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**North
West
Water**

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30 April 1986

TO: Members of the West Cumbria Special
Fisheries Advisory Group
(Messrs T A F Barnes (Chairman);
F Bunting; E P Ecroyd; A Gleaden;
A Moffat; Dr A Caldicott and
S G Payne).

Dear Member

A meeting of THE WEST CUMBRIA SPECIAL FISHERIES ADVISORY GROUP will be held at 2.15 pm on FRIDAY, 16 MAY 1986, at the SOUTH CUMBRIA AREA OFFICE of the RIVERS DIVISION, BEATHWAITE, LEVENS, CUMBRIA for consideration of the following business.

Yours faithfully

W H CRACKLE
Secretary and Solicitor

A G E N D A

1. Apologies for absence.
2. Minutes of the meeting held on 4 March 1985.
3. Fish Pass at Ennerdale, (oral item).
4. Authority proposals for discharge of compensation water from Ennerdale (paper to be available at the meeting).
5. Any other business.

Note: The following papers have been submitted by Egremont and District Anglers Association in connection with these items:-

- (a) River Flows, Fish Migration and the Fish Pass at Ennerdale.
- (b) Effect of water abstraction on Ennerdale Lake and the River Ehen.

MINUTES OF A MEETING OF THE
WEST CUMBRIA SPECIAL FISHERIES ADVISORY GROUP
HELD ON 4 MARCH 1985

Present: T.A.F. Barnes (Chairman)
F. Bunting
E.P. Ecroyd
A. Gleadon
A. Moffatt
Dr. A. Caldicott

Dr. J.I. Abernethy was present by invitation.

1. APOLOGIES FOR ABSENCE

An apology for absence was received from Mr. S.G. Payne. Mr. W.N. Nixon, who had also been invited to the meeting, was unable to attend.

2. MINUTES OF THE LAST MEETING

Members were advised that negotiations with British Steel had been concluded satisfactorily and that a new fish pass had been constructed during the summer of 1984. At the same time a new toe had been constructed at the weir, and the Authority would be assuming control of the weir following a satisfactory final inspection of the work later in 1985. Observations at the fish pass were continuing, particularly during high flow levels, and a decision would be taken later on whether to remove the gabion box at the foot of the fish pass.

RESOLVED:

That the Minutes of the last meeting of the Committee held on 9 March 1983 be approved as a correct record and signed by the Chairman.

3. PUBLIC WATER SUPPLIES IN WEST CUMBRIA

Members received a copy of a report which had been presented to the Cumbria Water Services Council on 15 January 1985 which detailed progress in the development by the Authority of a major scheme for improving water supplies in West Cumbria. The report indicated that because British Nuclear Fuels had decided to develop their own sources, the Authority was planning for the provision of additional public water supplies only, and the Board were likely to consider recommendations about the source of additional supplies in spring 1985. The report suggested that indications showed the groundwater option to be more economic than a River Derwent option, subject to establishing the availability of sufficient quantities of groundwater of adequate quality at suitable locations. Boreholes in the Aspatria and Egremont areas had shown that there were sufficient quantities of groundwater in the area, but recent studies had shown that water from the Egremont boreholes contained small quantities of radon a radioactive substance. Investigations into this problem were continuing and if it was decided that the groundwater was unsuitable for public

water supply, it was most likely that the Authority would revert to the more expensive scheme for obtaining supplies from the River Derwent.

In addition to the above proposals, improvement works were needed at Ennerdale Water involving improved outlet arrangements, a new treatment works, and other ancillary works. Informal consultations were taking place with the Lake District Special Planning Board and Copeland Borough Council, prior to the preparation of a formal application for planning permission.

4. PROPOSALS FOR WATER SUPPLY FOR BRITISH NUCLEAR FUELS

Members noted a report which summarised the position concerning investigations and proposed developments by British Nuclear Fuels affecting rivers in West Cumbria. In the case of Wastwater it was stated that the company no longer required the full additional temporary quantity and the existing authorisation would meet their requirements until the expiry of the temporary licence at the end of 1987, after which their additional requirements would be met by the use of mine water and boreholes in Calder Valley. Following extensive tests of the effects of increased abstractions from the Calder Valley boreholes, the Authority was satisfied that the increased abstraction could be authorised on a permanent basis. The necessary applications for licences to allow the company to abstract from the Calder Valley boreholes had been submitted, but following public advertising of the application, an objector had asked the Department of the Environment to adjudicate on this issue. The Company had agreed to a one month delay so that this objection could be dealt with.

