



NATIONAL RIVERS AUTHORITY

SOUTHERN REGION

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RIVER TEST FORUM

31ST OCTOBER 1990

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responsibility for Southern Region

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## INTRODUCTION

Mrs. Karen Morgan, NRA Board Member with  
special responsibility for Southern Region

Lord Crickhowell, Ladies and Gentlemen, may I extend a warm welcome to all those who know and love the River Test - that most magnificent of chalk streams, and are concerned about its welfare. You have expressed this concern in a manner both vigorous and articulate, through correspondence and through the press and media. The NRA shares those concerns and has arranged this meeting to discuss them with you.

The NRA is a public body; we are committed to being open. In our first year we have published a number of substantive reports, including our first Annual Report summarising our achievements, and our Corporate Plan which sets out our intentions for the future. We openly discuss issues that concern us and concern our public.

On behalf of all my colleagues I welcome you here tonight.

## OPENING ADDRESS

Lord Crickhowell, Chairman, National Rivers Authority:

Ladies and Gentlemen. It is a particular pleasure to be here today. It is quite clear from my correspondence files that there is a widespread affection and concern for the River Test. I am very much aware of the fact that those who express concern have an enormous amount of knowledge and experience of the river going back many years. The meeting tonight has been arranged to bring together all this accumulated experience in order to reach the widest possible understanding of the river and its future management.

I suppose it is flattering that so many of my correspondents should assume that within a year of our taking over our new responsibilities we would be able to come up with solutions to problems that they assert have been getting worse for at least 40 years. One correspondent went as far to imply that we should annihilate the entire non-fishing population of the Test catchment!

My recent Laphroaig lecture addressed some of these issues.

The condition of our rivers is critically dependent on volume and flow. I refer to the pressures that arise because we live in a crowded island and these pressures are particularly severe in the South and East where the rainfall levels are also much lower than in the West and there is a greater dependence on aquifers. Like so much else in our inheritance, there is a great deal that causes us concern. Abstractions and existing rights to abstract are unsatisfactorily related to the availability of supply. Demands for water mount all the time and pressure on many of our rivers and the aquifers that supply them is very severe. Sadly some streams, particularly in the chalk regions, have ceased to exist altogether or have been reduced to mere trickles. We are at work on the preparation of a national policy designed to address these problems which may well have to include the withdrawal of existing abstraction rights, compensation schemes recovered through charges on the Water Resources Account, and transfer schemes covering greater distances than has been thought economically feasible in the past. At present we often find a situation where water costs more in parts of the country such as Wales where it is abundant but where the engineering costs of supplying it are high, but if we are to ease the mounting pressures in the crowded South East increasingly, charging schemes must reflect not only the cost of providing a scarce resource but the damage that is being done to the environment.

In the meantime we have identified the 40 most severely affected rivers and have started a priority programme for the 20 that we regard as being in the most critical condition. For example, in the Southern Region we have designated 6 rivers for investigation, with the Darent and Wallop Brook taking priority. We are letting contracts for 3-4 month investigations of the Wallop Brook and the Bourne Rivulet; we have linked these two tributaries of the Test because of their similarities. A similar approach would then be taken with the Meon and Hamble in Hampshire next year. Solutions for the problems of the Stour/Nailbourne are linked with plans for a major new reservoir.

The Test by all standards of comparison that we have is a very clean river in good condition with the results of biological surveys showing a diverse and abundant fauna typical of very clean rivers. Yet when I wrote a letter saying just that in June this year, I brought down a stream of criticism on my head. In retrospect I can see that I would have saved myself a great deal of trouble if I had added just one or two sentences indicating that I understood the widespread concern among fishermen that things were not as good as they had been and promised further examination of the reasons for their anxiety. However, my failure to do so may have proved a blessing in disguise because in addition to the general allegations of blindness, boneheaded stupidity and worse, and some very controversial assertions, there were contributions that revealed a depth of knowledge and experience that we clearly need to harness if we are to obtain a complete picture of the river and its condition. It is to obtain such collective wisdom that we have statutory Regional Advisory Committees, but on this occasion in addition to seeking their advice we have invited all our correspondents and others to this meeting.

The extent of concern about a particular river and the power of a lobby prepared to do battle on its behalf does not necessarily bear a precise relationship to the scale of the problems in comparison with those existing on other rivers. The great and the good and others who fish that river are influenced by a range of factors: some perhaps by purely commercial considerations or the price they pay; many more by a vision, real or imaginary - it does not matter - of one of the greatest of rivers as they think it was or ought to be. They are not concerned with the fact that it may be very good or better than other rivers - they are concerned with absolutes. They believe that there are some things in life and art and nature that are worth preserving and fighting for simply because they are beyond comparison; and who can say that they are wrong? It is an attitude that I have to say poses particularly severe problems for an organisation with difficult choices to make about its priorities and with the statutory obligation to reconcile differing interests. Is this vision; are those commercial interests; are the views of the club subscribers expecting to catch their allowance whatever the conditions more important than the security of supplies of those who live in the towns, or water their gardens along the bank, or operate the fish farms? These are not easy questions to answer and our response should not, I think, be dictated just by the power of a lobby; but it may be of some comfort to those who have campaigned so vigorously that I do strongly believe that among our other priorities we have a duty to try and preserve or restore the very best just because they are the very best, and just as we would wish to do if we were dealing with great art or with great music.

The case of the Darent illustrates a chalk stream devastated by over-abstraction. I walked along part of the river this summer on a bed as dry as the floor of this room. This is a particular tragedy - oh lucky Test in comparison! surely we are right as an organisation to be at least as concerned about the virtual destruction of a fishery that should provide good sport for large numbers in Kent and from East London. Our Southern Region regard the Darent as their greatest challenge, not least because what we propose may pose real difficulties for Thames Water. This Summer we persevered in the face of an initial prickly response from the Water Plc.

We asked for and got a hosepipe ban together with a voluntary restriction of abstraction, and recently for the first time they have pumped water back into the Darent to sustain flows. We have been organising an environmental impact survey; we are preparing a Consultant's brief which will particularly investigate the root cause of the problem, the location of boreholes and sewage disposal policy for example, and consider radical solutions including relocating boreholes and revoking licences. Once again the River has its ardent advocates and the Darent River Preservation Society is doing excellent work.

Our effectiveness as an organisation will arise from a combination of effort and expertise in the carrying on of our operations in the Regions, a developing programme of Research & Development, and the pursuit of national policies and strategies designed to achieve long-term improvements to the water environment.

We have pressed for important reforms in planning, land use and agricultural policy, and we have strongly supported the moves towards economic charging policies that go much further than mere cost recovery and which in our view will strongly reinforce the existing systems of regulation. Again we are greatly encouraged that the Government is pressing forward with detailed studies of such charging policies.

I hope that the meeting this evening will reassure you that a great deal is going on. The NRA has acted and I can assure you that it has and will continue to do so with vigour and determination.

## The Current State of the Test Fisheries.

John Chandler, Regional Fisheries Officer

The Hampshire chalk streams are world esteemed, well used and very much appreciated. NRA Southern Region is proud to have them in its area and the staff have a personal commitment to the rivers. In 1990 most fisheries reported an excellent season, the fly hatch has been good as has the weather, but there have been problems and concerns which have centred on the middle reaches of the River Test. These have been the concerns of the trout anglers, but there is still the problem of a declining salmon catch in the lower reaches. Whilst the NRA is proud of its rivers it is not complacent, we recognise there is room for improvement. There are always things that need doing, the rivers are like one's home, the asset is a good one but it has to be maintained, there is always work to be done.

The trout fisheries of the river are managed privately and mostly extremely well. This is a co-operative venture, the trout fishery managed by private owners with the NRA providing help as needed. The salmon fishery is where the NRA must take an active interest, if we do not take care no one will. Over the last 15 years the salmon catches have been declining, but the NRA and its predecessors have been busy meeting the problem. First by introducing fish passes: at Testwood, Nursling, Drawingroom Pool on the Little River, and in Romsey two have recently been built at Abbey Mill and Test Mill. Another two are in progress, Sadlers Mill and Burnt Mill. Once they are complete we will be confident that the salmon can reach most of the river successfully. The second activity for the NRA has been to provide fish counters to investigate the relationship between the movement of fish to flows and other environmental parameters. This year a new aspect has been added to the studies, that of radio tagging salmon entering the rivers. The tags have a range of about a mile and the tagged fish this year have shown that the fish remained in the lower reaches of the estuary during the period of low flows. With the rain they are now moving. The research will tell us which reaches the fish frequent and also where they spawn.

A natural problem faced by these salmon and the native brown trout is that their spawning grounds have tended to silt; chalk streams naturally have a high silt load. Keepers traditionally raked gravels to prepare for the spawning season, but this practice has slipped into abeyance in recent years because of manpower and resource limitations. The NRA is experimenting with mechanical raking, which started ten days ago. The keepers have received this with enthusiasm and we wait to see if salmon and trout make use of these improved gravels.

The NRA also works with the specialist to improve the situation on our rivers. Last year the Institute of Freshwater Ecology looked at siltation in the gravels that salmon had used: these were not in pristine condition. The Ministry of Agriculture, Fisheries and Food has looked at the survival of eggs in the redds, and of emergent fish - their findings suggest that fewer fry emerge from the gravel than would normally be expected, but that once this phase is over, young fish survive well in the river. It would seem that water quality is not a problem for the success of our fisheries.

Riparian owners are also working actively in restocking and river management. Next year they are undertaking a massive restocking of salmon which will have been raised by the NRA from River Test eggs at Kielder Reservoir. These will be planted out early in the summer.

I hope I have shown that where problems are identified the NRA is quick to act, usually in co-operation with others. The special subject of the evening's discussion is the trout fisheries, we look forward to hearing your views as to how a co-operative solution can be found to the river's problems.



## Water Quality of the River Test: The way ahead

### Mike Beard, Environmental Protection Manager

I should like to begin by describing the quality of the River in chemical and biological terms by reference to the results obtained from 11 sampling points distributed along the 68 km from source to sea and then to continue to look at the two specific sources of complaint namely, turbidity and blanket weed, to see where the problems may lie and finish with a few ideas about what we might do about them.

The target for river quality in the Test is Class I under the NWC scheme (Fig.1). This Class is achieved everywhere in the river except for Overton where historic difficulties with industrial effluent have been overcome but where low diluting flows in 1989 caused the water to enter Class 2 (Fig.2).

The best chemical indicators of the condition of a river are ammonia and biochemical oxygen demand. In the case of ammonia the low baseline level, around 0.06 mg/l, coupled with the rapid removal of ammonia within a very short distance below significant inputs (from industry at Overton, sewage effluent at Andover and Romsey and the 5 large fish farms between Kimbridge and Romsey) is solid evidence for the good health of the river system.

