/INCOMPLETE & UNEDITED/

PRELIMINARY REPORT

of

A BIOLOGICAL SURVEY OF THE ORD RIVER BASIN

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Introductory Note

Because the collections of animals made during the survey have not yet been thoroughly researched, some of the identifications of specimens have been left open. A more complete report will be published in the near future that will provide more complete details of habitats and the biology of the animals in the Ord River Basin.

Introduction

Because of the paucity, and in most cases, the total absence of published information on the animals inhabiting the area of the Ord River Basin, the Western Australian Wildlife Authority commissioned the Western Australian Museum to undertake a biological survey of the area. The objectives of the survey were threefold. Firstly, it was intended to make a basic survey of the vertebrate animals, molluscs and spiders so that the diversity of species present and the habitat they occupied was recorded before the wet season of 1971-1972 when the area becomes inundated by water filling the main Ord River Dam. Secondly, the survey was to indicate what animals would require rescuing when the dam begins to flood, where they are likely to be stranded and what should be done with them once they have been rescued. Thirdly, it was also hoped that the information accrued during the survey would enable some predictions to be made on the ecological changes that may occur in the general area and forward recommendations that may be of assistance to the bodies concerned with the management of the Ord Dam and environs.

This is a report of the findings of the Museum Survey team that visited the area that is to be flooded when the main Ord Dam fills.

Survey Approach

1. Selection of terrestrial areas

Three general areas were selected for the general faunal survey. These areas represented the south-west, central-west and north-west regions of the area to be flooded and were selected (after examination of the CSIRO Land Survey Report No. 28) because they incorporated within them the representative forms of the Ord basin. The land forms in the Ord basin are shown superimposed upon the area to be flooded in fig. / . The three general areas surveyed (A, B and C) are also outlined in this fig. / . The actual habitats surveyed were selected after an aerial reconnaissance on October 1-2.

2. Selection of aquatic areas

An aerial survey of the fresh water pools and lagoons of the whole area was carried out to ensure that a representative selection of pools and lagoons was sampled. Mr McKay who surveyed the freshwater fish decided to concentrate mainly on the pools lying in the bed of the Ord River occurring between Argyle Lagoon and the junction of the Ord and Bow Rivers. In this area many isolated pools occur, some of which have water flowing slowly through the sand bars at each end while others were essentially stagnant pools with a surface scum of floating vegetation. In addition to sampling a representative selection of these river pools, Mr McKay sampled Argyle Lagoon and a small creek fed by a spring on the west side of the Ord River.

Dr Wilson, who concentrated on the freshwater molluscs, sampled the same areas as Mr McKay, but in addition examined several more lagoons and investigated several windmill dams and tributary creeks. All the localities sampled by Mr McKay and Dr Wilson will be flooded when the main dam fills and thus the fish and molluscs collected during this survey will contribute towards the freshwater fauna of the Ord Dam.

3. Organisation of the survey effort

The survey effort was divided into two phases. The first phase, which was concerned with the general faunal survey, took place between October 1-20. For the first phase of the survey, the survey party was split into 3 groups. The groups were as follows :

Group 1	Mr Rolly McKay and Mr John Dell
Group 2	Mr Harry Butler
Group 3	Mr Rick Graves and Dr Darrell Kitchener.

Dr Barry Wilson was with the survey party for the period between October 6-13. He joined the groups that allowed him the best coverage for his collecting interests.

While members of the survey party collected everything of interest that they found, individuals had particular groups of animals on which they concentrated their attention. The specialist interests of individuals were :

Lycosid spiders and freshwater fish	Mr McKay
Frogs and birds	Mr Dell
Birds, mammals and reptiles	Mr Butler
Mammals	Dr Kitchener
Freshwater molluscs	Dr Wilson.

Each team had a period in each of the three predetermined survey areas A, B and C. In this manner each team had the opportunity of examining all the areas, thus enabling a specialist coverage of the animals in all the selected habitats. The schedule of the areas in which the groups operated is as follows :

	Group 1	Group 2	Group 3
Area A	Oct 16-20	Oct 11-15	Oct 3-10
Area B	Oct 3-10	Oct 16-20	Oct 11-15
Area C	Oct 11-15	Oct 3-10	Oct 16-20

The second phase of the survey took place between October 20-26 and concentrated on the areas that may become important during the actual rescue operation and any habitats that were not covered in the first phase of the survey. These areas included Bananna Springs, mouth of Hicks Creek, termitaria near Old Lissadell and Mounts Misery and Munz.

Materials and Methods

Mammals

Three types of traps of standard design were used to catch mammals. These were

i) Break-backs (BB) - small metal traps made according to the same design as the commercial rat trap

ii) Elliots or funnel traps - a fold-up box with solid aluminium/and having /walls the dimensions of 3" x 9" x 3" high

iii) Cage or wire trap - a larger trap made from wire mesh and having the dimensions of 2' x 1½' x 1½' high.

Each survey team set traps. These traps were placed in habitat that bore animal sign or appeared to be suitable for small mammals. No attempt was made to standardise the actual positioning of traps because the rugged terrain prevented such an approach. Traps were set at approximately 1600 hrs and were baited with Universal Bait - a mixture of peanut butter, bacon, raisins and oats. They were checked each day between 0500 hrs and 0700 hrs.

In addition to trapping, spotlighting at night from the tray of the landrovers was conducted to determine the species of larger animals present and their numbers and distributions. Each of the three teams conducted spotlighting traverses in each of the A, B and C survey areas. Each team's traverse was conducted on the same nights (4th, 7th, 11th, 14th and 18th), at the same time (1830 hrs - 2130 hrs), by travelling over the same

section of road and taking the same course as that used by the previous team. Wherever possible a driving speed of 15 mph was maintained. Because of the poor road surfaces, the vehicles averaged only 7 mph during their spotlight traverses in areas B and C while on the better roads in area A, the average speed increased to 17 mph.

Birds

All birds sighted by Messrs Dell and Butler were recorded to provide information on the number of species present and their density and habitat preferences. In addition, observations on feeding habits, breeding and social behaviour were carefully recorded. Birds which could not be positively identified in the field were shot and a skin prepared of the specimen. On the 25th and 28th a collection of birds that had localised distributions and birds that were likely to be affected by the inundation were shot, deep frozen and shipped to Perth for reference and further research.

Reptiles

Reptiles were collected opportunistically. Many were found beneath logs, tins, in fence post holes and termitaria, and caught by hand. Most however were shot with dust early in the morning or late in the afternoon. Many gekkoes were collected at night on fence posts or on the open ground.

Fish

A small seine net ($^5/_8$" mesh x 66 yards x 200 meshes deep) was used to net the river pools. This net was particularly efficient in the pools that had a sand substrate but was difficult to use effectively in the rock pools. "Pronoxfish" systemic fish poison was used with much success, and as it was completely harmless to cattle and non-aquatic wildlife, a number of pools and both the non riverine sites were sampled by poisoning with this toxin. A hand net was used in all operations.

DESCRIPTION OF THE HABITAT SURVEYED

Terrestrial Habitats

1. Low Hilly Country location 159964

Low undulating hills bearing an open woodland community that was dominated by the low white barked Eucalyptus brevifolia. On the higher slopes Eucalyptus cf. dichromophloia F. Muell., a taller greyish-brown stringy barked tree was common. On top of the hills, a third, unidentified broad-leafed eucalypt, occurred occasionally. On the lower slopes were scattered clumps of Acacia holosericea Don, a low thin upright shrub and occasional low scraggy Eucalyptus tectifica F. Muell. The ground was covered with small clumps of an evenly distributed unidentified spinifex that at a little distance presented an appearance of a continuous light green mat. The leaf litter was sparse and discontinuously distributed. (See photo 1)- Appendix .)

2. Rugged Hilly Country location 138945

These hills were low (100 ft - 200 ft) situated 4 miles west of Argyle Downs Station. They were littered with large fine-grained granite boulders. The lower slopes and base of these hills were covered with an open woodland dominated by Eucalyptus brevifolia Schau and an unidentified low eucalypt that had a thin trunk that was grey and had a stringy bark. Beneath these eucalypts was a scattered shrub layer of Acacia wickhamii Benth that formed a continuous shrub stratum at the edge of the scree slope.

Large clumps of an unidentified spinifex and several other unidentified grasses formed an almost continuous ground cover. Occasional clumps of spinifex growing amongst crevices in the boulders were the only vegetation growing further up the slopes of these hills. There was no leaf litter. (See photo 2)- Appendix .)

3. Rugged Hilly Country Sloping down to Ord River Embankment - Location 134946

These hills extended as tongues southward along the east bank of the Ord River from location to location. They were steep faced stony outcrops about 500 feet high. An unidentified Spinifex and several other species of grasses including Cenchrus sp and Eulalia fulva Kuntze occupied crevices amongst the boulders on the scree slopes. Occasional low bushes of Rhychosia rhomboidea F. Muell, Aerva tomentosa Forsk and Celtis philippensis Blanco also grow in these crevices. Dense rows of low (12 ft) paperbarks, Melalenca lencadendron (L) L. grew along the lower slopes of the Ord embankment. Higher up on the banks the prominent tree was the taller (20 ft) rough grey barked Lysiphyllum cunninghamii (Benth) De Witt. The ground cover beneath these trees was a low dense unidentified grass. There was a sparse scattered leaf litter. (See photo 3) - Appendix).

4. Low Rocky Outcrops - Location 124910.

These were rocky sandstone and quartzite outcrops in the South Western edge of the area to be flooded. There were a few stunted trees, Calotropis procera (Willd) R.Br.ex Ait, and occasional bushes of Cassia Venusta F. Muell, Tephrosia sp and lochlospermum frazeri.planch growing on these outcrops. (See photo 4).

5. Open Woodland - Hicks Creek - Location 151957.

This area included the dry watercourse of Hicks Creek, the banks of the watercourse and the closely adjacent areas. There was a diverse assemblage of trees and shrubs growing on the banks. These included Lysiphyllum cunninghamii (Benth) De Wit, Eulalia of fulva Kuntze, Nauclea sp and Eugenia eucalyptoides. F. Muell. As was typical of other large watercourses in the basin, there was a surrounding open woodland to a distance of about 300m. from the dry creek bed. This woodland was dominated by Atalaya hemiglanca (F.Muell) Benth and an unidentified moderately tall smooth white barked thin leaved eucalypt. Eugenia eucalyptoides F.Muell was also prominent and common within the tree assemblage. The grasses which included a panicum sp formed a low dense ground cover. There was no shrub layer. Although the leaf litter was sparse in the open woodland is formed a dense, continuous layer on the bed of the watercourse (Photo 5).

