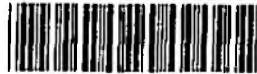


**DISTRIBUTION OF AZOLLA
IN THE
GREAT OUSE CATCHMENT.**

A Report by the Central Area Biology Laboratory.

ENVIRONMENT AGENCY



102599

AZOLLA IN THE GT OUSE CATCHMENT

(WITH PARTICULAR REFERENCE TO THE MIDDLE LEVEL)

1 INTRODUCTION

Following the Central Area Fisheries Advisory Committee meeting on the 26 September a request was made to investigate the distribution of the Water Fern (Azolla Filiculoides) in the Middle Level system. Fish mortalities in the Forty Foot Drain and in the Twenty Foot River were suspected to have been associated with its occurrence.

Accordingly surveys of the main drains in the Middle Level system were carried out on 30 September 1991 and 1 October 1991. Approximately 60 sites were inspected and the occurrence and abundance of Azolla noted. In addition Central Area staff were requested to supply information on sightings in other parts of the Great Ouse catchment.

This report summarises the findings of those surveys and gives information on the biology and on the control of Azolla. A brief account of the occurrence and distribution of Azolla in the Middle Level system since 1988 is also given, based on information provided by Geoff Cave, of the Middle Level IDB.

2 Distribution of Azolla, October 1991

Azolla was found to be widely distributed throughout the Middle Level system, see Figure 4. It was found throughout the Forty Foot Drain, the Sixteen Foot Drain, in the River Nene, Old Course, the High Lode and profuse growths have been reported by the Middle Level IDB in the New Dyke, Monk's Lode and drains to the east of March - March East Drain and Binnimoor Drain. The occurrence of Azolla in other, smaller drains must also be anticipated.

With water now flowing in the system (see arrows in Figure 4) further distribution of the plant must be expected until winter frosts kill most of it off.

Densities varied from scattered occurrences throughout the Forty Foot Drain between Ramsey Forty Foot and Leonard Childs Bridge to the profuse growths reported in the New Dyke and Monks Lode.

Azolla was also reported in several other watercourse in the Great Ouse Catchment and these are listed in Table 1. Densities varied from marginal cover (River Ouse) to complete cover (River Kym).

3 Implications to Water Quality and Fisheries

It is the heavy growths, such as those reported in the New Dyke and the Monks Lode which can potentially cause problems to water quality and to fisheries.

Low dissolved oxygen levels can be brought about by extensive Azolla cover as the surface growths will impair oxygen transfer to the water from the atmosphere. Where such cover is also very thick, then oxygen would be further depleted as underlying fronds die and decay. This situation would be further exacerbated, where there are underlying Cladophora (Blanket Weed) growths which also die and decay, due to lack of light penetration.

The latter scenario is quite a realistic threat in the Middle Level drains in a dry summer, as Cladophora establishes itself early from late spring, followed by Azolla reaching its greater profusion at the end of the summer/early autumn.

4 Overall Assessment

Azolla appears to have introduced into the Middle Level system in the late 1980s. The first recorded instances occurred in 1988. Its distribution appears to have been variable and sporadic in 1989 and 1990 but this year has been an explosion in its abundance and distribution. With water flowing in the drains its distribution throughout most, if not all, of the main drains can be expected by the time the winter frosts kill it.

Its success this year can be attributed, at least in part, to the recent succession of mild winters and warm, dry summers.

A return to cold winters and summer conditions where water flows more in the Middle Level drains, can be expected to reduce the further distribution and abundance of Azolla. However, Azolla can now be expected to be a sometimes, significant feature of the ecology of the Middle Level drains.

A similar prediction might be made for other parts of the Great Ouse catchment.

Table 1

Reports of Azolla in the Great Ouse Catchment

River Ouse	- Wolverton (Milton Keynes) to Odell (Bedford)
River Ivel	- Sandy
River Cam	- 'The Backs' (Cambridge)
River Kym	- Riseley
Middle Level	- Various

THE WATER FERN - AZOLLA FILICULOIDES

Biology

This tiny plant was introduced from warm regions of North America and is now naturalised in many ponds and ditches in England and Wales. It is a small, free floating fern made up of fronds with rootlets on the undersides. The fronds are from 1 to 2 cm across. In still waters, it can produce dense, floating masses. The fronds are bright green in the summer gradually turning red in the autumn and winter.

Hard frosts and ice will kill the plant but as it produces overwintering cysts, it is always likely to reappear the following summer. The spores in the cysts ripen between June and September.

