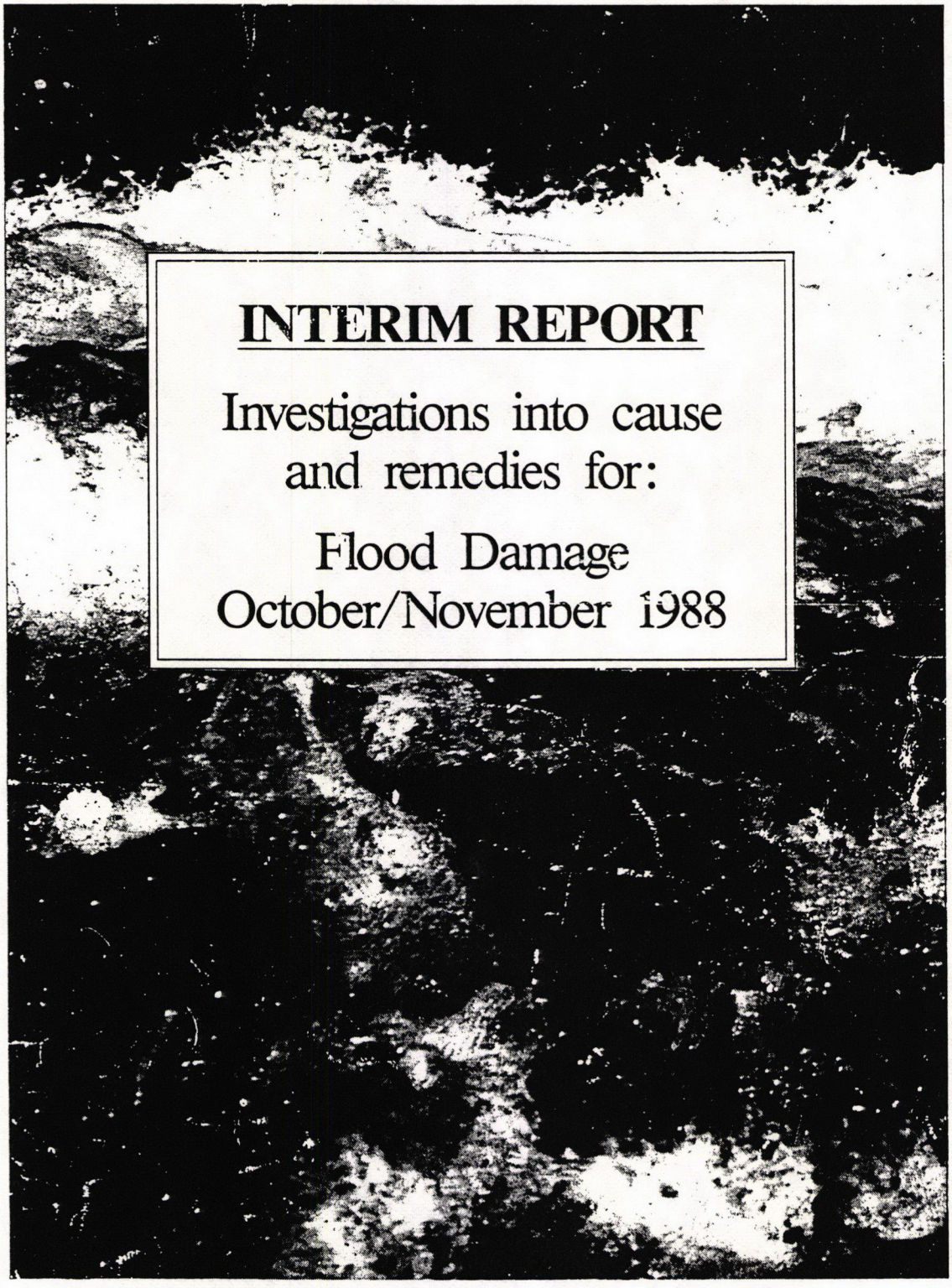
LOWER WAIAU RIVER



INTERIM REPORT

Investigations into cause and remedies for:

Flood Damage
October/November 1988

Electricity Corporation of New Zealand Limited

ELECTRICORP PRODUCTION

LOWER WAIAU RIVER

INTERIM REPORT ON INVESTIGATIONS

INTO CAUSE AND REMEDIES FOR

FLOOD DAMAGE OCTOBER/NOVEMBER 1988

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1. During October November 1988, extremely high rainfalls in the Te Anau/ Manapouri Catchment resulted in discharges from the Manapouri Lake Control Structure at Mararoa which reached a peak of more than 1475 cumecs. The resultant flows in the Lower Waiau river caused considerable damage to riparian properties.

2. It is worth recording here a number of items which have been established in relation to the event. A report entitled "Lakes Manapouri and Te Anau - Flooding - October November 1988" produced by H J Freestone, Investigations, (Hydrology), WORKS Project Services, February 1989, records:-

   * The October/November 1988 floods for Lakes Te Anau and Manapouri were the largest since records began in 1926 and the second largest since the historic 1878 flood.

   * Rainfall in the area was 50% to 90% above normal for the period May to October

   * Rainfall for October was 3.4 to 3.5 times higher than normal

   * The peak flood flows at Tuatapere were less than would have naturally occurred - the October 1988 Tuatapere flood peak was only ranked 8th in the 14 years record of annual flood peaks.

   * Attached as appendix A is a copy of a hydrograph comparing actual flows with calculated natural flows at Tuatapere.

3. As a result of expressions of concern at the damage caused by the high flows, a public meeting was arranged under the Chairmanship of Derek Angus, MP. The meeting was attended by representatives of the Southland Catchment Board and South Island Hydro Group, Electricorp Production.

   It was agreed that the following actions would be instigated.

   3.1 A site by site investigation of damage to riparian properties would be undertaken by staff of Electricorp Production.

   3.2 Investigations would be carried out into the cause of the erosion and the resultant damage. These investigations would be funded by Electricorp Production.

   3.3 The Catchment Board would prepare a works plan for the Lower Waiau river to render it better able to pass flood flows without damage.

   3.4 Electricorp Production confirmed its willingness to honour the commitment made by the former Electricity Division in 1984 to fund the cost of a hydrologist/hydraulic engineer if the Catchment Board need to engage additional support on contract to prepare the plan.

3.5 Electricorp to fund the costs of installing an upgraded publicly interrogable recorder at the Mararoa Weir and half the cost of an additional facility at an agreed site below Monowai.

3.6 The Catchment Board to install telemetry on these sites to enable them to provide a flood warning service for the Lower Waiau river.

4. The purpose of this interim report is to outline progress made at 30 April 1989 on each of the matters agreed to be undertaken following the meeting.

4.1 Site Inspections

The inspection of sites was carried out over the period 21 to 23 February 1989 inclusive, by Mark France and Barry Knox representing the Group Manager, South Island Hydro Group, Electricorp Production.

A map showing the location of the properties inspected and a detailed report on the discussions which took place are attached as appendices "B" and "C". The types of problems identified, not all of which were occasioned by the high flows in question, are as follows.

a) Erosion - noticeable at a number of areas, particularly on the outside of bends where gravel has built up on the inside of the bend causing changes in bed level.

b) Flooding - particularly noticeable in the lower reaches, this was associated with situations where erosion had removed the protection for low lying land which was formally afforded by relatively higher river banks. In some cases a form of evolsion is a possibility, with the river threatening to resume historic braids which had more recently formed part of farm properties.

c) Fence Damage - In a number of areas river bank fencing had been installed by the Electricity Division in areas where the river no longer acted as a stock barrier following establishment of the Manapouri Lake Control Structure.

In some cases, as recorded in the report, these fences had been removed or damaged by river bank erosion.

In one case, internal fencing had been washed away by flooding.

d) Noxious Weeds - Several land owners identified problems associated with the control of noxious weeds between riparian fencing and the river bed, and the cost of such control.

e) Water Supplies -

(i) A number of landowners who had been supplied with windmills to provide stock water when their properties were fenced off from the river, advised that their windmills needed repairs to/replacement of cranks and other major moving parts every five years.

(ii) at least one property experienced ongoing problems with unusable water supply for extended periods during turbid flows from tributories.

4.2 The DSIR Hydrology Centre, Christchurch has been contracted to investigate the changes which have occurred in the river. Flows, levels and bed profile data over the last decade is being collated to provide a picture of what has taken place.

The Southland Catchment Board has arranged for aerial photographs of the river to be taken in the last month, and these have been provided to the Hydrology Centre for comparison with photographs from the 1940's. This should provide clearer evidence of changes and the rate of change.

4.3 A report has been requested from the Catchment Board as to the feasbility and cost of carrying out river training and/or bank protection works to address the most urgent situations as revealed by site inspections.