6. Ord River Area - Location 128915.

The closed woodlands occupying the land that sloped down towards the Ord on the west bank of the river were composed of a mixed assemblage of low trees of which the following were prominent: Calotropis procera (Willa) R.Br en Ait, Eucalyptus alba and Lysiana subfalcata (Hook). There was no shrub layer and grasses were sparse. On the embankment of the Ord the trees are larger with Eualyptus camaldulensis Dehn, reaching a height of over 100 ft. An assortment of smaller trees and shrubs occur on the banks of the river and included Melia composita Willa, Melalenca levcodendron, Dolichandrome heterophylla (R.Br) F. Muell, Eucalyptus microtheca F. Muell, Passiflora foetida L., Ficus coronulata F. Muell, F. glomerata Willa, Habea arborescens R.Br. with a lower shrub

layer of Ehretia cf. urceolata W.V.Fitzg Santalum lauceolatum R.Br., Phyllanthus reticulatus Poir and Acacia Farnesiana Willa. Pandanus palms were common along the water edge as too were the mangrove Barringtonia acutangula Gaertn. Beneath the shrub layer was a moderately dense growth of grasses with Achyranthes aspera L. prominent (Photo 6).

7. Argyle Lagoon - Location 128941.
This lagoon was an oval sheet of water about 500 m. long and 100 m. wide. The edge of the water was surrounded by a 10 m. wide belt of the reed Eleocharis sphacelata R.Br. that was trampled flat by cattle at its outer edges. A 30 m. wide belt of the grass Brachiaria sp. that had been closely cropped by cattle encircled these reeds. Thickets of the shrub Acacia farnesiana Willa were scattered along the grass belt. The Brachiaria sp. ended at a line of trees that formed the edge of an open woodland encircling the lagoon. (Photo 7).

8. Mound Spring - Location 122909.
This was a series of brackish soaks overgrown with the fern Acrostichum speciosum Willd. that has formed a peat moss mound. This mound is fenced against cattle and as a result the enclosure contains a specialised vegetation that forms a moderately tall dense cover dominated by a Melaleuca sp. and containing Sesbania formosa L.F. Muell. N.T. Burbidge There was also a dense low grass cover of Cynodon and the sedge Fimbristylus ferruginea (L) Vahl and the low shrubs Ptilotus exaltatus Nees and Enchylaena tomentosa R.Br (Photo 8).

9. Bananna Springs - Location 133950.
This description is pending the identification of the floral collection from the spring. (Photo 9)

10. Tippera Tall Grass - Location 157948.
This is a savannah woodland composed of moderately tall grasses with at least four species of grasses prominent. Included in these grasses was Aristida sp. and Chrysopagon sp. The emergent trees were all low and included Terminalia arostrata Ewart et Davies, Eucalyptus c.f. dichromophloia F. Muell and Santalum lanccolatum R.Br. There was no low shrub layer and no leaf litter (Photo 10).

11. Blue grass plains - Location 163964.
This area was the plains country sloping away from the low hills in the north east region of the basin. The moderately tall grass, Chrysopagon Sp. Eucalyptus grandifolia R.Br. and E. tectifica F.Muell were frequent

emergents. There were occasional unidentified shrubs and although the leaf litter was sparse it was continuous. (Photo 11).

12. Blue grass plains - Location 125912.
Much the same as the above description although the low shrubs Hibiscus merankensis Hochr, Malvaceal, Sesbania simplicinsanta Benth, Grevillea mimosoides R.Br, Carissa lanceolata R.Br and trees Terminalia arostrata Ewart et Davies and Dolichandrone heterophylla (R.Br.) F.Muell were also recorded. (Photo 12).

13. Tall grassland - Location 125910.
This is an open woodland characterised by a very tall (8 ft.) unidentified coarse grass. This grass occurred only in pockets along the river bank and it appeared not to be browsed by animals. The tree layer included Eucalyptus microtheca F.Muell and Lysiphyllum cunninghamii (Benth) De Wit, in addition to the typical river bank vegetation (Photo 13).

14. Low Grassland - Location 123913.
These grasslands are found on the scree slopes and run off from the rocky outcrops. They are characterised by the very low ground coverage Trioda sp. with the following scattered trees and occasional shrubs also present: Melalenca nervosa (Lindl) Cheel, Cassytha sp., Dichrostachys spicata (F.Muell) Domin, Gyrocenpus americanus Jacq, Ventilago vimmalis Hook, Lysiphyllum cunninghamii (Benth) De Wit, Carissa lanceolata R. Br., Eucalyptus pruinosa Schan, Hakea arboresceus R.Br. Terminalia arostrata Ewart et Davies, Melalenca minutifolia F.Muell. (Photo 14).

Fresh Water Habitats:

The following fresh water masses were sampled for x fish:

1. Surveyors Pool (Grid reference 132944).

This pool was elongate, measuring approximately 100 m. x 25 m. with a maximum depth of 1½ m. The substrate was a fine sandy silt with stones occurring on the bottom near the northern end. The water temperatures were: surface 34.0°F and bottom 32.5°C. Aquatic plants (collected) were scarce but some areas of filamentous algae were present in the shallows.

2. Spring Creek (Grid reference 133950).

This is a fresh water spring which has created around it an area of swampy ground. It is a short creek with a clay silt bottom. There is a reasonably rapid flow of water in this creek and the water temperature is 34°C. Filamentous Algae and coarse aquatic plants were present and parts of the creek contained extensive beds of reeds.

3. Argyle Lagoon. (Grid reference 128940).

A large fresh water lagoon that is isolated from the Ord River. A description of the surrounding vegetation is given earlier in this chapter. The lagoon contained abundant aquatic vegetation including Duckweed, water lilies, Pond weed and filamentous algae.

4. Charlies Pool (Grid reference 131943)

An elongate pool about 160 m. x 30 m. and with a maximum depth of 2 m. This pool contained large quartzite rocks, shallow shelving sand and clay silt. bottom.

5. Catfish Pool (Grid reference 128913).

A large pool with slow flowing water containing a large dead tree stump and a small deep stagnant backwater pool near a steep bank.

6. Rocky Bend (Grid reference 127916).

Deep pools in basaltic rock crevices.

MAMMALS

Table
~~Appendix~~ 1 lists the localities that were trapped for mammals and the extent of the trapping effort carried out during this survey.

The grid reference system in use throughout the report to locate habitats more accurately is taken from the R.A.S.C. Lissadell sheet series R502, edition 1-AAS. A reproduction of this map showing the grid section on the area to be flooded is presented in Appendix I ~~Fig. 2.~~ In all, there were 2131 trap nights that included 1092 Elliot, 831 Break-back and 208 cage trap nights. Only one mammal was caught in these traps and that was a common house mouse Mus musculus.

The following list of mammals was recorded during the survey :

Megachiroptera

Pteropus scapulatus (11 specimens).

A large colony consisting of probably well over 100,000 individuals occupied the Pandanus palms at Bananna Springs (loc. 133950). Occasional smaller groups were seen in Pandanus palms that grew along billabongs. There appeared to be a high ratio of males relative to females in these colonies because of the 54 individuals counted at Bananna Springs, only 6 were females. The Ord River Basin is well within the known range of distribution of this species.

Microchiroptera

Nyctoceius greyi (3 specimens)

Chalinolobus rogersi (17 specimens)

Taphozous georgianus (4 specimens)

All species were within their known range.

Macropodidae

Petrogale brachyotis (6 specimens)

Macropus robustus (no specimen)

Macropus agilis (2 specimens)

Onychogalea unguifer (2 specimens)

The total macropod observations (both occasional observations and those observed on the regular spotlight runs) are recorded in fig. 2. The Short-eared Rock wallaby Petrogale brachyotis was common on the higher rocky hills along the banks of the Ord and was occasionally seen on the Carr Boyd Range and Mt Misery. Euros, Macropus robustus, were common on the Carr Boyd Ranges and foothills and were occaionally seen on Mt Misery. The Nail-tailed wallaby Onychogalea unguifera was present in low numbers. This was the only macropod species observed on the regular spotlight runs and an indication of its numbers can be obtained from the fact that in a total distance travelled of 465 miles on the regular spotlight runs, on an average only one Nail-tailed wallaby was sighted for every 17 miles of road travelled. Nail-tailed wallaby were, however, sighted in most habitats although they appeared to be more concentrated on the land bordering the Ord River and on the low undulating hills that lead down to the Ord.

Sandy Wallabies Macropus agilis: Only three individuals were seen and these were observed in the low rugged hilly country around the mouth of the Behn River and Hicks Creek.

Dasyuridae

Sminthopsis froggatti (1 specimen)

One specimen was captured by hand on the Mitchell and other grass plains at location 134946. This specimen was well within its known range of distribution.

In addition to the native mammals mentioned above there were a number of introduced species. These were :

Common House Mouse, Mus musculus.

One specimen was trapped in Tippera tall grass at location 128914.

Feral cat, Felis catus.

Apart from the domestic cattle, horses and goats, these were the most common mammal sighted during the survey. 35 separate sightings were made of individual feral cats and these observations occurred in a wide range of the available habitat.

Dingo, Canis familiaris.

Five dingos were sighted. Three of these sightings were in the Riverine Open Woodland. Two carcases were also found. One of these was on Mitchell Grass Plain and the other on the slopes of a low rocky hill.

Donkey, Equus asinus.

Two groups of donkeys were seen on the west bank of the Ord. One group, consisting of seven animals, was sighted in the vicinity of Mound Spring and the other group of eleven was seen near Bananna Spring.

Cattle, Bos taurus.

Both aerial mustering and the muster of cattle on horseback was in progress at the time of this survey. Many cattle were in very poor condition and several were barely able to stand. Some of the cattle that were in poor condition appeared to have been missed by the muster.

Horses, Equus caballus

Large groups of horses were observed. These were in good condition and all appeared to have been rounded up by the muster.

Goats, Ovis aries.

The only goats seen were a large herd of about 80. This was a domestic herd and remained in the vicinity of Argyle Downs Station.

LIST OF BIRDS SIGHTED BY W.H. BUTLER AND J. BELL
COMPILED BY MR. RON JOHNSTONE.

1.	EMU	Dromaius novaehollandiae.
2.	AUSTRALIAN PELICAN	Pelecanus conspicillatus.
3.	DARTER	Anhinga rufa.
4.	LITTLE BLACK CORMORANT	Phalacrocorax melanoleucos
5.	LITTLE PIED CORMORANT	Phalacrocorax melanoleucos.
6.	LITTLE GREBE	Podiceps novaehollandiae.
7.	PACIFIC HERON	Ardea pacifica.
8.	WHITE FACED HERON	Ardea nouaehollandiae.
9.	CATTLE EGRET	Bubulcus ibis.
10.	WHITE EGRET	Egretta alba.
11.	NIGHT HERON	Nycticorax caledonicus.
12.	BLACK BITTERN	Dupetor flavicollis.
13.	JABIRU	Xenorhynchus asiaticus.
14.	WHITE IBIS	Threskiornis molucca.
15.	STRAW NECKED IBIS	Threskiornis spinicollis.
16.	ROYAL SPOONBILL	Platalea regia.
17.	YELLOW SPOONBILL	Platalea flavipes.
18.	MAGPIE GOOSE	Anseranas semipalmata.
19.	WATER WHISTLING DUCK	Dendrocygna arcuata.
20.	GRASS WHISTLING DUCK	Dendrocygna eytoni.
21.	BURDEKIN DUCK	Tadorna radjah.
22.	BLACK DUCK	Anas superciliosa.
23.	GREY TEAL	Anas gibberifrons.
24.	GREEN PIGMY GOOSE	Nettapus pulchellus.
25.	BLACK KITE	Miluus migrans.
26.	BLACK BREASTED BUZZARD	Hamirostra melanosterna.
27.	WHISTLING EAGLE	Haliastur sphenurus.
28.	GREY GOSHAWK	Accipiter novaehollandiae.
29.	AUSTRALIAN GOSHAWK	Accipiter fasciatus.
30.	COLLARED SPARROWHAWK	Accipiter cirrocephalus.
31.	WEDGE TAILED EAGLE	Aquila audax.
32.	SPOTTED HARRIER	Circus assimilis.
33.	WHITE BREASTED SEA EAGLE	Haliaeetus leucosaster.
34.	LITTLE FALCON	Falco longipennis.

