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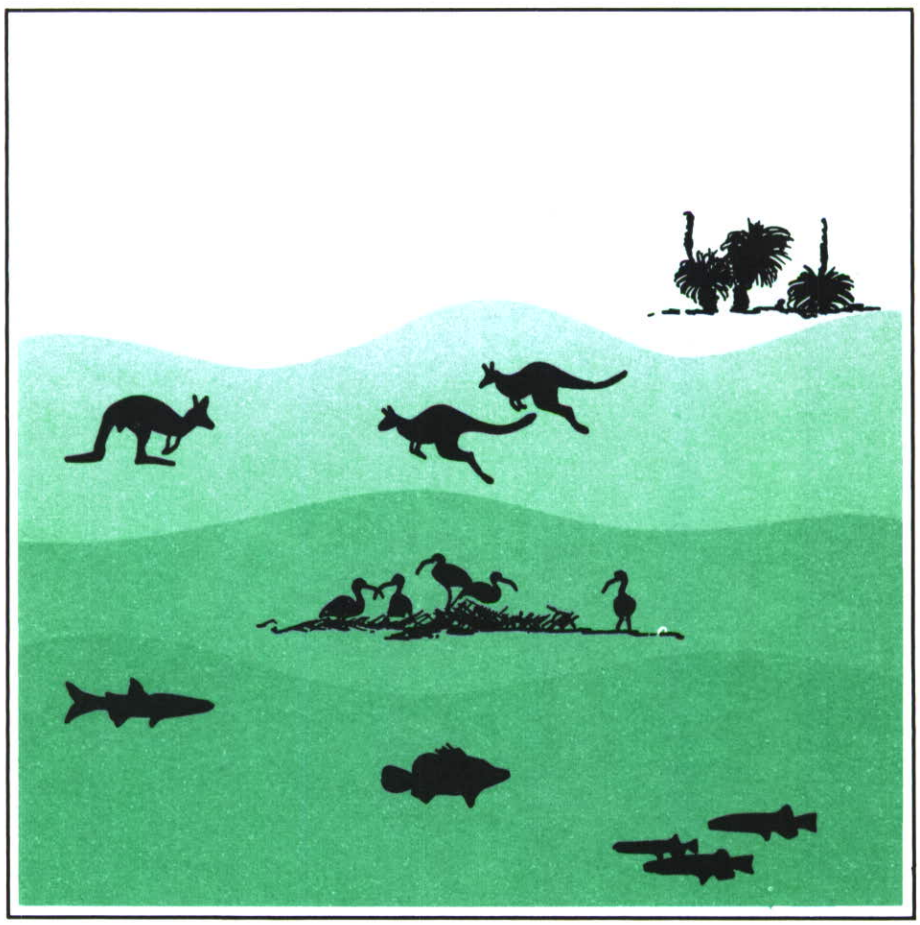
June 1989



Freshwater Fish Management Branch Fisheries Division

Department of Conservation, Forests & Lands - Victoria

ARTHUR RYLAH INSTITUTE FOR ENVIRONMENTAL RESEARCH

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# THE FISH FAUNA AND HABITATS OF THE KOROROIT CREEK, TRUGANINA SWAMP, LAVERTON CREEK AND CHERRY LAKE

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# INTRODUCTION

The lower reaches of Kororoit Creek flow through highly industrialised western suburbs of Melbourne before entering Port Phillip Bay at Altona. Cherry Lake and Laverton Creek/Truganina Swamp are situated within the vicinity of Kororoit Creek at Altona.

Of these waters only Cherry Lake has previously been surveyed for fish populations, (Fisheries unpublished data). This was by the Fisheries Division in 1975.

The purpose of this study was to conduct fish surveys of these waters and provide a preliminary assessment of fish habitat.

Initial sampling was undertaken between 21 July and 21 September 1988. A follow-up survey was carried out between 11 January and 3 March 1989.

The information in this report was collected in response to a request from the Melbourne and Metropolitan Board of Works.

## KORONOIT CREEK

Kororoit Creek arises in the Blackhills of the Great Dividing Range south of Gisborne and flows in a south-easterly direction for some 80 kilometers to Altona Bay (Fig.1). Approximately 60% of the creek flows through rural farmland with the remainder flowing through urban, highly industrialised areas. The estuary is permanently open and under tidal influence. The total catchment area is approximately 250km$^2$.

### METHODS

Sampling was undertaken between 21 July and 21 September and 11 January and 3 March 1989. Seven sites in the freshwater section of Kororoit Creek were sampled using a Smith Root 7.5 GPP model electrofisher. At one site (Site 6, Fig.1) mesh, fyke nets and rotenone were also used. The estuary (Site 8, Fig.1) was sampled with mesh and fyke nets. Rotenone was also used to collect small forage fish species in areas of aquatic vegetation. It is a fish poison which kills fish by blocking oxygen uptake and is used to sample fish in situations where other sampling methods are not effective.