Catchment Board and Hydrology Centre engineers have carried out further site inspections and it is intended that an ongoing works programme can be developed to increase the ability of the waterway to pass flood flows safely.

4.4 At this stage it appears that the hydrologists and civil engineers of the Hydrology Centre, together with existing Catchment Board resources, will be able to prepare the necessary works programme.

4.5 & 6 The Corporation has forwarded funds to the Catchment Board to carry out the necessary upgrading of equipment. Work is underway to provide improved public information and to install telemetry to enable flood forecasting.

5. Proposed Action

It is perceived that some problems require urgent action. This action must, however, be appropriate in that it will ease or remedy the adverse effects of high flows and at the same time be compatible with ongoing longer term remedial and maintenance works.

5.1 Erosion/Flooding

A range of possible actions is being investigated including (where appropriate):-

- In stream works to re-establish preferred flood channel
- Bank protection works
- Consideration may have to be given to purchasing part of properties which are affected by flooding.

An interim report has been received from the Catchment Board and DSIR Hydrology to identify areas where urgent attention is required, and the preferred options.

Time Frame It is anticipated that the first instream works will commence before the end of June 1989.

5.2 Fencing

Electricorp has accepted responsibility for the reasonable cost of reinstating riparian fencing which was originally installed by Ministry of Works and Development.

Invoices for completed work, including reasonable labour costs, are to be forwarded through the Lower Waiau Action Committee to South Island Hydro Group, Dunedin for reimbursement.

Other fencing which was damaged due to inundation will be addressed on a case by case basis, but it seems reasonable that Electricorp contribute to the cost of reinstatement in the proportions determined by the consultants to be appropriate, as set out in Paragraph [5.5] below.

5.3 Noxious Weeds

It is envisaged that all noxious plants in the river bed and banks will be part of the control programmes to be included in the works plan proposed in paragraph [5.6].

Where broom is left in place for bank stability, Electricorp will come to an arrangement with individual landowners for control of weeds encroaching on the riparian fence lines for which the Corporation has accepted responsibility.

5.4 Water Supplies

Electricorp has accepted responsibility for the cost of repairs needed to maintain the windmills in working order. Routine maintenance will be the responsibility of the landowner. The Corporation will arrange with the land owners whose water supply has been identified as being affected by turbidity for an appropriately upgraded rainwater supply system for the periods when the river is too discoloured to use.

5.5 Funding of Works

It is part of the brief given to DSIR, for the Hydrology Centre to determine the extent to which the adverse changes in the river bed were naturally occurring events and the extent to which the changes were caused or accelerated by the presence of the Manapouri power scheme.

From this it should be possible to determine an appropriate proportion of funding which will be the responsibility of Electricorp.

The Southland Catchment board will outline a proposal for a special catchment rating district to provide ongoing funding of the local share of necessary instream works.

If it is agreed between the parties that it is necessary to purchase land this will be finalised on the same basis. Electricorp Production is prepared to provide initial funding for agreed urgent remedial works, on the basis that whatever proportion of this funding is subsequently agreed to in excess of the Corporation's proportion of costs, will be a credit against future contributions.

5.6 Works Planning

The Catchment Board will prepare a long term plan for works to render the flood channel more competent to pass flood flows.

A Liaison Committee is proposed to facilitate local involvement in the planning process. At least once a year, priorities will be determined for the annual works to be undertaken in the framework of the agreed plan.

The Electricity Corporation will continue to provide expertise from DSIR Hydrology to assist with preparation of the Works Plan.

Timeframe

It is expected that details of the works identified as having highest priority and hence needed to be carried out during the 89/90 financial year will be available for discussion with the liaison committee before the end of June.

The works plan for overall establishment/maintenance of the flood channel should be available before the commencement of the 1990/91 financial year.

M France B Knox
for Hydro Group Manager
South Island Hydro Group
Electricorp Production

APPENDICES

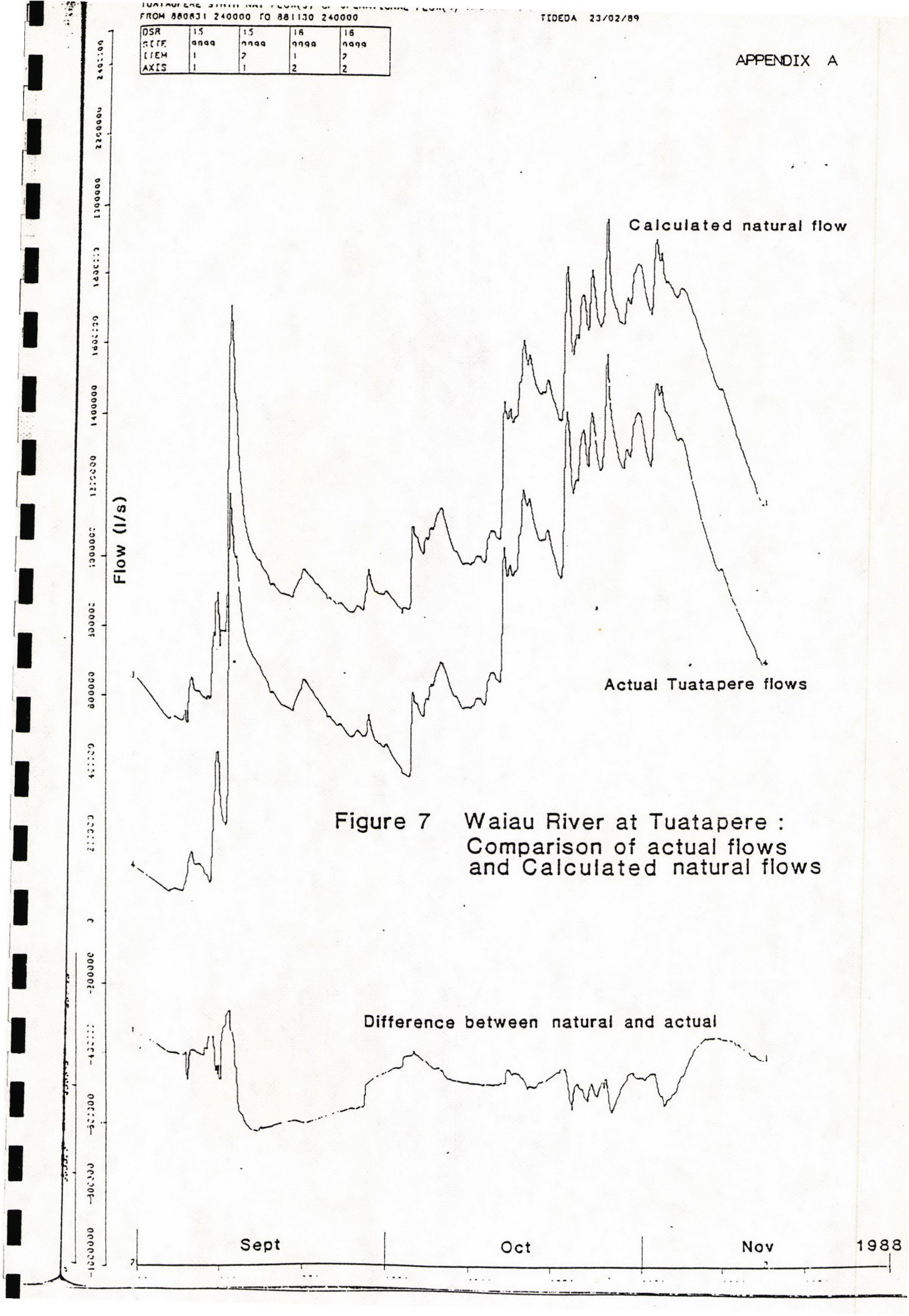


Figure 7 Waiau River at Tuatapere : Comparison of actual flows and Calculated natural flows

WAIAU RIVER - INSPECTION OF ADJOINING PROPERTIES

INTRODUCTION

ON 2 February 1989 there was a meeting at Tuatapere organised by the Waiau River Action Group.

One of the undertakings given by Electricorp at that meeting was that Mark France and Barry Knox would visit those properties where landowners had problems which they attributed wholly or in part to Electricorp.

The following notes record these visits, completed on 21/22/23 February 1989.

It is intended that these notes form the basis of a subsequent report making recommendations on appropriate Electricorp action in respect of the Waiau river.

The following general format is used for each property visit:

1. NAME/ADDRESS
2. MAP REFERENCE
3. PROBLEMS
4. ACTION PROPOSED BY LANDOWNER
5. COMMENTS
6. PRIORITY

For MAP REFERENCE, refer to the attached map. The indicates the approximate location of the property.

For PRIORITY, the following categories apply:

A. Urgent
B. Important. Include in the Management Plan as a specific issue.
C. Routine. Part of the overall problem to be addressed in the Management Plan.