35. KESTREL	Falco cenchroides.
36. BROWN HAWK	Falco berigora.
37. BROLGA	Grus rubicunda.
38. WHITE BROWED CRAKE	Porzana cinerea.
39. SWAMPHEN	Porphyrio porphyrio.
40. BUSTARD	Eupodotis australis.
41. LOTUS BIRD	Jacana gallinacea.
42. MASKED PLOVER	Vanellus miles.
43. BLACK FRONTED DOTTEREL	Charradrius melanops.
44. ORIENTAL DOTTEREL	Charadrius veredus..
45. RED CAPPED DOTTEREL	Charadrius alexandrinus.
46. LITTLE WHIMBREL	Numenius minutus.
47. GREENSHANK	Tringa nebularia.
48. WOOD SANDPIPER	Tringa glareola.
49. COMMON SANDPIPER	Tringa hypoleucos.
50. GREY TAILED TATTLER	Tringa brevipes.
51. SHARP TAILED SANDPIPER	Calidris acuminata.
52. WHITE HERDED STILT	Himantopus himantopus.
53. SOUTHERN STONE CURLEW	Burhinus magnirostris.
54. MARSH TERN	Chlidonias hybrida.
55. BAR SHOULDERED DOVE	Geopelia humeralis.
56. PEACEFUL DOVE	Geopelia striata.
57. DIAMOND DOVE	Geopelia cuneata.
58. WHITE QUILLED ROCK PIGEON	Petrophassa albipennis.
59. COMMON BRONZEWING	Phaps chalcoptera.
60. CRESTED PIGEON	Ocyphaps lophotes.
61. PLUMED PIGEON	Lophophaps plumifera.
62. FLOCK PIGEON	Histriophaps histrionica.
63. RED COLLARED LORIKEET	Trichoglossus hrematodus.
64. VARIED LORIKEET	Psitteuteles versicolor.
65. RED TAILED BLACK COCKATOO	Calyptorhynchus Banksi.
66. WHITE COCKATOO	Cacatua galerita.
67. LITTLE CORELLA	Cacatua sanguinea.
68. GALAH	Cacatua roseicapilla.
69. COCKATIEL	Nymphicus hollandicus.
70. RED WINGED PARROT	Aprosmictus erythropterus.

71. NORTHERN ROSELLA	Platycercus venustus
72. BUDGERYGAH	Melopsittacus undulatus.
73. PALLID CUCKOO	Cuculus pallidus
74. HORSFIELD BRONZE CUCKOO	Chrysococcyx basalis.
75. KOEL	Eudynamys scolopacea.
76. CHANNEL BILLED CUCKOO	Scythrops novaehollandiae
77. PHEASANT COUCAL	Centropus phasianinus.
78. WINKING OWL	Ninox connivens.
79. BOOBOOK OWL	Ninox novaeseelandiae.
80. BARN OWL	Tyto alba.
81. TAWNY FROGMOUTH	Podargus strigoides
82. OWLET NIGHTJAR	Aegotheles cristatus.
83. SPOTTED NIGHTJAR	Erostopodus guttatus.
84. BLUE WINGED KOOKABURRA	Dacelo leachi
85. RED BACKED KINGFISHER	Walcyon pyrrhopygia.
86. SACRED KINGFISHER	Halcyon sancta.
87. BEE EATER	Merops ornatus.
88. DOLLAR BIRD	Eurystomus orientalis.
89. BUSHLARK	Mirafra javanica.
90. WHITE BACKED SWALLOW	Cheramoeca leucosternum.
91. WELCOME SWALLOW ?	Hirundo neoxena. check with jennier.
92. TREE MARTIN	Petrochelidon nigricans.
93. FAIRY MARTIN	Petrochelidon ariel.
94. PIPIT	Anthus novaeseerandiae.
95. BLACK FACED CUCKOO SHRIKE	Coracina nouaehollandiae.
96. PAPUAN CUCKOO SHRIKE	Coracina papuensis.
97. WHITE WINGED TRILLER	Lalage sueurii
98. GREY CROWNED BABBLER	Pomatostomus temporalis.
99. FANTAIL WARBLER	Cisticola exilis.
100. LAVENDER FLANKED WREN	Malurus duleis.
101 RED BACKED WREN	Malurus melanocephalus.
102. PURPLE CROWNED WREN	Malurus coronatus.
103. WHITE THROATED WARBLER	Berybone olivacea.
104. WEEBILL	Smicrornis brevirostris.
105. BROWN FLYCATCHER	Microeca leucophaea.
106. NORTHERN FANTAIL	Rhipidura rufiventris.
107. WILLIE WAGTAIL	Rhipidura leucophrys.

108. LEADEN FLYCATCHER	Myiagra rubecula.
109. RESTLESS FLYCATCHER	Seisura inquieta.
110. RUFOUS WHISTLER	Pachycephala rufiventris.
111. BROWN SHRIKE THRUSH	Colluricincla brunnea.
112. ROCK THRUSH	Colluricincla woodwardi.
113. WHITE WINGED SITELLA	Neositta leucoptera.
114. BLACK TAILED TREE CREEPER	Climacteris melanura.
115. MISTLETOE BIRD	Dicaeum hirundinaceum.
116. RED BROWED PARDALOTE	Pardalotus rubicatus.
117. BROWN HONEYEATER	Lichmera indistincta.
118. BANDED HONEYEATER	Myzomela pectoralis.
119. SINGING HONEYEATER	Meliphaga virescens.
120. YELLOW TINTED HONEYEATER	Meliphaga flavescens.
121. YELLOW FRONTED HONEYEATER	Meliphaga plumula.
122. WHITE GAPED HONEYEATER	Meliphaga unicolor.
123. WHITE THROATED HONEYEATER	Melithreptus albogularis.
124. GOLDEN BACKED HONEYEATER	Melithreptus laetior.
125. BLUE FACED HONEYEATER	Entomyzon cyanotis.
126. LITTLE FRIAR BIRD	Philemon citreogularis.
127. SILVER CROWNED FRIAR BIRD	Philemon argenticeps.
128. BAR BREASTED HONEYEATER	Ramsayornis fasciatus.
129. RUFOUS THROATED HONEYEATER	Conopophila rufogularis.
130. YELLOW THROATED MINER	Manorina flavigula.
131. PAINTED FINCH	Emblema picta.
132. CRIMSON FINCH	Neochmia phaeton.
133. MASKED FINCH	Poephila personata.
134. LONG TAILED FINCH	Poephila acuticauda.
135. DOUBLE BARRED FINCH	Poephila bichenovii.
136. ZEBRA FINCH	Poephila guttata.
137. BLACK THROATED FINCH	Poephila cincta.
138. CHESTNUT BREASTED FINCH	Lonchura castaneothorax.
139. OLIVE BACKED ORIOLE	Oriolus sagittatus.
140. MAGPIE LARK	Grallina cyanoleuca.
141. WHITE BREASTED WOOD SWALLOW	Artamus leucorhynchus.
152. BLACK FACED WOOD SWALLOW	Artamus cinereus.
143. LITTLE WOOD SWALLOW	Artamus minor.
144. PIED BUTCHER BIRD	Cracticus nigrogularis.

145. MAGPIE	Gymnorhina tibicen
146. GREAT BOWER BIRD	Chlamydera nuchalis.
147. CROW	Coruus orru.
148. GROUND CUCKOO SHRIKE	Pteropodocys maxima.
149. FOREST KINGFISHER	Halcyon macleayi.

FROGS and REPTILES

Dr Glen M. STORR

SPECIMENS COLLECTED

* specimen
not retained

FROGS

Leptodactylidae

Cyclorana inermis

Crinia "signifera"

Hylidae

Litoria caerulea

L. peronii

L. coplandi

L. rubella

TURTLES

Chelyidae

Emydura australis

LIZARDS

Gekkonidae

Diplodactylus stenodactylus

Rhynchoedura ornata

Heteronotia bynooei

Gehyra sp. (slender)

Gehyra sp. (white transverse lines)

G. australis

G. (?) punctata

Agamidae

Amphibolurus inermis

Tympanocryptis tetraporophora

Physignathus gilberti

Diporiphora sp. (yellow breast)

Diporiphora sp. (plain brown)

D. bilineata

Scincidae

Tiliqua scincoides

Ctenotus pantherinus

C. inornatus

Ctenotus n.sp. (affin. leonhardii)

Ctenotus wotjulum

Sphenomorphus richardsonii

Carlia sp. (dorsals 3-keeled, plain)

Carlis sp. (dorsals smooth, striped throat)

Carlia sp. (dorsals smooth, dull)

Cryptoblepharus boutonii

Menetia greyi

Morethia taeniopleura

Varanidae

Varanus timorensis

V. storri

V. gouldii - unnumbered specimen*

SNAKES

Typhlopidae

Rhamphotyphlops diversus

Pythonidae

Aspidites melanocephalus

Liasis childreni

L. olivaceus

Colubridae

Natrix mairii

Elapidae

Vermicella semifasciata

V. annulata

Demansia modesta

D. psammophis

Pseudechis australis

Owing to the time of the year (height of dry season) and to degradation of habitats by cattle grazing, collecting was difficult, and perhaps only about half of the local fauna is represented in the collection. Representation seems poorest in geckos, skinks, varanids, typhlopids and colubrids, and best in freshwater turtles, agamids and pythons.

Nevertheless the collection adds a good deal to our knowledge of Kimberley reptiles. At least two new species were discovered, viz. a skink of the genus Ctenotus and a gecko of the genus Gehyra. Possibly some of the unidentified specimens of Carlia and Diporiphora belong to new species. The goanna Varanus storri was previously known only from north Queensland. Good series were obtained of species previously known only from limited Kimberley material, e.g. Tympanocryptis tetraporophora.

Our knowledge of reptile distribution within the Kimberley Division has barely begun, and so it is not yet possible to say how the Ord fauna differs from that of other parts of the Division. The collection, however, makes it clear that on the Ord Torresian elements have largely replaced the Eyrean elements characteristic of the North-West Division. For example, tree-frogs of the genus Litoria are dominant, rather than burrowing frogs of the Leptodactylidae; geckos of the genus Gehyra, rather than of the arid-adapted Diplodactylus; agamids of the generic complex Physignathus-Diporiphora, rather than of the genus Amphibolurus; and skinks of the genus Carlia rather than of Lerista.