Mesh nets were 25 m long, 2.5 m deep with stretched mesh sizes of 37, 50, 75 and 100 mm. The fyke nets had a stretched mesh size of 25 mm and a single central wings.

Fish were measured to the nearest 1 mm (caudal fork length) identified and counted. At each sample site water temperature, conductivity, turbidity, river width and depth and length of sample reach were recorded. A preliminary assessment of instream habitat and riparian vegetation condition was also undertaken.

### RESULTS

### FISH

Twelve species of fish, 10 native and 2 introduced, were captured in 8 sections of the Kororoit Creek over the two study periods (Tables 1 and 2). Over the two study periods, the species distribution in the freshwater sections (Site 1-7) was essentially the same.

The common galaxias (*Galaxias maculatus*) was the most widely occurring species being captured at 4 sites (Table 1 and 2). Australian smelt (*Retropinna semoni*) occurred in the largest numbers but were only captured at Sites 3 and 4. Short-finned eels (*Anguilla australis*) were captured at sites 4, 5 and 8.

Small numbers of flat-headed gudgeon (*Philypnodon grandiceps*) were captured at site 4 and one specimen of Tamar River goby (*Favonigobius tamarensis*) was taken at Site 6.

The introduced goldfish (*Carrassius auratus*) was restricted in its distribution occurring only at site 5 whilst the mosquito fish (*Gambusia affinis*) occurred in relatively high numbers at sites 4 and 5.

The estuary contained a large population of black bream (*Acanthopagrus butcheri*) in addition to a large population of smooth toadfish (*Sphaeroides glaber*). The short-finned eel, yellow eyed-mullet (*Aldrichetta rosteri*), greenback flounder (*Rhombosolea tapirina*), sandy sprat (*Hyperlophus vittatus*), common galaxias and the flat-headed gudgeon were found in small numbers throughout the estuary.

## HABITAT

The Kororoit Creek contains a diverse range of instream fish habitats generally deteriorating in quality from the upstream sections to the lower sections. About 60% of the creek flows through rural farmland and contains very little riparian vegetation other than native and introduced grass species. The remainder of the creek flows through urban, industrial land and lacks riparian vegetation (Table 3 and 4).

The creek is generally narrow, ranging in width from 0.1 to 8.0 m and shallow, ranging in depth from 0.1 to 1.6 m. The estuary is about 65 m wide and ranges from 0.3 m to 2.4 m deep at low tide (Tables 3 and 4).

Bed substrate ranged from boulders and cobble in the upper sections to silt, boulders and cobble in the lower sections. Instream cover ranged from boulders and wood debris in the upper sections to aquatic vegetation, boulders and cobble in the lower sections (Tables 3 and 4).

Bank erosion of varying degrees with resultant instream siltation occurred at most sites, particularly where bank vegetation was sparse or absent. Water clarity varied over the two survey periods but was generally clear except in the estuary where the water was highly discoloured (Tables 3 and 4).

## DISCUSSION

The distribution of fishes in Kororoit Creek may be related to available water flows, water quality and instream habitat.

No fish were captured at sites 1 and 2. This may be attributed to the regulation of flows in the east and west branches of the creek which has resulted in intermittent flows throughout much of the year. This has reduced instream habitat and may restrict the movement of migratory species such as the common galaxias.

Slow-flowing pools, up to 8 m wide and 1.6 m deep were predominant at sites 3, 4 and 5, together with instream cover in the form of aquatic vegetation, wood debris or cobbles. The highest diversity and abundance of fish species were recorded at these sites over the two survey periods (Tables 1 and 2).

In comparison, only one specimen of Tamar River goby was captured at site 6 and no fish were captured at site 7. Both sites appeared to have sufficient flows and instream habitat to support fish numbers similar to those captured at sites 3, 4 and 5.

Thus, whilst this study was not designed to provide detailed information on instream habitat or to provide data on water quality, the information gathered on fish distribution and numbers does suggest a general deterioration in water quality in the lower sections compared to the upper sections.

The estuary (site 8) contained a diversity of fish species, comparable with other small estuaries in Victoria. The total species catch per net of 21.0 for sport fish (black bream and yellow-eyed mullet) is well above the State-wide average of 12.8 fish per net (McCarraher 1986).

The estuary remains under tidal influence throughout the year allowing the movement of fish to and from the sea. The black bream sampled in the mesh nets were most probably captured on the incoming tide and the population may be a mobile one, entering and leaving the stream in conjunction with tidal movement. Further sampling would be needed to verify this.