1. JOHN PEEK

1.1 ADDRESS Te Tua No.1 R.D. Riverton (0225) 6534.

1.2 MAP REFERENCE - 5

1.3 PROBLEMS

Concerns expressed by John Peek included:

* Costs associated with reinstating flood damaged fences installed by E.D.M.E. (Electricity Division of the Ministry of Energy)
* Costs associated with on-going maintenance of E.D.M.E. installed stock water system windmills.
* Noxious plant control in areas fenced off from the river by E.D.M.E. (Note: Some of these problems were expressed by Mr Peek on behalf of other members of the Waiau Action Group.)

1.4 ACTION PROPOSED BY LANDOWNER

John Peek reiterated a request for reimbursement of fencing and windmill maintenance costs. He also felt that it would be reasonable for Electricorp to control noxious plant growth along the fences installed by E.D.M.E.

1.5 COMMENTS

Mark France saw no problem with John Peek's request for reimbursement of fencing and windmill costs. As a policy, Electricorp requires that these requests be channelled through the Waiau River Action Group, then forwarded to Electricorp after being checked by the Group. (This is to ensure a consistent, fair approach to the problem.)

As to the noxious plant issue, Mark France introduced the notion of a reasonable, sustainable long term solution. The appropriate level of contribution from all parties had to be assessed. No definite commitment to noxious plant control could be given by Electricorp at this stage.

John Peek has completed substantial river bank protection work which had been very successful for the 3-4 years since its installation. This involved laying mature willow trunks in a horizontal criss-cross fashion facing the main flows, and tying them back with wire strops to "dead men" in the adjoining paddock. Soil was then pushed over the willows, encouraging young willow growth. This form of protection could be used successfully in many other situations, given the ready availability of mature willows.

1.6 PRIORITY C

2. KEN AND DEBBIE LYON

2.1 ADDRESS Te Tua No.1 R.D. Riverton (0225) 6767

2.2 MAP REFERENCE - 4

2.3 PROBLEMS

* A smaller braid of the Waiau has actively eroded into the Lyon's property.
* A fence removed by the 1984 flood has not yet been reinstated.

2.4 ACTION PROPOSED BY THE LANDOWNER

A stretch of river bank just up-stream from the actively eroding area has been successfully protected with "old man" willows, similar to the protection on John Peek's property. Debbie Lyon felt that if more mature willow could be easily obtained, this form of protection should be continued into the affected area.

The fence would be installed again if Electricorp are prepared to pay for this. (However, controlling the active erosion was seen as the major problem.)

2.5 COMMENTS

It was felt that the Southland Catchment Board (S.C.B) should be consulted on the best way to tackle erosion here. Perhaps in-stream works to direct the braid away from the bank could be attempted. (Electricorp to follow up with S.C.B.)

2.6 PRIORITY B

3. DAVE ADAMS

3.1 ADDRESS Te Tua No.1 R.D. Riverton (0225) 6768

3.2 MAP REFERENCE - 1

3.3 PROBLEMS

Mr Adams said that at various times he had experienced the following problems:

* Erosion of the river lease land.
* Occasional mouth closure leading to flooding.
* Reduced stocking capacity and changes to management flexibility because of the risk of having stock in the low lying area prone to flooding.

3.4 ACTION PROPOSED BY LANDOWNER

No definite proposals were forwarded by Mr Adams.

3.5 COMMENTS

No comments noted.

3.6 PRIORITY B

4. GRAEME SANDERSON

4.1 ADDRESS Te Wae Wae R.D.1 Riverton (0025) 6630

4.2 MAP REFERENCE - 2

(Note: 70 acres of the property are leased from Hilary O'Brien. 70 acres are affected by flooding - total 350 acres.)

4.3 PROBLEMS

* Main problem relates to fences, some "internal" and not adjoining the Waiau, which have been damaged during flood conditions.
* Regrowth has been poor, as a result of longer term flooding - water often sits in low lying paddocks for weeks.
* Impairment to farm management - some areas must have reduced stocking because of the risk of stock loss due to flooding.

4.4 ACTION PROPOSED BY LANDOWNER

Mr Sanderson was primarily concerned about reimbursement for "internal" fencing. He estimated that he had replaced 40 chain of fence.

4.5 COMMENT

The question of whether or not Electricorp can assist with replacement costs for "internal" fencing depends on results of the D.S.I.R study to be completed in a few weeks. After the Study, the percentage liability attributable to Electricorp (if any) can form the basis of compensation payments.

4.6 PRIORITY B

5 DOUG STALKER

5.1 ADDRESS Te Tua No.1 R.D. Riverton (0225) 6631

5.2 MAP REFERENCE - 3

5.3 PROBLEMS

* Severe and very active erosion by the main channel of the Waiau adjacent to Mr Stalker's property has removed several acres of productive land, (previously used as a lambing paddock).
* Loss of fences alongside the river.
* Declining profitability from a property with a high debt ratio.

5.4 ACTION PROPOSED BY LANDOWNER

Mr Stalker indicated considerable concern about his erosion problem. (He had purchased the property several years ago in the belief that E.D.M.E. would "fix the river".) He felt that the erosion should be stopped (SCB had already indicated that, in this case, considerable expense would be involved); or that his property should be purchased. If the latter option was to adopted, Mr Stalker was concerned that current market values, even allowing for payment of land lost to erosion, would barely cover mortgage repayments.

5.5 COMMENTS

Mark France felt that options for erosion protection of property should be fully investigated. Purchase of all or part of the property may also be an option. Opportunites for purchasing alternative compensating property should also be looked at. He advised Mr Stalker to obtain the services of a solicitor to put a proposal to Electricorp in respect of property purchase by Electricorp.

5.6 PRIORITY A

6 PETER AND NICKI BAKER

6.1 ADDRESS Rannockmoor R.D. 2 Otautau (0225) 5094

6.2 MAP REFERENCE - 21

(Note: The property comprises 2000 acres, close to the Monowai power station turn-off.)

6.3 PROBLEMS

* The Bakers indicated that there were no severe problems directly related to their property at the moment. Mr Baker noted that he had approximately 3km's of fenceline adjoining the river - most of it along the top of the high bank next to the river. Noxious plants (mainly gorse) covered the bank. Control was a problem - To what extent is Electricorp liable?
* The Bakers also expressed concern about the general affects of flow reduction on the Waiau, with specific reference to its decline as a fishery.

6.4 ACTION PROPOSED BY LANDOWNER

Apart from the enquiry about noxious plant control, the Bakers addressed the broader Waiau problems, asking Mark France about future water rights application, possibilities for improving the fishery, etc.

6.5 COMMENTS

Mark France talked about the need for Electricorp to apply for a water right for the Waiau, and the possibility of say, altered spill regimes, compensatory releases of brown trout fingerlings, etc. Electricorp is to set up a series of working parties for the Waiau, in conjunction with S.C.B.

In relation to the noxious plant issue, this had to be seen in context - an assessment of the scope of the problem needs to be made. A programme dealing with the total problem can then be determined.

Mr Baker enquired about the feasibility of a dam/power station on the Waiau river downstream of the weir. Mark France said he knew of no such proposal, but that he would follow up with Electricorp Production Development section and get back to Mr Baker with any reports, etc, which may have been completed.

6.6 PRIORITY C

7. DAVID AND LYNN O'BRIEN JOHN O'BRIEN

7.1 ADDRESSES

(D O'Brien) "Rocky Top" No 2 R.D Otautau (0225) 5075
(J O'Brien) "Sunnyside" No 2 R.D Otautau (0225) 5074

7.2 MAP REFERENCES - 19, 20

7.3 PROBLEMS

* Water turbity affecting house water supply.
* Noxious plants alongside fences erected by E.D.M.E.
* The need for repairs to a stockwater windmill erected by E.D.M.E.

7.4 ACTION PROPOSED BY LANDOWNER

As discussed earlier with Barry Knox, the O'Briens were keen to get some funding from Electricorp to alter the water supply situation on their properties. This would involve installation of additional tanks.

The O'Briens were also keen to ascertain the Electricorp position on noxious plant control in areas fenced off from the river by E.D.M.E.

7.5 COMMENTS

Mark France suggested that the O'Brien's write to Electricorp outlining the problem, and requesting funds for their proposed solution. They should detail number of tanks required, general costs, etc.

7.6 PRIORITY C

8 IRVING PEARCE

8.1 ADDRESS

Estate of R.G. Pearce, Broadlands Otahu No 2 R.D. Otautau (Orawia) 840.

8.2 MAP REFERENCE - 15

8.3 PROBLEMS

* Erosion of the high bank on Mr Pearce's property adjacent to the Waiau (which goes through a gorge at this point).
* Gravel bed aggregation within the river channel, which has exacerbated the erosion.