The same may be deduced from the baseline level of BOD at approximately 1.7 mg/l and a similar rapid rate of assimilation.

Dissolved oxygen averages well above 90% but at Overton the figure is 85%.

Data from invertebrate surveys is available from three sampling occasions in the last twelve months. The average values for BMWP score show the upper river points score above 110 and the middle and lower river sites score above 167. Since scores above 80 are acceptable (particularly in the light of the high score per taxon at all sites) these results must be seen as confirmation of the very good quality of the river water.

Examination of chemical trends occurring at the lowest site on the river during the latest decade, indicate that the concentration of growth nutrients, Nitrogen and Phosphorus has increased in the last 6 years. Analysis of this trend against evidence from the Polhampton site and against river flow, confirms that this enrichment is due to reductions in the volume of groundwater available to dilute the inputs from effluents and from land use. That is, there has been no increase in polluting inputs from any source, but the lower rainfall in the past years has reduced the availability of dilution. The reduction in dilution is explained by the sharp rise in Phosphorus concentration in 1989 which experienced the lowest flow in the decade (Fig.3).

Such rises in nutrient level must be seen in context. The same phenomenon occurred on the River Itchen, most particularly in 1989 and if anything the P levels are rather higher than those on the Test. These levels are about one-fifth of the concentrations found on the River Stour in Kent. Hence this small enrichment should be seen not as cause for immediate concern for water quality but as a pointer to more significant enrichment which could be difficult to manage if the weather conditions of 1989 become common place.

To summarise the water quality condition:

By any standard of measurement the River Test water is in excellent condition in chemical and biological terms, only in the upper river below Overton can any sign of stress be deduced and this area will be afforded special attention in the Authority's new programme of monitoring which for the first time links chemical and biological quality together in the RIVPACS system.

Where then do these problems of turbidity and algae growth stem from if not from water quality?

It is a well-founded concern that the river exhibits prolonged turbidity which extends now into the Summer before clarification takes place. This appears to have occurred in previous times - the 1930s fishing records make occasional reference to late turbidity, but it is a problem for us now.

It is worth noting that turbidity as measured in our laboratories has not changed in the Summer months over 10 years, so that there appears to be no new factor to account for the phenomenon (Fig.4).

Turbidity is primarily dependent upon water velocity and this is seen clearly in the figures provided by Mr Foot at Nursling; In 1989 the river cleared by 1st June (Fig. 5), in 1990 it was not clear until the latter half of July (Fig.6). (Figures from Leckford Estate confirm these dates).

Clearly the extension of the turbid period in 1990 derives from the higher water velocity in summer as the result of poor weed growth failing to slow the water in the spring. But turbidity is dependent also upon other factors, namely the nature of the sediment in the river and the amount of it which is present. Sediment that is resident for long periods may develop upon its surface an organic layer which is itself lighter and more readily suspended than the mineral fraction. Such material was recovered from samples of water exhibiting the well known "colouration" which is the source of so much complaint.

That sediment can remain in the river for long periods seems evident in view of the record of sediment load moved past Testwood in recent years (Fig.7). The figures show 12000 tonnes shifted in 1990 against less than half that value in the preceding five years (one twelfth in 1989).

We conclude that the build up of sediment must be avoided and will explain how we believe this should be addressed, having looked first at the other source of complaining - the Blanket Weed.

Cladophora glomerata is a filamentous alga of unattractive appearance, brown or dark green in colour its fronds can grow to 3 metres in length where they pose a serious nuisance to fishermen.

The alga competes rather effectively with rooted weed and it can be demonstrated that it tends to predominate where the bed is muddy or silty and the flow is moderate or at least not fast. Its growth pattern appears to commence rather earlier than rooted species and it is fairly tolerant of turbidity. Hence in 1989 it did rather well and tended to suppress rooted weed. This aided the disappearance of the weed early in 1990 (although much of this was due to simple scouring by the high winter flows):

The figures which are shown are the results from a weed growth survey carried out in the summer of 1990. The growth pattern at the sites described provides confirmation that the cause of blanket weed growth cannot be attributed to water quality but to the nature of the bed and the speed of flow.

To summarise the findings from this presentation:

1. The water quality is good, judged in chemical or biological terms from source to sea and the health of the river is robust. The area below Overton appears to be subject to stress and may need some help in low flow situations. Particular attention will be paid to this area.
2. Turbidity in the river is dependent principally on velocity of water and we aim to study the dynamics of sediment movement and the nature and source of the sediment. This will enable us to predict the optimum velocities needed in the river to promote self cleansing and to prevent sediment accretion and suppress algal growth.
3. In the longer term the Region's policy toward conservation of water resources in the catchment will preclude further licensing of abstractions in the upper and middle river. Nevertheless it seems likely that some form of support for river flow in very dry periods will be needed to protect water quality particularly in the event of increased effluent loads from any developments. The options will be explored in the Authority's River Catchment Management Plan for the Test and Itchen catchments which is being prepared next year.

All these things NRA can and will do, but all our activities cannot resolve these problems unaided. There is an equivalent role for those who manage the river - we need an agreed plan for the hydraulic management of the river - a Code of Practice whereby it is agreed that owners would:

- a. Cut weed in the Autumn to encourage cleansing winter flows and stimulate spring growth of weed to slow the flow and clarify the water
- b. Optimise water velocities by use of simple traditional structures to encourage cleansing of sediment
- c. Begin to restore and build back the eroded banks so as to narrow the overall width of the river and thereby stimulate higher velocities and make the most of the available water
- d. Protect banks from erosion by cattle and from the growth of clogging plants eg. cress which encourage siltation and encourage erosion.

# CURRENT WATER QUALITY CLASSIFICATION

CLASS	DO	BOD	NH3	USE
1A RECOMMENDED AVERAGE	80	3 1.5	0.3	Potable abstraction
1B RECOMMENDED AVERAGE	60	5 2	0.7 0.5	Game Fishery
2	40	9	0.7	Potable Abstraction Coarse Fishery
3	10	17		Industrial Abstraction Poor Fishery
4	FAILS CLASS 3			Grossly Polluted Likely to cause nuisance



## NWC CLASSIFICATION OF TEST

RQO	85
Testwood (1A)	1A
L bridge	1A
G bridge	1B
K bridge	1A
Leckford	1B
7 stars	1B
Wherwell	1B
E Ashton	1A
Kingfisher	-
Br St (1B) Overton	2
Polhampton	1B

Fig. 2

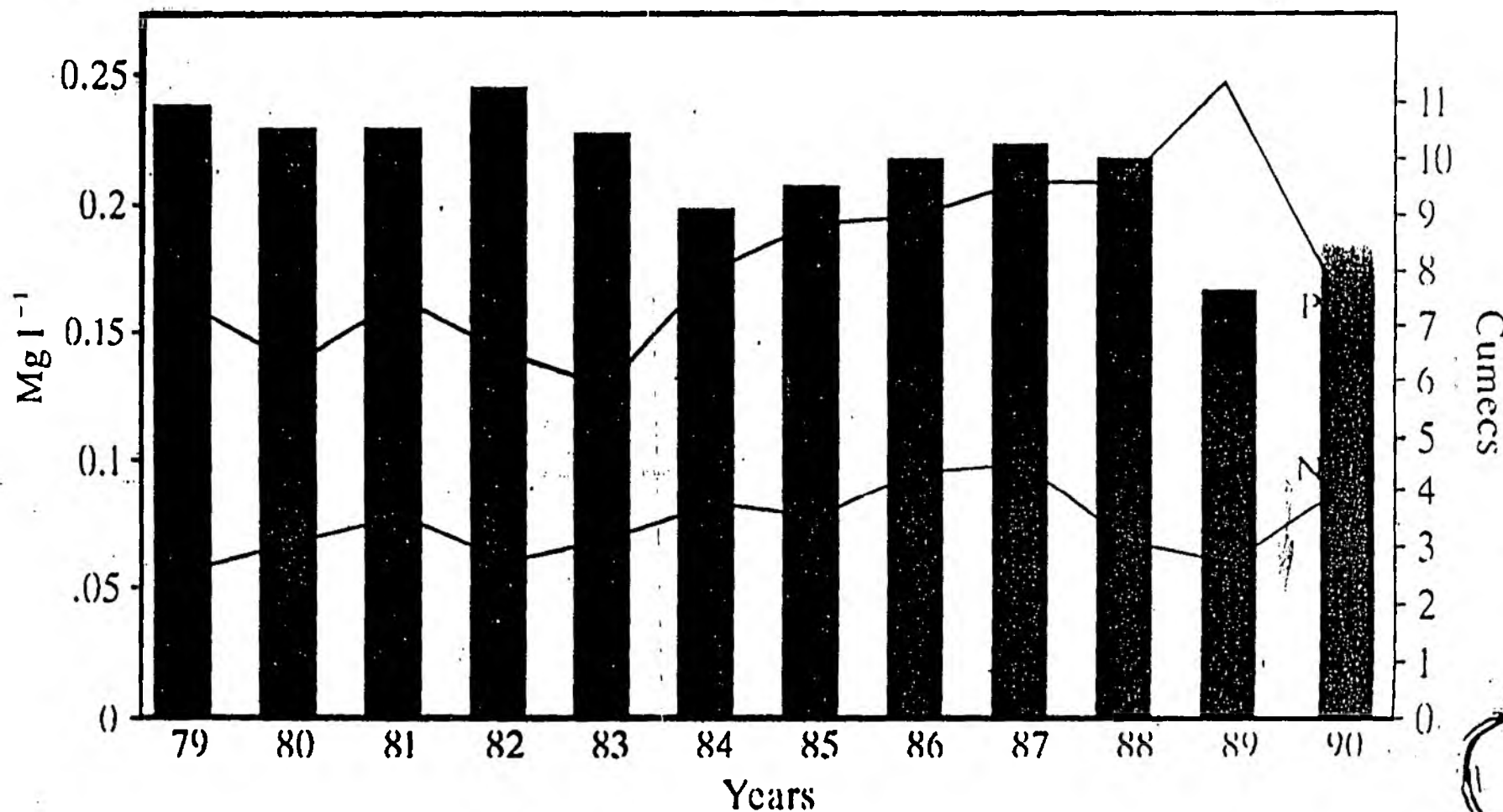
86	87	88	89
1A	1A	1A	1B
1B	1B	1A	1B
1A	1B	1A	1B
1A	1A	1A	1B
1B	1B	1A	1A
1B	1A	1A	1B
1A	1A	1A	1A
1A	1A	1A	1A
-	1B	1B	1B
3	2	1B	2
1B	1A	1A	1B

Fig. 3.

