ELLENBROOK DEVELOPMENT PROJECT

SURVEY FOR WESTERN SWAMP TORTOISES

by

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1. BACKGROUND

The Ellenbrook Development project covers an area of 1797 ha, 20 km north-east of Perth city. A Public Environmental Review (PER) was prepared pursuant to the requirements of the Environmental Protection Act for Ellenbrook Management Pty Ltd in April 1992 (Feilman Planning Consultants 1992) and was assessed by the Environmental Protection Authority (EPA), following a period of public comment (EPA 1992).

The EPA made recommendations on the project to the Minister for the Environment in August 1992. Recommendation 3 stated that the proponents should set aside land for conservation in the Sawpit Gully area and that the final boundary should be determined to meet the requirements of the Minister for the Environment following advice from the Department of Conservation and Land Management and the Department of Planning and Urban Development. The EPA considered that a decision to rezone land in the northern part of the area should be deferred pending further, more detailed, environmental investigations and that the studies should include survey for the Western Swamp Tortoise.

In September 1992, Bowman Bishaw Gorham, Environmental Management Consultants, contacted us with a request that we undertake the Western Swamp Tortoise survey. The work was commissioned on 5 October 1992.

This report is not an official publication of the Department of Conservation and Land Management.

2. THE WESTERN SWAMP TORTOISE

2.1 Status

The Western Swamp Tortoise (*Pseudemydura umbrina*), also known as the Short-necked Tortoise, is the world's rarest and most endangered tortoise or turtle. It is a declared Threatened Species under the W.A. Wildlife Conservation Act, is listed as Endangered nationally (ANPWS 1991), as Endangered in the IUCN Amphibia-Reptilia Red Data Book (Groombridge 1982), as Priority 1 in the Action Plan for Tortoises and Freshwater Turtles (IUCN/SSC 1989), and is categorised as Critical under the draft new IUCN categories of Mace and Lande (1991). In 1991 there was only one wild population, of about 30 animals (only 7 adult females known to be alive) in Ellen Brook Nature Reserve (EBNR), plus 48 captives, of which only 6 were adult females.

CALM published a Management Program for the species in 1990 (Burbidge *et al.* 1990). A Recovery Plan has been prepared for the period 1993 to 2002 (Burbidge and Kuchling in press) and funding is being provided by CALM, Perth Zoo, the Australian National Parks and Wildlife Services' Endangered Species Program and the World Wide Fund for Nature with the aid of a donation from Land Management International. Several other organisations are helping with the Recovery Plan, including the W.A. Water Authority, The University of W.A.'s Zoology Department, Bundesverband für fachgerechten Natur-und Artenschutz (Germany) and the British Chelonia Society. Much of the information on the species' biology and ecology provided here is taken from the Recovery Plan.

2.2 Distribution and Habitat requirements

Western Swamp Tortoises have been recorded only from scattered localities in a narrow (3 to 5 km wide) strip of the Swan Coastal Plain with largely alluvial soils, roughly parallel with the Darling Scarp, running from Perth Airport at Guildford to near Pearce Royal Australian Air Force Base at Bullsbrook. Anecdotal information (Burbidge 1967, 1981) suggests that

their stronghold was the clay soils of the Swan Valley, the first part of Western Australia developed for agriculture. Almost all this land is now cleared and either urbanised or used for intensive agriculture or the extraction of clay for brick and tile manufacture.

During the 1960s to 1980s there were two significant populations; one in each of Twin Swamps Nature Reserve (TSNR) and EBNR, which were created to protect its habitat in 1962. By 1985 the population at TSNR was effectively extinct; this decline is thought to have been caused by a combination of fox predation, the marginal nature of the habitat in the reserve, and drought (see section 2.3).

P. umbrina inhabits shallow, ephemeral, winter-wet swamps on clay or sand over clay soils with nearby suitable aestivation refuges. They have a low fecundity (3 - 5 eggs per clutch, maximum of one clutch per year), and a very slow growth rate, not reaching sexual maturity until an age of between 10 and 20 years (depending on habitat and annual rainfall).