FISH

by Mr Rolly McKay

Introduction:

The fishes of the Ord River System are poorly documented. Description of some species are given in Whitely ( ) but a complete list of the fishes has been hither to unavailable. This report lists the species collected during this survey and attempts to predict possible changes that may result in the fish populations when the Main Dam fills.

The following fish, listed in the order of their abundance, were collected from the following localities during the survey.

Locality	October Date	Method of Collection	Fish Present
1. Surveyors Pool	4th	Poison	Hardyheads; Rainbow Fish; Freshwater Sole; Fork Tailed Catfish; Black Bream; Bony Bream; Chanda Perch; Eel-tailed Catfish; Striped Perch; Spangled Perch; Archer Fish; Sleepers and Gobies.
2. Spring Creek	6th	Poison and hand net	Rainbow Fish; Spangled Perch; Gudgeon; Eel Catfish.
3. Argyle Lagoon	8th	Poison	Chanda Perch; Rainbow Fish and Spangled Perch were observed.
	20th	Mist net	Rainbow Fish; Mouth almighty. Anchor Fish seen.
	21st	Mist net	Salmon Catfish and Spangled Perch.

	Argyle Lagoon	22nd	Mist net	Salmon Catfish; Sleeper; Neosiburas.
4.	Charlies Pool	8th	Seine net	Rainbow Fish; Bony Brim; Eel Catfish; Black Bream; Striped Perch; Spangled Perch; Chanda Perch; Goley.
5.	Large Catfish Pool	12th	Poison and Seine net	Rainbow Fish; Striped Perch; Spangled Perch; Black Bream; Archer Fish; Eel Catfish; Fork-tailed Catfish Soles.
	Small Catfish Pool	12th	Poison and Seine net	Rainbow Fish; Spangled Perch; Sleepers and Eel-Catfish.
6.	Rocky Bend	13th	-	Rainbow Fish; Spangled Perch, Striped Perch and Archer Fish were observed.
	Rollys Pool	22nd	Seine net	Spangled Perch, Striped Perch, Black Perch, Salmon Catfish; Eel Catfish; Long Tom; Fresh water Sole; Strawman; Giant Chanda Perch; Archer Fish; Rainbow Fish; Bony Bream; Sleeper; Gobies.

Following is annotated list of the fish caught during this survey.

List of Fishes Recorded 1971

1. Rainbow fish: Nematocentris species. Common in all river pools, Argyle Lagoon and Spring Creek. This is a surface feeding fish and is considered to be a valuable species for mosquito control as it survives temperatures in excess of 35°c and co-exists with all Therapon species in the Ord River.

2. Gambusia affinis, a popular fish used for mosquito control is preyed upon by Spangled Perch.

3. Therapon unicolor. Widely distributed.

4. Hardyhead: Craterocephalus sp. Common in shallow flowing pools, but absent from many river pools containing large perch. Taxonomic status unknown.

5. Striped Perch: Therapon percoides. Grows to about six inches in deep pools, but in the Ord River this species did not exceed 4 inches. Most abundant in shallow pools containing aquatic plants where water temperatures exceeded 35°c. This species is probably tolerant of low oxygen levels as the fish poison was rather ineffectual in stunning this perch. Widely distributed.

6. Spangled Perch: Therapon unicolor. A very widely distributed fish in Northern Australia that grows to about $9\frac{1}{2}$ inches. Voracious and pugnacious it is very hardy and eats a variety of food items. Numbers should increase in the Ord River Reservoir shallows.

7. "Black Bream" Therapon sp. A large perch that should be referred to as Black Grunter rather than Bream. Common in deep pools this species should become a popular food fish in the Ord Reservoir.

8. Bony Bream: Fluvialosa sp. Common in deep pools. A mud ingesting fish destined to become very abundant in the Ord Reservoir.

9. Eel-tailed Catfish or Dewfish Landanus sp. Common in deep pools of the Ord River and a popular angling fish the species grows to about 2 feet and 8 lbs.

10. Fork-tailed Catfish or Salmon Catfish Arius australis: A large catfish said to attain 4 feet. In the Ord River this species should become a popular angling fish.

11. Long Tom: Belone krefftic. A predacious fish feeding on Rainbow fish, this species may not breed in freshwater and may gradually disappear from the Ord River Reservoir.

12. Kimberley Sole: Liachirus klunzingeri. A small sole common only in sandy shallow pools of flowing water.

13. Chanda Perch: Chanda sp. In all freshwater pools this small fish swims in schools.

14. Archer Fish: Toxotes sp. Common in deep pools especially near rock outcrops. An interesting little fish that "shoot down" small insects from overhanging vegetation.

15. Sleeper: Bunaka herwerdenii. Common in deep pools where water flow is slower.

16. Goby: Glossogalius giuris. A voracious fish reaching about 8 inches in length. This fish rests on the bottom and preys on small crustacea and fishes.

17. Gudgeon: Mogurnda sp. Found only at Spring Creek, this fish may be common in small freshwater creeks entering the reservoir.

Discussion

Fish:

A total of 17 species of fish occur in the area to be flooded. Only one of these species, the Gudgeon (Mogurnda mogurnda), was taken in flowing streams and not in the river, all other localities sampled had fish that also occured in the river. The specialised habitat of Mogurnda will be destroyed once the Main Dam fills. Streams outside the flood area should, however, carry Mogurnda and the loss of this species from the flood area is not critical.

It is likely that the two catfish species in the Ord River will form the basis of a profitable fish farming enterprise adjacent to the Main Dam site and the river pools situated up river from the Main Dam may prove to be very valuable nursery areas for a number of sport fishes destined to become popular in the Main Dam.

The decline in the 'Barramundi' (Lates calcarifer) is largely due to the barrier caused by the Diversion Dam. The Main Dam has no provision for the movement upstream of Barramundi, mullet and a number of semi-estuarine fishes.

I predict that the Main Dam will become a very popular fishing locality once the decay of aquatic vegetation leads to the formation of a silt-mud bottom. The popular angling fishes will be Salmon Catfish, Eel Catfish and Black Perch.

The establishment of a dense aquatic vegetation around the periphery of the Dam will be rapid once the waters of the Dam settle to provide a clear body of water. The aquatic vegetation in the Lagoons (e.g. Argyle) is now very abundant and almost chokes these bodies of clear standing water. These nuclei will allow a ~~rapid~~ rapid establishment of aquatic plants that may in time become so profuse as to seriously choke the shallow waters (under 10 feet) of the Dam. It is envisaged that the shallow weedy areas of the dam will be considerable and control of the growth of aquatic vegetation may be necessary. The Diversion Dam is largely weed free at present as are the pools in the river bed. Standing bodies of water, including some Black Perch, Spangled Perch, and Rainbow Fish. The increased fish

populations will not be immediate but will require sufficient time for the newly flooded area to accumulate organic material on the bottom and aquatic vegetation.

At this time I would predict the following changes:

1. A decline in the availability of easily accessible fishes confined at present to the river pools. These fishes will disperse in the new Main Dam.

2. The increase of Rainbow fish and Spangled Perch populations. These fishes are not dependent on a specialized habitat and eat a variety of food items. This increase should be noticed within three years of the flooding of the Main Dam.

3. The gradual increase of Black Perch (Therapon), Gobies, Archer fish and of Sleepers as the Dam becomes settled and accumulates organic material.

4. An increase of Striped Perch (Therapon percoides) and apogonids (the Mouth almighty Glossaniia) as aquatic vegetation becomes established around the margins of the dam. Chanda Perch will also increase.

5. An increase of Salmon Catfish (Arius) and Eel Catfish as the aquatic vegetation decays to produce a heavy black silt. Bony Bream will also increase in areas where siet-sand is available.

6. A decline in freshwater Soles (L. klunzingeri) and Hardyheads, after a brief population increase. These fishes inhabit flowing sandy pools and will decline as the bottom of the Dam changes from a silty sand or loam to a heavy flocculent clay silt or heavy mud. The growth of luxurient aquatic plants will also lead to the decline of these species.

FRESHWATER MOLLUSCS

by B.R. Wilson and G.W. Kendrick

Introduction

The Kimberley region of Western Australia lies within the Leichardtian Fluvifaunula of Iredale and Whitley (1938). Published records of freshwater molluscs from this region are few (Iredale, 1943; McMichael and Hiscock, 1958; Odhner, 1917) and none of these refers explicitly to occurrences within the Ord River System. During the decade prior to the present survey, limited collecting of freshwater molluscs has been undertaken in the Kimberley region, including the Ord. The material so obtained has been deposited in the collection of the Western Australian Museum and has contributed to the distributional information included in this report. Taxonomically, these collections have received only the most cursory study and final determinations of many of the genera and species and assessment of their biological significance depend on future study by specialist authorities.

Knowledge of the freshwater molluscs inhabiting the Ord River System is important for three reasons :

(i) It will contribute to a better understanding of the classification, distribution and origins of this faunal element in the Kimberley region and northern Australia and will clarify its relationship to faunas of the Indo-Malayan Archipelago and southeast Asia.

Without reliable basic information of this nature, biological studies of these animals are likely to be of limited value.

(ii) It will provide a baseline for future studies of environmental and faunal changes in the Ord River System brought about by the existence of the reservoir.

(iii) It will establish the presence or absence of species which might be of medical, veterinarian and economic significance, arising from their role as actual or potential secondary hosts to disease-causing parasites.

This report deals mainly with the observed habitat preferences of the mollusc species found in the area of the survey and will attempt to forecast those which will develop significant populations in the reservoir. The potential of certain species to harbour parasites and spread diseases will be discussed. Taxonomic studies on the material and much of the biological data collected will be of long-term relevance and, in the main, lie outside the scope of this report.

SPECIES COLLECTED

Altogether ten/eleven freshwater mollusc species were collected within the survey area by the party. These, together with some distribution data are listed below. All determinations are tentative and are mainly derived from evaluations of shell characters; nomenclature follows McMichael (1967).

Bivalves

Subclass Palaeoheterodonta

Family Hyriidae (naiades or freshwater mussels)

Velesunio wilsonii (Lea). In Western Australia, this species inhabits river pools and lagoons from the Kimberley region south at least to the Ashburton River System. It has an extensive range in northern, central and eastern Australia.

Velesunio angasi (Sowerby). In Western Australia this species has a similar known range to V. wilsonii; elsewhere, confined to northern Australia eastward to the Gulf watershed of Cape York.

Lortiella rugata (Sowerby). Prior to the present records, this species was known in Western Australia only from the Carson River. It is recorded also from the Victoria and Katherine Rivers of the Northern Territory.

Subclass Heterodonta

Family Corbiculidae

Corbiculina sp. Clams of this genus inhabit river pools in Western Australia from the Kimberley region southward to the Greenough River. No specific determinations are available.

Gastropods

Subclass Prosobranchia (Operculate Snails)

Family Viviparidae

Notopala sp. In Western Australia, the genus occurs throughout the Kimberley region but is not known south of the Fitzroy River. It has an extensive range in northern, eastern and central Australia. No specific determinations of Western Australian material are available.

Family Bithyniidae

Gabbia sp. This is the first known record of the genus from the Kimberley region, though it has been reported from the Victoria River of the Northern Territory. Elsewhere in Western Australia, the genus is known only from a few occurrences between the Murchison and Hill River districts. No specific determinations are available.

