Project Summary

UPPER KENNET RIVER LEVELS STUDY

WS Atkins Water
commissioned by

NRA

National Rivers Authority
Thames Region

June 1992

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PROJECT BRIEF

This project was commissioned in response to public concerns that the condition of the upper reaches of the River Kennet has declined and, in particular, that river levels have reduced, over recent years. The study was divided into two stages.

Stage One considered the evidence for change in catchment characteristics with regard to the following parameters :

Groundwater levels	Water Quality
Surface flows and water levels	Flora and Fauna

Each parameter was considered with regard to historical evidence, local information and perceptions and factual data analyses.

and Stage Two considered each of the possible causes of catchment change as below:

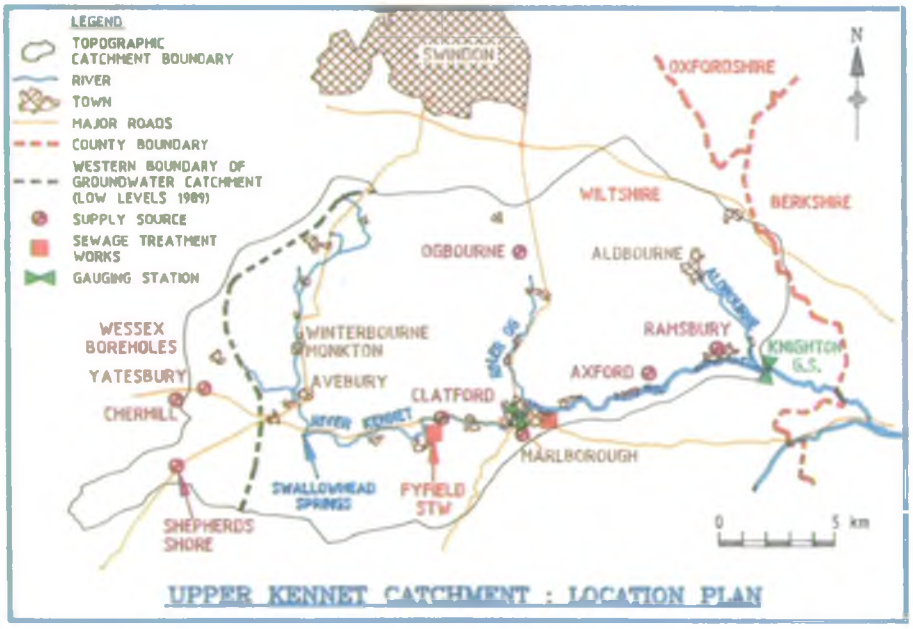
Meteorological variation	River Management
Groundwater abstraction	Land Management
Effluent discharges & pollutant inputs	

View of Kennet at Mildenhall

RIVER KENNET

The project considers the Upper Kennet catchment to Knighton gauging station near Ramsbury, a total area of 295 km^2. The catchment is largely rural and forms part of the North Wessex Downs. It is underlain by the Chalk aquifer and is a good example of a southern chalk stream, well known for the quality of its trout flyfishing. Public concerns have focussed upon reduced river levels and drying of the upper reaches above Marlborough, losses in submerged river weed (e.g. *Ranunculus*), and consequent reduction in both ecological and amenity value.

Dry Reach Upstream of Marlborough - October 1991



Emergent weed growth amid unimproved pasture upstream of Marlborough - September 1991

STAGE ONE – CHANGES IN CATCHMENT CHARACTERISTICS

GROUNDWATER LEVELS

The variation in groundwater levels at individual borehole sites and the groundwater level distribution throughout the study area were considered. Minimum levels are reduced during the current (1989-92) drought period to a similar level as in the last major drought in 1976. Similar levels were also recorded in the 1940's. The distribution of levels has remained very consistent between the 1970's and present day. A number of old dry wells in the catchment indicate historical low levels.

SURFACE FLOWS

Surface flows as measured at Marlborough gauge show a direct relationship with meteorolgoical data and there is no evidence for any other influence on this reach. Historical data shows that the upstream limit of the river has varied between Swallowhead Springs and Marlborough over the last 300-400 years. The river has dried to Marlborough approximately once per decade over the last 100 years.