Perth has a Mediterranean climate with cool, wet winters and hot, dry summers. The mean annual rainfall is about 800 mm. After the swamps fill in June or July the tortoises can be found in water, feeding when water temperatures are high enough (> 12^{o} -14^{o}C). They are carnivorous, eating only living food such as insect larvae, small crustaceans and small tadpoles. As the swamps warm in spring and swamp life becomes plentiful, the tortoises' food intake increases and fat supplies are laid down for the forthcoming summer. When the swamps are nearly dry and water temperatures rise above *ca* 28^{o}C, usually in November or early December, the tortoises leave the water to aestivate during the summer and autumn. Aestivation refuges vary with the soil type: at EBNR they are naturally-occurring holes in the gilgai clay, while at TSNR most aestivated under *Banksia* leaf litter or fallen branches, but a few find holes in the ground dug by other animals or left by a rotting tree root.

2.3 Reasons for threatened status

There are a number of compounding reasons for the current critically endangered status of the Western Swamp Tortoise;

i) a very small geographic range, most of which has been converted to agricultural, industrial or urban use,

ii) protection of habitat solely in two small nature reserves that include only marginal habitat,

iii) a specialised biology that includes dependence on a rare habitat, a wholly carnivorous diet, low fecundity and slow growth rates, mitigated to some extent by great longevity,

iv) increasing aridity, a factor compounded by the marginal nature of the remaining habitat and which will become worse if current climatic predictions are correct, and

v) the presence of exotic predators, particularly the European Red Fox.

3. AREA EXAMINED

General descriptions of the area, prepared by Dames and Moore, are provided in Appendix A of the PER (Feilman Planning Consultants 1992).

The area to be surveyed for possible Western Swamp Tortoise populations was defined by the EPA (their Figure 4) and is shown in Figure 1. Within this area five 'damplands', in addition to Sawpit Gully creek itself, were shown. In addition there are several swamps that

the EPA decided should be included in a conservation reserve (the 'Lexia wetlands'). The damplands and swamps have been numbered for easy description (see Figure 1).

4. METHODS

We visited the area on seven occasions: 11 September, 13 October, 16 October, 21 October, 3 November, 10 November and 12 November 1992.

All the 'dampland' areas were visited and repeated searches were made of areas with standing water until they dried. Dry areas were not visited again. We also visited and searched parts of the swamps within the proposed conservation area to the west.

All areas of shallow, standing water were searched. Our methods were:

- visual searching (walking slowly through an area looking for tortoises), and

for areas where the water was too deep or too dark for visual searching to be effective,

- puddling (feeling with the hands and/or feet for animals).

The second method is only effective in relatively small areas and is usually only reliable when the area of water shrinks as swamps dry up. Although the swamp waters in the study area were tannin-stained, they were not so dark as to prevent efficient visual searching of areas with a depth of less than 20 to 30 cm. Only areas vegetated with reeds were deeper than this during all of our visits.

5. RESULTS

No Western Swamp Tortoises were located. One Oblong Tortoise (*Chelodina oblonga*) was captured in Swamp 4 (area D).

6. THE DAMPLANDS AND SWAMPS AS WESTERN SWAMP TORTOISE HABITAT

6.1 The damplands

We consider that all areas shown as 'damplands' in the EPA report are not suitable swamp tortoise habitat. There are two reasons for this assessment.

1. Period and depth of standing water.

All dampland areas are very shallow and in 1992 held water for only a short time during the winter and spring. Areas 5, 6 and 7 had extensive shallow water (< 5 cm) present during our September 11 (day 255[1]) visit. By 13 October (day 287) very little water remained and by 16 October (day 290) all were dry except for a pool in a firebreak into which water was flowing from cleared land to the north. This pool was dry on 21 October (day 295).

Areas 1, 2, 3 and 10 were dry on 13 October (day 287) and area 9, which was examined later is considered from its vegetation and appearance to have been dry on this date.

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[1] days of the year are provided to facilitate comparison with Figures 2 to 4.

A typical standing water profile for EBNR and for two swamps at TSNR is given in Figures 2 to 4. In 1992 EBNR contained water until late November (*ca* day 330), East Swamp at TSNR contained water until the first week of October (*ca* day 280) and South West Swamp at TSNR still had water in mid-December (*ca* day 350). (East Swamp is to be supplemented from groundwater, see below.)