Control

Azolla can be killed by herbicides such as Glyphosate and Diquat. Repeated applications are necessary however, because of the continual germination of spores throughout the summer and autumn. Control is also only a realistic option in enclosed waters. Flowing water readily breaks up the colonies and carries the tiny plants with it.

THE OCCURRENCE AND DISTRIBUTION OF
AZOLLA IN THE MIDDLE LEVEL SYSTEM

Azolla first came to prominence in the Middle Level system in 1988. The local press reported a 'Mystery Plant' in Town End Pit, at March and a subsequent 'sighting' was made in a pond at Abbots Ripton near Huntingdon.

The Middle Level IDB investigated both incidences, identified the plant as the water fern, Azolla, and treated both waters with repeated applications of herbicide. In 1989 Azolla reappeared in Town End Pit, March and was recognised in the Bevill's Leam in small amounts.

In 1990 isolated occurrences of Azolla were noted, but neither in significant abundance nor in extent.

In 1991, the Middle Level IDB first became aware of Azolla problems in July, when drains to the east of March - March East and the Binnimoor Drains were found to have profuse growths. Subsequently Monks Lode and New Dyke, at the western side of the Middle Level, were found to be similarly affected. With water almost static in the Middle Level system this summer, great profusions of Azolla - 100% cover and several layers deep - developed in these drains.

Following survey by the NRA Biologists at the end of September and beginning of October Azolla was found to be distributed throughout the Forty foot River, the Sixteen Foot Drain, the High Lode and the old course of the River Nene.

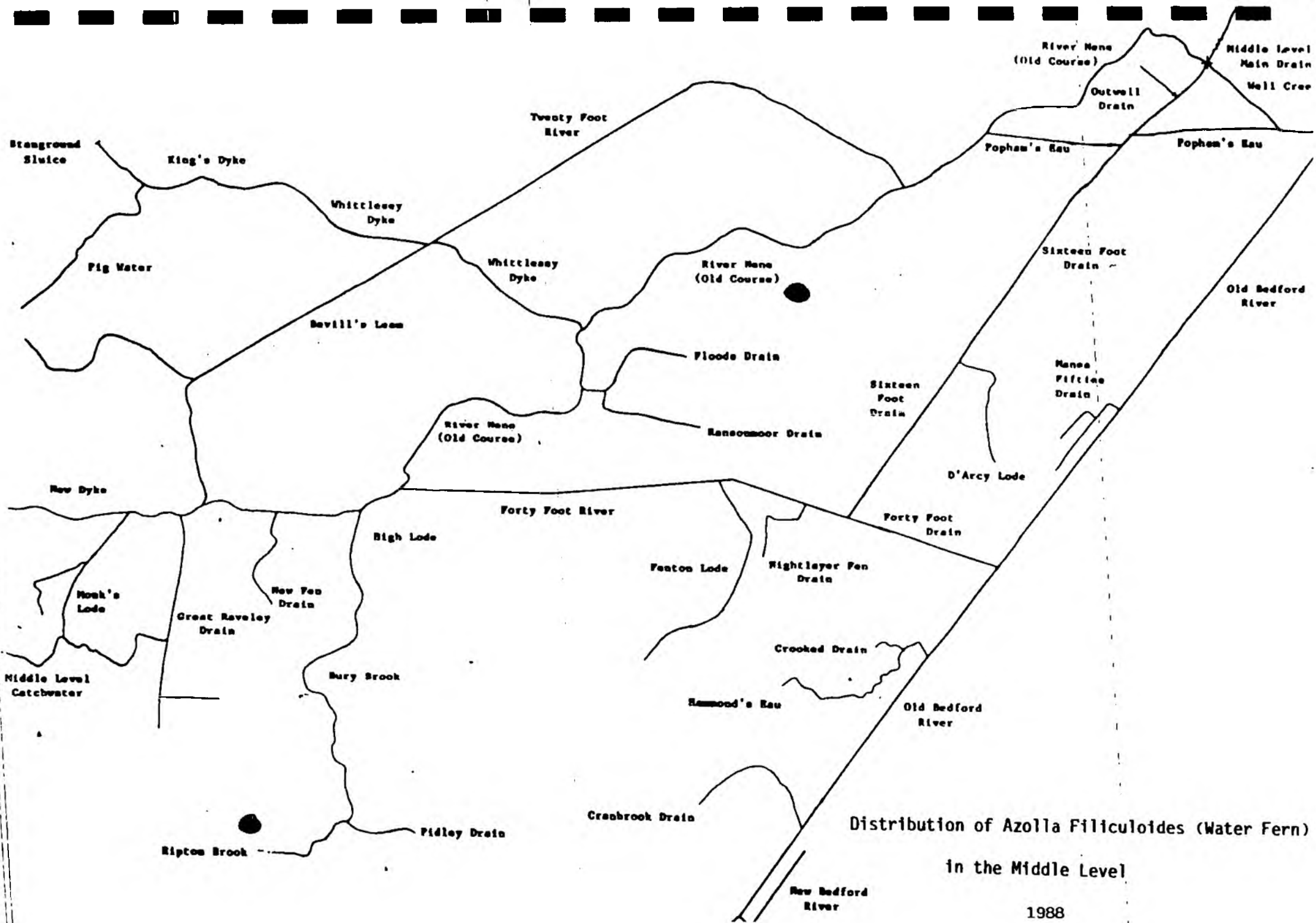
With water now moving in the Middle Level system and with Azolla likely to persist until the frosts and cold weather kill most of it further distribution throughout the Middle Level can be expected.