In order to guarantee the flow of mine water from the Florence mine to the River Ehen, it was understood that the Company wished to carry out continuous pumping of mine water so that they could abstract an equivalent quantity from the river at Braystones. Further monitoring work was being carried out in connection with a request from the Company to take additional groundwater from boreholes near Brow Top Reservoir and Calder Bridge.

5. ENNERDALE AND THE RIVER EHEN

Members were reminded that at their meeting on 9 March 1983 they had considered the problem of the fish pass at Ennerdale and had accepted the principal that expenditure in the region of £100,000 on a new fish pass could not, in all the circumstances, be justified. Revised proposals resulting in a reduced rate of abstraction from the lake for public supply when the lake was not overflowing would reduce the extent and duration of the lake drawdown and shorten any periods when the fish pass was not fully effective. During drought periods, if the fish pass dried out any migratory fish accumulating below the weir could be collected manually and transferred to the lake.

During discussion the officers confirmed that a new fish pass costing £100,000 would be no more effective than the existing fish pass which was a Ministry approved fish pass. It was explained that the situation concerning the fish pass had not changed since the last meeting;

the only thing which had altered was the reduction in the rate of abstraction from the lake which would bring about an improvement in conditions by reducing the period when the fish pass was ineffective. Mr. Bunting agreed to produce a paper about problems of the River Ehen for consideration at a future meeting of the Regional Fisheries Advisory Committee.

6. FISHERIES ON RIVER ESK

In response to a question from Mr. Gleadon, Mr. Harpley indicated that although fishing had been poor for many years, last year produced the longest run of sea trout for some 5 years. Very extensive investigations were continuing on this river to try to identify the cause of the problem and much interesting information was being produced by the investigations.

7. LANCASTER UNIVERSITY TARC STUDY

In response to a question from Dr. Caldicott, Mr. Barnes stated that Prof. Pott from Lancaster University had produced certain conclusions from his preliminary study into TARC in the River Lune, and that the Authority would be working with him and his colleagues to produce more information.

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NORTH WEST WATERWEST CUMBRIA SPECIAL FISHERY ADVISORY GROUP16TH MAY, 1986

The Authority has been considering for some time various methods of discharging the compensation water at Ennerdale under the new regime.

The intention has been to discharge the water in such a way as to allow the passage of migratory fish through the fish pass at all times. Basically the proposal is to introduce into the fish pass a new sideways or vertically opening sluice, which will only be utilised at lake levels below which the fish pass will not function fully by gravity. At this point the new sluice will be closed and the other existing sluices in the fish pass will be raised to make the fish pass functional. Water will be supplied to the fish pass by pumping, through a grid in the wall of the top 'box' of the fish pass. An alarm system will be constructed at the downstream end of the fish pass, which will give a warning that a fish is entering the pass. This alarm will be based on a resistivity or sonar sensing device. When this alarm is triggered the operator will inspect the fish pass, and if fish are in the top box operate the sideways opening sluice. This will wash the fish into the lake. The sluice will then be closed, and pumping will recommence immediately.

A detailed description of the operating procedure and a diagram is attached. These proposals have been discussed informally with experts from the Ministry of Agriculture, Fisheries and Food who have agreed that they are suitable, subject to the production of proper drawings and a finalised operating procedure.

crump weir < 7 Mg/day. The revised proposals did not alter Lake Level determination of start, although this is clearly no longer a specific requirement.

- b) Gate operated automatically on cyclic basis - waste of pumped water/short breach of licence.

B REVISED OPERATION (20 FEBRAURY 1986)

Manual Operation of Gate:-

pneumatic pump to pressurise hydraulic ram
NOT motorised.

1. Implications

- (a) Manual inspection prior to operation of gate - SAFE
- (b) Opened when needed, i.e. visual sighting of fish and less waste.
- (c) No power needed to lakeside - cheaper installation
- (d) Manual assistance to any stranded fish
- (e) No need to cover gate (with protective flooring)
- (f) Recommend introduction of manual valve to discharge chamber inlet, to satisfy A1 (c) above.