Family Thiaridae

Plotiopsis sp. In Western Australia, the genus ranges from the Kimberley region southwards to the Swan-Avon River System. It has a wide distribution in northern, southern and central Australia. Most of the available species names are probably no more than nominal and the biological species are undefined. The status of the genus is in doubt; the group is closely related to Thiara of the Indo-Malayan Region and may be congeneric, but until this is actually demonstrated, we propose to retain the above name which is well established in the Australian literature (see McMichael, 1967).

Subclass Pulmonata (Pond Snails)

Family Lymnaeidae

Lymnoea tomentosa (Pfeiffer). In Western Australia, this species occurs from the Kimberley Region southward to at least the Wooramel River. It has an extensive range elsewhere in Australia.

Family Planorbidae

Amerianna sp. The few records of the genus from Western Australia are all from between the Kimberley Region and the Cane River in the north west of the State. At present, reliable determination at generic level depends on characters of the anatomy, which we have not examined.

Physastra sp. A

Physastra sp. B

Gyraulus sp. In Western Australia, animals tentatively referred to this genus range from the Kimberley Region southwards to the vicinity of Perth. This and similar apparently related genera in the Australian fauna are poorly defined and reliable classification requires detailed anatomical examination.

FRESHWATER HABITATS AND ASSOCIATED MOLLUSCS IN THE SURVEY AREA

Five kinds of freshwater habitats were recognised in the area of the survey. These and their associated molluscs are described.

(i) Pools of the main river channel. In the dry season, the Ord does not flow at the surface and the channel bed consists mainly of dry sand. There are, however, many pools of water in the channel, some only a few feet across, others up to a quarter mile long. Most pools were found to be about a foot deep or less, but others, associated with outcropping rocks or steep alluvial banks were up to 10 feet deep. Small flowing streams often connected the pools indicating a continuing river flow within the substrate.

Little diversity of aquatic plant life was found in this habitat. The most common plant was , which grew as loose mats in the deeper water. The substrate was generally a fine, silty sand.

Only three mollusc species were found in the pools of the main channel and of these the small bivalve Corbiculina sp. was by far the most abundant, occupying the sandy margins of nearly all of the pools examined. The presence of many juveniles indicated that young had been released in recent weeks. The snail Plotiopsis sp. was also found in most channel pools but nowhere abundantly.

This observation contrasts with the dense populations of these snails that occur in rivers elsewhere in Western Australia. The naiade Lortiella rugata was found at only two localities and only as empty shells. It probably inhabits the substrate of the deeper pools.

The sandy channel substrates which at present favour Corbiculina sp. are likely to disappear from most of the area of the reservoir and this species may not be as abundant in future as it now is, once the reservoir fills. This may also apply to Plotiopsis sp., but should the margins of the reservoir develop organic silty to muddy substrates, it is possible that dense populations of this species would become established there. This would be in line with observations on similar snails in other parts of the State. Insufficient is known about the habitat preferences of Lortiella rugata for any predictions to be made.

(ii) Lagoons. Two large lagoons, located on the floodplain of the Ord some distance from the main channel of the river, were examined. The larger, Argyle Lagoon, is a deep pond about 400 by 200 yards, without banks but with a dense marginal growth of reeds. Much of the lagoon is choked with an aquatic plant ( ). The second lagoon examined lay a few miles south of Argyle Lagoon and is smaller and shallower.

Six mollusc species were found in the lagoons and all but one of these was seen to be common. The snails Lymnaea tomentosa, Amerianna sp., Gyraulus sp. and Gabbia sp. were abundant on the water plants, the last mentioned being the least common of the four. Dead shells of Notopala sp. were common on the dry, cracked clay around the margins but no living specimens were seen; these may pass the dry season inactive within the fissures of the clay and emerge during the wet season when the surface is inundated. A few dead shells of Velesunio wilsonii were found beside Argyle Lagoon, but no living specimen was seen.

It seems likely that the Lagoon habitat, with large expanses of weed-grown shallows will in time become established around the edges of much of the reservoir, especially in the upstream parts. It could be expected that the five species of snails which are now common in the comparatively limited areas of the natural lagoons, will increase greatly in numbers as comparable habitats become stabilized around the reservoir margins. The naiade V. wilsonii may also become common in the reservoir where fine to medium grained substrates form.

(iii) Permanent springs. One example only was examined. This was Flying Fox Spring, located at the foot of the Carr Boyd Range about 6 miles WSW of Argyle Downs homestead. The spring feeds a small stream with a few small pools rarely more than two feet deep and with a substrate of fine silt and gravel. Some pools contain growths of aquatic plants.

Two mollusc species were found at this locality. V. wilsonii was found living in the substrate of the pools. Physastra species B was found to be common among the aquatic plants in the stream and on the marshy marginal areas. Both species are likely to be provided with suitable habitats within the reservoir, the Physastra probably in the weedy shallows near the margins.

(iv) Mill dams. A number of station bores in the district discharge from windmills into large earth-walled dams. Several were examined and in two, a pond snail, Physastra species A, was found. This species appears to have good dispersal powers and was probably introduced into this isolated habitat by water birds. It could be expected to become established in the reservoir.

(v) Tributary creeks. Several tributary creeks within the survey area were examined and found to contain pools of water. No living molluscs were observed but dead shells of V. wilsonii were found at several. Shells of Plotiopsis sp. and Notopala sp. were found in several dry creek beds.

AQUATIC SNAILS AS HOSTS TO HARMFUL PARASITES

Aquatic molluscs, particularly snails, are known to be secondary hosts to a large number of trematode parasites, some of which, such as Schistosoma spp., Chlonorchis sinensis, Paragonimus westermani, Fasciola hepatica and Austrobilharzia may be harmful to man and livestock.

Perhaps the most serious of these diseases affecting man is schistosomiasis, which has been brought into Australia on a number of occasions by human vectors (Johnson and Cleland, 1937; Charters et al., 1969). None of these cases led to the formation of endemic sources of infection and there is no evidence that any Australian water snail is a potential host for Schistosoma japonicum or S. mansoni, Asian and African species respectively. However Johnston and Cleland (1937) refer to a local infection from Western Australia in the period following the South African War involving suspected S. haemotobia, an African species. This case indicated the presence in the fauna of at least one susceptible species of water snail, the identity of which has never been established.

The known hosts of S. japonicum in China, Taiwan, Japan and the Philippines belong to the genus Oncomelania, but in Celebes, Laos, Cambodia and Thailand, the identity of the snail hosts has not been established (Dr E. H. Michaelson, personal communication, June 1971). No snails referable to Oncomelania were collected by the recent Ord survey but samples of a small operculate species tentatively identified as Gabbia sp., family Bithyniidae, have been sent to South Africa to determine its potential as a vector for schistosomiasis. This precaution might well be followed with other water snails from the region, in particular those of the family Planorbidae which in other parts of the world is a contributor of host species.

Paragonimiasis is a serious disease of both man and livestock, which, until recently, had not been recorded from Australia; however a suspected case has been reported in cattle from Lansdowne station in the Kimberley region within the Fitzroy River System (M.R. Gardiner, personal communication, August 1969). Vectors include both crustaceans and water snails, and among the latter are relatives of Plotiopsis sp., which was found to be common in the main channel pools of the Ord. A related thiarid snail, Stenomelania denisonensis, occurs widely in northern Australia, including Western Australia, but was not found in the area of the recent survey. It may be present in other parts of the Ord River system.

Fasciolisis is a serious disease of livestock in many parts of Australia but as yet is not known to have become established in Western Australia. The snail host of the fluke Fasciola hepatica is a pond snail Lymnaea tomentosa, a species which was found to be common in certain habitats of the survey area L. tomentosa could be expected to become established in irrigated areas below the dam and livestock pastured in such areas would risk infection from F. hepatica should it ever become established in the district.

The fluke Austrobilharzia may cause in susceptible persons the dermatitis known as "swimmers' itch". There are numerous reports of this condition which may be quite severe in its effects, following swimming in inland waters in southern Australia, but we know of no previous reports from the Kimberley region. Two members of the recent survey party experienced severe attacks after swimming in Argyle Lagoon and these we suspect were due to Austrobilharzia or similar parasites.

In the reservoir, the likely combination of warm water together with dense populations of snails and water birds would create conditions in which such parasites would exist in high densities and susceptible individuals would be well advised to avoid the shallow parts of the reservoir when fluke density is high. In southern Western Australia, dermatitis of this nature tends to worsen as the summer progresses into autumn. The snail vector(s) present in the Argyle Lagoon population should be identified as a means of assessing the prevalence of Austrobilharzia. Eradication of either host or parasite is not feasible.

Velesunio wilsonii (Lea).

Dry creek near Argyle Downs homestead.

Velesunio angasi (Sowerby).

This shell from Glenelg River, W. Kimberley.

Lortiella rugata (Sowerby).

Ord River near Old Lissadell crossing.

Notopala sp.

Argyle Lagoon.

Gabbia sp.

Argyle Lagoon.

Plotiopsis sp.

Ord River, pools opposite Argyle Lagoon.

Lymnaea tomentosa (Pfeiffer).

Argyle Lagoon.

Amerianna sp.

Argyle Lagoon.

Gyraulus sp.

Argyle Lagoon.

BORAY, J.C. and McMICHAEL, D.F. 1961.

The identity of the Australian lymnaeid snail host of Fasciola hepatica and its response to environment.

The Australian Journal of Marine and Freshwater Research, volume 12, pages 150-163.

CHARTERS, A.D., MUIR JACKSON, J. and VIVIAN, A.B. 1969.

A case of severe schistosomiasis (Schistosoma mansoni) in Western Australia.

The Medical Journal of Australia, vol. 2, pages 299-302.

IREDALE, T. 1943.

A basic list of the freshwater Mollusca of Australia.

The Australian Zoologist, vol. 10, pahes 188-230.

IREDALE, T. and WHITLEY, G.P. 1938.

The fluvifaunulae of Australia.

The South Australian Naturalist, vol. 18, pages 64-68.

JOHNSTON, T.H. and CLELAND, E.R. 1937(a).

Larval trematodes from Australian terrestrial and freshwater molluscs. Part I. A survey of the literature.

Transactions of the Royal Society of South Australia, vol. 61, pages 191-201.

McMICHAEL, D.F. 1967.

Australian freshwater Mollusca and their probable evolutionary relationships : a summary of present knowledge.

Pages 123-149 in

WEATHERLEY, A.H.

Australian Inland Waters and their fauna.

Australian National University Press, Canberra. 287 pages.

McMICHAEL, D.F. and HISCOCK, I.D. 1958.

A monograph of the freshwater mussels (Mollusca : Pelecypoda) of the Australian region.

The Australian Journal of Marine and Freshwater Research, vol. 9, pages 372-508, 19 plates.

ODHNER, N.H. 1917.

Results of Dr E. Mjoberg's Swedish scientific expedition to Australia, 1910-1913, XVII - Mollusca.

Kungl. Svenska Vetenskapsakademiens Handlingar vol. 52(16).