During the survey period there was some visual evidence that the estuary was being adversely affected by pollution. The surface water was highly discoloured and an `oil slick' was observed in the upper and middle sections of the estuary. Common galaxias and sandy sprat in a distressed condition, were captured in the `oil slick'. A fyke net set overnight in the upper estuary and designed to retain fish alive was, the next day, found to contain dead short-finned eels and smooth toadfish.

Short-finned eels are extremely hardy, (Cadwallader and Backhouse). It is very unusual to find this species dead in a fyke net after an overnight set.

The water quality of Kororoit Creek and its estuary was studied by the Environment Protection Authority in 1977 (EPA, 1979). The results showed that significant levels of the nutrients nitrogen and phosphorus and heavy metals were present in the lower reaches of the creek. The results of previous discharges of heavy metals to the creek were evident in the high levels recorded in sediments. Tighter controls by regulatory authorities in recent years have improved water quality and further improvements can be expected, particularly for levels of nutrients and toxicants (Urban Land Authority, 1987).

## CONCLUSION

As the conservation status of the native fish species recorded from the Kororoit Creek is "common and secure" (Cadwallader et al 1984) and the fish habitat of the creek is substantially degraded, Kororoit Creek is classified as having a low conservation value for native fish. It is recommended that native bank vegetation be re-established along the length of the creek so as to consolidate stream banks and enhance the native fish habitat. Priority should be given to fully investigate water quality within the urbanized reaches of Kororoit Creek.

## TRUGANINA SWAMP AND LAVERTON CREEK

Truganina Swamp is a retarding basin which forms part of the Melbourne and Metropolitan Board of Works drainage and waterways system and consists of a series of saline ponds and channels connected to Altona Bay via a large shallow outlet channel (Fig.1).

### METHODS

Truganina Swamp was sampled with mesh nets (Site 1), fyke nets (Sites 2 and 3) and rotenone (Site 4). The outlet channel from Truganina Swamp (Site 5) was sampled with fyke nets and the main outlet channel (Site 6) was sampled with rotenone. Laverton Creek (Site 7) was sampled by electrofishing (Fig. 1).

The mesh net consisted of 3 equal sized panels, having stretched mesh sizes of 37 mm, 75 mm and 112 mm respectively and a drop of 2.5 m. The fyke nets had a stretched mesh site of 25mm and a single central wing. Electrofishing was undertaken using a Smith Root 7.5 GPP model electrofisher.

Fish were measured to the nearest 1 mm (caudal fork length), identified and counted. At each sample site, water temperature, conductivity, turbidity, river width, depth and length of sample reach were recorded. A preliminary assessment of instream habitat and riparian vegetation was also undertaken.

### RESULTS

### FISH

Sampling was undertaken between 21 July 1988 and 8 September 1988, and 6 and 7 February 1989. Ten species of fish, 8 native and 2 introduced were captured in the Truganina Swamp and Laverton Creek system. Fish were recorded at all sample sites (Tables 5 and 6).

The most widely occurring species were short-finned eels, small-mouthed hardyhead (*Artherinosoma microstoma*) and flat-headed gudgeon, all occurring at 4 sites (Tables 5 and 6).

Small-mouthed hardyhead was the most abundant species caught with large numbers captured in Truganina Swamp (Site 4) and the main outlet channel (Site 6).. Black bream were only captured in Truganina Swamp (Site 1) along with yellow-eyed mullet (Site 5). Juvenile greenback flounder were captured at sites 2, 4 and 6 (Table 5 and 6).

The introduced species, goldfish and mosquito fish, were only captured above tidal influence in Laverton Creek at site 7 (Table 5 and 6).

### HABITAT

Truganina Swamp has a surface area of approx 3 ha and a depth of 0.1 - 1.5 m. Bed substrate consists of silt and sand. Aquatic vegetation and algae provided the only instream cover for fish (Tables 7 and 8).

The adjoining ponds and channels (Sites 5 and 6) provide similar habitat conditions although the channels in general were only 8 - 28 m wide, 0.1 - 1.3 m deep and were under tidal influence (Tables 7 and 8).

Riparian vegetation throughout the system was sparse consisting mainly of native and introduced grass species. Laverton Creek (Site 7) was generally only 2.0 - 4.0 m wide and only 0.1 - 0.6 m deep.

Bed substrate consisted of clay and silt and instream cover was predominantly aquatic vegetation with cobbles and boulders (Tables 7 and 8).

## DISCUSSION

Truganina Swamp, Laverton Creek and adjoining ponds and channels contain a range of native fishes comparable to other small estuaries situated along the Victorian coastline.

The habitat available to fish species is similar to other small tidal estuaries although the main outlet channels from Truganina Swamp are shallow and may limit the movement and migration of some fish species to the sea at certain times of the year.