8.4 ACTION PROPOSED BY LANDOWNER

Mr Pearce said he would like to see:
* armouring around the eroding cliff base. (He estimated about 3.5 metres of protection would be required for effective control.)
* removal of some of the estimated "20 feet" of gravel which has built up in the river bed at this point.

8.5 COMMENTS

This problem obviously requires input from DSIR hydrologists and S.C.B. There is a danger that implementing "ad hoc" solutions to a particular problem may in fact cause more problems in other parts of the river. (This applies to almost every situation encountered on site visits. It is apparent that river dynamics must be carefully studied before solutions are put in place, in all but the most urgent situations.)

8.6 PRIORITY B

9 TREVOR MOLLISON
(Manager for CAMPBELL property)

9.1 ADDRESS Lilburn Valley R.D.1 Tuatapere (0225) 6573

9.2 MAP REFERENCE - 9

9.3 PROBLEMS

* Active bank erosion of property on the true right side of the Waiau, downstream of the Lilburn tributary.
* Active erosion around the Lilburn tributory (S.C.B. are involved with this problem).
* Threats to river side fencing as a result of erosion.

9.4 ACTION PROPOSED BY LANDOWNER

Mr Mollison would like to see erosion halted, however this might be achieved.

9.5 COMMENTS

Mr Mollison's problem is part of a larger problem affecting several properties in the area. Careful assessment by DSIR Hydrology Centre and S.C.B. will be necessary.

A large gravel bar has built up just upstream of where the erosion is occuring. This gives some indication of the power of the Waiau to move material in times of high flow. Electricorp is to seek expert advice on how feasible it may be to re-channel flows to the centre of the river, where large deposits of gravel impede flows.

9.6 PRIORITY B

10. CHRIS AND JACKIE HOWDEN

10.1 ADDRESS Blackmount No.2 R.D. Otautau (0225) 5146

10.2 MAP REFERENCE - 17

10.3 PROBLEMS

* No site inspections were made of Mr Howdens river frontage, but he noted that his main problem was replacing fences installed by E.D.M.E. (Approx 400 metres).
* Mr Howden also talked about gravel depositions in the Waiau adjacent to his property, but this has not had a direct impact on erosion to his land at this stage.

10.4 ACTION PROPOSED BY LANDOWNER

In relation to the deposition problem, Mr Howden was of the opinion that the gravel bars will never stabilise. The only solution, he said, was to provide stable river flows, or armour the river beds.

10.5 COMMENTS

Mr Howden was told of Electricorp's policy in relation to fencing. Claims should be channelled through the Waiau River Action Group, for checking and subsequent payment by Electricorp.

Mark France noted Mr Howden's comments. He wanted to explore with S.C.B. the feasibility of moving gravel around within the river banks to improve flow situations. (Removal of material from the river area would probably create disposal problems.)

10.6 PRIORITY C

11 GLEN McLEES

11.1 ADDRESS "Dun Luce" R.D. No 2 Otautau

11.2 MAP REFERENCE - 20

11.3 PROBLEMS

* Mr and Mrs McLees more than other landowners expressed a general disappointment at the loss of "The mighty Waiau" as an intrinsically beautiful river, with excellent fishing. Mrs McLees expressed disappointment that the "backwater" had been eroded away - she used to use this area for fishing.
* Another problem mentioned was the excessive amount of noxious growth on flats which used to be open. However, this area is owned by D.O.C. (previously Forest Service) and Mr McLees has "given up trying" to get any action from D.O.C. (DOC had suggested using cattle for broom management, but access for stock was a problem.)

11.4 ACTION PROPOSED BY LANDOWNER

Mr and Mrs McLees seemed to appreciate the opportunity to express their general feelings about the Waiau. However, Mr McLees felt that "training works in this section of the river would be useless". In relation to gravel depositions occurring around the Mararoa weir, he offered the opinion that "a schoolboy could have seen that this would happen".

11.5 COMMENTS

Mark France discussed the Waiau as a fishery - many rivers the size of the Waiau as it is now are excellent fisheries, and the Waiau has potential for fisheries enhancement.

11.6 PRIORITY C

12 MICK O BRIEN

12.1 ADDRESS West End Station R.D. 2 Otautau (0225) 5142

12.2 MAP REFERENCE - 22

(Note: As well as this property, Mr O'Brien owns another property further up river.)

12.3 PROBLEMS

* Main problem is removal of fences by floods (11 Kms length of fencing on the property next to the Waiau)
* Poachers coming across the river (Mentioned in passing - not really an Electricorp related issue)

12.4 ACTION PROPOSED BY LANDOWNER

Mr O'Brien was keen to ascertain the Electricorp policy in respect of fencing.

12.5 COMMENTS

Mr O'Brien was informed of the policy. (Liaison through the Waiau River Action Group, for checking by the Group, and subsequent payment by Electricorp).

12.6 PRIORITY C

13 BRUCE DEVERY

13.1 ADDRESS Clifden R.D. 2 Tuatapere (0225) 6626

13.2 MAP REFERENCE - 6

(Note: 40 acres total. 25 acres flat land adjoining Tuatapere bridge, 18 acres on higher ground.)

13.3 PROBLEMS

* Frequent flooding over the "island" downstream of the Tuatapere bridge, affecting the productive land beyond this.

13.4 ACTION PROPOSED BY LANDOWNER

Mr Devery suggested that the island could be removed or reshaped to offer greater protection to his nearby more productive land.

13.5 COMMENT

Mark France made reference to the importance of involving S.C.B. in such proposals - there could be serious repercussions for other sections of the river if such action proceeded without careful appraisal. (The Waiau was at highflow on Friday 23/2/89. It was apparent that any in-stream modifications could easily affect parts of the river. Mr Devery acknowledged this.)

13.6 PRIORITY C

14 IAN SWALE ~~25a~~

TOM HIGGENS

DAVID CHURCH

14.1 ADDRESSES

(I Swale) R.D. 2 Otautau (0225) 25757
(T Higgins) R.D. 2 Otautau (0225) 25812
(D Church) Otahu Flat R.D. 2 Otautau (0225) 25755

14.2 MAP REFERENCES - 11, 12, 13

These properties are all located adjacent to one another, upstream of the Clifden bridge. (The problems experienced are common. All the landowners were present during the inspection of Mr Swales property.)

14.3 THE PROBLEMS

* Two sites of active river bank erosion were viewed. The first was a long length adjacent to the main Waiau channel, where considerable land has been lost recently. Fences have also been lost.

* The second site looked at was an area where water in high flow situations forced its way into a side braid. This area is generally lower than the river bed, and if erosion continues, Mr Swale's plantation of pines could be threatened, and parts of the properties of Mr Higgins and Mr Church would also be flooded.

14.4 ACTION PROPOSED BY LANDOWNER

Apart from general comments about the inadvisability of reducing the flow of the "mighty" Waiau, the landowners were extremely concerned that current erosion trends be halted as soon as possible.

Mr Swale said that the Waiau used to be constant, full and straight, now it is slower, and tends to meander. He also noted that the tributaries now have larger flows than the main Waiau, and this causes imbalances.

14.5 COMMENTS

This is a priority area for S.C.B/Hydrology Centre assessment.

14.6 PRIORITY A

15 ALAN BENNIE

15.1 ADDRESS Clifden R.D. 2 Tuatapere (0225) 6575

15.2 MAP REFERENCE - 10

15.3 PROBLEMS

* Very active erosion of Mr Bennie's property adjacent to the Waiau, with consequent loss of fencing. Mr Bennie noted that the problem had worsened since work was completed on the Lilburn tributary, upstream from his property. Now Waiau water is forced into the bank on his property.

15.4 ACTION PROPOSED BY LANDOWNER

Mr Bennie advocated the following:
* Relocating fence back 10-15 metres, to allow for further erosion.
* Attempt bank protection with willows laid and tied back.
* Coordinate with S.C.B on possible river works to direct main flows away from the bank.

15.5 COMMENTS

Mark France agreed with all suggestions. This problem is part of the larger one which affects may properties in the area. Further study is definately required.

15.6 PRIORITY A

16 JOHN KNOWLER

16.1 ADDRESS Clifden R.D. Tuatapere (0225) 6755

16.2 MAP REFERENCE - 8

03 2266755

16.3 PROBLEMS

* Bank erosion, downstream of an area already very successfully protected several years earlier.

16.4 ACTION PROPOSED BY LANDOWNER

Mr Knowler has actively campaigned for several years to get something done about problems associated with the Waiau. He sees his problem as being very much associated with that of his neighbour, Mr Carr. If flows are not discouraged from doing so, there is a danger that Mr Carr's "island" might be isolated. (Currently there is easy access.) As far as his property is concerned, Mr Knowler would like to see some re-channelling completed to divert the main flow away from his area of bank erosion, and away from Mr Carr's island.

16.5 COMMENT

Mr Knowler has implemented very successful plantings to protect some of his eroding banks. This could be used as a model for work elsewhere.