# WATER QUALITY TRENDS AT TESTWOOD 1979 - 1990

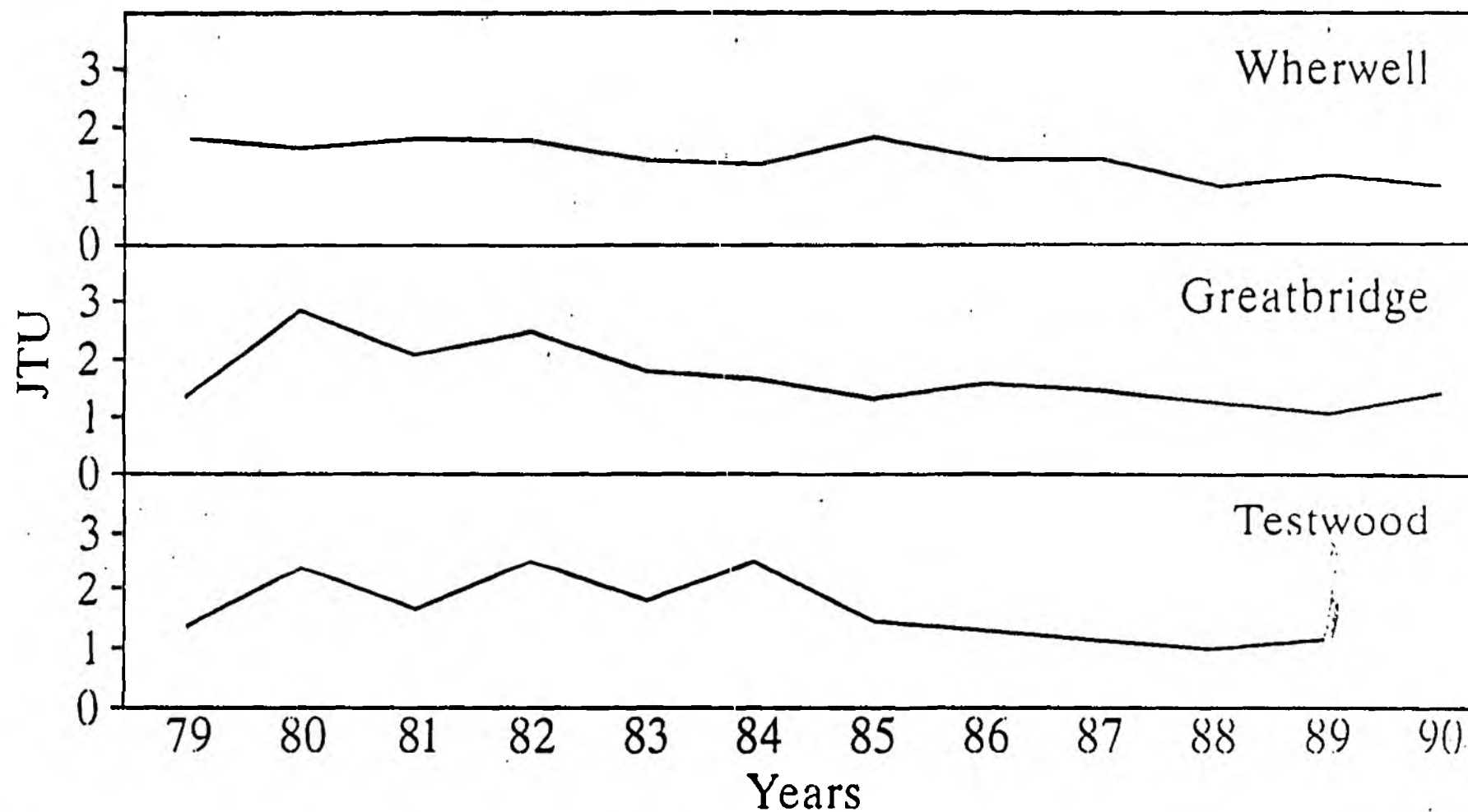
Phosphorus and Nitrogen

Flow at Broadlands



# TURBIDITY IN THE RIVER TEST SUMMER AVERAGE VALUES

Fig. 4.

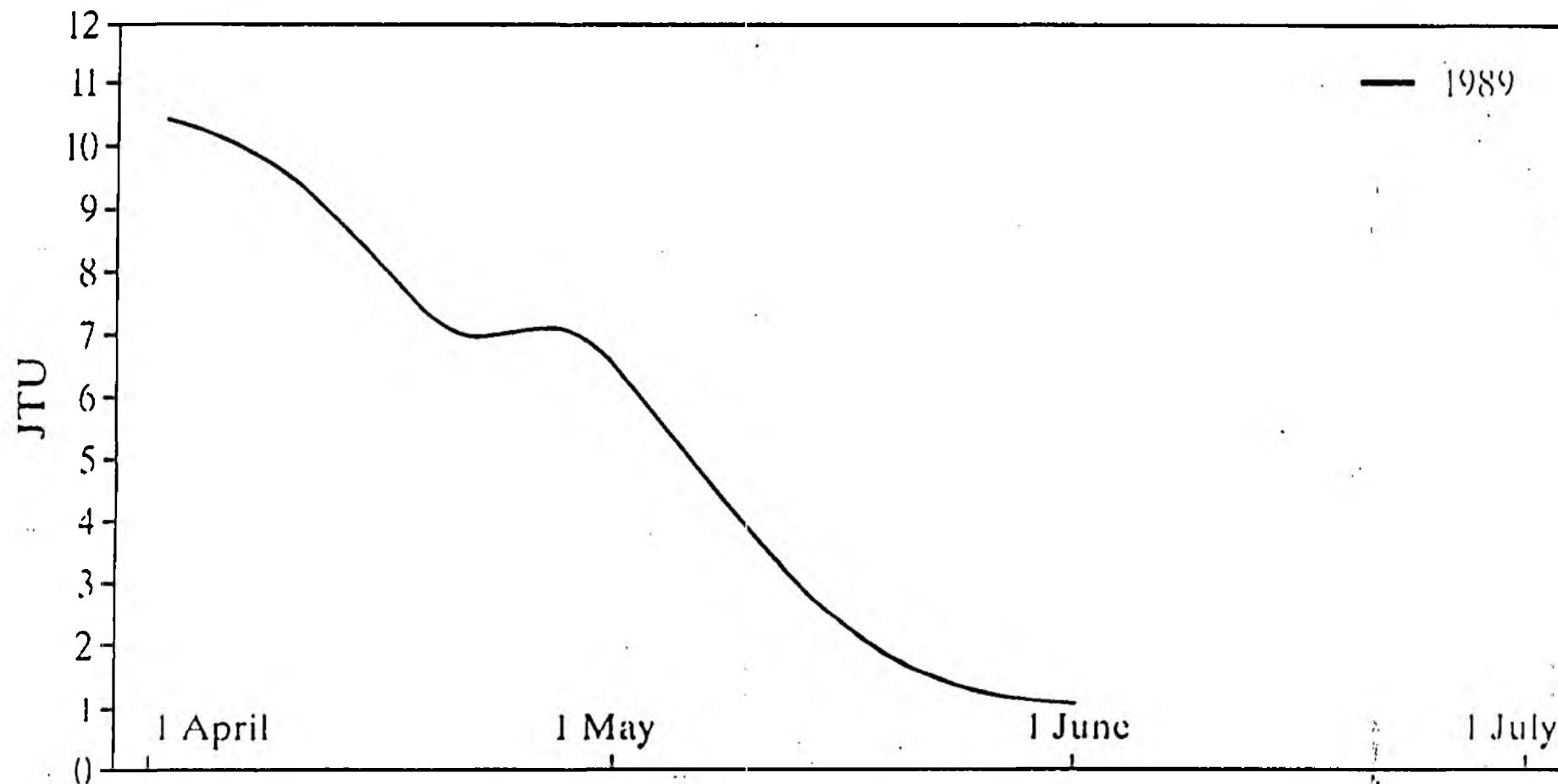


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# TURBIDITY IN THE RIVER TEST AT NURSLING