It should be noted that, although both nature reserves support or supported populations of Western Swamp Tortoises, neither provides an ideal period of standing water for them. Desirably, standing water should be present until at least mid-December, after nesting takes place (latter half of November, early December), and that it is proposed in the Recovery Plan to dig deeper swamps at EBNR and to experimentally supplement from groundwater two swamps at TSNR, even though the latter action may lead to a deterioration in the water quality.

2. Swamp vegetation.

All the 'dampland' areas are densely vegetated with shrubs and, in some cases, with trees and blackboys (*Xanthorrhoea preissii*). The dense vegetation and the presence of blackboys shows that the damplands are very ephemeral. Dense vegetation is also considered to be unsuitable for Western Swamp Tortoises, which need relatively open areas in which to move and forage.

6.2 The swamps

We consider that the swamps are not suitable Western Swamp Tortoise habitat. There are two reasons for this opinion.

1. Swamp type and vegetation.

The swamps are mostly deep with dark, tannin-stained water and are most are vegetated with *Baumea articulata* reeds. Western Swamp Tortoises have never been located in this type of swamp, even though similar swamps are common on the Swan Coastal Plain and are located relatively near (in terms of the tortoises' walking capabilities) known tortoise populations. These swamps are inhabited by the long-necked Oblong Tortoise (*Chelodina oblonga*), which is occasionally also found in swamps inhabited by Western Swamp Tortoises.

Some of the area of the Swamps, particularly Swamp 4, have areas of reeds, but also have areas vegetated with fairly dense shrublands, dominated by *Pericalymma ellipticum*, somewhat reminiscent in appearance to some swamps at TSNR, which are vegetated with open shrublands of *Melaleuca* spp. (e.g. *M. viminea* and *M. teritifolia*). However, the former areas do not seem to support the quantities of tortoise food found at TSNR (see below).

2. Food availability.

Western Swamp Tortoises are carnivores, eating only live food, mainly invertebrates such as crustacea, aquatic insects and the larvae of terrestrial insects. They require large quantities of invertebrates, especially during late spring and early summer when fat stores are laid down for the following summer and autumn aestivation period, and when the females' follicles develop and they ovulate and lay their eggs. Inspection of swamps that contained water during late October and November revealed that they had little invertebrate biomass. At this time water in swamps at EBNR and TSNR contains copious amounts of invertebrates, concentrating to an almost soup-like appearance as the swamps dry.

7. SAWPIT GULLY

Most of the two arms of Sawpit Gully Creek are narrow and densely vegetated with an upper storey of flooded gums (*Eucalyptus rudis*) and paperbarks (*Melaleuca preissii* and *M. raphiophylla*) and, further away from the water, Coojong (*Acacia saligna)*. The lower storey along the creek itself is mostly dense with rushes and bracken. At the time of our visits, the creek water was murky, with many dead leaves and twigs, and by November it was smelly. Western Swamp Tortoises have not been found in this type of habitat. At EBNR, where tortoises have been radio-tracked, they avoided the semi-permanent water in the Ellen Brook, aestivating underground within 100 - 200 m of pools in the Brook.

At its western extremity the creek becomes shallow, with extensive areas flooding into it after heavy rain. These areas are described above under 'damplands'.

8. CONCLUSION

The searches for Western Swamp Tortoises in the Ellenbrook Development Project Area were unsuccessful. Our experience in searching for tortoises in tannin-stained water at TSNR and in slightly muddy water at EBNR suggests that we would have located tortoises in the search area if a population had been present. Locating tortoises when they are present at very low density can be difficult and is time-consuming, and our results do not prove that no tortoises were present in the area.

It is our opinion that the area does not contain suitable habitat for this threatened species.

9. REFERENCES

ANPWS (1991). List of endangered vertebrate fauna, April 1991. Australian National Parks and Wildlife Service, Canberra.

Burbidge, A.A. (1967). The biology of south-western Australian tortoises. Ph.D. Thesis, University of Western Australia, Nedlands.

Burbidge, A.A. (1981). The ecology of the Western Swamp Tortoise, *Pseudemydura umbrina* (Testudines, Chelidae). *Australian Wildlife Research* **8**, 203-222.

Burbidge, A.A., Kuchling, G., Fuller, P.J., Graham, G. and Miller, D. (1990). The Western Swamp Tortoise. Western Australian Wildlife Management Program No. 6, Department of Conservation and Land Management, Perth.