A pre-spawning population of black bream was sampled during the first survey period (Table 5). Although no 'young of year' bream were captured during the second survey some tentative conclusions regarding bream spawning can be reached. Black bream are known to spawn in temperature and salinity conditions similar to those recorded in Truganina Swamp and bream eggs are known to hatch under these conditions (Bacher Pers. Comm.) It is likely that there is a resident population of bream in Truganina Swamp. It appears unlikely that they migrate to other estuaries to spawn as "spent" bream were captured during the second survey.

The populations of juvenile greenback flounder captured at sites 2, 4 and 6 indicate that Truganina Swamp may be a nursery ground for this commercially important species.

The wide distribution of short-finned eels (4 sites) is indicative of the diverse range of habitats which the species can tolerate (Cadwallader and Backhouse 1983). The common galaxias was only captured at site 7 where freshwater conditions existed. Both the short finned eel and the common galaxias require passage to the estuary or sea to complete their life cycles (Cadwallader and Backhouse, 1983).

Large numbers of the small-mouthed hardyhead were captured at sites 4,5,6 and 7 whilst small populations of flat-headed gudgeon were captured at sites 2, 3,5 and 7 during the first survey. The Tamar River goby was captured at site 4 and 6 in the estuary and at site 7 above tidal influence (Tables 5 and 6).

A small number of yellow-eyed mullet were captured in Truganina Swamp (Site 5). Goldfish and mosquito fish were only captured at site 7, above tidal influence.

## CONCLUSION

Results of this survey indicates that the instream habitat and water quality in the system appear to be sufficient to support a diverse range of fish species.

Although the bed substrate in the system is predominantly silt on sand, this appears to have no detrimental effects on the species present. Bed substrates of silt are relatively common throughout Victorian estuaries which coincidentally produce large populations of black bream and other estuarine species.

# CHERRY LAKE

Cherry Lake is a Melbourne and Metropolitan Board of Works retarding basin which forms part of the Board's drainage and waterways system and is one of a number of wetlands found along the west coast of Port Phillip Bay (Fig.1). The lake has a surface area of approx. 48 ha. The water level is artificially controlled by a concrete spillway with outflow water flowing directly into Altona Bay. The lake is currently used as a recreation area by a large number of people, including anglers.

## METHODS

Sampling was undertaken between 7 and 8 September 1988 and 6 and 7 February 1989.

The lake was sampled at 10 sites and the outlet channel at one site (Fig.1). Sites 1 to 8 were sampled with mesh nets, site A with fyke nets, site B with rotenone and electrofishing and the outlet channel, site C, by electrofishing. Rotenone was used to sample small forage fish species in areas of aquatic vegetation.

Mesh nets were 25 m long with a 2.5 m drop and stretched mesh sizes of 37, 50, 62, 75, 87, 100, 112 and 125 mm. Fyke nets had a stretched mesh size of 25 mm and a single central wing.

Fish were measured to the nearest 1 mm (caudal fork length) weighed to the nearest 1 gram and identified and counted. Over each survey period, water temperature, conductivity, turbidity and water depth were recorded. A preliminary assessment of instream habitat, substrates and riparian vegetation was also made.

## RESULTS

### FISH

Six species of fish, 3 native and 3 introduced were captured in Cherry Lake and the outlet channel over the two survey periods (Table 9).

Fish were recorded at all sample sites. Common galaxias were captured in areas of aquatic vegetation along the shoreline. Juveniles of this species occurred in the outlet channel downstream of the lake spillway together with the small-mouthed hardyhead.

Although short-finned eels were only captured at Site A, the presence of `eel slime' on mesh nets indicated that their distribution was more widespread.

The most abundant and widely occurring species in Cherry Lake was English perch (*Perca fluviatilis*). Common Carp (*Cyprinus carpio*) are also widely distributed throughout the lake whereas the goldfish was only captured at Sites A and 8 but may occur in small numbers throughout the lake.

## HABITAT

Cherry Lake has an average depth of approximately 0.8 m and a bed substrate consisting of silt and clay. Instream cover consists of small amounts of aquatic vegetation, particularly along the northern shoreline, and boulders. Water clarity was turbid. Water temperatures varied from 14$^{o}$C (1st survey) to 20$^{o}$C (2nd survey) whilst conductivity levels remained relatively constant (2300 - 2600 microseimens).

## DISCUSSION

Cherry Lake was originally surveyed by the Fisheries Division in 1975 and found to contain English perch, Common carp and goldfish.

The present study has revealed two additional species, common galaxias and short finned-eel and a third, the small-mouthed hardyhead in the outlet channel.

This study has shown that English perch, the main angling species, has increased in numbers, although the size range has remained relatively constant (Table 9).