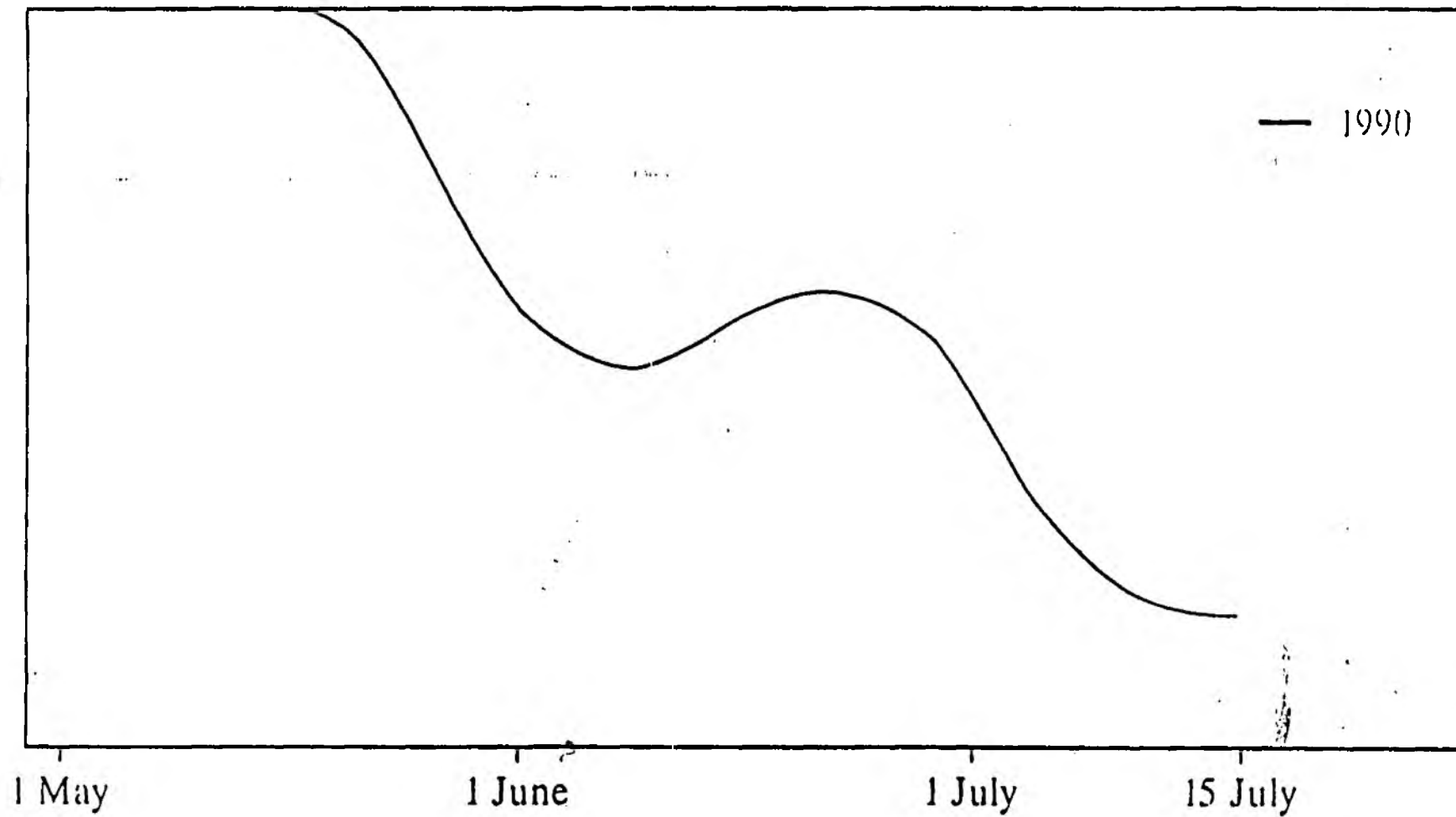
Fig. 5



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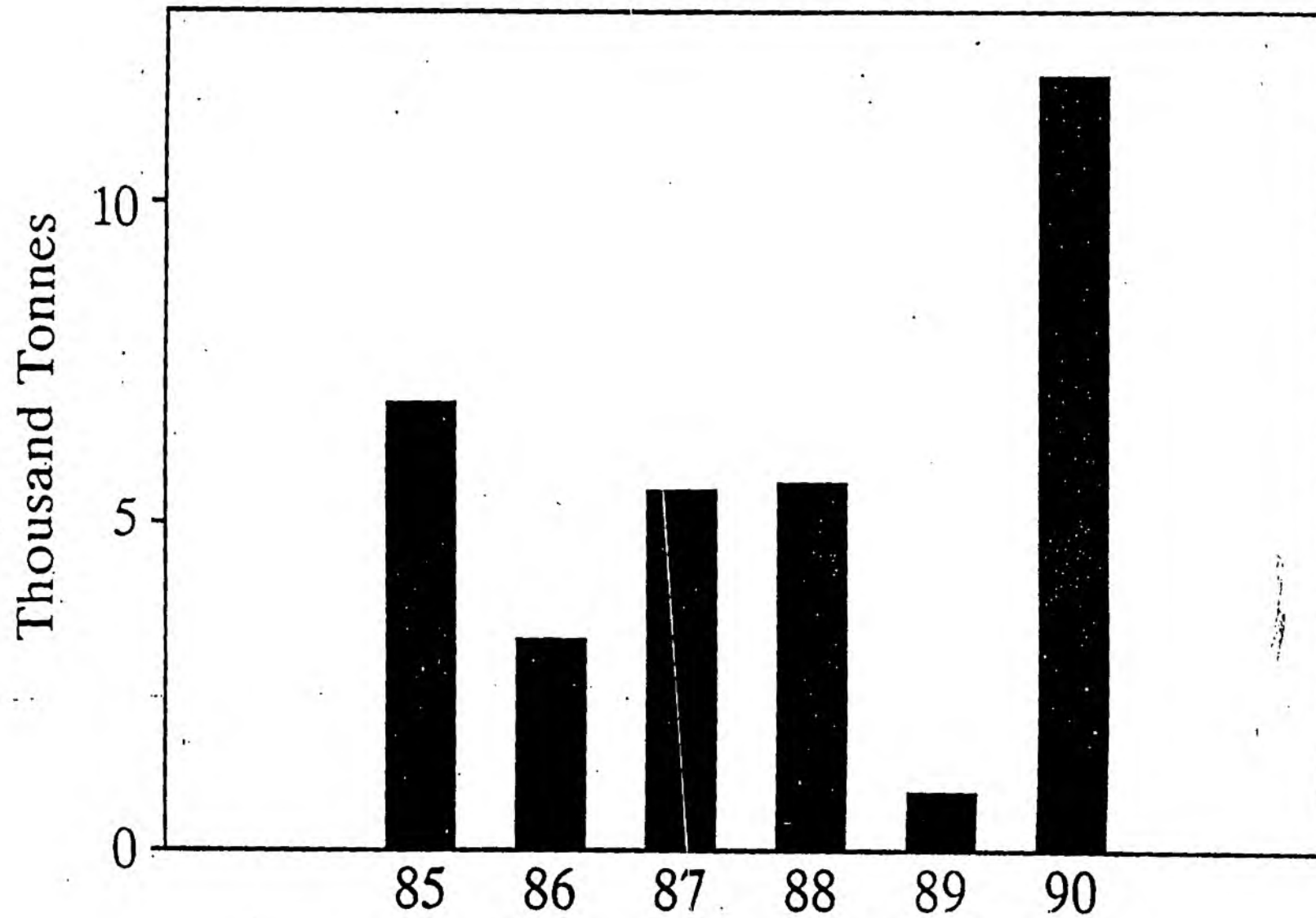
# TURBIDITY IN THE RIVER TEST AT NURSLING

Fig. 6



# SEDIMENT REMOVAL IN THE RIVER TEST TESTWOOD

Fig. 7.



## Water resources in the Test Catchment past, present and future

Peter Herbertson, Resources Manager

It is possible that the reason for the decline of salmon may lay in reduced flows, lower groundwaters or diminishing rainfall or even increased abstraction.

To monitor the river the NRA has flow gauges at Broadlands, Fullerton and Chilbolton. We will also be presenting results today from the rainfall gauge at Otterbourne and from four key groundwater boreholes. Testwood is the major abstraction for water supply at the bottom of the river and is utilised by Southern Water. Small abstractions feed local communities. Sewage treatment works in the catchment are well distributed, this has benefits because water taken into supply locally is returned locally at each centre of population (Fig. 8).

During this presentation we will be using metric units so I will give a quick conversion:

$$1 \text{ mgd} = 4.546 \text{ Ml/d}$$

$$19 \text{ mgd} = 1 \text{ m}^3 \text{ per sec (cumeecs)}$$

If we look at average monthly flows during the period 1963 to 1990 we will see that the minimum flows each year have not reduced over the years to match the salmon decline (Fig 9). The second area to explore is the number and volume of abstractions from the river. The Testwood abstraction licence is for 135 Ml/d and the rest of the licence upstream amount to 246 Ml/d, a total of 381 Ml/d. Licensed abstraction upstream of Testwood is about a quarter of the total flow which is around 972 Ml/d upstream of Testwood. Of the 246 Ml/d water abstracted, only 22 Ml/d (or 10%) is lost from the catchment. The vast proportion of it is known as non-consumptive. This is water which returns to the river such as that from gravel washing, cress beds and sewage treatment works. The amount of loss from the catchment is of the order of 2% of the average flow (Fig. 10). For this reason it would seem unlikely that abstraction contributes to the apparent decline of salmon catches.

A further area to explore is rainfall and its relationship with flow and abstraction. Flow in the river lags behind rainfall with a delay of something like four months as the rain works its way through the chalk aquifer to feed the river springs (Fig 11). If peak rainfall is late in the winter season the flow response of the river in spring is also late.

What do the NRA records tell us about the flow regime? It is easy to assume that low levels and low flows are one and the same thing, but the records tell us otherwise. If we take 50% of average flow as a guideline we can see that the records for Broadlands show that flow has only dipped below this once in 1976. But if we compare level, that is the depth of water, over the same period we find that levels have dropped below 50% average seven times.

That gives us a clue to what is happening on the river, level goes down more frequently than flow, there are times when the level is relatively high for a given flow and these appear to be the times when good weed growth is keeping the level up despite poor flows. At other times when there is less weed growth there are low levels for a given flow (Fig 12).

It appears that these periods follow occasions of high scouring winter flows after which it is probable that the root of weed has not grown back. Examining the 98 year record for rainfall at Otterbourne shows that us that rain giving rise to scouring flows has happened about ten times in the last hundred years (Fig 13). These scouring flows on average occur one year in ten. We believe this is the mechanism which affects weed growth which in turn governs levels.

Another question commonly asked is whether the groundwater has shown a decline in recent years. Looking at the various records we have selected the one closest to the Wallop Brook which is where there is a known over abstraction problem. Between 1963 and 1990 there has been no obvious decline in minimum levels (Fig 14). So considering all these factors we can derive an NRA policy for water resource management in the Test Catchment:

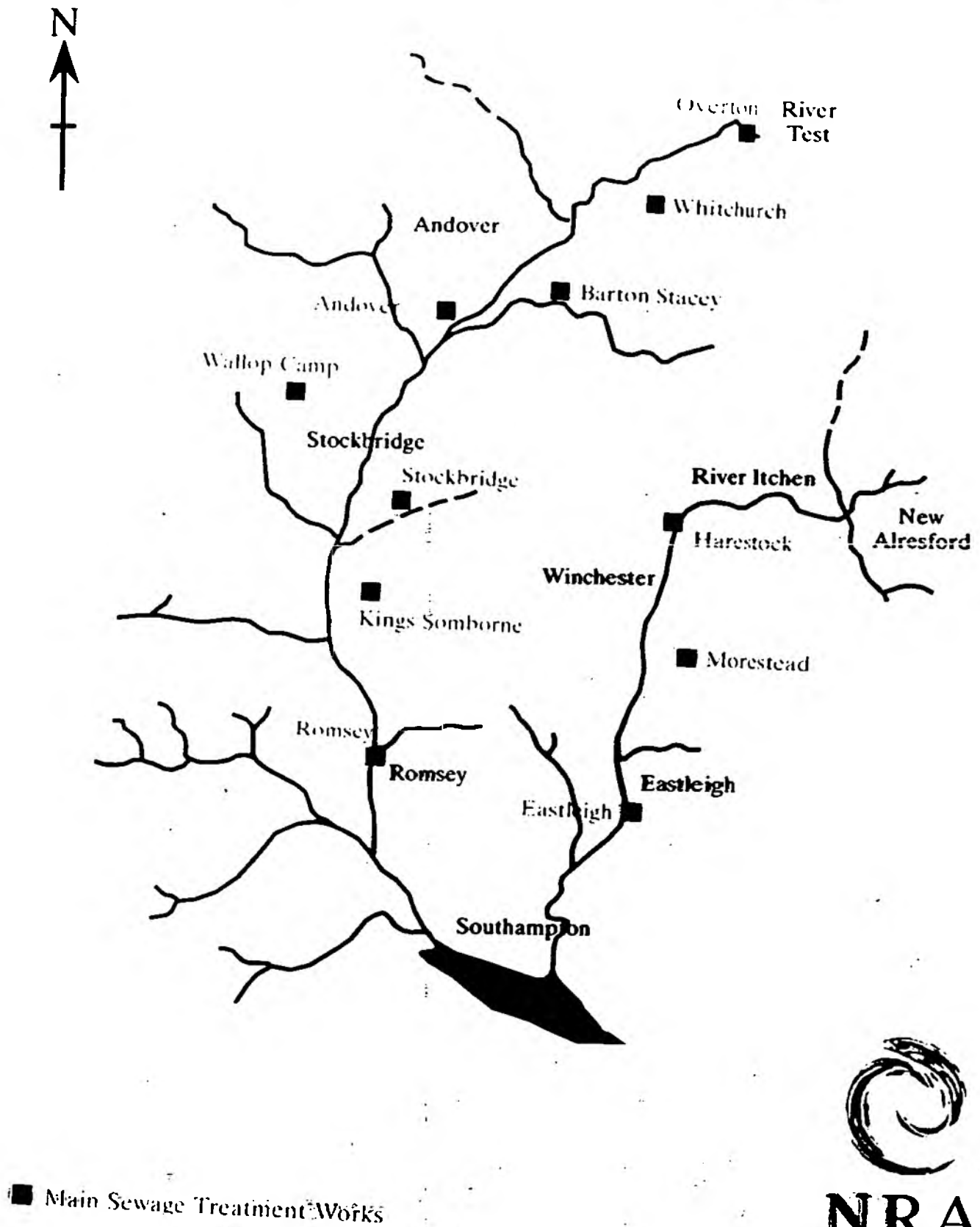
1. No summer licences for consumptive use without prescribed flow and/or winter storage.
2. No new public water supply abstractions upstream of Testwood
3. Small reservoir at Testwood could meet summer peak demands and give security from river pollution.
4. New demands for water in Test catchment (e.g. Andover) to be met by transferring water northwards from Testwood.
5. Test Groundwater Scheme to be investigated to meet highest river water quality standards (Fig 15).

#### Action plan for water resources

1. External audit of Broadlands flow record - especially pre-1963
2. Sediment yield study: hydraulics/land run off.
3. Report on Wallop Brooke and Bourne Rivulet: Over-abstracted catchments (May 1991)
4. Start investigations in 1991 for a Test Groundwater Scheme.

# THE RIVER TEST: MAIN SEWAGE TREATMENT WORKS

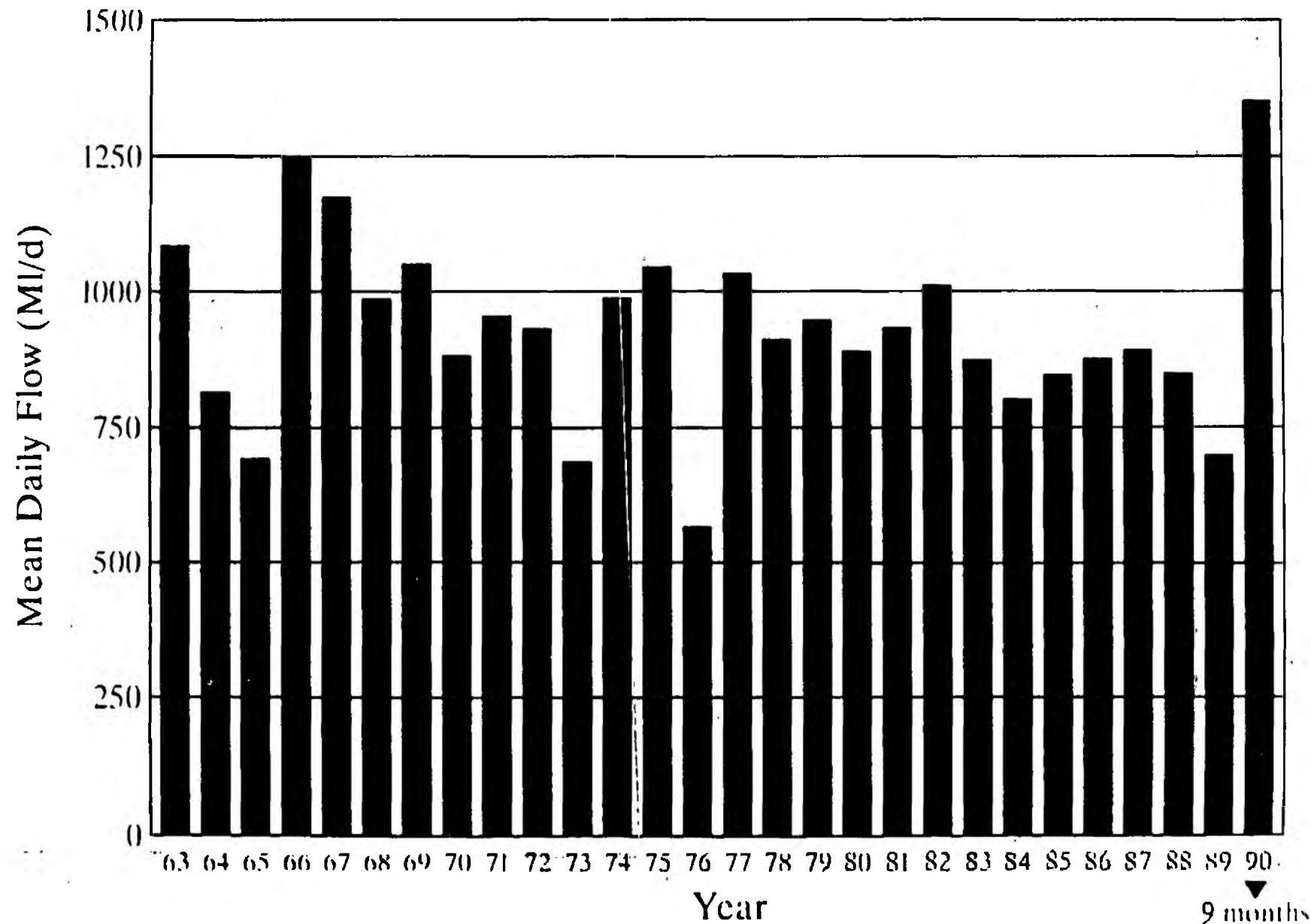
Fig. 8



# RIVER TEST AT BROADLANDS

## MEAN ANNUAL FLOW 1963 - 1990

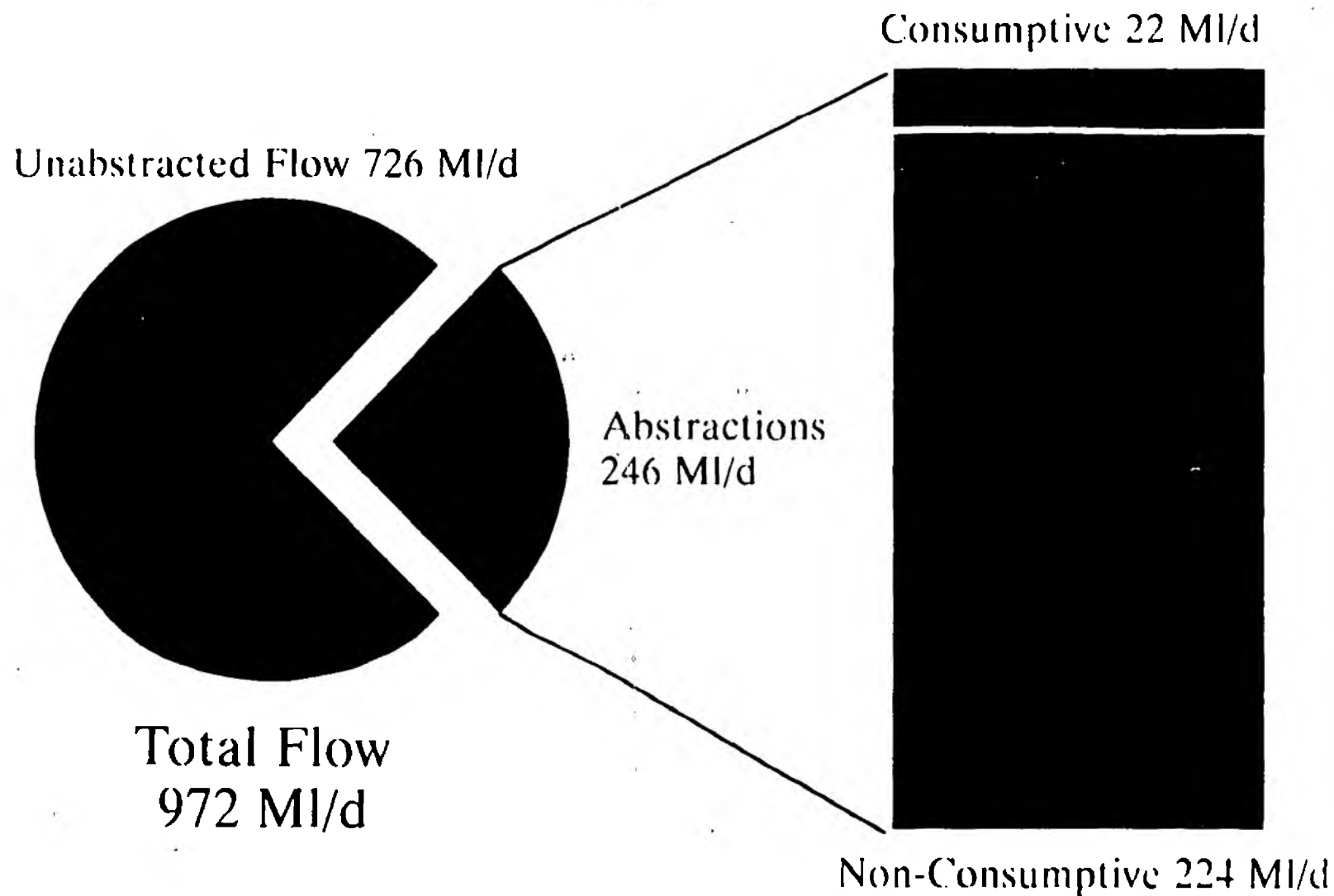
Fig. 9



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# RIVER TEST CATCHMENT: FLOWS AND ABSTRACTIONS (UPSTREAM OF TESTWOOD)