2. Control

- (a) Manual introduction of pumping compensation water, assisted by alarm from crump weir (inadequate lake discharge)
- (b) Control of quantities pumped by crump weir.
- (c) Termination of pumping compensation water by manual monitoring of lake levels.

Implications

The proposed alterations to the fish pass cannot reduce the dependance on manual diligence - reliant upon satisfactory operation of the existing penstock weirs prior to and following pumping.

Introduction of pumping would be complementary to existing manual penstock operations.

However termination would be reliant upon continued Lake Level monitoring - failure to respond to the lakes ability to discharge adequate flows would result in waste but not licence breach.

WEST CUMBRIA WATER SUPPLIES

REVIEW OF:- NOTES ON FISH PASS PROPOSALS (REVISED 24/1/86)

A. OPERATION DESCRIBED

1. Lake flows just inadequate through fish pass.
 - (a) All penstocks fully retracted - so raise No. 2 (say 450mm)
 - (b) Gate (side opening sliding penstock) closes, compensation water pumping commences.
 - (c) Gate opened for ejection of fish.
In fact pump might better be turned off to allow fish to swim out against small lake flows i.e. negligible "flushing" action.
2. Lake level below fish pass base.
 - (a) No. 1 penstock fully retracted
 - (b) Gate closed, compensation water pumping occurring .
 - (c) Gate opens to "flush out" fish - pumping maintained. Partial pumped flows continue to discharge along fish pass. However, majority of flows directed to Lake due to raised penstock No. 2. Flushing and quiescent zone could be improved by relocation of inlet grid near penstock No. 2.
3. Lake flows inadequate and shallow depth prevents swimming into lake i.e. situation between 1 and 2 above.
 - (a) No. 1. penstock fully retracted.
 - (b) Gate closed, compensation water pumping occurring.
 - (c) Gate opens, pumping maintained but "flush" effectiveness impaired by lake flows i.e. reduced differential head compared to 2 above.
Possible fish may be stranded.
4. Safety
 - (a) Obvious danger from remotely operated steel plate moving at high speed - would need covering (with flooring) .
 - (b) Danger of children gaining access to dry area of fish pass and being "flushed" (with fish) into lake.
5. Control
 - (a) Gate introduced and pumping of compensation water by reference to lake level.
i.e. Originally thought necessary as information suggested 7 Mg/day would pass through by-pass pipes, hence 5 Mg/day not passing through fish pass. Subsequent information suggested fish pass works adequately over the designed regime of lake levels i.e. if F.P. flows < 5 Mg/day then