A comparison of the abundance of English perch in Cherry Lake with other high value English perch waters in Western Victoria, Lake Burrumbeet, Lake Colac and Lake Learmonth, (Tunbridge 1988), indicates that the lake contains exceptionally large numbers of this species. However, there are few large fish in Cherry Lake compared to other high value English perch waters. The numbers of common carp appear to have increased along with an increase in the size of larger specimens (Table 9).

Although only occurring in small numbers, the short finned-eel constitutes a sought after angling species in Cherry Lake. The populations of common galaxias and goldfish provide a major part of the diet of English perch and short finned eels and an important part of the diet of many species of water birds. Conditions in the lake were apparently poor for native fish but suited to introduced species.

Water from Cherry Lake flows into Altona Bay via a concrete outlet channel and spillway. The outlet channel contained large numbers of small mouthed hardyhead and juvenile common galaxias. The spillway consists of a vertical wall 920 mm high (maximum) and provides a barrier to the upstream migration of the juvenile common galaxias under conditions of normal flow.

Water conductivity, temperatures, turbidity, depth and substrate appear to have stabilised with little change since the initial fish survey in 1975 and are apparently sufficient to maintain the introduced fish populations.

## CONCLUSION

The results of this survey indicate that Cherry Lake contains three sought after angling species of fish (English perch, common carp and short-finned eels). English perch were stocked into Cherry Lake by the Fisheries Division in the early 1970's and are now well established. Whilst they do not grow to a large size and would not therefore be sought by the more experienced angler, the lake must still be regarded as an important urban fishing water. Maintenance of the water level, particularly during summer, is necessary to provide suitable habitat for this species and to provide suitable recreational angling conditions.

The lake also contains a population of common galaxias which are considered to be important as a major food source for predator species and as a food source for many water birds.

**ACKNOWLEDGEMENTS**

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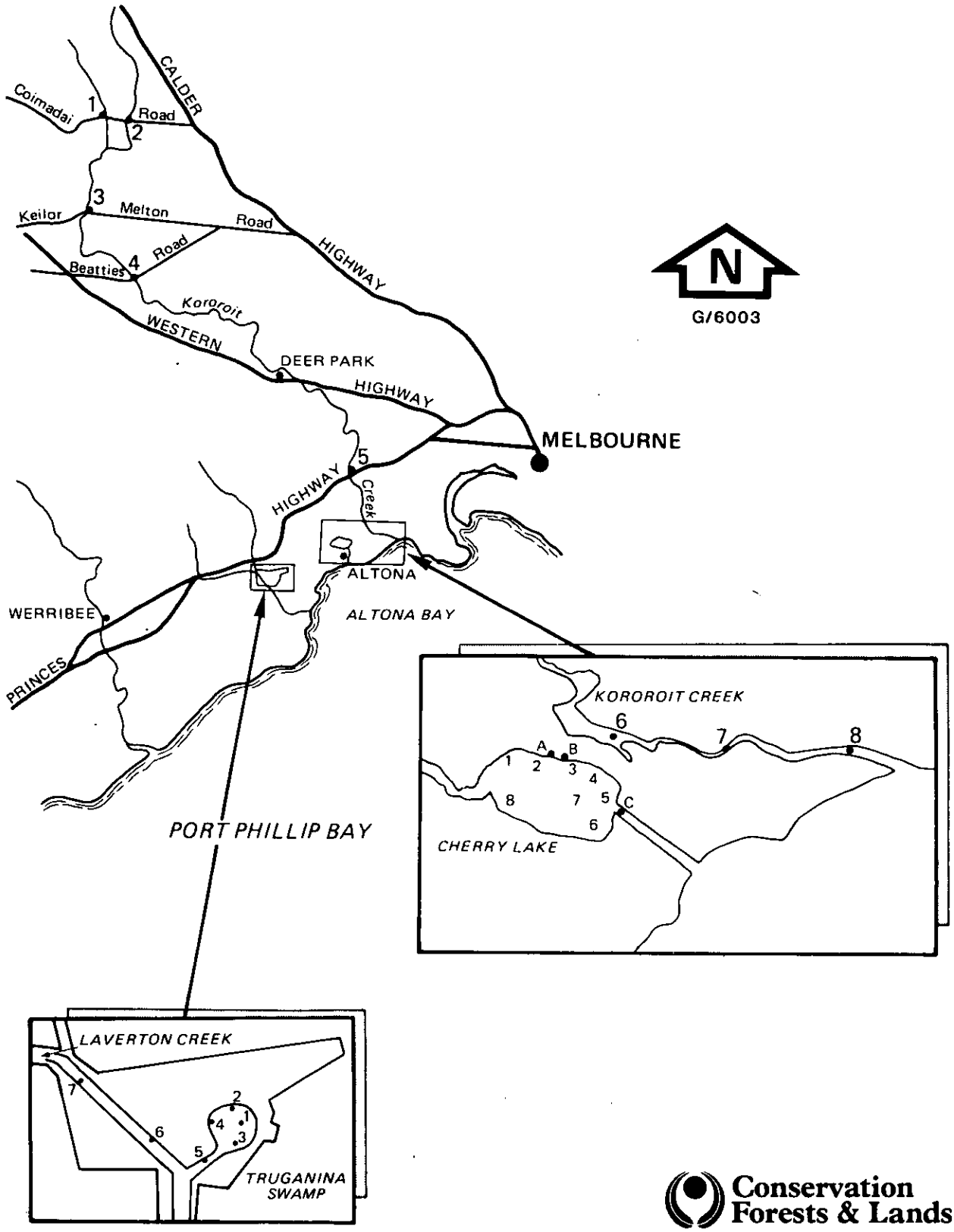
*Figure 1.*