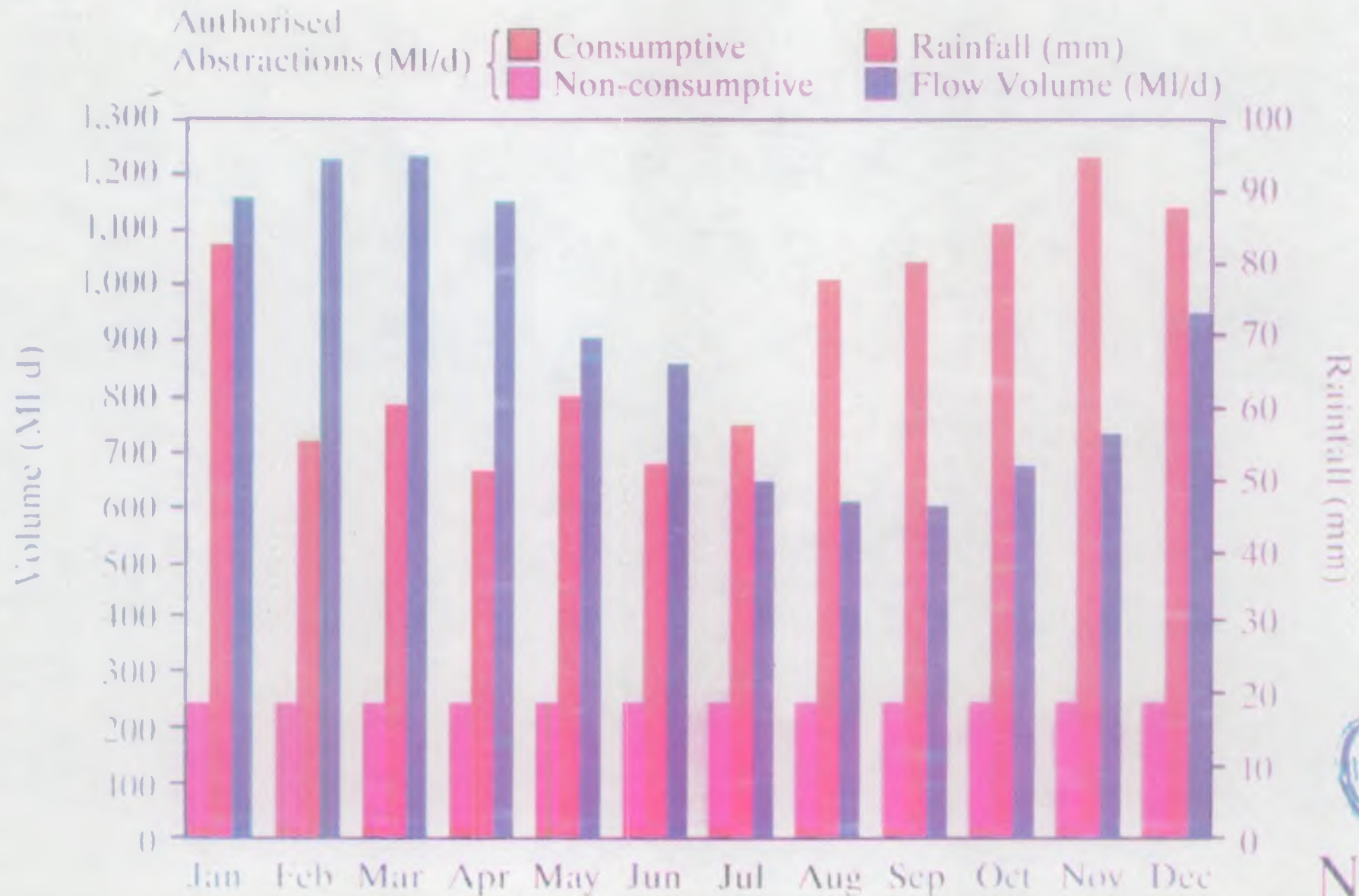
Fig. 10



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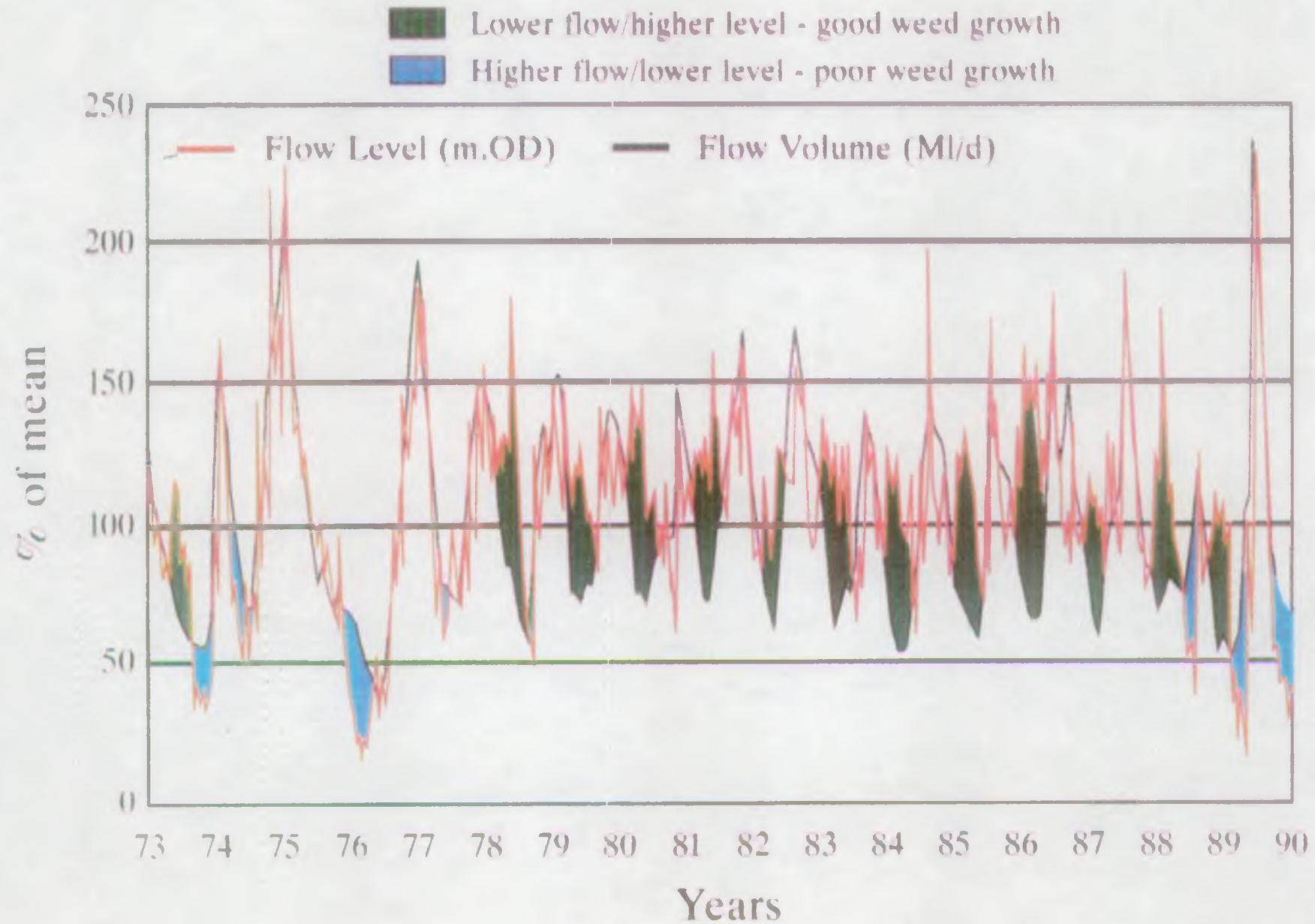


# TEST CATCHMENT: THE RELATIONSHIP BETWEEN AVERAGE RAINFALL, FLOW AND ABSTRACTION



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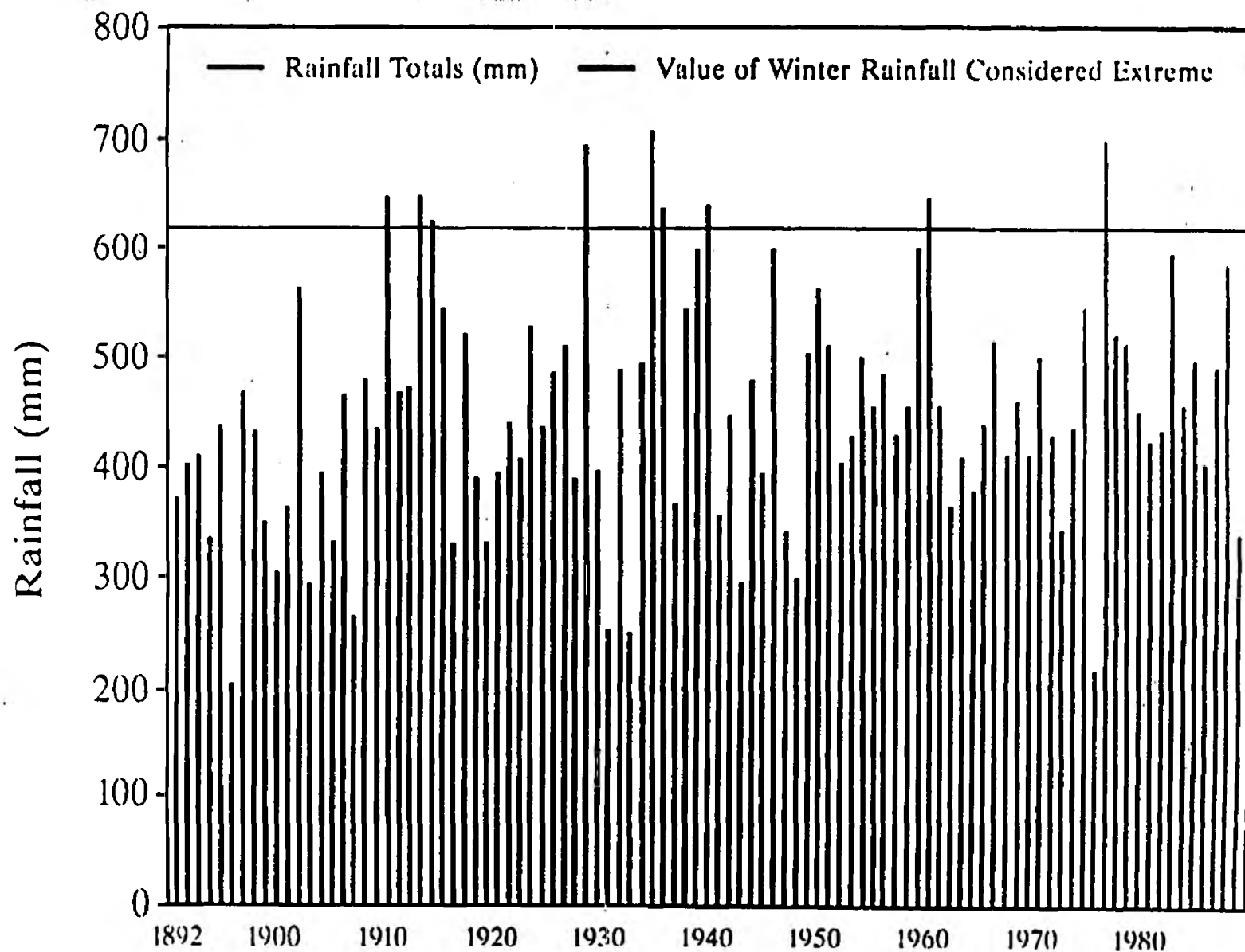
# RIVER TEST AT BROADLANDS: WEED GROWTH