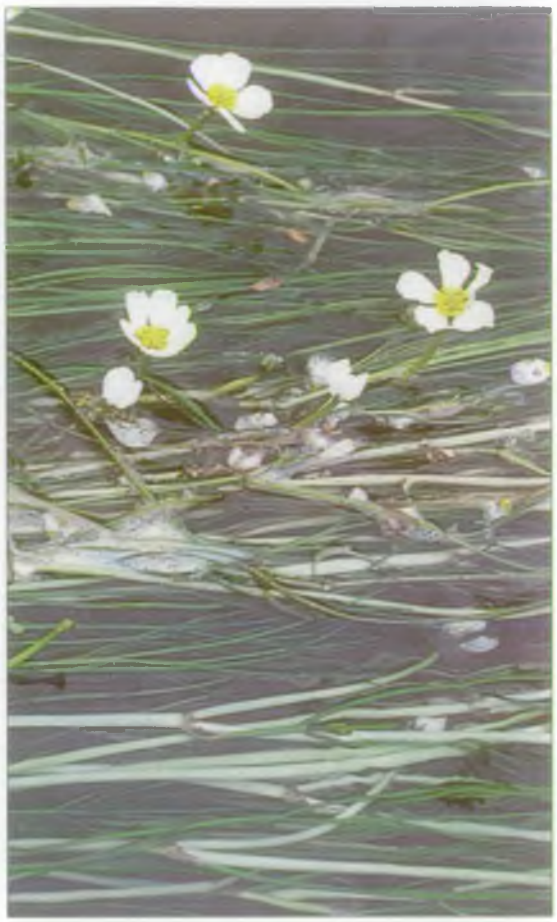
The relationship between meteorology and surface flow to Knighton gauge at Ramsbury indicates a relative reduction in surface flows of approximately 10 Ml/d dating from the mid 1970s.

WATER QUALITY

The River Kennet meets its Water Quality Objective of 1A, the highest category available. The main concerns with water quality are the increased siltation and mud accretion on the river bed. This is considered to be due to reduced flow velocity leading to a loss of bed flushing/scouring, there is no evidence of increased sediment input to the river.

FLORA AND FAUNA

The major change in river character over the last 4 to 5 years has been the gradual loss of submerged in-stream vegetation and replacement with marginal emergent vegetation and blanket weed. This has affected the river ecology as submerged weed forms the base of the chalk river food chain. The loss of submerged weed, combined with increased siltation, has also greatly reduced natural trout breeding and, at present, most game fish are the produce of river stocking.



Flowering Ranunculus - a common submerged weed

STAGE TWO – CAUSES OF CHANGE

METEOROLOGY

The rainfall and percolation record over the last 70 years has been analysed and periods of reduced river levels and, in particular, the movement of the upper flow limit to Marlborough correlate with both severe winter droughts (e.g. 1975-76) and 2 to 3 year periods of reduced rainfall as in the current drought. The Chalk aquifer is considered to be particularly vulnerable to extended 2 to 3 year periods of drought and the current drought period is the most severe since 1942-45. Prolonged drought periods also have a severe and cumulative effect on submerged weed, which requires a high river flow rate to flourish. The loss of submerged weed can, alone, lead to a reduction by half in river level with no change in flow rate.

GROUNDWATER ABSTRACTION

One of the main public conerns at the start of the Project was the impact of public supply groundwater abstraction on the upper reaches of the Kennet above Marlborough. Assessment of the surface flow record and actual groundwater abstractions over the last 30 years indicate that groundwater supply is only a minor influence on this reach. The progressive drying of this upper reach over the last 3 to 4 years is a largely natural phenomenon related to reduced rainfall and has been a regular occurrence over at least the last 100 years.

Groundwater abstraction has had the effect of reducing surface flows along the downstream reach to Ramsbury. The major influence on this reach over the last 2 to 3 years has been the drought but abstraction has had a significant subsidiary impact, a quarter of that of the drought. Ogbourne Pumping Station has had a significant local impact on the River Og tributary.

EFFLUENT DISCHARGE

A build up of organic muds and sediments from both natural organic and silt inputs and sewage discharges has become a problem during the current drought period. The water quality of the River Kennet is generally very good however, and effluent disposal is not considered to be a significant issue.