*Fish Sample Sites in Kororoit, Cherry Lake Truganina Swamp, and Laverton Creek.*

*21/7/1988 to 3/3/1989*

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LENGTH, SIZE RANGE AND NUMBERS OF EACH FISH SPECIES
IN SIX SAMPLE SITES IN KOROROIT CREEK 21/7/88 - 21/9/88

(FORK LENGTH RANGE IN MM
NUMBERS OF FISH IN PARENTHESIS)

TABLE 1

SAMPLE SITE No

| SPECIES | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Short finned eels (*Anguilla australis*) | - | - | - | 890-900(2) | - | - |
| Common galaxias (*Galaxias maculatus*) | - | - | 155-160 (6) | 147-182 (2) | 83-155 (25) | - |
| Australian smelt (*Retropinna semoni*) | - | - | 63-65 (25) | - | - | - |
| Flatheaded gudgeon (*Philypnodon grandiceps*) | - | - | - | 93-107 (3) | - | - |
| Mosquitofish (*gambusia affinis*) | - | - | - | 30-43 (150) | - | - |

LENGTH SIZE RANGE AND NUMBERS OF EACH FISH SPECIES IN EIGHT SAMPLE SITES IN KORONOIT CREEK 11/1/89 - 3/3/89

(FORK LENGTH RANGE
NUMBERS OF FISH IN PAREN

TABLE 2

| SPECIES | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Short finned eels (*Anguilla australis*) | - | - | - | - | 370 (1) | - | - | 250-700 (4) |
| Common galaxias (*Galaxias maculatus*) | - | - | 145-147 (2) | 142-163 (3) | 58 (1) | - | - | 35-44 (8) |
| Australian smelt (*Retropinna semoni*) | - | - | - | 63-64 (50) | - | - | - | - |
| Flatheaded gudgeon (*Philypnodon grandiceps*) | - | - | - | 70-81 (2) | - | - | - | 113 (1) |
| Tamar River goby (*Favonigobius tamarensis*) | - | - | - | - | - | 22 (1) | - | - |
| Black bream (*Acanthopagrus butcheri*) | - | - | - | - | - | - | - | 124-360(59) |
| Green back Flounder (*Rhombosolea tapirina*) | - | - | - | - | - | - | - | 80-100 (2) |
| Yellow eyed mullet (*Aldrichetta forsteri*) | - | - | - | - | - | - | - | 204-332 (4) |
| Sandy sprat (*Hyperlophus vittatus*) | - | - | - | - | - | - | - | 25-35 (20) |
| Smooth toadfish (*Torquigener glaber*) | - | - | - | - | - | - | - | 34-95 (77) |
| Goldfish (*Carassius auratus*) | - | - | - | - | 117-157 (6) | - | - | - |
| Mosquitofish (*Gambusia affinis*) | - | - | - | 14-56 (100) | 11-50 (2) | - | - | - |

SITE NUMBER, GRID REFERENCE, PHYSICAL CHARACTERISTICS AND WATER PARAMETERS IN KORONOIT CREEK 21.7.88 - 21.9.88

TABLE 3

| Site No. | Grid Ref. | Length of Sample | Width (m) | Depth (m) | Water Temp($^{O}$C) | Conductivity (microseimens) | Salinity ppt | Water turbidity | Substrate | Instream Cover |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 934331 | 60 | 0.2-2.8 | 0.1-0.35 | $18^{O}$ | 1350 | 1.2 | Clear | Boulder, Cobble | Boulder |
| 2 | 941329 | 60 | 0.2-1.8 | 0.1-0.5 | $18^{O}$ | 1350 | 1.2 | Clear | Cobble, Pebble | Cobble |
| 3 | 918270 | 80 | 3.0-5.0 | 0.1-1.0 | $12^{O}$ | 420 | - | Turbid | Boulder, Cobble, Pebble, Gravel | Cobble, Wood debris |
| 4 | 950236 | 140 | 1.5-6.0 | 0.3-1.5 | $15^{O}$ | 6000 | 4.5 | Clear | Silt | Aquatic vegetation SSP |
| 5 | 087117 | 60 | 2.0-8.0 | 0.4-1.2 | $13^{O}$ | 1750 | 1.8 | Clear | Cobble | Cobble, Aquatic vegetation |
| 6 | 097079 | 80 | 1.3-2.0 | 0.4-1.3 | $17^{O}$ | 2200 | 2 | Clear | Silt | Aquatic vegetation, Algae |

