

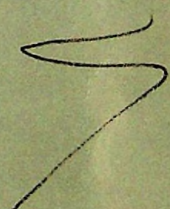
THE FISHERIES IN THE  
FALKLAND ISLANDS

by

Leslie Stewart, M.B.E., M.Sc., Ph.D.

Fisheries Consultant

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PLATE 1



THE MALO RIVER NEAR TIDAL WATER

PLATE 2



THE APLOCHITON ZEBRA (*APLOCHITONIDAE*) REFERRED TO AS THE TROUT IN THE FALKLAND ISLANDS. ONE OF THE ONLY TWO INDIGENOUS SPECIES OF FRESHWATER FISH IN THE ISLANDS.

## CONTENTS

	<u>PAGE</u>
PREAMBLE	4
TERMS OF REFERENCE	5
INTRODUCTION	6
SECTION 1 - GENERAL	8
CHAPTER 1 - THE FALKLAND ISLANDS	8
(A) GENERAL DESCRIPTION	8
(B) CLIMATE	9
(C) OTHER INFORMATION	10
CHAPTER 2 - FISH SPECIES IN THE FALKLAND ISLANDS	12
(A) INDIGENOUS SPECIES	12
(B) EXOTIC SPECIES	13
(1) INTRODUCTION OF BROWN TROUT	13
(2) INTRODUCTION OF ATLANTIC SALMON AND SEA TROUT	14
(3) OVA AND FRY PLANTINGS	17
SECTION 2 - AN INVESTIGATION INTO THE MIGRATORY FISHERIES	19
CHAPTER 3 - MATERIALS AND METHODS USED IN INVESTIGATING THE MIGRATORY FISHERIES OF THE FALKLAND ISLANDS	19
(A) MATERIALS	19
(B) METHODS	21
CHAPTER 4 - THE MIGRATORY FISH RIVERS OF THE FALKLAND ISLANDS	22
(A) EAST FALKLAND	22
(1) MURRELL	22
(2) SAN CARLOS	23
(3) SWAN INLET	24
(4) MALO	24
(5) FITZROY	25
(6) FRYING PAN CREEK (PEAK RIVER)	26
(7) PEDRO	26
(B) WEST FALKLAND	27
(1) WARRAH	27
(2) CHARTRES	28
(3) OTHER RIVERS AND STREAMS	29
(C) LAFONIA	30
CHAPTER 5 - EXAMINATION OF FISH SAMPLES TAKEN FROM THE RIVERS	31
(A) FOOD AND FEEDING HABITS	32
(1) ANALYSIS OF STOMACH CONTENTS	32
(2) TERRITORIAL BEHAVIOUR, SURVIVAL AND PREDATION	38
(B) FECUNDITY	39
(C) PARASITISM	40
CHAPTER 6 - THE VALUE OF SCALE READING AS A MEANS OF DETERMINING GROWTH RATES AND AGES OF TROUT	42

<u>CONTENTS (CONTINUED)</u>	<u>PAGE</u>
SECTION 3 - SALMON IN THE FALKLAND ISLANDS	51
CHAPTER 7 - INTRODUCTION OF SALMON INTO THE SOUTHERN HEMISPHERE	51
(1) ATLANTIC SALMON	51
(2) PACIFIC SALMON	51
INTRODUCTION OF SALMON INTO THE FALKLAND ISLANDS	54
SECTION 4 - OTHER ASPECTS OF MIGRATORY FISHERIES	58
CHAPTER 8 - CATCHES OF TROUT IN SOME RIVERS IN THE FALKLAND ISLANDS	58
(A) DOUGLAS SETTLEMENT RECORDS	58
(B) THE FALKLAND ISLANDS COMPANY DARWIN SETTLEMENT RECORDS	60
(C) THE FALKLAND ISLANDS ANGLING CLUB'S RECORDS	61
CHAPTER 9 - SOME LEGAL AND FINANCIAL ASPECTS	71
(A) RIPARIAN OWNERSHIP	71
(B) FISHERY REGULATIONS	71
(C) FISHERY FINANCE	75
(1) REVENUE FROM ROD ANGLERS	75
(2) FISHERY RATES LEVIED UPON RIPARIAN OWNERS	76
(3) CONTRIBUTIONS FROM THE GENERAL RATES FUND	77
CHAPTER 10 - RIVER AND CHANNEL IMPROVEMENTS	79
SECTION 5 - TOURISM AND ANGLING	81
CHAPTER 11 - TOURISM/ANGLING IN THE FALKLAND ISLANDS	81
SECTION 6 - SEA FISHERIES	85
CHAPTER 12 - SEA FISHERIES OFF THE FALKLAND ISLANDS	85
SECTION 7 - SUMMARY	88
CHAPTER 13 - SUMMARY	88
SECTION 8 - RECOMMENDATIONS	92
CHAPTER 14 - RECOMMENDATIONS	92
ACKNOWLEDGMENTS	96
APPENDICES	i.
APPENDIX 1	i.
APPENDIX 2	iii.
APPENDIX 3	iv.
APPENDIX 4	v.