CONCLUSIONS and RECOMMENDATIONS

MAMMALS

1. Short-eared Rock Wallaby, Petrogale brachyotis:
Moderate size populations of this species will be trapped on the rocky hills along both the east and west banks of the Ord River and on Mt Misery. These animals will readily enter cage traps. It is suggested that 30 traps of dimensions 2' x 1½' x 1½' high be obtained to assist in the removal of stranded rock wallabies.

2. Euros, Macropus robustus:
Occasional euros will be trapped on some of the larger hills such as Mt Misery. The removal of these animals will be difficult. It is recommended that euros be immobilised with a phencyclidine/acepromazine mixture fired from a Palmer Cap-Chur gun or some other suitable weapon. This immobilising method was used successfully on Lake Menindee in N.S.W. for the removal of red kangaroos (Megaleia rufa) and Western grey kangaroos (Macropus fuliginosus) from Snake Island. For a description of that removal operation see Keep, J.M. and Fox, A.M. (1971). The Capture, Restraint and Translocation of Kangaroos in the Wild. Aust. Vet. J. vol. 47 : 141-145.

3. Sandy Wallabies, Macropus agilis:
Occasional sandy wallabies may become trapped in the low hilly country near the mouth of the Behn River and Hicks Creek. They should be captured in the same manner as euros.

4. Nail-tailed Wallabies, Onychogalea unguifera:
There were reasonable numbers of nail-tailed wallabies on the plains country adjacent to the Ord River. It is possible that some of these may become trapped on islands formed as a result of the joining of creeks and watercourses. They should be captured in the same manner as euros.

5. Small mammals were scarce and should cause few problems during the rescue operation. Only one Sminthopsis froggatti and one Mus musculus were captured. It is expected however that a number of other small mammals would be present. These would possibly include Isoodon macrourus, I. auratus, Dasyurus hallucatus, Antechinus macdonnellensis, Planigale ingrami, P. subtilissima, Mesembriomys gouldi and Zyzomys argurus as well as several other species.

6. Feral cats, Felis catus.
Numerous and fairly evenly distributed. It is probable that they will be trapped in all areas. Feral cats are listed as vermin and should be shot when encountered and their guts slit. to facilitate decomposition

7. Dingos, Canis familiaris.
Occasional dingos were seen. It is probable that they will be trapped in all areas. Dingos are listed as vermin and should be shot when encountered and their guts slit.

8. Donkeys, Equus asinus.

Two herds of donkeys (one of 7 and the other 11 animals) were seen on the west bank of the Ord. It is probable that these will be trapped. Donkeys are listed as vermin in this area. It would be preferable to shoot several herds before the flooding begins, and slit their guts.

9. Cattle, Bos taurus.

Because of the inefficiency of cattle mustering in the Ord River basin it is probable that many cattle will not be evacuated before the dam fills. It is suggested that

(i) pressure be placed upon the owners of Argyle Downs and Lissadell stations to remove as many cattle as possible

(ii) that the stock remaining in the basin be shot and their guts slit before the flooding begins. Several shooters with high power rifles could probably accomplish this task in 1 week.

10. The Riverine Open Woodland country and the low hilly country around the mouth of the Behn River and Hicks Creek will be the first land to be flooded (see fig. 3 which is an indication of the sequence of flooding in the Ord River basin; this sequence has been based on the calculation that average rainfall will cause the dam to rise at the rate of 1 ft per day).

Sandy wallabies and arboreal species will then be amongst the first animals to be stranded and it is recommended that the initial rescue attempts should concentrate on these two areas. The next areas to be flooded will be the extensive grass plains that extend out from the major watercourses, and at this stage it can be expected that nail-tailed wallabies will be stranded on the islands of grassland formed by the joining of creeks and watercourses. Because creeks and watercourses are numerous over the Ord basin (see fig. 4 which shows the watercourses taken from the Lissadell sheet of the R.A.S.C. series R502 edition 1-AAS) there will be many points on which animals may be stranded. There are also a number of very low hills on these grass plains that will be focal points for nail-tailed wallabies escaping the waters. The complete flooding of the grasslands may take considerable time but because of the rapid formation and flooding of islands that is expected on these lowlands, the grassland areas will need to be watched continuously for stranded animals. It is recommended that the rescue of the Short-eared Rock Wallabies and Euros be a later consideration. This is suggested because they inhabit only the higher rugged hills and will be amongst the last animals to be inundated. Also the terrain of these high hills is such that it is desirable to let the rising water level reduce the area of the hills and so confine the animals on them to a smaller area and facilitate their capture.

11. Because the topographic maps of the area are incomplete it is not clear whether or not there will be any islands remaining when the dam reaches full flood level. It is, however, clear that any islands that do remain will be too small to be used as reserves for any macropod species. Because there are no nearby fauna reserves to which animals can be translocated it is suggested that as many animals as possible should be deposited in zoos. Immediate moves to contact zoos seeking their desire to receive rescued animals should be instigated and it is suggested that these moves be coordinated by the Director of the South Perth Zoo.

Animals that cannot be deposited in zoos (both private and public) should be released in suitable nearby habitat. Euros and Short-eared Rock Wallabies could be released anywhere along the eastern scarp of the Carr Boyd Ranges. Nail-tailed Wallabies and Sandy Wallabies and smaller mammals could be released into the country on the eastern side of the Duncan Highway.

BIRDS

12. The Ord River has a very diverse and numerous avifauna. With the possible exception of the ~~Lilac~~ Purple crowned, Red backed and Lavender flanked Wrens, the birds of the Ord should have no difficulty in escaping the rising waters of the dam. Of the wrens, only the ~~Lilac~~ Purple crested Wren has a localised distribution. This latter wren, however, is found elsewhere in the Kimberleys and as a result it is not considered practical to make any particular attempt to rescue this species or any of the other wrens.

REPTILES

13. It is probable that many reptiles will concentrate in trees and on higher points of ground during the flood. It is recommended that the rescue of these be confined to two men working their own boat and that these persons be familiar with handling poisonous snakes.

FISH

14. Research grants be made available for research into the biology of freshwater fishes of the main dam. In particular it is important that work be carried out on the Salmon and Eel Catfishes.

15. There should be no introduction of Nile Perch (Lates nilobius) or any other exotic freshwater fish until after careful research on the disruptive effects such an introduction may have on the indigenous species of fish.

16. Because of the presence of the predatory Spangled Perch, the Mosquito Fish, Gambusia affinis should not be introduced because it is unlikely that such an introduction would be successful. Rainbow Fish appear to be highly suitable for mosquito control.

17. Cattle should be excluded from the inner pools that are situated upriver from the main dam. This is considered necessary because cattle aggravate the normal tendency of these pools to silt up and foul.

These pools will probably become important nursery areas for a number of sport fish destined to become popular in the main dam and will need such protection.

18. Provision should be made at the main dam site to allow for the movement of Barramundi, Mullet and a number of other semi-estuarine fishes upriver.

MOLLUSCS

19. Populations of snails in the area should be investigated further for their actual or potential contribution to the establishment of parasitic diseases. Special attention should be given to populations of Plotiopsis and other thiarids in the area that are likely to be involved in the life cycle of paragonimiasis, a serious disease of both man and livestock. This is of particular importance because paragonimiasis was recently suspected of infecting cattle from Lansdowne Station in the Kimberley region.

FINAL NOTE

20. The filling of the dam will undoubtedly flush out many species of animals that were not observed during the October 1971 biological survey of the area. Because this will be the last chance to extend our knowledge of the fauna that occupied the Ord River basin prior to the flooding, it is imperative that as many specimens as possible should be recovered during the period of the flooding.

For this reason it is hoped that there will be close cooperation between members of Operation Noah and the collecting team from the Western Australian Museum who will be in the area between the tentative dates of January 3 and February 18, 1972. It is hoped that the members of Operation Noah will collect as many animals as they can conveniently handle in conjunction with their normal movements.

TABLE 1.

Listing the localities in which Elliots (E) Break-Back (BB) and Cage (C) traps were set. The period in which they were set, the number of traps set at each locality ( ) and the number of trap nights at each locality.

AREA.	GRID REF.	PERIOD	NO. OF TRAP NIGHTS. E/	BB/	C.	TOTAL NO. OF TRAP NIGHTS
Ord Riverbank	128914	3rd/9th	30(10)	30(10)	- (0)	60
Blue grass plains) with termitaria)	128913	3rd/9th 16th/19th	80(20)	80(20)	- (0)	160
Mound Spring &) hillslope behind)	122909	3rd/19th	8 (3)	24 (6)	- (0)	32
Mitchell grass plains	136945	17th/19th	40(10)	80(20)	- (0)	120
Blue grass plains	163964	4th/10th	15 (5)	15 (5)	- (0)	30
Mitchell grass plains	123904	16th/19th	48 (8)	24 (6)	- (0)	72
Mitchell grass flats	126914	3rd/9th	8 (2)	- (0)	6 (1)	14
Tippera Tall grass	157948	4th/10th	15 (5)	30(10)	- (0)	45
Woodland-Hicks Ck.	151957	4th/10th	48 (8)	- (0)	12 (2)	60
" "	"	11th/14th	48 (8)	- (0)	18 (3)	66
Woodland-Stockade Ck	152943	17th/20th	40(10)	40(10)	- (0)	80
Low Hilly Country	159964	4th/10th	- (0)	8 (2)	8 (2)	16
" "	"	11th/14th	48 (8)	- (0)	12 (2)	60
Mt.Misery	142948	16th/19th	40(10)	40(10)	- (0)	80
Bananna Springs	133950	17th/19th	- (0)	52(13)	16 (4)	68
Argyle Lagoon(edge)	128941	4th/14th	24 (8)	18 (6)	12 (4)	54
" "	"	17th/19th	264(24)	30 (6)	22 (2)	316
Argyle Lagoon(flats)	128941	17th/19th	30(10)	30(10)	- (0)	60
Rugged Hills(Ord)	134946	4th/14th	55 (5)	- (0)	- (0)	55
" "	"	17th/19th	55 (5)	76(18)	30 (4)	161
Stony outcrops on plains	135944	17th/19th	30(10)	30(10)	- (0)	60
Tippera Tall grass (airstrip)	128914	4th/14th	11 (1)	55(11)	16 (1)	82
Spinifex with termitaria	123913	16th/19th	55 (5)	25 (5)	44 (4)	124
Bank of Behn River	144945	17th/20th	20 (5)	20 (5)	- (0)	40
Rugged Hills (Stockade Ck)	139951	21st/24th	- (0)	44(11)	12 (3)	56
Spinifex plain	142958	22nd/23rd	40(10)	40(10)	- (0)	80
			40(20)	40(20)	- (0)	80
	TOTAL:		1092	831	208	2131

FIG.1.

Shows the land forms in that part of the Ord River Basin to be inundated when the Main Dam floods. The Land Forms of this area were taken from the map of the C.S.I.R.O. Land Survey Series No.28. The three general areas surveyed (A, B, AND C) are also shown outlined in this fig.