SITE NUMBER, GRID REFERENCE, PHYSICAL CHARACTERISTICS AND WATER PARAMETERS IN KOROROIT CREEK 11.1.89 - 3.3.89

TABLE 4

| Site No. | Grid Ref. | Length of Sample | Width (m) | Depth (m) | Water Temp($^{O}$C) | Conductivity (microseimens) | Salinity ppt | Water turbidity | Substrate | Instream Cover |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 934331 | 60 | 0.1-3.0 | 0.1-0.25 | 21 | 1420 | 1.3 | Clear | Boulder, Cobble | Boulder |
| 2 | 941329 | 100 | 1.0-2.1 | 0.1-0.25 | 22 | 1450 | 1.3 | Turbid | Cobbles, Silt | Cobble |
| 3 | 918270 | 80 | 3.0-5.0 | 0.1-1.1 | 19 | 430 | - | Turbid | Boulder, Cobble, Pebble, Gravel | Cobble, Wood debris |
| 4 | 950236 | 140 | 1.5-6.0 | 0.2-1.6 | 19 | 5800 | 3.8 | Clear | Silt | Aquatic vegetation |
| 5 | 087117 | 80 | 1.8-7.0 | 0.3-1.0 | 19.5 | 1400 | 1.3 | Turbid | Cobble | Cobble, Aquatic vegetation |
| 6 | 097079 | 50 | 1.3-2.0 | 0.3-1.2 | 25 | 3600 | 2.5 | Clear | Silt | Aquatic vegetation |
| 7 | 108078 | 60 | 20.0-25.0 | 0.2-1.0 | 23.5 | 3400 | 2.3 | Clear | Boulder, Cobble Sheet Rock, Silt | Boulder Cobble |
| 8 | 115076 | Estuary | - | (Low tide) 0.3-2.4 | 25.0 | - | 29.0 | Highly discolored | Silt, Boulder Sand | Boulder |

LENGTH, SIZE RANGE AND NUMBERS OF EACH FISH SPECIES SAMPLED IN TRUGANINA SWAMP 7.9.88 - 8.9.88 AND LAVERTON CREEK 21.7.88

(FORK LENGTH RANGE IN MM
FISH NUMBERS IN PARENTHESIS)

TABLE 5

| Species | Sample Site Number 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Black bream (*Acanthopagrus butcheri*) | 102-263(13) | | | | | | |
| Greenback flounder (*Rhombosolea tapirina*) | | | | 70-80(18) | | 70-80(50) | |
| Short finned eel (*Anguilla australis*) | | | | | 450(1) | | 420(1) |
| Common galaxias (*Galaxias maculatus*) | | | | | | | 69-140(200) |
| Small mouthed hardyhead (*Atherinosoma microstoma*) | | | | 70-85 (est. 1000) | 90-100(9) | 70-85(10) | 55-75(30) |
| Flat-headed gudgeon (*Philyprodon grandiceps*) | | 105(1) | 88(1) | | 95-110(12) | | 42-45(2) |
| Tamar River goby (*Favonigobius tamarensis*) | | | | 55-65(15) | | | |
| Goldfish (*Carassius auratus*) | | | | | | | 130-150(2) |

LENGTH SIZE RANGE AND NUMBERS OF EACH FISH SPECIES SAMPLED IN TRUGANINA SWAMP AND LAVERTON CREEK 6.2.89 - 7.2.89

(FORK LENGTH RANGE IN MM
FISH NUMBERS IN PARENTHESIS)

TABLE 6

| Species | Sample Site Number 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Black Bream (*Acanthopagrus butcheri*) | 233-235(2) | | | | | | |
| Greenback flounder (*Rhombosolea tapirina*) | | 78-98(2) | | | | | |
| Short finned eel (*Anguilla australis*) | | 300-500(7) | 300-500(8) | | 350-600(8) | | 250-280(15) |
| Common galaxias (*Galaxias maculatus*) | | | | | | | 70-94(130) |
| Small mouthed hardyhead (*Atherinosoma microstoma*) | | | | 11-70 (est. 3000) | | 28-71(1000) | |
| Flat headed gudgeon (*Philypnodon grandiceps*) | | | | | | | |
| Tamar River goby (*Favonigobius tamarensis*) | | | | | | 36-42(6) | 30-40(100) |
| Yellow eyed mullet (*Aldrichetta forsteri*) | | | | | 110-119(3) | | |
| Goldfish (*Carrasius auratus*) | | | | | | | 140-165(50) |
| Mosquitofish (*Gambusia affinis*) | | | | | | | 10-28(300) |