Burbidge, A.A. and Kuchling, G. (in press). Recovery Plan for the Western Swamp Tortoise Pseudemydura *umbrina*. Western Australian Wildlife Management Program No. ?.

EPA (1992). Ellenbrook urban rezoning, subdivision and development - Shire of Swan. Bulletin 642, Environmental Protection Authority, Perth.

Feilman Planning Associates (1992). Ellenbrook Management Pty Ltd. Ellenbrook Public Environmental Review Report. Vols 1 - 5.

Groombridge, B. (1982). *The IUCN Amphibia-Reptilia Red Data Book. Part I. Testudines, Crocodylia, Rhynchocephalia.* IUCN, Gland, Switzerland.

IUCN/SSC Tortoise and Freshwater Turtle Specialist Group (1989). Tortoises and Freshwater Turtles. An Action Plan for their Conservation. IUCN, Gland, Switzerland.

Mace, G.M. and Lande, R. (1991). Assessing extinction threats: towards a reevaluation of IUCN categories. *Conservation Biology* **5**, 148-157.

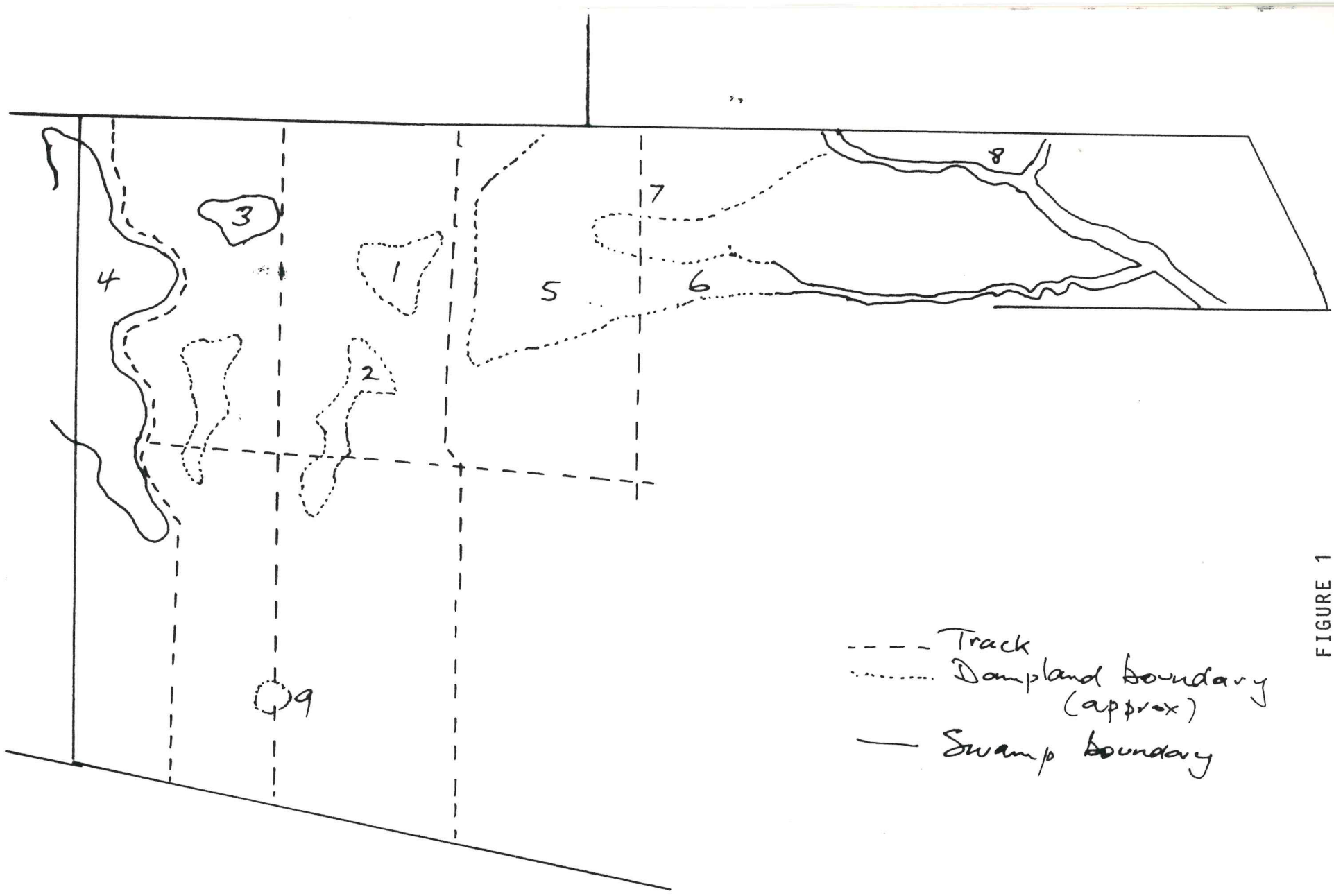

FIGURE 1