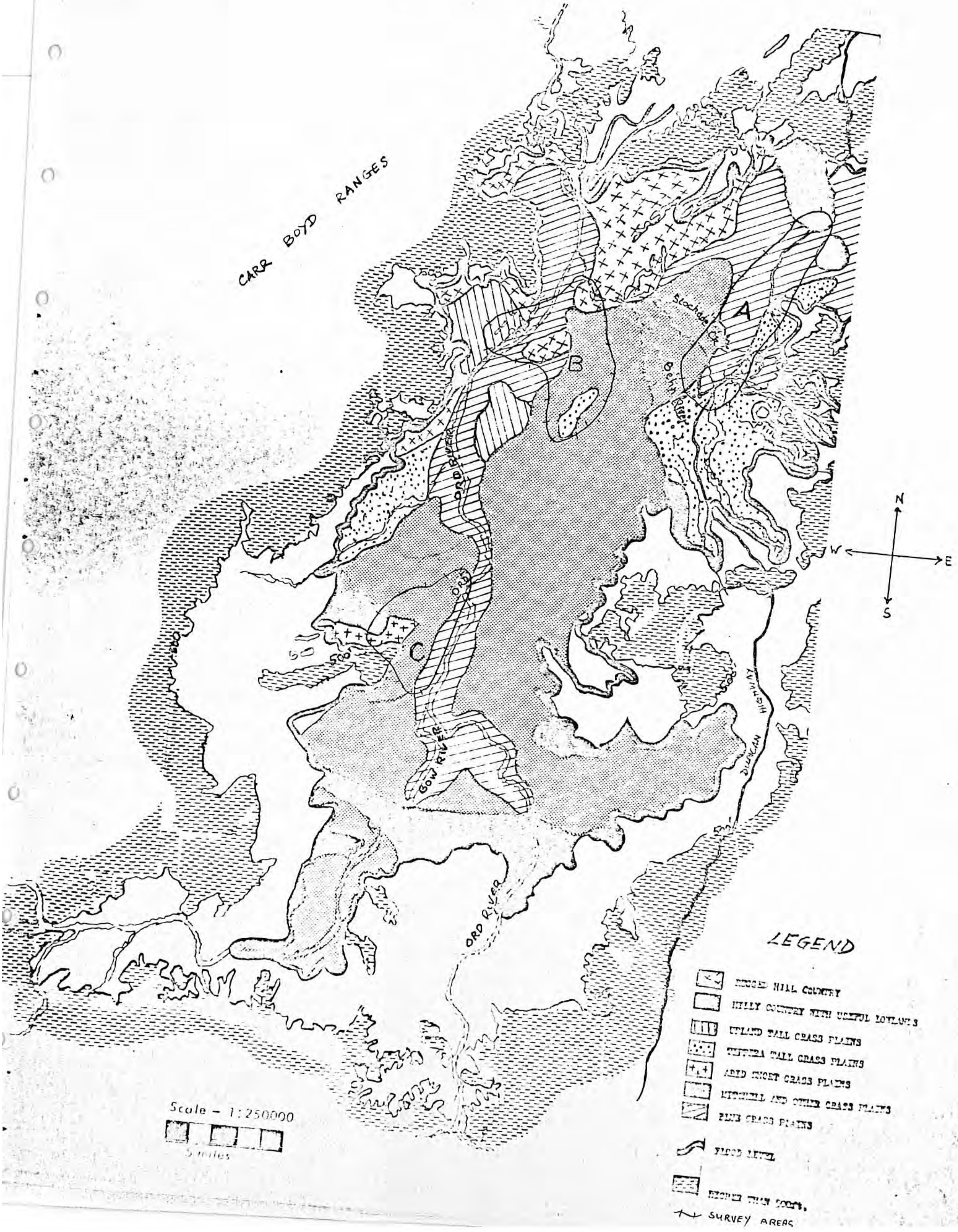

CARR BOYD RANGES
A
B
C
ORD RIVER
GOW RIVER
DUNCAN HIGHWAY
N
W
E
S
LEGEND
HILL COUNTRY
HILLY COUNTRY WITH USEFUL LOWLANDS
UPLAND TALL GRASS PLAINS
TALL GRASS PLAINS
ARID SHORT GRASS PLAINS
MITCHELL AND OTHER GRASS PLAINS
BLUE GRASS PLAINS
FLOOD LEVEL
SURVEY AREAS
Scale - 1:250000
5 miles

FIG. 2.

Showing the position of all the macropods observed during this survey. Also shows the routes taken on the regular spotlight runs and distinguishes between occasional observations and those made during the regular spotlight runs.

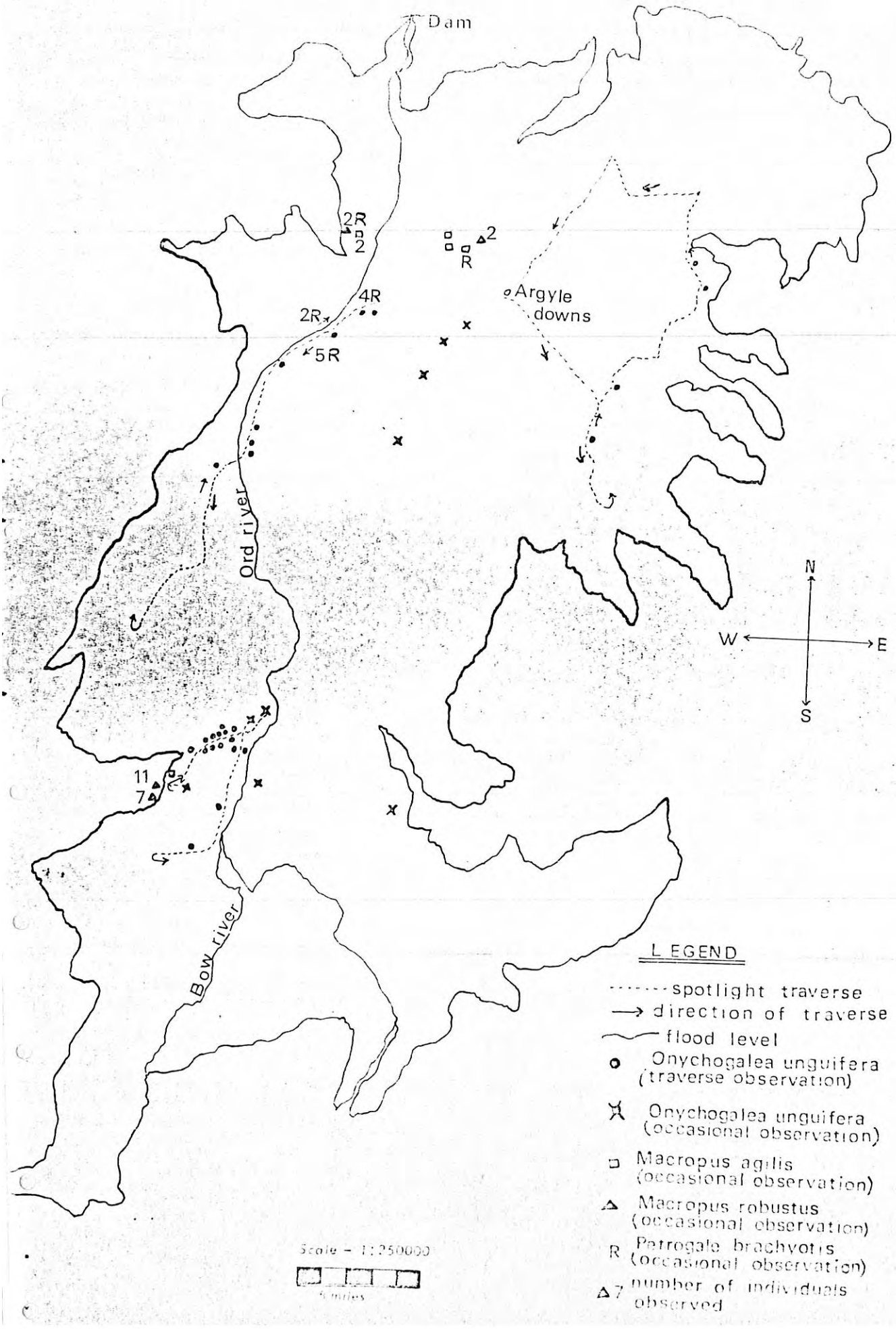

Dam
2R
2
R
2
4R
2R
5R
Argyle downs
Ord river
N
W
E
S
11
7
Bow river
LEGEND
spotlight traverse
direction of traverse
flood level
Onychogalea unguifera (traverse observation)
Onychogalea unguifera (occasional observation)
Macropus agilis (occasional observation)
Macropus robustus (occasional observation)
R Petrogale brachyotis (occasional observation)
7 number of individuals observed
Scale - 1:250000
Kilometres

FIG. 3.

Indicating the sequence, taken at monthly intervals, in which the areas of the Ord River Basin will be flooded. This map is based on the prediction that during average rainfalls the water level in the Main Dam will rise at a rate of 1 foot per day.