SITE NUMBER, WATER PARAMETERS AND PHYSICAL CHARACTERISTICS MEASURED AT EACH SAMPLE SITE IN TRUGANINA SWAMP 7.9.88 TO 8.9.88 AND LAVERTON CREEK 21.7.88

TABLE 7

| Site No. | Length of Sample (m) | Water Depth (m) | Water Temp($C^{O}$) | Conductivity (microseimens) | Salinity ppt | Turbidity | Substrate | Instream Cover |
|---|---|---|---|---|---|---|---|---|
| 1 | Swamp | | | | | | | |
| 2 | " | | | | | | | |
| 3 | " | 0.1 - 1.5 | 15 - 17.3 | - | 23 | Clear | Silt, Sand | Algae, Aquatic vegetaton |
| 4 | " | | | | | | | |
| 5 | - | 0.2 - 1.3 | 16 | - | 22 (tidal) | Clear | Sand, Silt | Algae |
| 6 | 40 | 0.2 - 1.0 | 16 | - | 22 (tidal) | Clear | Sand, Silt | Algae, Aquatic vegetation |
| 7 | 130 | 0.1 - 0.6 | 12 | 420 | - | Clear | Clay, Silt | Cobbles, Boulders, Aquatic vegetation |

SITE NUMBER, WATER PARAMETERS AND PHYSICAL CHARACTERISTICS MEASURED AT EACH SAMPLE SITE IN TRUGANINA SWAMP AND LAVERTON CREEK 6.2.89 - 7.2.89

TABLE 8

| Site No. | Length of Sample (m) | Water Depth (m) | Water Temp $C^{O}$ | Conductivity (microscimens) | Salinity ppt | Turbidity | Substrate | Instream Cover |
|---|---|---|---|---|---|---|---|---|
| 1 | Swamp | | | | | | Silt, Sand | |
| 2 | " | | | | | | Silt, Sand | |
| 3 | " | 0.1 - 1.5 | 25.0 | - | 25 | Clear | Silt, Sand | Algae, Aquatic vegetation |
| 4 | " | | | | | | Silt, Sand | |
| 5 | - | 0.2 - 1.1 | 28.0 | - | 28 (tidal) | Clear | Sand, Silt | Algae |
| 6 | 40 | 0.2 - 1.0 | 28.5 | - | 28 (tidal) | Clear | Sand, Silt | Algae, Aquatic vegetation |
| 7 | 100 | 0.1 - 0.4 | 22.5 | 2700 | 2.4 | Clear | Clay, Silt | Cobble, Boulder, Aquatic vegetation |

NUMBERS, LENGTH RANGE AND WEIGHT RANGE OF FISH SPECIES CAPTURED IN CHERRY LAKE OVER THREE SURVEY PERIODS

TABLE 9

| | 30.12.75 - 31.12.75 | | | 7.9.88 - 8.9.88 | | | 6.2.89 - 7.2.89 | | |
|---|---|---|---|---|---|---|---|---|---|
| Species | Number of Fish | Length Range (mm) | Weight Range (gms) | Number of Fish | Length Range (mm) | Weight Range (gms) | Number of Fish | Length Range (mm) | Weight Range (gms) |
| Common galaxias (*Galaxias maculatus*) | Nil | - | - | est. 140 | 46 - 127 | - | 52 | 75 - 143 | - |
| Short finned eel (*Anguilla australis*) | Nil | - | - | 2 | 665 - 690 | 775 - 890 | Nil | - | - |
| Small mouthed hardyhead (*Atherinosoma microstoma*) | Nil | - | - | est. 300 | 40 - 73 | - | - | - | - |
| English perch (*Perca fluviatilis*) | 28 | 175 - 315 | 70 - 450 | 46 | 142 - 295 | 49 - 443 | 175 | 175 - 320 | 88 - 555 |
| Common Carp (*Cyprinus carpio*) | 12 | 298 - 662 | 720 - 4300 | 22 | 260 - 805 | 522 - 11316 | 23 | 51 - 750 | 21 - 13000 |
| Goldfish (*Carassius auratus*) | 7 | 245 - 470 | 300 - 1400 | 2 | 168 - 300 | 112 - 826 | 1 | 200 | 280 |