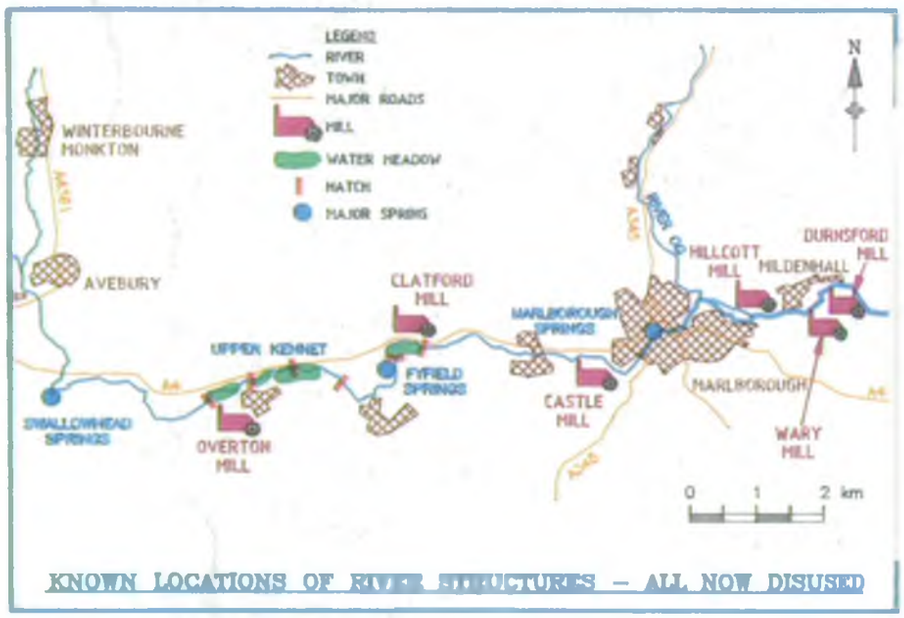
Canalised Section at Axford - May 1992

RIVER MANAGEMENT

The upper reaches of the Kennet, particularly between East Kennett and Marlborough, were intensively managed over the last few hundred years both for fishing and due to the operation of mills and water meadows. The location of some of these are shown below. The main purpose of each management activity would have been to hold back and control the water level by a system of stops and sluices and the river would have appeared very different over much of the year up until the turn of the Century. Both the mills and the water meadows were already falling into disrepair in the early years of the 20th Century and, following the Second World War, there was no longer the manpower available to manage these reaches for fishing.

Records of public concern as to the river condition dating from the mid 1940's are considered to be due, in part, to the drought experienced at that time but also to these changes in management practice.

Following the last war priorities changed and flood protection was the main concern, in part due to the major floods of February 1940. As a result most barriers to flow were removed and, in addition, much of the river was dredged in the 1950's. Some reaches, e.g. near Axford, were deeply dredged and straightened, changing the character of river and resulting in a virtually canalised river section. Dredging practices have changed and current policy is much more environmentally sensitive.



KNOWN LOCATIONS OF RIVER STRUCTURES – ALL NOW DISUSED

LAND MANAGEMENT

Farming policies have changed a number of times over the last 100 years or so with both arable and stock farming being dominant. Since the War large parts of the upper catchment have been ploughed for cereal farming. This has led to an increase in nitrate concentrations in both surface and groundwater but the impact on river conditions has not been significant in this catchment. Unimproved pasture land has been retained over much of the river corridor and this has acted as an effective buffer for the river and the consequences of changing land management practice are not considered significant.

SUMMARY

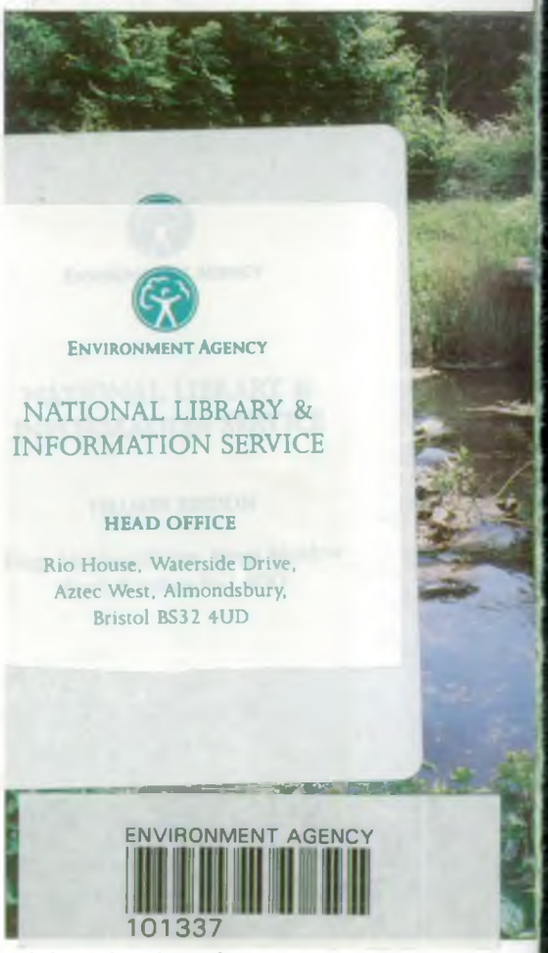
In summary, the main impact on the river is the current drought which has reduced flow rates and led to a loss of submerged weed, further reducing river levels and adversely affecting the river ecology. Groundwater abstraction has very little effect on the river to Marlborough which is in a largely natural condition but is a contributory factor to reduced flows downstream of Marlborough and is having a local impact on the River Og tributary. Changes in river management practice would have altered the condition of the reach upstream of Marlborough over the first half of this century. Subsequent overdredging has adversely affected some reaches, mainly downstream of Marlborough.

THE NATIONAL RIVERS AUTHORITY

Established on 1 September 1989, the NRA is an independent public body charged with safeguarding and improving the natural water environment. It is responsible for flood defence, regulating the quality of rivers and groundwaters, balancing the needs of various water users, protecting and improving fish stocks and promoting water based recreation of all kinds. The NRA is committed to improving wildlife habitats and conserving the natural environment in all it undertakes.

Published by the NRA. Project undertaken on behalf of NRA by WS Atkins Water

Flooding near Ramsbury February 1940



Submerged weed growth at temporary weir location - May 1992

National Rivers Authority Thames Region:

Kings Meadow House,
Kings Meadow Road,
Reading,
Berkshire,
RG1 8DQ.
Tel: 0734 535000.