20/4/80

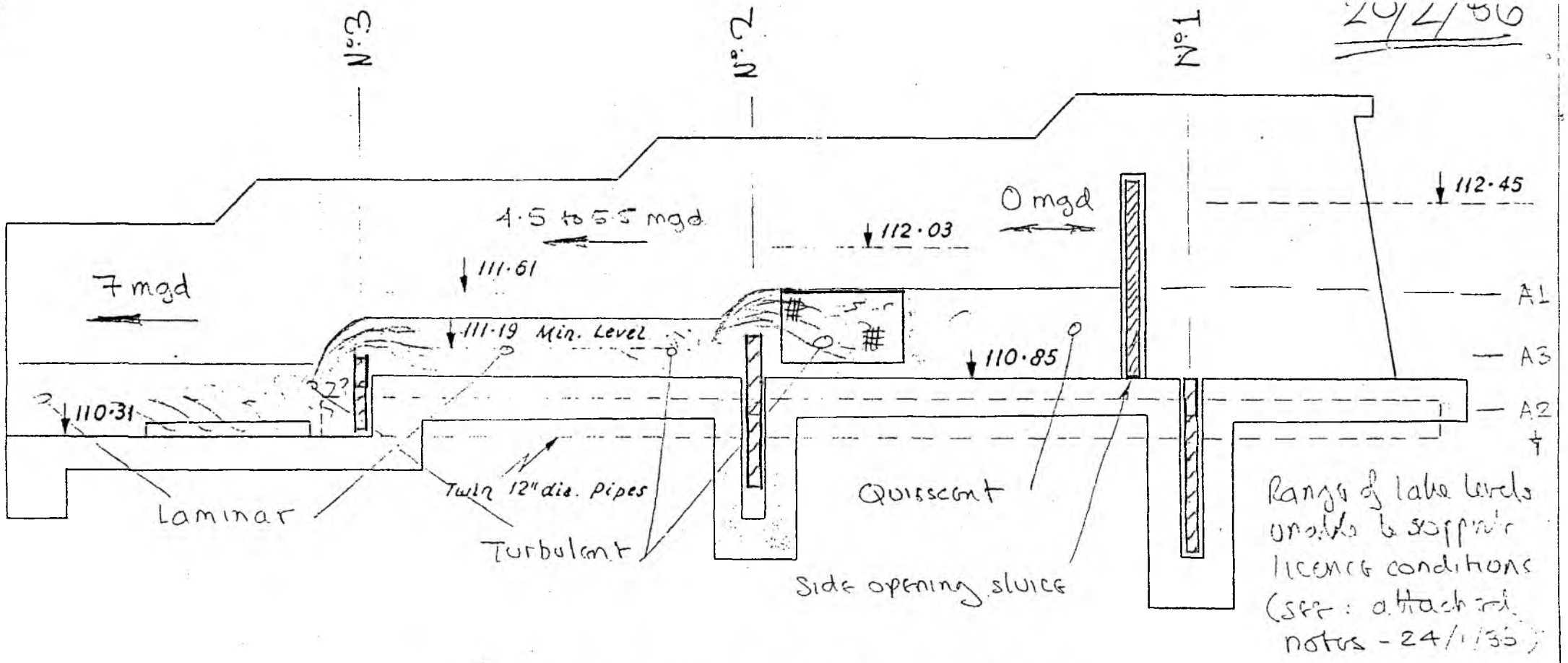


DIAGRAM OF FISH PASS AT ENNERDALE

NOTES: PUMPING IN PROGRESS
 SIDE-OPENING GATE CLOSED

[D+C North]

North Lakes Distribution
 and Water Supply District
 Whitehaven Sub District Office,
 The Hollins, Hensingham,
 Whitehaven, CA28 8EY.
 Telephone: Whitehaven (0946) 2593

To: Members of the West Cumbria Special Fisheries Advisory Group

RIVER FLOWS, FISH MIGRATION AND THE FISH PASS AT ENNERDALE

In March 1983 Members received the following advice from the Authority:

"The present fish pass at Ennerdale has been inoperable on a number of occasions in the past during drought periods when the lake level has been drawn down. This has not been regarded as presenting any particular problems, as fish movement is most unlikely during periods of very low flow".

Unfortunately the Authority did not support this advice with factual quantified data.

The records of lake levels and river flows have been examined and compared with predicted flows (determined by the Authority) for the River Ehen in the absence of abstractions from Ennerdale Lake. The examination shows quite clearly that fish migration would have been likely at times when the fish pass was inoperative.

The Ehen is characterised as a spate river. Summer spates and smaller rises are vital to the maintenance of the fishery. The present Scheme of abstraction at Ennerdale has been in operation for twelve years. This Scheme has had a pronounced adverse effect on the regime of the Ehen. The majority of the summer spates are eliminated by abstractions from the Lake. In fact, in the three months June - August 70% of all migration flows are eliminated by drawdown of Ennerdale Water. An analysis of the loss of migration flows in the summers of the five years 1974 to 1978 is provided in Table One.

It can hardly be regarded as satisfactory that the Ennerdale fish pass remains dried-out and presents a physical barrier to fish wishing to enter or leave the Lake at times when, under a more natural river regime, a migration flow would have been created by overspill from the Lake.

It is a fact, confirmed by observation as recently as September 1984, that fish migration is taking place in the upper reaches of the neighbouring West Cumbrian rivers whilst the Ennerdale fish pass is inoperative.

In Table Two the failure of the fish pass in the five years 1974 to 1978 is quantified. The migration flow used in the Table is 70 mld. and is based on the formulae developed by Dr Leslie Stewart.

The following conclusions may be drawn from Table Two.

1. The average annual - unrelieved - period during which the River Ehen at Ennerdale is formed by a regulated compensation flow exceeds three months.
2. The fish pass is inoperative for about one third of this period.

/contd....