ELLEN BROOK NATURE RESERVE
WATER DEPTHS - GAUGE 1 - 1991

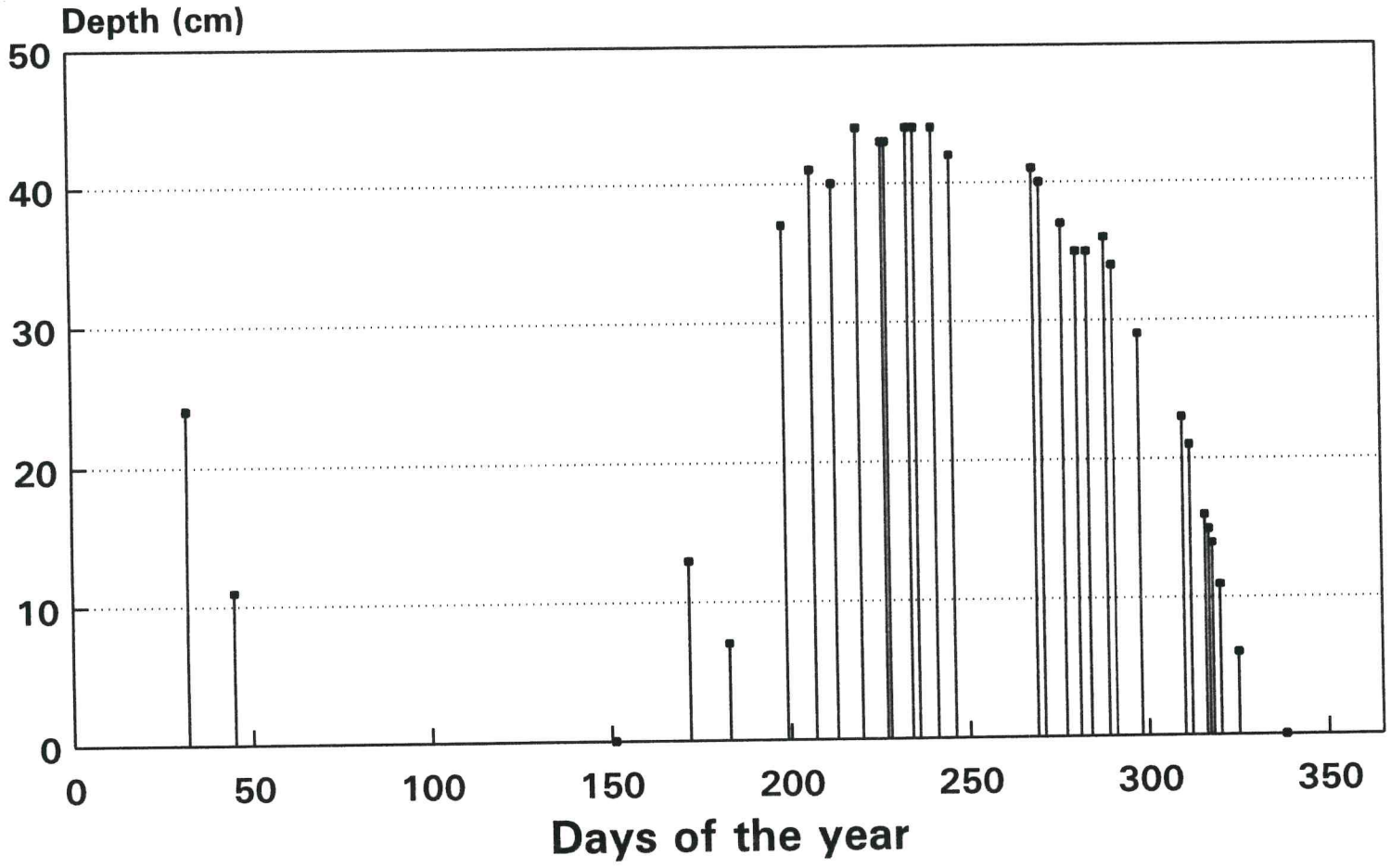

FIGURE 2

TWIN SWAMPS NATURE RESERVE
EAST SWAMP - 1991

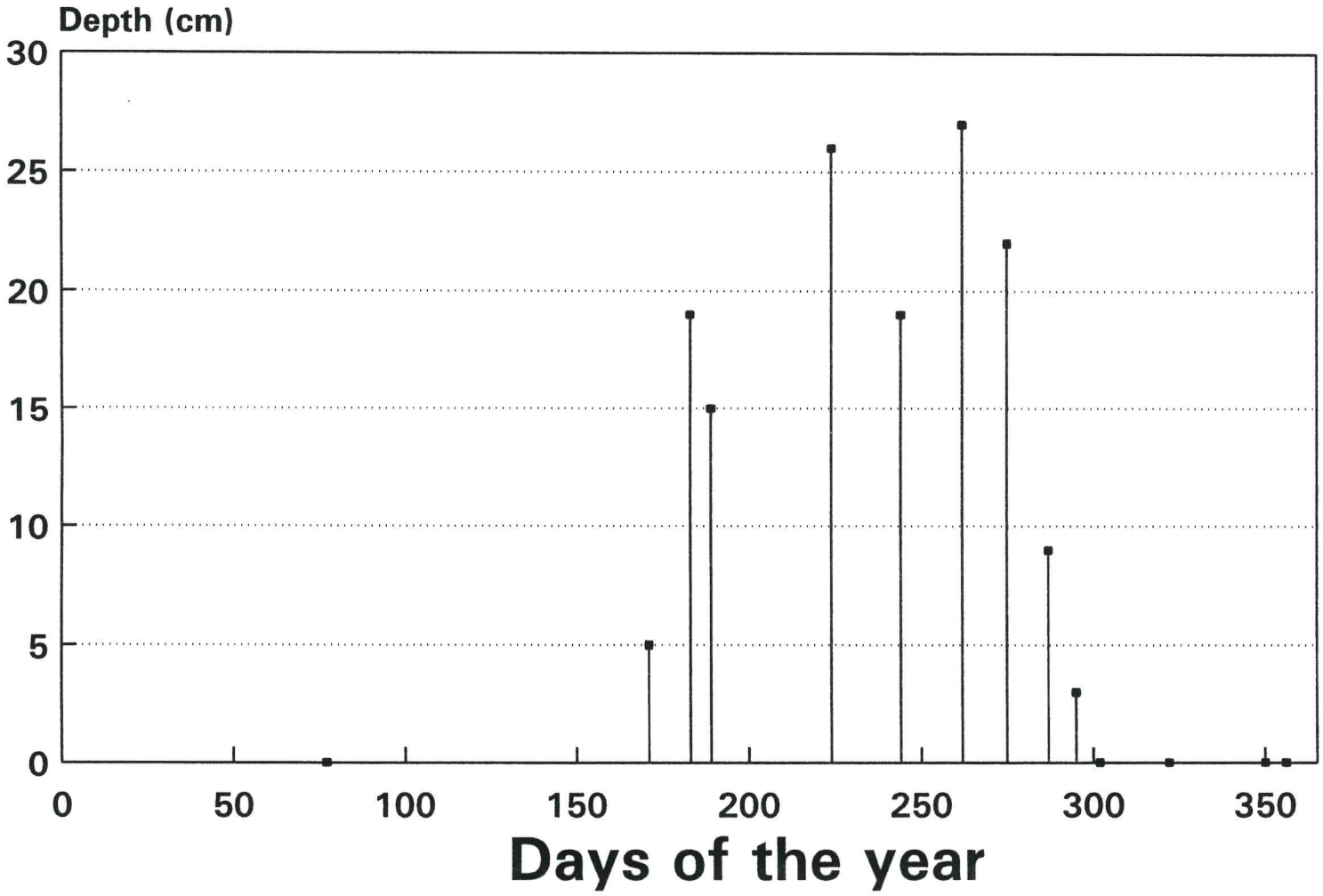

FIGURE 3

TWIN SWAMPS NATURE RESERVE
SOUTH WEST SWAMP - 1991

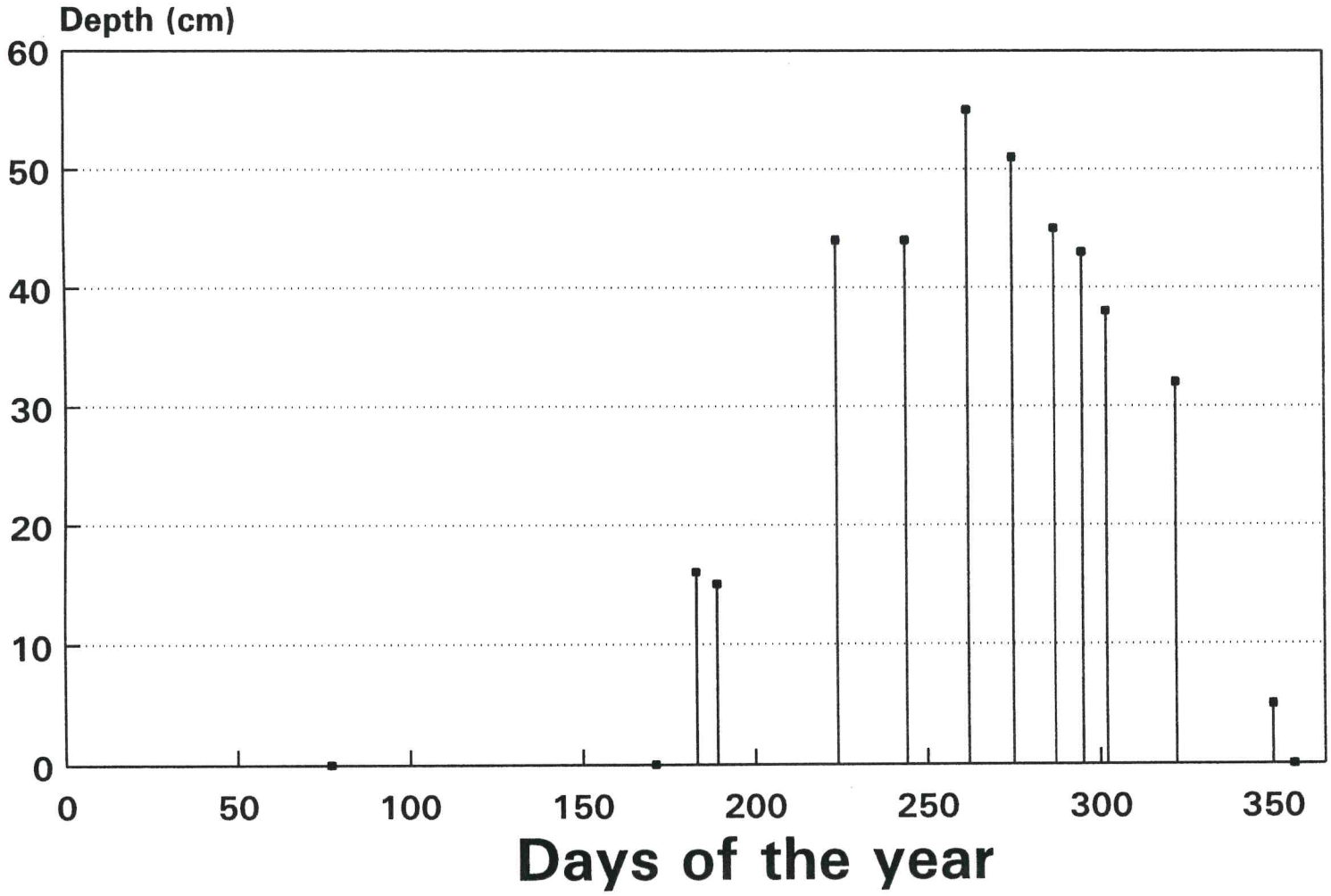

FIGURE 4