Prospects for 1992 will depend on the severity of the winter and weather next summer. If the prevailing weather pattern continues - a mild winter and warm dry summer - then profuse Azolla growths can be expected throughout the Middle Level in 1992. If the winter is harsh and next summer is wet (with water moving in the drains in the summer) then a situation of minor isolated occurrences, similar to 1990 might be expected.

In either event, Azolla can now be expected to be a feature of the ecology of the Middle Level system.

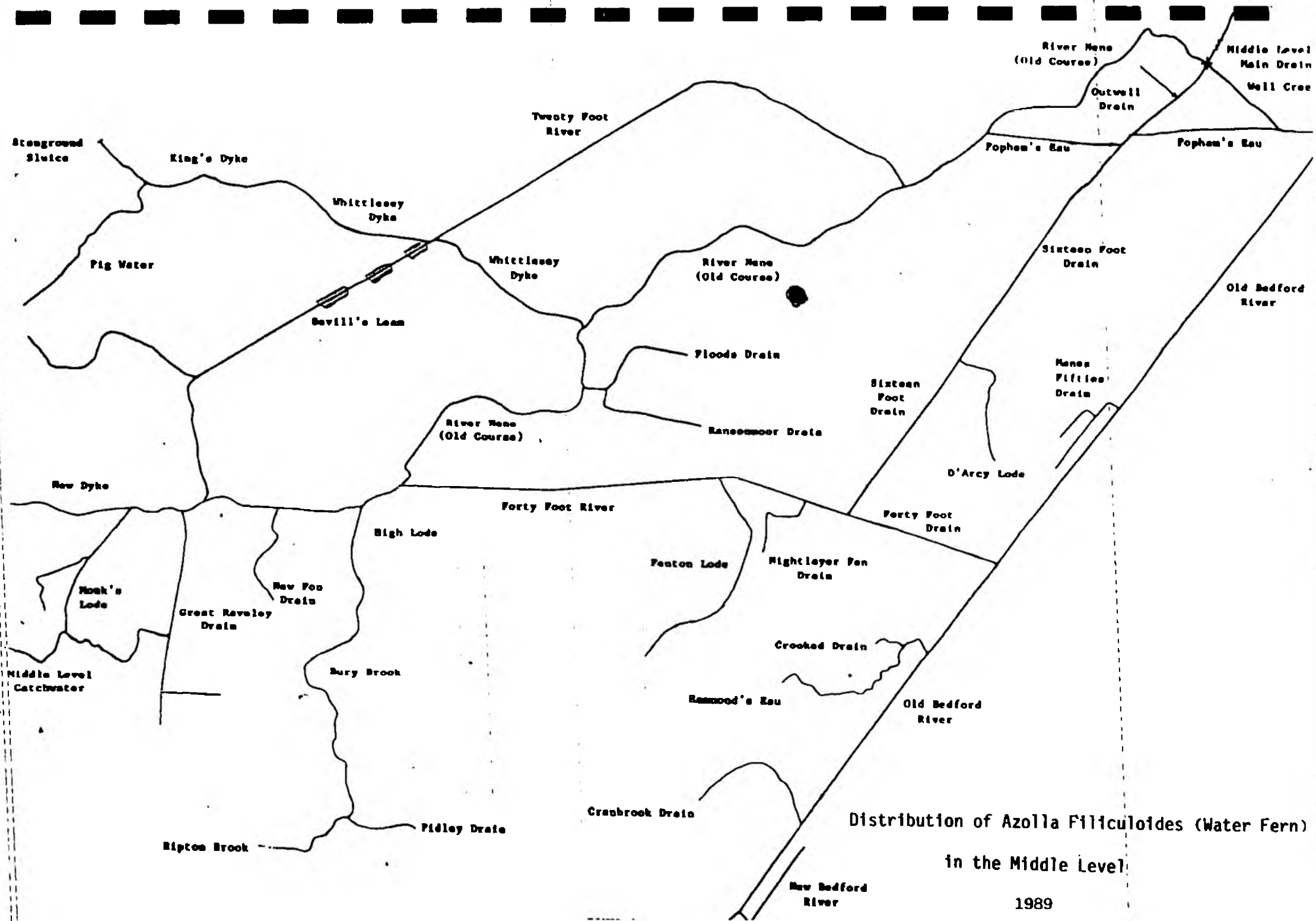


Azolla Filliculoides (Water Fern)