16.6 PRIORITY B

17 JOHN CARR

17.1 ADDRESS Clifden R.D. Tuatapere (0225) 6758
(Mr Carr also has a property at Papatotara, further downstream)

17.2 MAP REFERENCE - 7

17.3 PROBLEMS

* The Waiau threatens to cut off a large island belonging to Mr Carr. Currently cattle graze the area (Clifden property)
* Active bank erosion (Papatotara property).

17.4 ACTION PROPOSED BY LANDOWNER

- (Clifden) - River bed works to direct flows away from the island.
- (Papatotara) consult with S.C.B - possible work on instream island diverting flow against high, eroding bank.

17.5 COMMENTS

Both of the areas of concern to Mr Carr require further assessment by S.C.B/Hydrology Centre.

17.6 PRIORITY A

NOTE: Two landowners who indicated they had problems were unable to be visited in February. These are Mr Diak and Mr King Allen. Visits to their properties should be arranged at the next convenient opportunity.

Barry Knox
Environmental Planning Officer

14 March 1989



APPENDIX C

MAP REFERENCE
FOR PROPERTIES VISITED
BY
ELECTRICORP, 21-23 FEB 1989

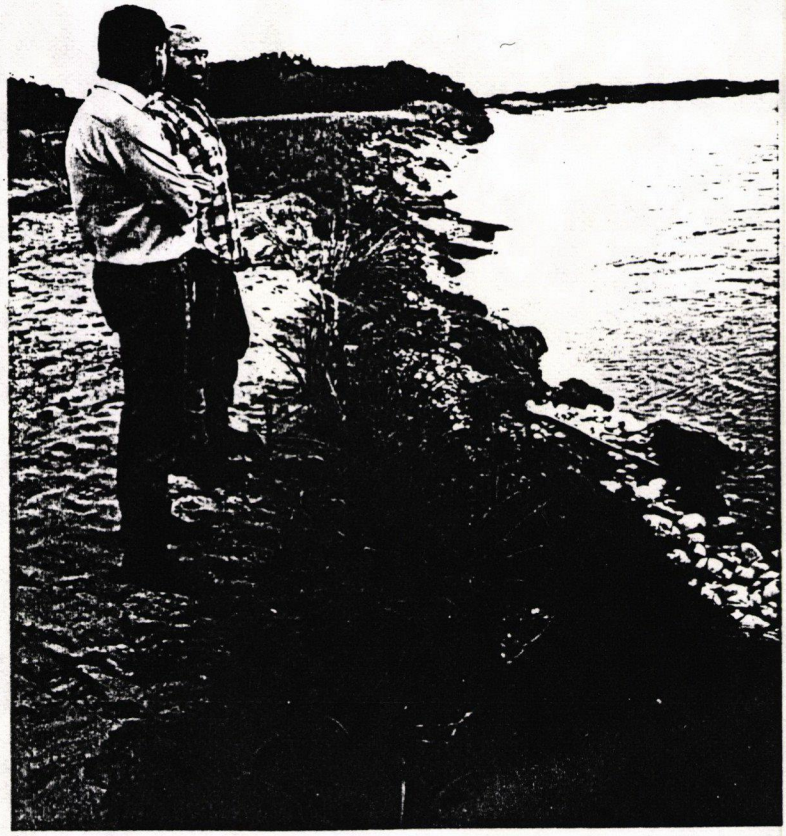
(To accompany the report, Waiau River - Inspection Adjoining Properties)

22 Mick O'Brien
21 Peter and Nicki Baker
20 Glen McLees
19 David and Lynn O'Brien
18 John O'Brien
17 Chris and Jackie Howden
16 Sandy Diak (to be visited)
15 Irving Pearce
14 Mr King Allen (to be visited)
13 Ian Swale
12 Tom Higgens
11 David Church
10 Alan Bennie
9 Campbell Property (Trevor Mollison)
8 John Knowler
7 John Carr
6 Bruce Devery
5 John Peek
4 Ken and Debbie Lyon
3 Doug Stalker
2 Graeme Sanderson
1 Dave Adams



DAVE ADAM's property

Mark France and Dave Adams look over the low lying areas on the true left of the Waiau (including the SANDERSON and STALKER properties in the background) which flood at times of high flow.

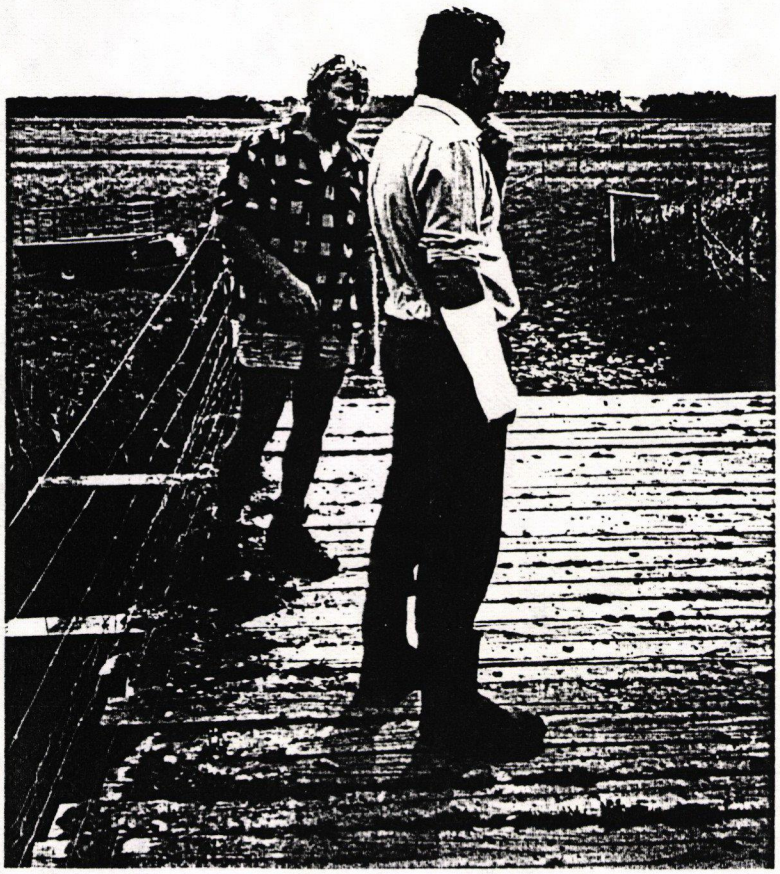


Dave Adams and Mark France on low lying lease area on Mr Adam's property.



GRAEME SANDERSON'S property

During recent flooding gravel deposits built up in Mr Sanderson's creek, causing some access problems.

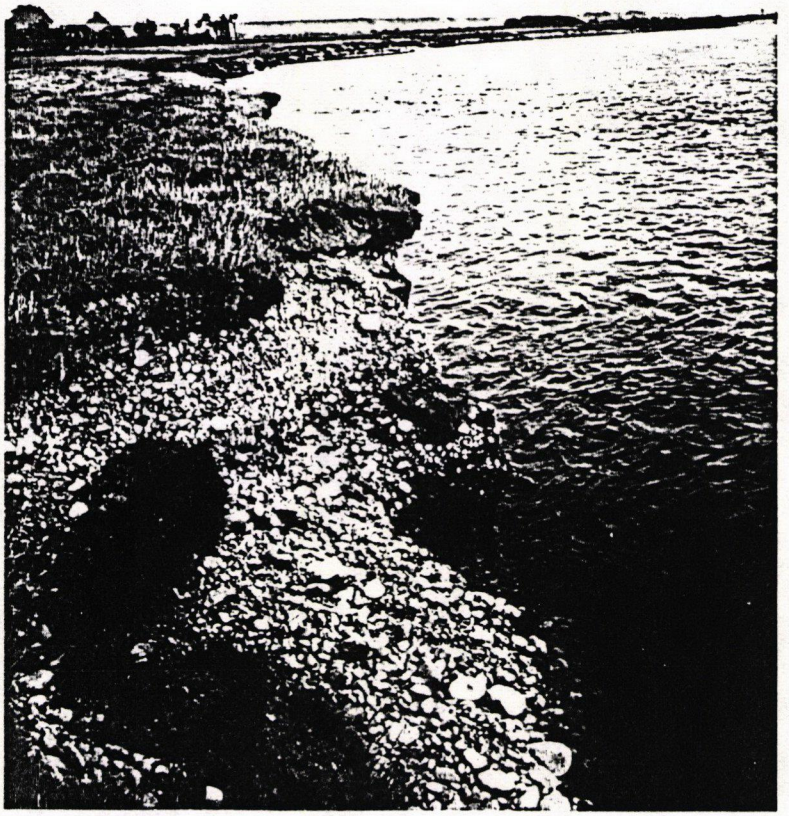


This bridge was scoured at the abutments.



