENDIX III

Participants

AITKEN, Ray	Perth	oral history
BEECK, Neville	Katanning	" "
COCHRANE, Laura	Duranillin	" "
COCHRANE, Louden	"	" "
DURELL, Bob	Busselton	" "
FOX, Normah	Cunderdin	" "
GARSTONE, Ray	Woodanilling	" "
HALL, Henry	Perth	" "
KING, Ray	Goomalling	anecdotal notes
MASTERS, Jim	Northam	oral history
MCMILLAN, Peter	Perth	" "
MITCHELL, Frank	Wagin	" "
PAULEY, Phil	East Wickepin	oral history and anecdotal notes
RIGBY, Ray	Yealering	" "
SCOTT, Bill	Moodiarrup	" "
SMITH, Bill	Cervantes	oral history andanecdotal notes
WARREN, Gwen	Highbury	anecdotal notes
WATSON, Vern	Woodanilling	oral history
YEWERS, Alf	Dongara	oral history and anecdotal notes

APPENDIX IV

Sample Interview Outline

Brief Biography of interviewee

- Birth date
- Birth place
- Where lived and when
- Occupation/s

Changes in wetlands - dated

- Vegetation - what was it/what did it look like?

Checklist
-paperbark
-tea-tree
-sheoak
-reedbeds
-aquatic weed
-water lilies

- Fauna- what was there/approximate numbers?

Checklist
-water-rat
-waterbirds
-birds associated with 'reedbeds' e.g. crakes
-western tiger snake
-oblong or long-necked turtle
-frogs
-fish
-crustaceans
-molluscs
-leeches

When were changes first noticed and why were they noticed?

Checklist
-death of vegetation
-disappearance or changes in fauna
-salinisation
-water levels
-waterlogging
-siltation
-eutrophication
-samphire appearance or increase
-frequency of flooding/droughts

Special records

Checklist
-appearance of maned duck
-breeding records of waterbirds
-rabbit plague (related to wetlands)

APPENDIX V

Sample Master Control Sheet

INTERVIEWEE..... TAPE NO/S .....

INTERVIEWER.....

INTERVIEW DATE .....

TRANSCRIBED BY ..... DATE COMPLETED .....

DRAFT TRANSCRIPT AND COPYRIGHT DOC SENT.....

REMINDER SENT .....

FINAL TYPING OF TRANSCRIPT .....

PROOFREAD BY..... ..... DATE .....

FINAL TRANSCRIPT AND THANKYOU TO INTERVIEWEE .....

APPENDIX VI

Hints on Interviewing

Before interviewing starts (these suggestions help to formulate an interview outline)

- Find out about the person to be interviewed

  - what is their connection with the wetlands?
  - what is their main area of knowledge/interests?

- Conduct background research on the wetland/s to be covered

  - where is it?
  - how big is it?
  - what does it look like now? (visit the wetland if possible)

Conducting interviews

- Explain a system of signals to use if you want to stop the taping and also if the informant wants to stop taping.
- After arriving at the place of interview commence taping as soon as it is comfortably possible.
- Record the name, date and place of birth, place of residence/s and occupation/s of informant.
- Listen silently - avoid interjections.
- Give encouragement silently - nod or smile.
- Do not interrupt unless absolutely necessary.
- Take down notes during the interview of points to come back to.
- Make notes of people named during the interview to check spellings after the interview.
- Do not talk over the informant - if you do, transcribing will be difficult.
- Don't be afraid of pauses - give the informant time to think.
- If reference is made to the size of something with gestures either say 'that's about half a metre' or if it is difficult to interrupt write down the size and add it to the transcript in [square brackets].
- Concentrate and pick up clues for further questions, make notes of them and ask the question later.
- If the informant strays from the subject wait for a suitable break in the flow of speech and say 'getting back to what you were saying about....'

- Let the informant do the talking - don't be tempted to add your own knowledge
- Keep a surreptitious eye on the tape counter and try not to let the tape run out in mid-sentence.
- Don't interview more than one person at a time.
- Keep questions short with each one covering one point.
- Avoid asking leading questions.
- If a question was asked prior to the interview and the answer was negative don't forget to record the question again. A negative answer is sometimes as important as a positive one.
- If a question has obviously been misunderstood ask the question again in a different way.
- Try to keep the interview restricted to personal recollections although it may be interesting in some instances to collect second-hand accounts.

After the interview

- Check that all the points noted during the interview have been covered on tape.
- Remember to check the spellings of names of people mentioned in the interview before leaving.
- If there is any doubt as to the identity of species mentioned confirm these before leaving. Also make sure the location of all wetlands mentioned is recorded.

(These notes were adapted from Battye Library Oral History Unit, 'Some points on interviewing')

APPENDIX VII

Sample Excerpts from Transcripts

Sample A - Jim Masters

MASTERS I'll perhaps go back to my first experience of salt in the eastern wheatbelt. My father was one of the pioneers of Tammin and he started there in 1902 on a block on the East Avon[1] branch which runs out towards Yorkrakine-Wyalkatchem. He had a sandplain block on one side of this river which was slightly saline in those days. I first knew it in about 1928 when I would have been eleven years of age around about then. Well you know, I was there long before that as a baby, but not taking notice of things.