3. During the periods when the fish pass was inoperative, there were ten occasions totalling fifty six days when a migration flow would have been created by overspill from the Lake - in the absence of abstractions from Ennerdale Water.

The Authority has also advised the Group that "it is estimated that only some 40/50 fish, almost entirely sea trout, pass through Ennerdale each year to spawn in the River Liza".

It is difficult to see how this figure and its composition was determined.

In the 1950's and 1960's it was commonplace for salmon and sea trout to enter Ennerdale in July or August. The exceptionally wet summer of 1985 provided migration flows which encouraged - and permitted - salmon and sea trout to enter Ennerdale in July and August.

The new Scheme proposed for Ennerdale may well be operated beyond the 1990's. The restoration of a continuous pathway for fish migration may prove to be essential in the long term if the runs of migratory fish are to return to the levels and patterns which prevailed in the 1950's and 1960's.

It is submitted that the recurring failure of the fish pass at Ennerdale cannot be dismissed as not presenting particular problems to the River Ehen fishery.



Clive Fisher
Hon. Secretary
Egremont and District Anglers Association

5.4.86

RIVER EHEN
ANALYSIS OF INITIAL MIGRATION FLOWS
(AND FLOWS ABOVE INITIAL MIGRATION FLOW)
ENNERDALE 1974-1978

	<u>MAY</u>		<u>JUNE</u>		<u>JULY</u>		<u>AUG</u>		<u>SEPT</u>		<u>TOTAL</u>		<u>% of Migration Flows lost through Abstraction</u>
	A	P	A	P	A	P	A	P	A	P	A	P	
1974	0	5	0	16	6	30	19	31	29	30	54	112	52
1975	7	18	0	16	8	21	0	13	14	23	29	91	68
1976	20	31	17	26	0	7	0	0	0	13	37	77	52
1977	17	18	0	11	4	19	7	17	22	30	50	95	47
1978	0	0	0	4	0	17	18	31	18	30	36	82	56
TOTAL	44	72	17	73	18	94	44	92	83	126	206	457	55
<u>% of Migration Flows lost through Abstraction</u>	39		77		81		52		34				

RIVER EHEN

Start of Migration 70 MLD

A = Actual days above migration flow.
P = Predicted days above migration flow
in the absence of abstraction from
Ennerdale Lake.

ANALYSIS OF FLOWS AND PREDICTED FLOWS
FROM ENNERDALE WATER TO THE RIVER EHEN 1974-1978

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>Five Year Average</u>
(a) Number of days in unbroken sequence without overspill from Ennerdale Water	121	76	102	86	126	102
(b) Number of days when the fishpass failed to pass compensation flow of 32 mld by gravity discharge	65	5	39	-	60	34
(c) Number of days predicted at flows of 70 mld. or greater (i.e. migration flow) when fishpass was inoperative *	34	4	3	-	15	11
(d) Number of separate rises in the predicted flows in (c)	5	1	1	-	3	2

* Data obtained from the Authority's calculations on flows in the River Ehen in the absence of abstractions from Ennerdale Water - i.e. the natural river regime.

Effect of water abstraction on Ennerdale Lake and the River Ehen

Background

1. Ennerdale Lake and the River Ehen are of considerable importance to Copeland as scenic and recreational attractions and as a fishery. Approximately 600 local people as well as visitors are regular participants in angling in these waters.
2. Ennerdale Lake has been a source of water for Public and Industrial use throughout living memory and additional water is abstracted from the River Ehen at Braystones for industrial use. Approximately half of the water abstracted from Ennerdale Lake is provided to Marchon Works at Whitehaven and only about one third is supplied for domestic consumption.
3. The problem which arises is to obtain a balance between abstraction, with consequent effects upon draw-down of the lake level during dry periods and depletion of river flows and protection of the amenities provided by the lake and river.
4. It should be noted that the 1980 Public Inquiry into the North West Water Authority proposals to raise the level of Ennerdale and increase abstraction resulted in the rejection of these proposals by the Minister on environmental grounds.

Effects of abstraction from Ennerdale

5. About half of the River Ehen flow originates in the catchment area upstream of Ennerdale Lake.
6. The 1947 Whitehaven Corporation Water Order allowed 14 million gallons a day (MGD) to be abstracted from Ennerdale with only 4MGD Compensation Water being allowed to the River Ehen once the level of the lake fell below the sill of the weir.
7. It was recognised in the 1960's that the compensation level had been set too low at 4MGD; reducing the Ehen flow to a trickle under dry conditions.