DOUG STALKER's property

Downstream views. Mr Stalker claims several acres have gone from this area in the last year. The bank seems to be actively eroding, and overtops during high flows, flooding adjacent properties.





KEN AND DEBBIE LYON'S property.

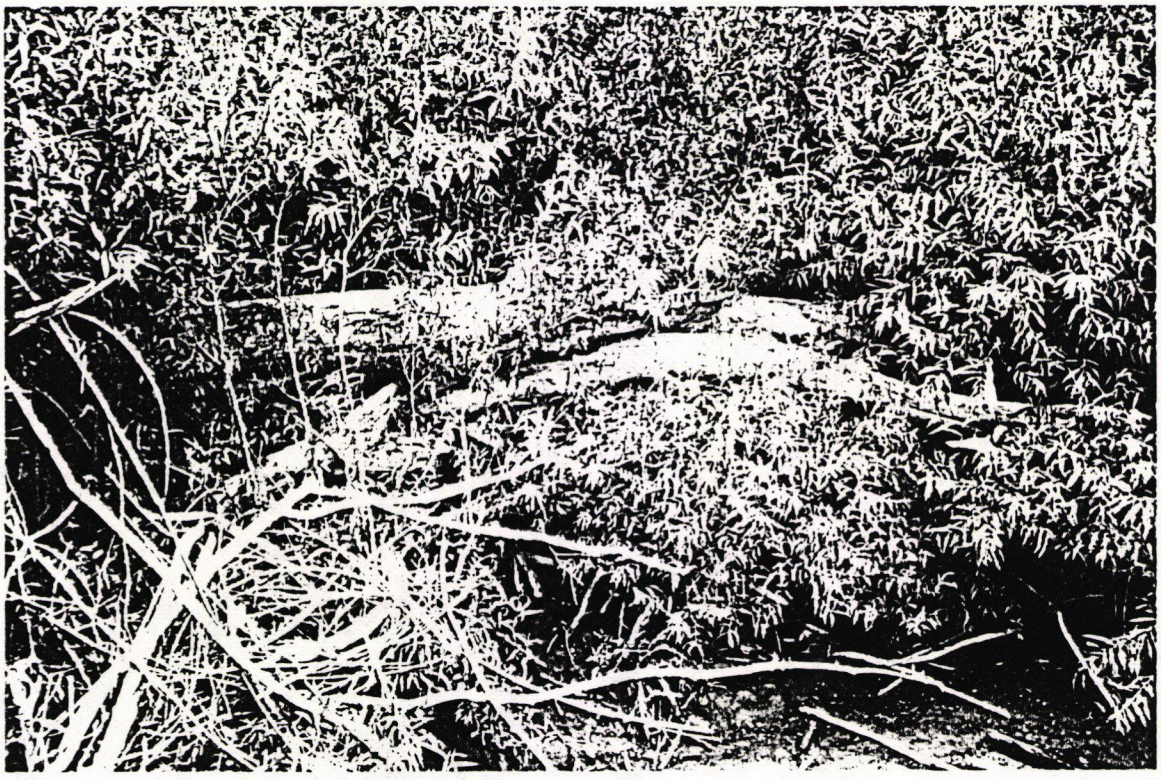
Mark France and John Peek stand above a bank successfully protected with mature willow branches laid horizontally.

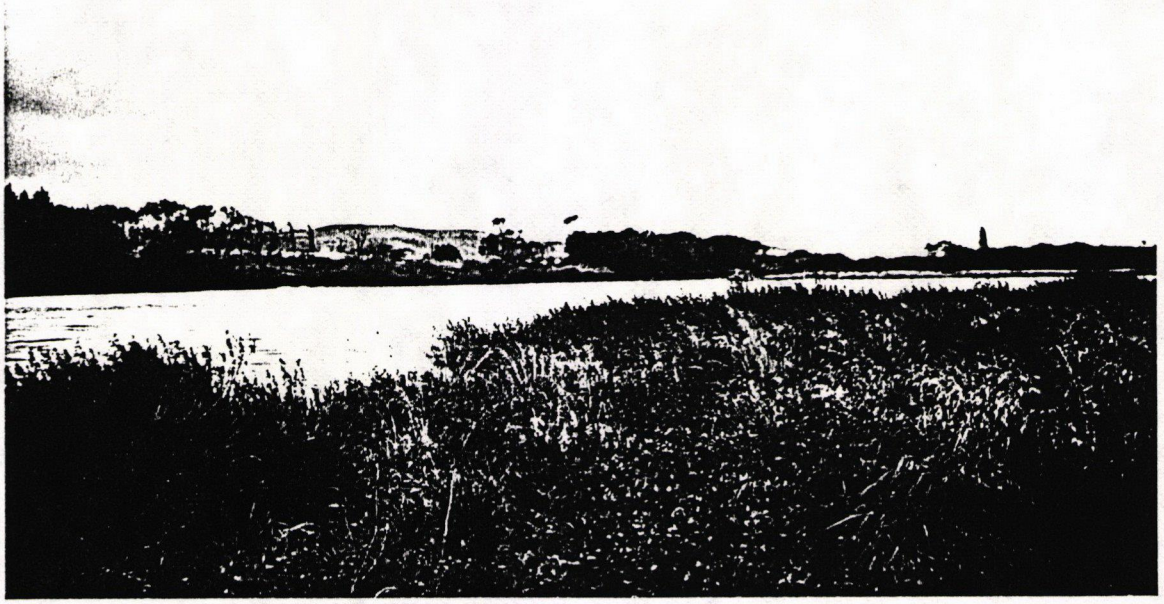


Debbie Lyon stands in a low lying part of her property which has been scoured by flooding (just down from willow bank protection, which held this section of river bank).



JOHN PEEK'S property. Side braid bank protection with horizontally laid mature willow branches tied back with wire strops and "dead men".

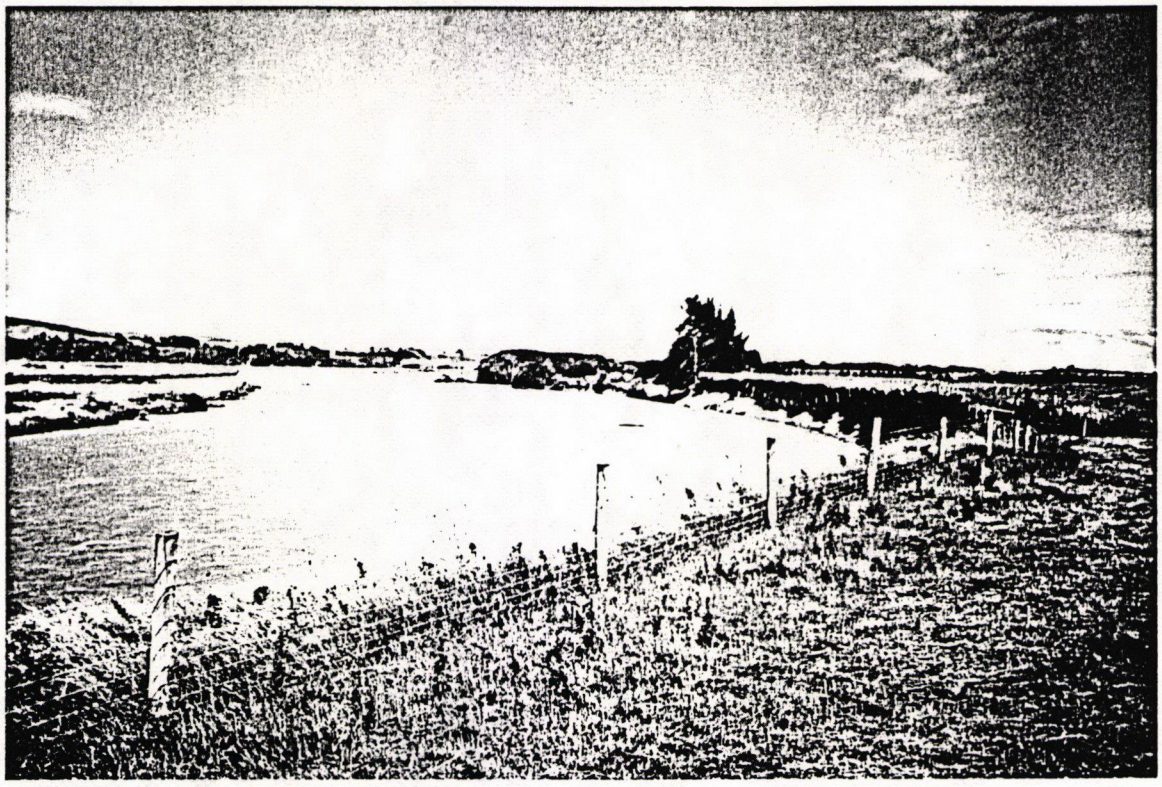




BRUCE DEVERY'S property

Mark France and Bruce Devery stand on the low lying island, downstream from the Tuatapere bridge.