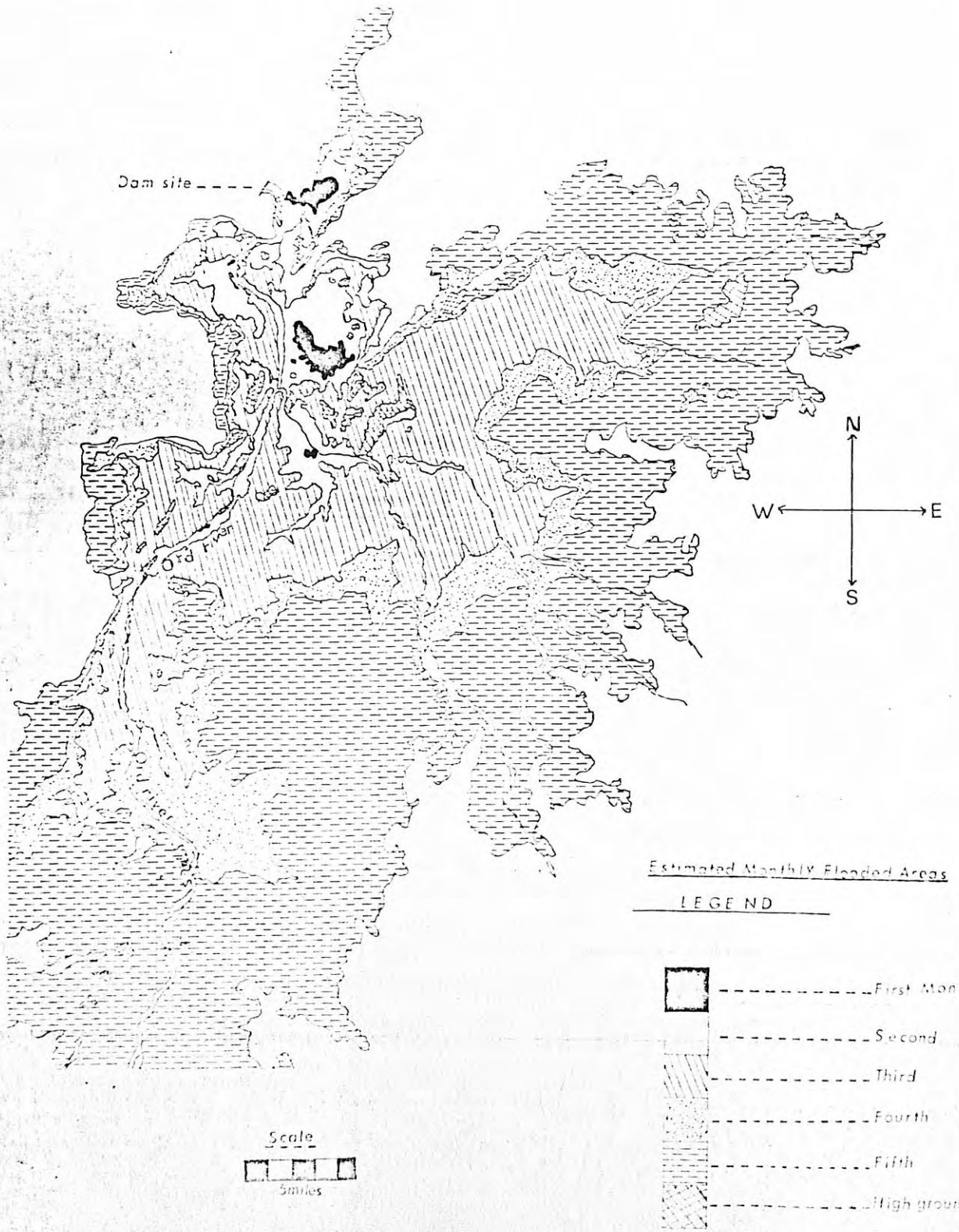
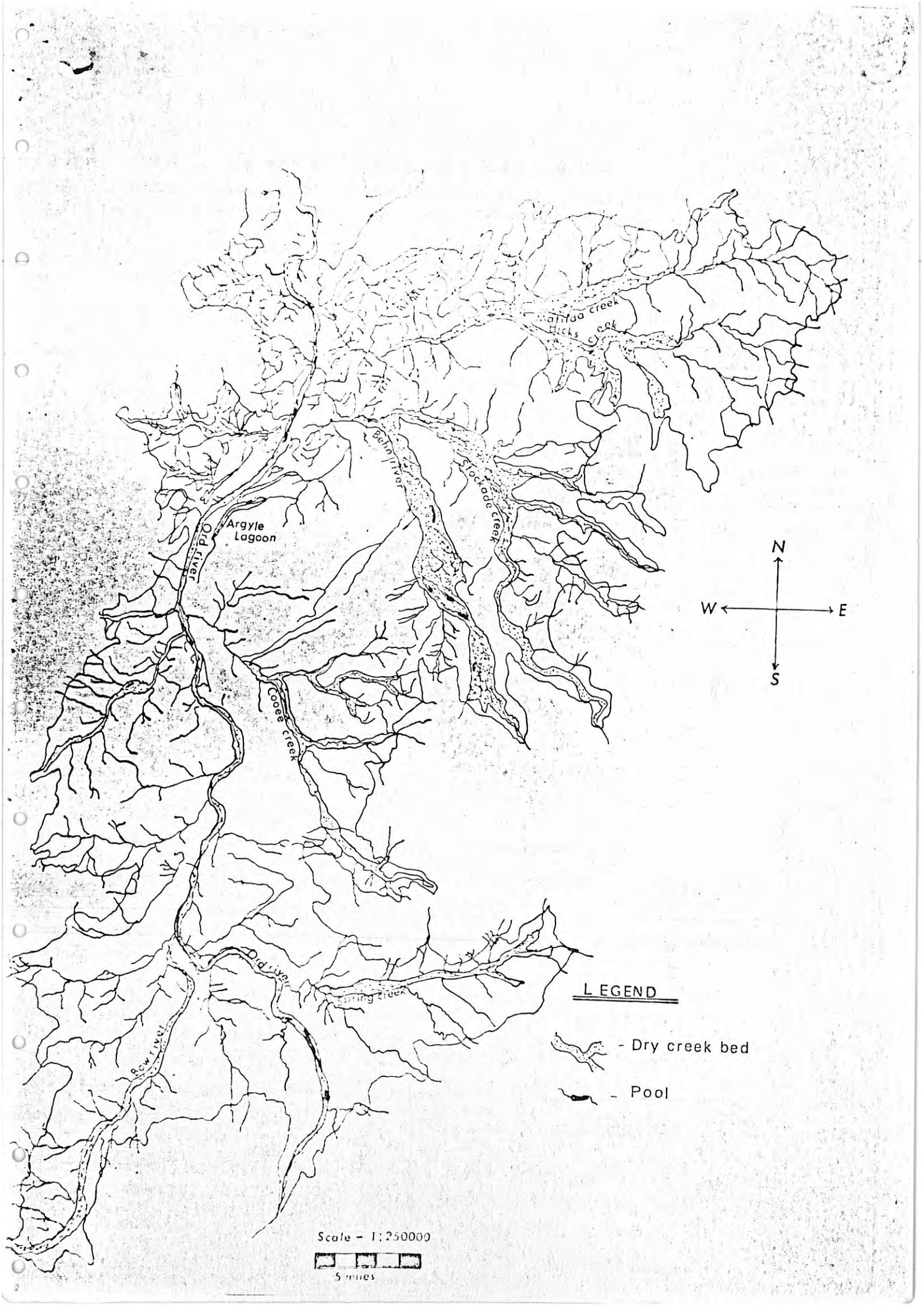

Dam site
Old River
N
W
E
S
Estimated Monthly Flooded Areas
LEGEND
First Month
Second
Third
Fourth
Fifth
High ground
Scale
5miles

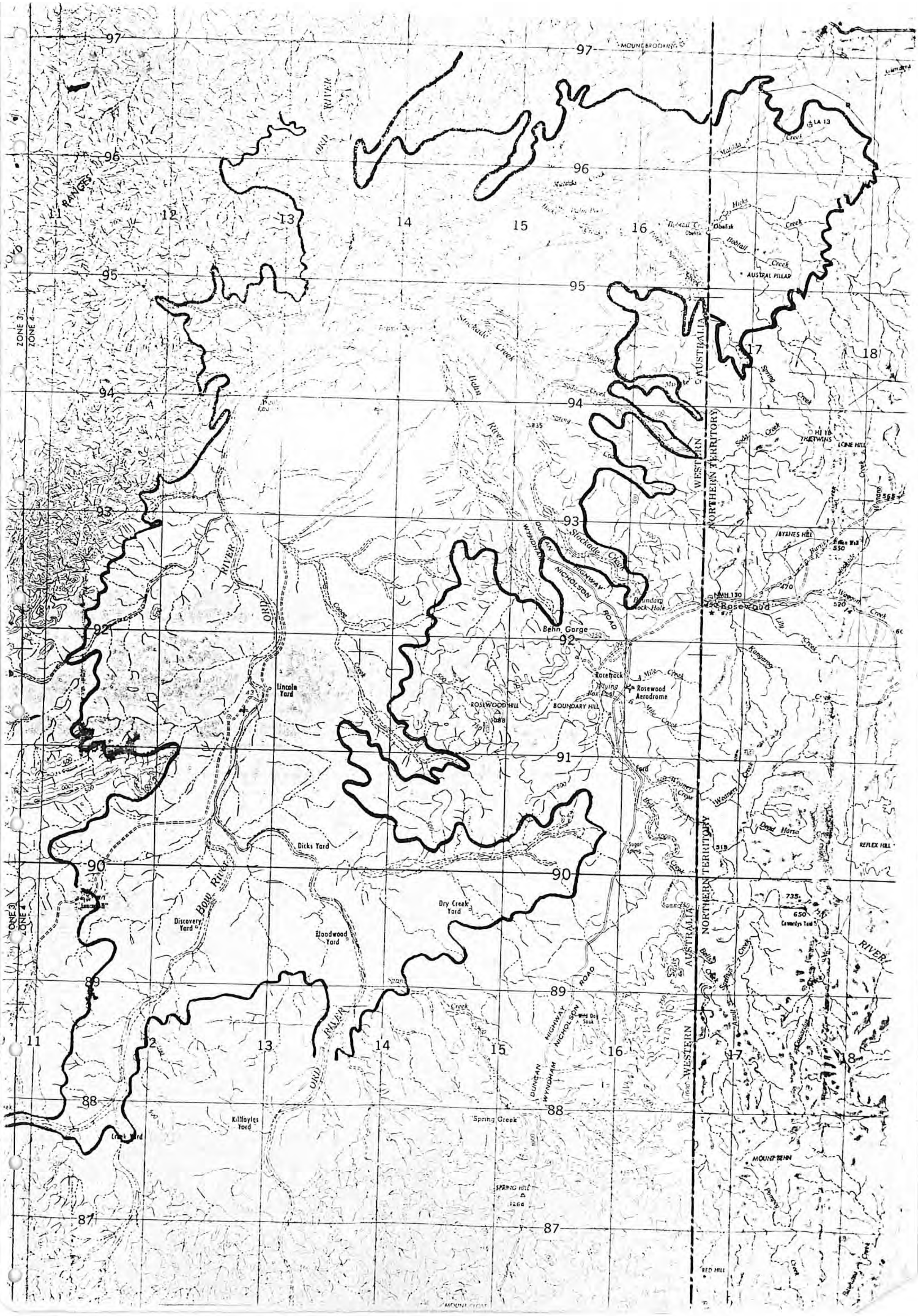
FIG 4.

Showing the watercourses, lagoons and pools occurring in the area to be flooded. These were taken from the R.A.S.C. Lissadell Sheet, Series R502, Edition 1 - AAS.


Mantua creek
Hicks creek
Behn river
Blockade creek
Old river
Argyle Lagoon
Cooee creek
Did river
Spring creek
Bow river
N
W
E
S
LEGEND
- Dry creek bed
- Pool
Scale - 1:250000
5 miles

APPENDIX 1.

This is a photocopy of a portion of the R.A.S.C. Lissadell sheet, Series R502 Edition 1 - AAS. It has been reproduced here to show the grid system that was used for locality references throughout this report. The thick dark lines indicate the level the waters will reach when the Main Ord Dam is in flood.



97
96
95
94
93
92
91
90
89
88
87
11
12
13
14
15
16
17
18
ZONE 3
ZONE 4
RANGES
MOUNT BROOKING
ORD RIVER
Matilda Creek
Hicks Creek
Bobtail Creek
Obelisk
AUSTRAL PILLAR
Stockade Creek
Behn River
Spring Creek
WESTERN AUSTRALIA
NORTHERN TERRITORY
THE TWINS
LONE HILL
BYRNES HILL
DUNCAN WYNDHAM NICHOLSON HIGHWAY ROAD
Boundary Rock Hole
Rosewood
Lilly Creek
Behn Gorge
Racetrack
Rosewood Aerodrome
ROSEWOOD HILL
BOUNDARY HILL
Lincoln Yard
Dicks Yard
Weaners Creek
Dead Horse Creek
REFLEX HILL
Bow River
Discovery Yard
Bloodwood Yard
Dry Creek Yard
RIVER
Killfoyles Yard
Creek Yard
Spring Creek
SPRING HILL
MOUNT BEHN
RED HILL

(3)

(4)

(5)

(6)

(7)

(8)

(9)

(10)

(12)

(14)