The other area on the south side of the river was heavy forest land and he started on that first. Some of this country round was the typical tea-tree, which we now know as salt lake country. Not saline marshes so much as it's become now. He cleared from the forest into the edge of this tea-tree country, it was quite easy to clear.

By 1910 he had about a thousand acres after eight years work with his initial development. About one third of this was surrounded with this tea-tree country in the low lying valley, which was then quite free of salt, no indications of salt in the soil.

Before 1910 there were big flood periods, droughts actually from 1911 to 1914. 1914 was the worst drought south-western Australia has ever suffered in the period of European settlement.

1915 and 1917 were flood years and by 1920 the first appearance of salt, only ten years after. But it took the flood period to apparently raise the water table to show what could happen in the valleys.

By 1935, when I actually worked up there, seven hundred acres of this initial thousand acres was affected to some degree by salt. The sad part about this, we weren't unique in that area, it was happening at that same period all the way from Meckering, through Cunderdin certainly as far as Kellerberrin, in these valleys. But so little notice was ever taken in the local land development, because to me that area's the first in this State to show what really could happen. Well, however, coming back to the wildlife side of it in this which we now know as a saline valley. When anybody goes to Yorkrakine Hill to the north and the north-west they'll see this long salted valley down through there. Well I first knew it as all green tea-tree and everything else, but it had these braided streams through it, just like I mentioned earlier in this Lower Avon, but there on a much broader scale. This particular saline area is about a mile broad and runs all the way down and past Cunderdin, you see it on the main road there. There were little pans and lakes and things in it and they were largely fresh. But as they dried out, even in the natural state, in summer they'd show a little bit of salt in them.

Sample B - Neville Beeck

AS[2] What about things living in the water such as the crustaceans?

BEECK Yes, when it was fresh all those systems had what we used to call a koonac, or gilgies. These are the big blue fellows, you know the ones, with the great whopping big claws and he grows to about this long [eight to nine inches] and digs great big holes. Well they were all through that system and we had them here even in the creeks, in the creek just across the road, which has now gone salty, they were all up that creek. They were everywhere, we had them in our dams here, but they seem to have disappeared now.

[1]This is corrected to the East Mortlock on page 9.

[2]AS=Angela Sanders (interviewer)

Lake Wardering, have you heard of Lake Wardering?

AS No.

BEECK Now I'm getting away from the Coblinine system but I just might mention here Lake Wardering which is a sanctuary, it's a waterfowl sanctuary west of Woodanilling. Actually I was instrumental in having that turned into a sanctuary back in 1954, I think it was [or] 55. The then Fisheries department came and met some of us who were interested in, well I suppose you'd say conservation in Katanning, and I made the recommendation that Wardering would be closed to all shooting and turned into a wildlife sanctuary. It was passed, gazetted and I was abused because it was a good duck shooting spot. But this Wardering, now I'm getting away from what you were actually talking about, but I think it might be relevant.

AS Yes.

BEECK Wardering Lake when I first knew it had a big population of crustaceans, these big...well we called them koonacs but we'll call them gilgies just so there's no argument. Gilgie covers a lot doesn't it?

AS Yes it does.

BEECK There were holes all through that [lake]. When you were walking through to retrieve a duck or something you'd bog down in these holes. But that's gone salty since [then] of course and they've disappeared too.

AS Did you ever notice leeches in any of these wetlands?

BEECK Oh, did I what [laughs]. Yes, they've disappeared now because they can't stand salinity. But any good bulrush swamp back in the 30s and early 40s, and the last one that I can remember is one that we called Douglas Swamp, or Rushy Swamp, it's now gone salty. I used to bird observe in there and poke around in the rushes and you got the leeches alright, they were very plentiful. But I haven't seen a leech for thirty-five years now, well thirty years anyway. They seem to have completely disappeared.

APPENDIX VIII

Sample Copyright Document

I, ...

give permission to .....

to use the interview, or part of the interview, conducted with me on .....

.....

for research, publication, and/or broadcast (delete those not required) and for copies to be lodged in the J S Battye Library of West Australian History for the use of other bona fide researchers.

Signed .....

Date .....

Interviewer's signature .....

APPENDIX IX

Indexes to Transcripts

AITKEN INDEX

BEECK INDEX

COCHRANE AND SCOTT INDEX

DURELL INDEX

FOX INDEX

GARSTONE INDEX

HALL INDEX

MASTERS INDEX

MCMILLAN INDEX

MITCHELL INDEX

PAULEY INDEX

RIGBY INDEX

SMITH INDEX

WATSON INDEX

YEWERS INDEX

APPENDIX X

Historical Photograph Register

DATE	SUBJECT	WHERE HELD
?	Narrogin Brook	Mrs G Warren - Highbury
1978	Wollwolling Pool	"
1964	Perch caught in Lake Dulbining	Mr P Pauley - East Wickepin
1928	Horses drinking in the Avon River	Mr P McMillan
1920	Yealering Lake-passage cut through trees	Yealering Historical Society
1920-21	Boating Parties on Lake Yealering (7 Photographs)	"
?	Lake Yealering showing live trees and old jetty	"
1920	Crowd at Lake Yealering picnic	"
1930	Lake Yealering (Robert Roepke)	"
1940's	Lake Yealering below present bowling club	"
1940's	White Lake picnic	"
1950's	Fun at the Lake Yealering	"
1950's	Old change shed at Lake Yealering (some dead vegetation)	"