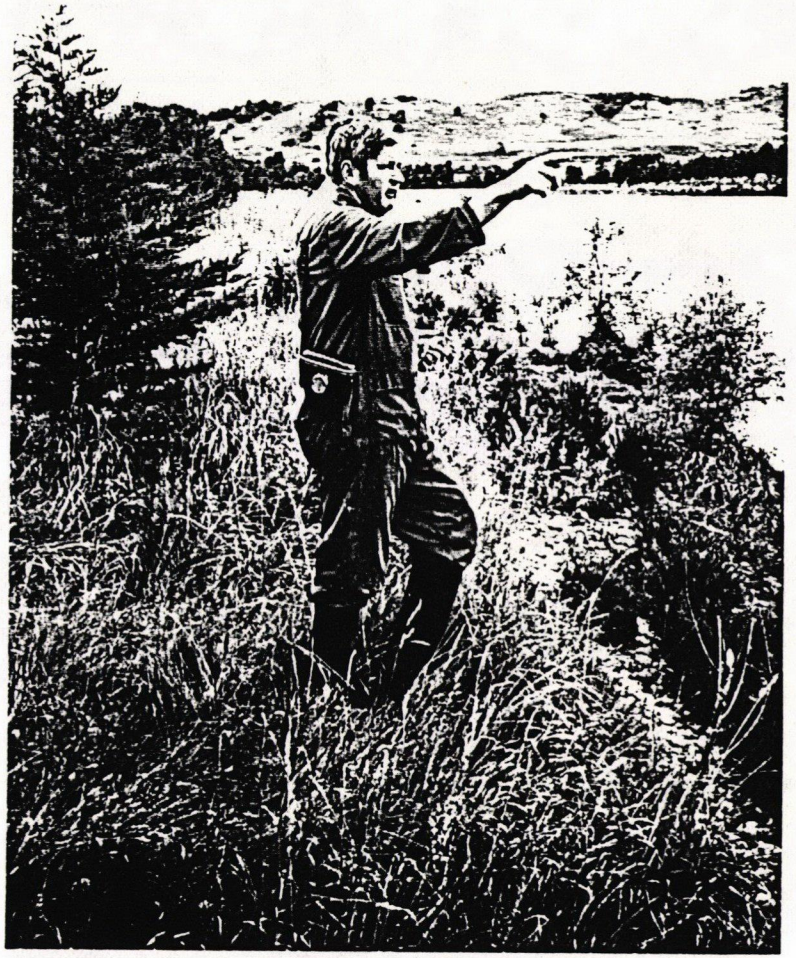
JOHN CARR'S Papatotora property

View downstream. Active bank erosion.

View across the river. Island in middle distance.







JOHN KNOWLER'S property

Note earlier successful erosion protection planting.

WAIAU INSPECTION FEB 1989



Islands in mid stream divert flow towards the low braid in Mr Carr's property.

JOHN KNOWLER'S property

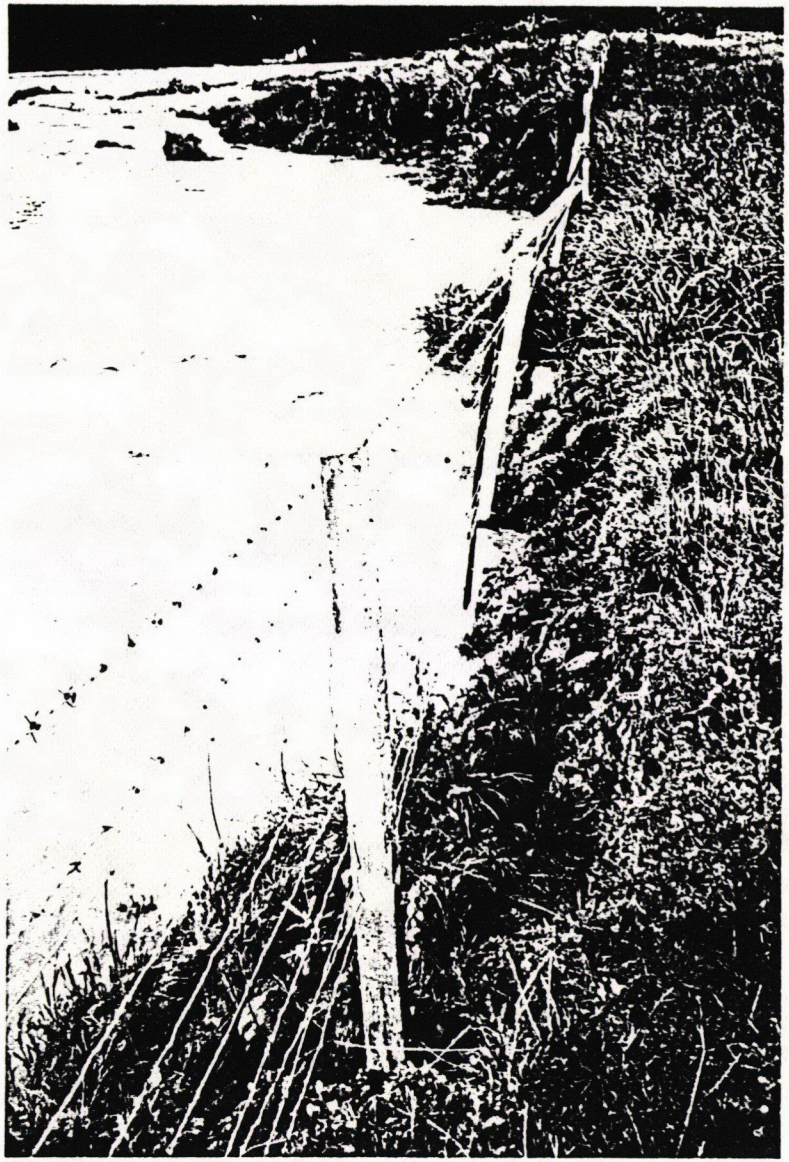
Downstream of area protected by planting, towards Mr Carr's property.

Some active bank erosion.

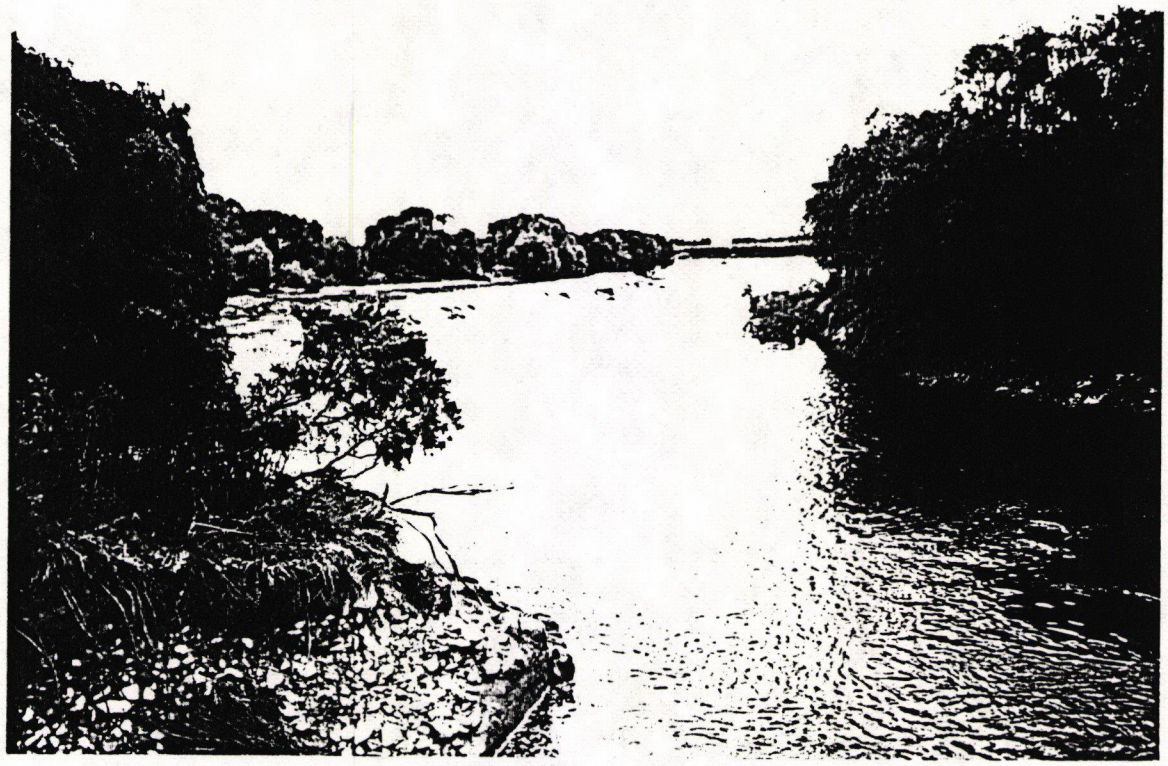




JOHN CARR'S Clifden property



A braid has cut off the island Mr Carr uses for cattle grazing.