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# HIGH WINTER RAINFALL OTTERBOURNE 1892-1990

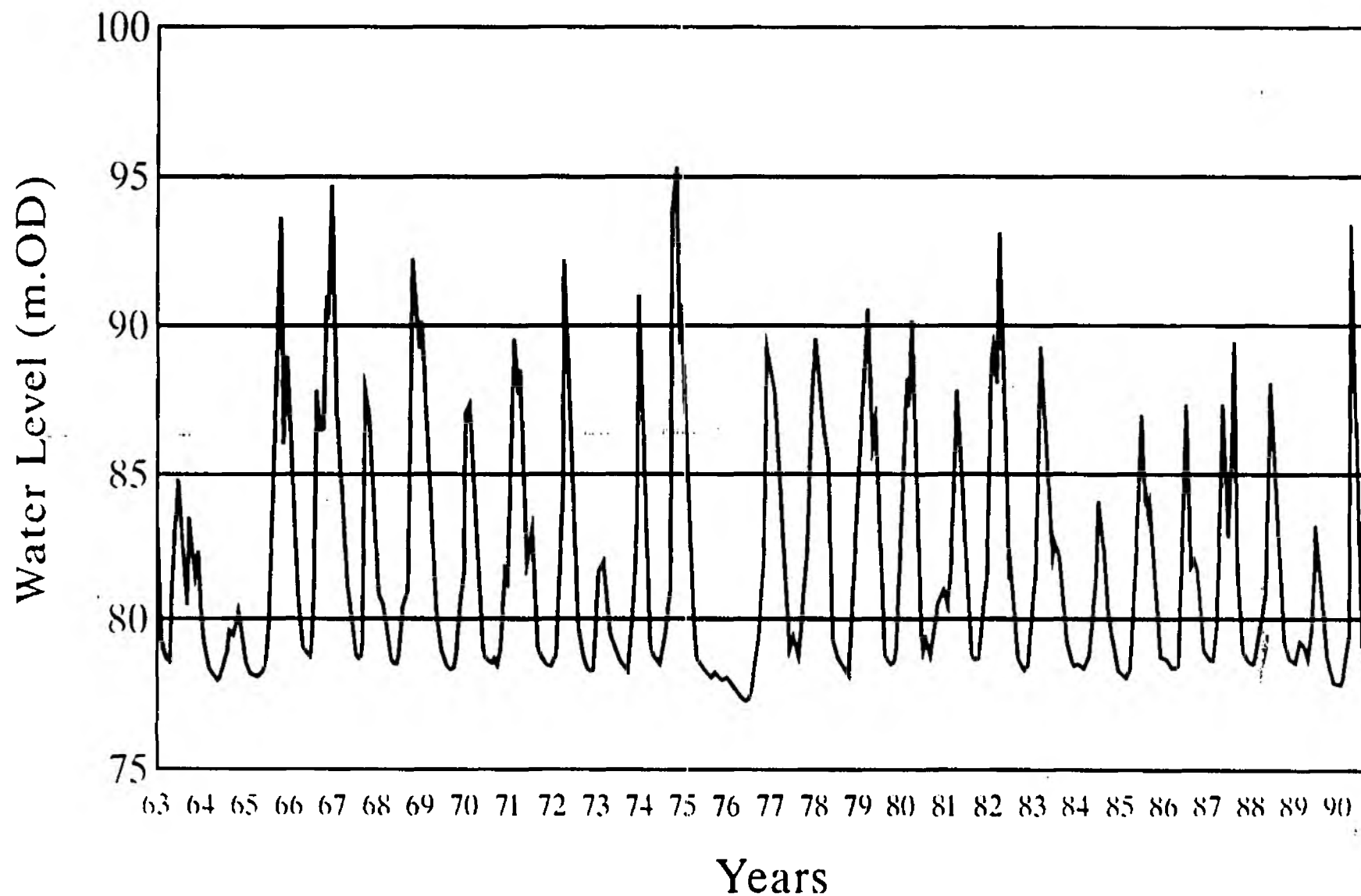
Fig. 13



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# GROUNDWATER LEVELS AT LOPCOMBE CORNER HAMPSHIRE 1963 - 1990

Fig 14.

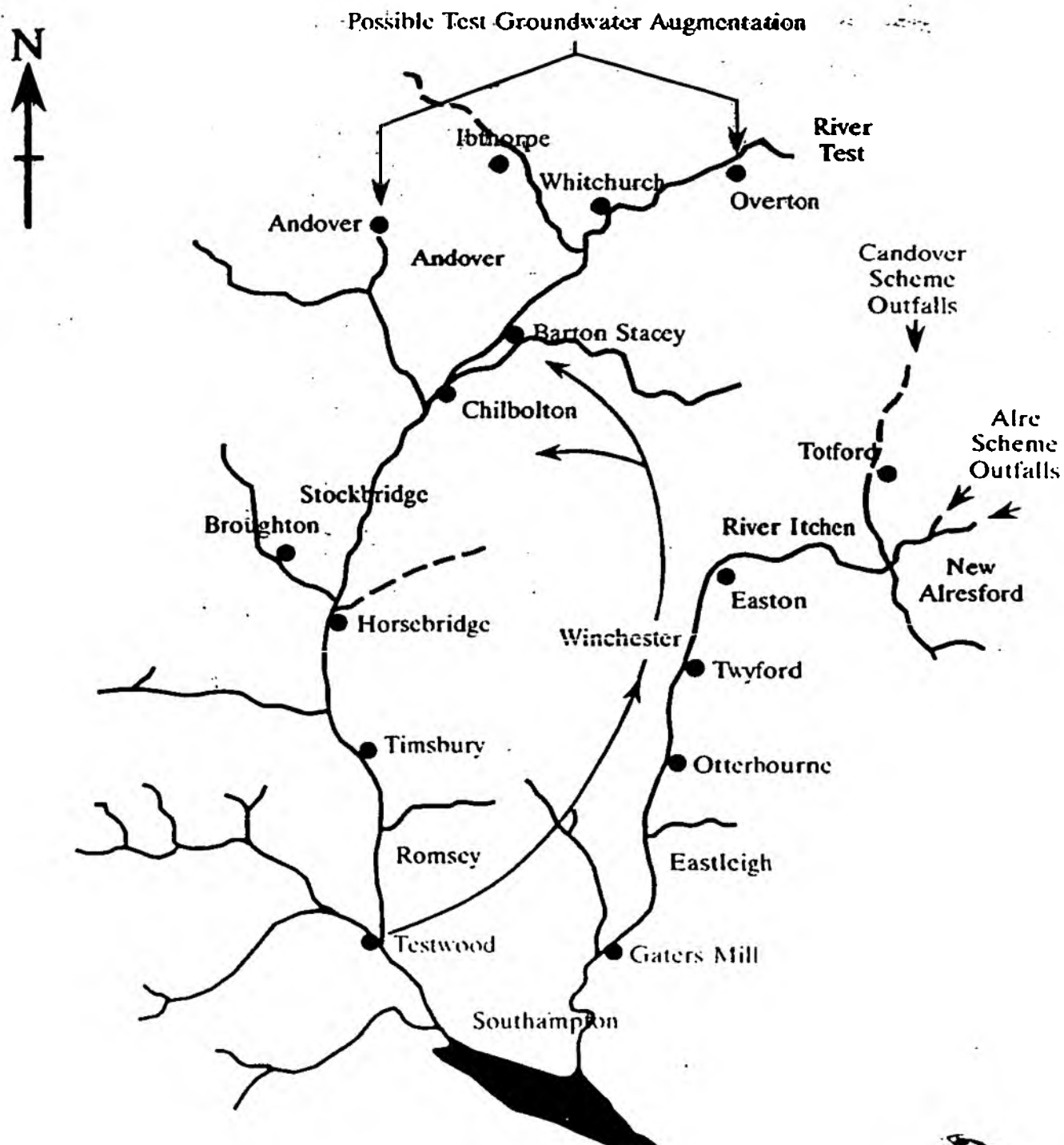


NRA



# THE RIVER TEST: WATER RESOURCES WATER SUPPLY SOURCES

Fig. 15



- Water Supply Sources
- ➔ Groundwater Schemes Outfall
- ➔ Transfer of Water for Public Water Supply



## SUMMARY

Grainger Davies, Regional General Manager.

### NRA Southern Region

Concerns have been expressed this evening about the state of the River Test. Serious concerns. In particular we have had questions concerning above-abstraction, discolouration, the flow and level of the river, and concerning weed growth.

We have been joined here tonight by those with a duty of care for the river, those with experience and knowledge of the river, those with riparian and fishing interests and those who can significantly affect the river regime. In fact all those with a deep affection and concern for the well-being of the river.

We came here tonight to review the present state of knowledge of the River Test and its catchment and to agree the areas of concern. We have discussed the NRA proposals for monitoring and investigation. We have also identified that there are actions which could be pursued by others, by riparian owners and special interest groups in consultation with the NRA.

The NRA has plans in all spheres of its activity for the river. In relation to fisheries, the River Test fish pass programme will continue, as will the salmon tracking programme. We have already embarked on gravel raking trials to encourage more successful spawning of salmonids.

In the water resources field the NRA will continue to support a strategy of returning properly treated effluent to the river to maintain the flow. The NRA believes new licensed abstraction from the river for the Andover area must be limited to the lower reaches at Testwood. We also plan to investigate the possibility of augmenting river flow using groundwater reserves. This would maintain river quality and dilution of effluents in low flow periods, particularly at the top end of the river. We have already embarked on investigations with a view to preparing action plans for remedying low flows in the Wallop Brook and Bourne Rivulet.

Water quality is generally sound and stable except in a small part of the upper river where the NRA may have to take action. River quality monitoring is at a high level but will be appraised as a result of a review of river quality objectives.