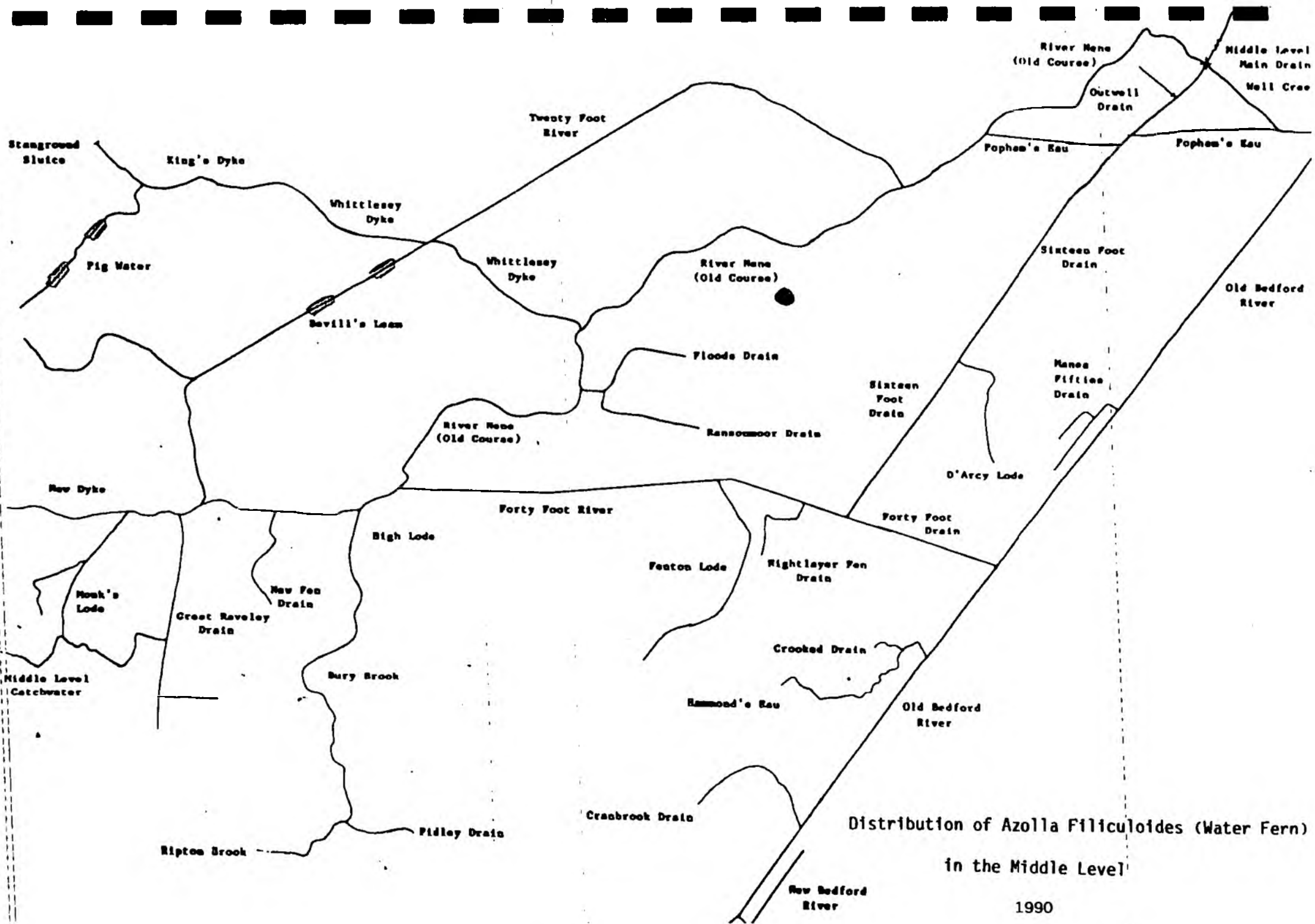


Distribution of *Azolla Filiculoides* (Water Fern)
in the Middle Level

1988

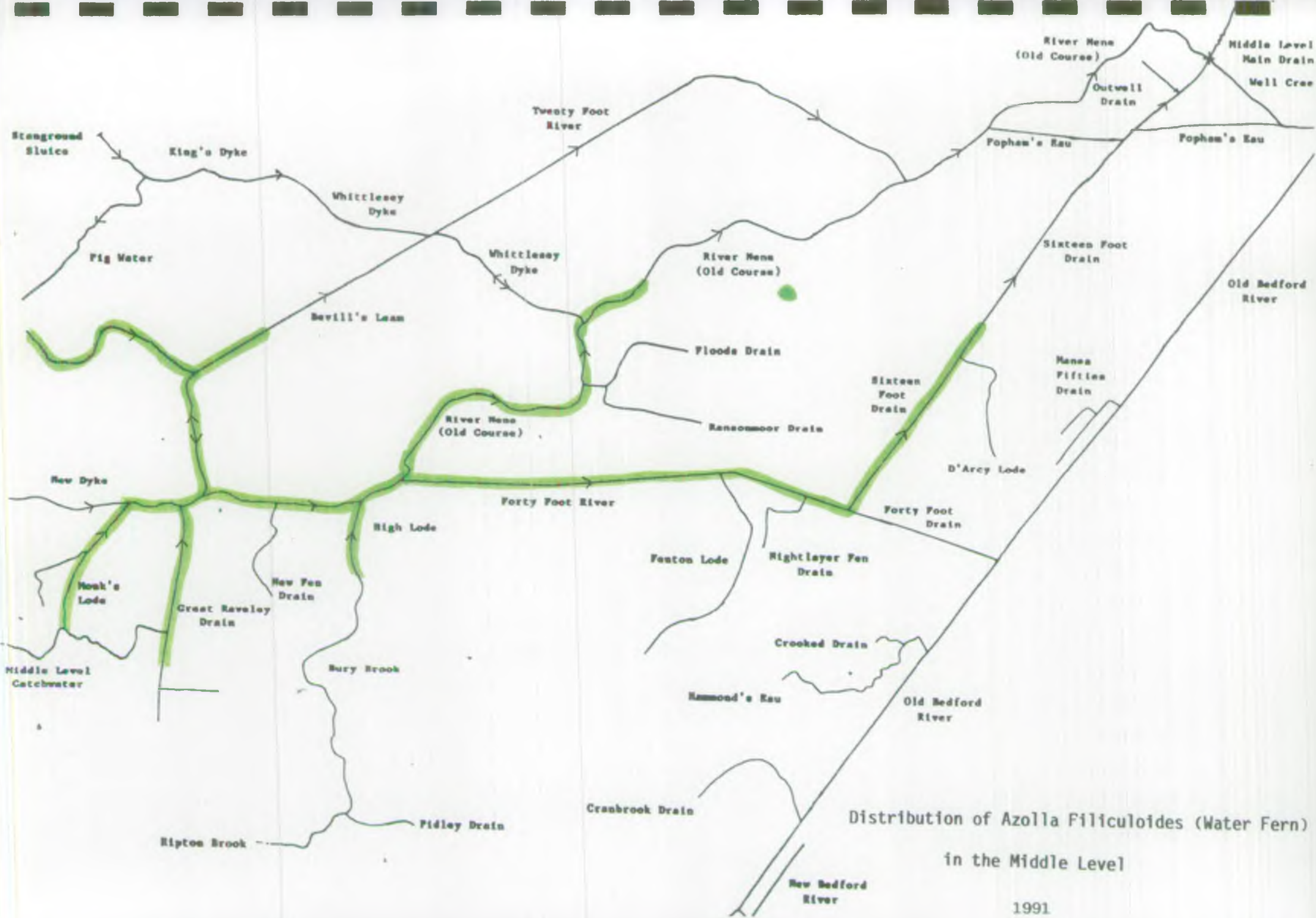


Distribution of *Azolla filiculoides* (Water Fern)
in the Middle Level



Distribution of *Azolla filiculoides* (Water Fern)
in the Middle Level

1900



Distribution of *Azolla Filiculoides* (Water Fern)
in the Middle Level