Island

CAMPBELL'S property (Trevor Mollison, Manager)

↑
View upstream. Note large gravel bar which has formed.
View downstream. Note "Papa" base rock.
↓



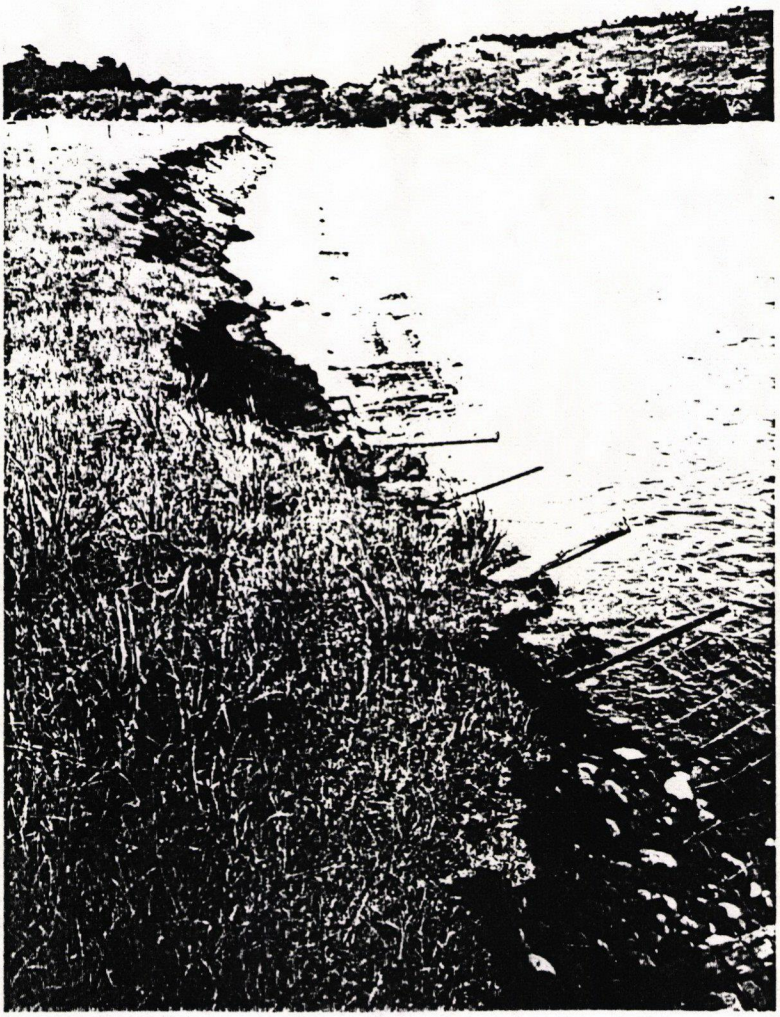


ALLAN BENNIE'S property

↑

Upstream

Downstream →



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IAN SWALE'S property



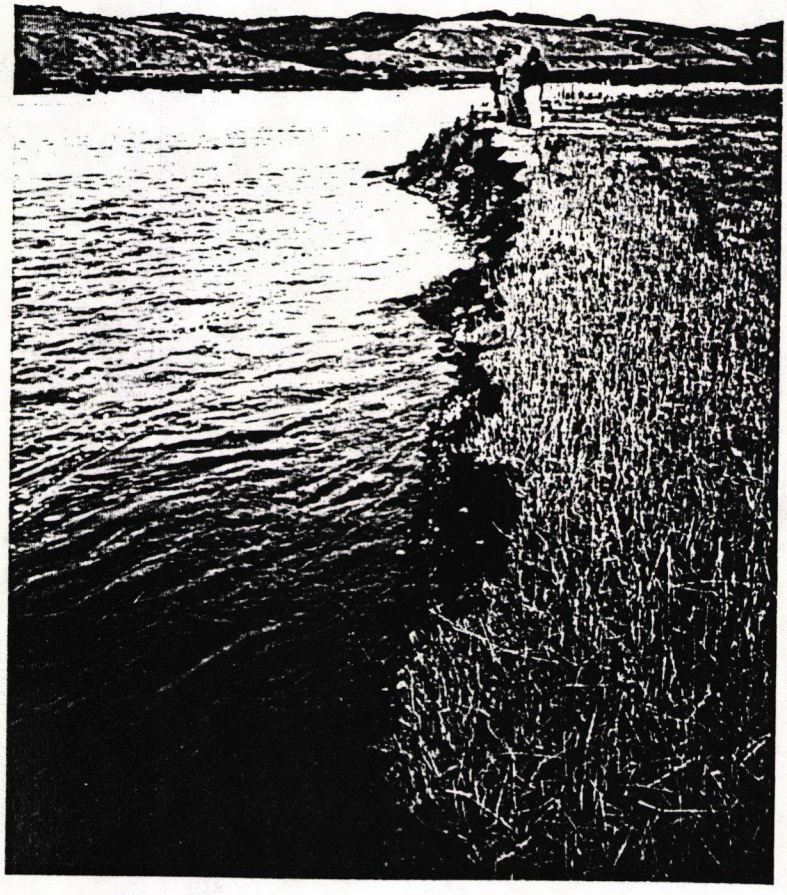
WAIAU INSPECTION FEB 1989



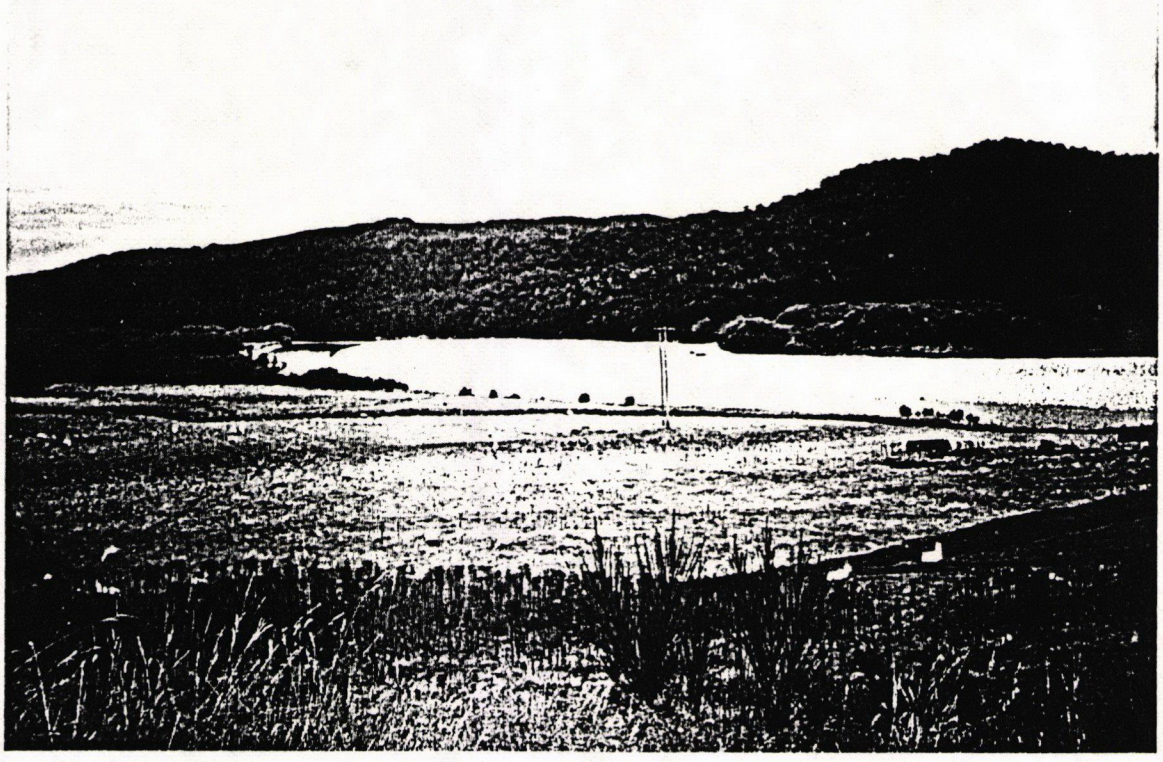
View downstream

IAN SWALE'S property

Waiau in high flow.



View Upstream



IRVING PEARCE'S property

Substantial gravel depositions have built up a bar some "20 feet" above pre-weir levels, according to Mr Pearce.



Mark France and Irving Pearce at the top of the eroding cliff face.