Sediment loads have been a subject of much consideration. The NRA will investigate further the nature of the sediment and how it moves in the river. Indeed the key to solving the problems of the River Test appear to be better hydraulic management to maintain high water velocity during the winter months, thereby cleansing the sediment and encouraging the growth of rooted weed. We all know that velocity is related to flow and level. For the same flow and level, a narrower channel will produce a higher velocity.

We would like to discuss the development, publication and promotion of river management guidelines with riparian interests, the Test and Itchen Fishing Association and anyone else who has a contribution to make. We are concerned here to provide guidance on matters such as weed cutting, the provision of baffles and the building back of eroded banks.

The NRA would like to consider joint sponsorship of a manual of chalk stream management. This would provide a code of practice for those who manage the river and may contribute to national guidelines from the birth place of fly fishing. This is an example of where optimum management of the river can only be achieved in co-operation with users. We look forward to hearing from them.

## DISCUSSION SESSION

Mrs. M. Baring. Test and Itchen Association pointed out, in relation to a possible groundwater scheme on the upper part of the River Test, that an industrial abstraction of 4 million gallons near Overton was already using water from that aquifer. She asked whether there was to be another borehole to take water at Overton.

Peter Herbertson replied that it is recognised now that boreholes must be remote from the river to avoid any adverse effects on flows. Water for recharge would be piped to the river from distant boreholes. Investigations into any possible groundwater schemes will be extensive and will take place over a number of years.

Mr. Sewter. CPRE wanted to know if there was liaison between the NRA and local authorities in relation to water resources where new houses are to be built. Is it questioned whether water is available for these developments and what will it cost? Who decides if water is available, for example for the 7,000 houses proposed in the locality in the new few years.

Peter Herbertson explained that NRA contributes to the regional plan for the South East, SERPLAN, which co-ordinates contributions from County Councils in East Anglia, SE London and Hampshire, reporting to the Secretary of State. Southern Region made a specific input relating to water resources and the concerns of increasing demands and landfill sites etc. SERPLAN provides the framework for County Structure Plans. The NRA also liaises directly with County Councils and prepares demand forecasts in the region. These are discussed with Water Companies which have a statutory duty to forecast demand and put water into supply, there is a good degree of liaison between the responsible bodies.

Mr. Sewter. CPRE was concerned that in practice this did not work, he highlighted the example of over-abstraction on the Wallop Brook.

Lord Crickhowell said that the NRA was giving over-abstracted catchments a very high priority. The establishment of the NRA creates for the first time an independent regulator. It has been given an overall responsibility for resource management. The NRA can encourage liaison between various parties. The NRA may wish to influence Water Company proposals and may want them altered. We have heard that we can issue a policy not allowing abstraction in certain areas. We are anxious to see the introduction of financial parameters. We must add on the cost of damage to the environment. It is early days and we are only just beginning to work on a strategy but we will be addressing these issues. We have got to try and agree an economic way, so that the transfer of water over longer distances can be considered.

Mr. James Ferguson, Salmon and Trout Association said that there has been a Parliamentary Question along the lines of the previous question. There was a DoE circular on Structure Plans which merely says Local Planning Authorities will have regard to the advice received from the NRA. Therefore is there nothing to stop such planning?

Supplementary Point An additional 66,000 dwellings are anticipated in Hampshire, over the 10 years 1991-2001, by SERPLAN. The Hampshire County Council are considering whether they include this or a lower figure in their Structure Plan.



Lord Crickhowell answered - We cannot necessarily prevent people coming but we could utilise financial parameters and secure proper use of water resources to meet demand. This could mean bringing water from better resourced areas where there would not be environmental damage. Essentially the developer should pick up the bill. The USA has problems, as do other countries. We are not empowered to wipe out the non-fishing population of the County! We can say bring water in from elsewhere, economise on use or find other solutions. We should have some influence on the way water is supplied.

Dr. N. Potter - The effects of abstraction on migratory fish are of great importance. Further abstraction of water at Testwood could deter the passage of salmon and sea trout into the river.

Peter Herbertson answered that we have specified prescribed flows below which abstraction must cease for exactly that reason. The Water Company may consider a small reservoir to support demand at times of peak use in summer, thus relieving pressure on low river flows. The abstraction licence at present protects the flow and helps the salmon to run.

M. Dunning asked on the question of abstraction whether there are any plans for detailed surveys of aquifers to see what water we actually have.

Peter Herbertson replied that in the River Test catchment the water supply company is only using 55% of its authorised quantity at the largest abstraction at Testwood. There is considerable scope within the existing licence for continued meeting of public water supply demand. Population growth and demand forecasts to the 2011 have been prepared. Forty percent growth in requirements is due to increases in per capita consumption but Water Companies will save 40% of the growth if they achieve their targets for reducing leakage. We estimate there will be only a 20% increase in demand due to population growth. There is a continuing programme for monitoring and looking at aquifer management and Testwood Groundwater Scheme would be part of that programme. He continued with a detailed explanation.

Mrs. M. Baring then asked if the NRA monitored the amounts of water in aquifers and if there was any evidence that the groundwater in the Candover aquifer is lower than it has ever been. If there were another 2 or 3 years of drought would there be enough water?

Peter Herbertson said that there is replenishment in the winter months and groundwater levels in Candover are not as low as 1989 and 1976. We know what the water levels are and therefore know what the situation will be, but we would have to review our augmentation policy if the drought extended into 3 and 4 years.

Mr. Dunning asked about climate change and what the NRA was doing to maintain the rivers.

Peter Herbertson replied that we believe in this region that we should take into account the possible effects of climate change. It is prudent in terms of long term water planning to take into account any possible and likely changes. We employ consultants who are currently working with experts to look at the implications on water resources. Nationally there is a major contract to look into climate change and water resources. We should allow for changes in rainfall patterns.

Mr. Lunn, HFAC, River Keeper said the growth of Cladophora was stimulated by low water, warmth and sunlight. Two drought years have messed up the river. But it is also true of all stretches that there are places which the fish do not like. Much of the sediment last winter came straight off the land and had never been in the river. There had been ploughing of marginal land which encouraged sediment to wash into the river. We must return to traditional land use, subsidies might help.

Mike Beard replied that the proposed sediment survey would give some answers. He agreed about the problems caused by the use of marginal land, this will be looked at as part of the survey. We will then make recommendations.

Mr. Baron, HFAC said that organic matter comes in from watercress beds and does not settle, giving the water its opalescence.

Mike Beard answered that this depends on the amount of material put in from the watercress beds. Previously cress beds have not been subject to consent conditions. The NRA is now introducing a requirement for water quality consent for cress growing which is mainly carried out in the Wessex, Thames and Southern Regions. The consents are aimed at removing the large amounts of sediment containing organic material and zinc. This will not stop it but could cut amounts down by about 90%.

Professor Barker raised the question of the River Dun and said that the NRA had not adequately addressed the problem. He wanted assurance that in future consultation would precede action.

Grainger Davies answered that we have to face conflicts such as this from time to time. This provides an example of the cases which confront us. The NRA approach to identifying conflicts will be River Catchment Management Planning. Where there are conflicts of use, the NRA will have a look at the total picture in the catchment, consult with all concerned and then come up with proposals for the future. The NRA is prepared to take a lead which we hope will help people who have problems. The Plans will be prepared after consultation with all interested parties. It is interesting to note that of the six catchments in the Southern Region which have been given a priority for having River Catchment Management Plans prepared, the Test is one. We have recently allocated work to consultants and they have already embarked on the early stages of devising a plan. We will consult with groups and users on how we see the future of the catchment and how it is to be managed.

Mr. E.L. Parish asked about the status of invertebrates. Mr. Lunn mentioned lots of silt from the land especially in the Upper Test. In particular free range pig farming in the upper catchment was a recent change in land use. How did this effect river life?

Mike Beard answered that the NRA had introduced systematic invertebrate surveys into their river monitoring programme.

Bob Dines, Principal Biologist then explained about the use of the RIVPAK computer programme in water quality surveys. The computer has been programmed with information from pristine chalk streams to provide a base line of what would be expected from a chalk stream in prime condition. Surveys results from this year would be fed in to seek a measure of whether the flora and fauna in the river was meeting its maximum potential.

John Potter, Chairman HFAC commented that there was an outstanding question over the River Dun and it was high time the Authority grasped the nettle, shook it and sorted it out!

Dr. David Solomon, Salmon Consultant asked about over-abstraction in the context of two over-abstracted tributaries having been identified in the Test catchment. Graphs for 1990 showed the average rainfall over the year was high. Had the aquifers recharged? We had low flows this summer, water ran off rapidly and appeared not to recharge.

Peter Herbertson answered that we need more work to understand the mechanisms of groundwater recharge, particularly what happens in instances of intense winter rainfall. In 1948 a public inquiry had granted the public water abstraction supply on the Wallop Brook, which predated the licencing system of 1963 and could therefore continue at the historic rates as a Licence of Right. The Wallop Brook and Bourne Rivulet, small tributaries of the Test, had boreholes located extremely close to them. If we were licensing such boreholes today we would not permit this. Boreholes must be remote from chalk streams to draw on the underground reserves without significantly affecting river flows.

We are looking at a variety of solutions to the problems of over-abstracted catchments. We could reduce licences as one option, but in law we would then have to pay compensation. We are also considering lining river beds and augmenting river flows. We have brought in experts to look at the feasibility and costs of all the options.

C. Duffy asked if we are now in a situation where we can control the Local Water Company. Observations in the vicinity of the Wallop Brook had noted the water companies dragging weed out in May, taking a lot out.

Peter Herbertson replied that we would wish to receive reports of any such incidents. A riparian owner could manage his stretch of river and Southern Water are riparian owners of a short stretch of the Wallop Brook at their Broughton Pumping Station. But the NRA must be involved in the management of the River and it believed it was most important that river management guidelines should be drawn up for use by riparian owners.

John Potter mentioned that there was a manual on chalk stream management produced for the Test and Itchen Association by Roy Darlington. Mick Lunn had already had a valuable input into editing the document which could provide a basis from which the NRA could proceed.

Mike Beard thought this a good idea. The NRA would want to be involved and they would be in touch. The burden of management lies with the riparian owners. The NRA feels it can have a constructive role and will take forward the preparation of guidelines.

Mr. A.F. Headlam expressed his support for the meeting. He questioned whether there is enough groundwater for the future to support existing licences. He felt the Hampshire Periodical Survey was out of date. He was interested in the subject of the top end of the Candover. They have heard that groundwater is being used to support the River Dever and are concerned about the possible depletion of aquifers in the Candover catchment. He felt that a six monthly news letter would be helpful so that people could read for themselves what is being done.



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