8. Apart from the effect associated with the low compensation flow, the River Ehen was not seriously affected by water abstraction during the 1960's because the abstraction rate was much lower than allowed by the 1947 Order e.g. by 1962 the abstraction rate to supply was only 7MGD.
9. Because of the low abstraction rate the lake level was never drawn down, even by 24 inches, during the Summers of 1957 to 1971, for which records are available.
10. Because of the small draw-down of the lake the scenic impact was negligible during these years and after rain the lake level quickly returned to overspill the weir, thus giving an almost natural return of fresh water to the River Ehen.
11. During the early 1960's the Ehen fishery was at a peak with regard to salmon and seatrout catches.
12. In common with other rivers in the area the Ehen fishery suffered severely in the epidemic of the Salmon Disease (UDN) in 1966.
13. Most river fisheries in Cumbria deteriorated to about a third of their pre-disease level following the epidemic but the Ehen fishery continued to deteriorate during the 1970's to only 7% of the pre-disease level.
14. The only special factor affecting the River Ehen during the 1970's was the increasing abstraction from Ennerdale which was causing serious draw-down of the lake by 1972, when the abstraction rate had increased to 12MGD. (The lake level was drawn down by more than 24 inches for 41 days during the Summer of 1972, with consequent reduction of flow on the River Ehen, when fish should have been ascending the river).
15. In 1974 a new licence was operated which allowed 17.5MGD abstraction to supply from Ennerdale, with compensation flow now increased to 7MGD. The present fish pass into the lake was operated for the first time and failed to cope with the compensation flow, due to the lake level being drawn down below the entry to the pass during the Summer. The abstraction rate by then had increased to greater than 14MGD.
16. The lake level has been drawn down seriously in dry weather ever since 1972 with regular failure of the fish pass and the necessity to pump compensation water to the River Ehen, and sometimes to supply.

17. The lake draw-down is now frequently to 40 inches below the sill, at which the fish pass fails. At 48 inches below the sill it is necessary to pump to supply. In 1978 the lake level fell to 65 inches below the sill.

Effects of the present regime on the River Ehen

18. There are now prolonged periods when the river only receives compensation water from the lake.
19. When a drought breaks there is insufficient water to bring the lake level up to the sill. Consequently, when neighbouring rivers receive a good flow of fresh water, the Ehen is deprived of lake water. This causes a depression of the River Ehen both scenically and as a fishery.
20. During these periods of lake draw-down, young fish are unable to migrate to the sea from the lake and mature fish are prevented from returning to the lake to spawn.

1980 Public Inquiry

21. North West Water Authority proposed to raise the Ennerdale weir and to increase abstraction to 23MGD, with even greater and more prolonged draw-down of the lake being a consequence. This scheme was rejected by the Minister.
22. In evidence, North West Water Authority listed the improvements which would be required at Ennerdale if their proposals were rejected. This included detailed evidence concerning improvements which would be required to the fish pass.
23. Following the Inquiry, North West Water Authority revised their estimate of the reliable yield of Ennerdale Lake with the present weir level to 11.7MGD.
24. North West Water Authority now estimate that a new fish pass will cost £100,000 and state that this expenditure is not justified.

Conclusions

25. Based upon previous records it can be seen that an abstraction rate of 11.7MGD from Ennerdale will still cause frequent failures of the present fish pass.

26. During dry periods North West Water Authority will require additional water from sources other than Ennerdale. (Hence the current interest in bore-hole supplies).

Recommendations

27. The abstraction to supply from Ennerdale should be decreased to such a level that the present fish pass will always carry the compensation flow.
28. This will:
- (a) save £100,000 expenditure on a new fish pass
 - (b) reduce environmental damage to the lake and river which is at present a consequence of excessive abstraction and lake draw-down
 - (c) restore the Ehen flows nearer to a natural condition, with consequent advantages to the fisheries.

A. Marshall
Assistant Secretary
Egremont & District Anglers' Association

29/5/85

- N.B. For more detailed information please see the Proof of Evidence submitted by Egremont & District Anglers' Association to the 1980 "Two Lakes" Public Inquiry.