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(FOR LIST OF ILLUSTRATIONS, PLEASE SEE OVERLEAF)

ILLUSTRATIONS

LIST OF PLATES

<u>PLATE NO.</u>		<u>FOLLOWING PAGE</u>
1	THE MALO RIVER NEAR TIDAL WATER (PHOTO: T.G. SPRUCE)	FRONTISPIECE
2	THE APLOCHITON ZEBRA .. .. .	FRONTISPIECE
3	A SECTION OF THE MURRELL RIVER .. .. .	22
4	THE LOWER REACHES OF THE SAN CARLOS RIVER .. .. .	22
5	APPROACHING THE WARRAH RIVER .. .. .	27
6	A TYPICAL STREAM IN THE FALKLAND ISLANDS .. .. .	27
7	A TYPICAL SALMONID REACH .. .. .	27
8 )	THE UPPER AND MID REACHES AND ESTUARY OF THE CHARTRES RIVER	( 28
9 )		
10 )		
11	THE MID REACH OF THE MALO RIVER .. .. .	39
12	A SEA TROUT (A) AND A SLOB TROUT (B) TAKEN FROM THE UPPER SALINE LIMITS OF THE MALO ESTUARY, NEAR THE GORGE .. .. .	39
13	TROUT CAUGHT IN THE MURRELL BY ELECTRO FISHING ..	41
14	TROUT CAUGHT IN THE MALO BY ELECTRO FISHING ..	41
15	SCAR TISSUE ON 10 LBS. SEA TROUT ARISING FROM INJURY CAUSED BY SEALS OR OTHER PREDATORS .. .. .	41
16	10 LBS. SEA TROUT FROM THE MALO RIVER .. .. .	41
17	SEA TROUT, WEIGHING 10 & 8 LBS. RESPECTIVELY, FROM THE MALO RIVER .. .. .	41
18	SEA TROUT CAUGHT IN THE CHARTRES RIVER BY ELECTRO FISHING .. .. .	41
19	SCALE FROM O+ TROUT .. .. .	42
20	SCALE FROM SEA TROUT .. .. .	42
21	TYPICAL REGENERATED SCALE COMMON TO FISH IN ALL RIVERS .. .. .	43
22	SCALE OF SLOB TROUT .. .. .	43
23	SCALE FROM BROWN TROUT WITH NO CLEARLY DEFINED WINTER BANDS .. .. .	46
24	SCALE FROM TWO YEARS OLD BROWN TROUT .. .. .	46

MAPS

MAP No. 1	FALKLAND ISLANDS	INSIDE FRONT COVER
MAP No. 2	SALMON DISTRIBUTION (WORLD MAP)	FOLLOWING PAGE 55

FIGURES

FIGURE 1	AGE/LENGTH CURVES FALKLAND FISH	FOLLOWING PAGE 44
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PREAMBLE

THIS REPORT HAS BEEN PREPARED AT THE REQUEST OF THE OVERSEAS  
DEVELOPMENT ADMINISTRATION FOR HIS EXCELLENCY THE GOVERNOR OF THE  
FALKLAND ISLANDS AND HIS EXECUTIVE COUNCIL.

## TERMS OF REFERENCE

- (1) TO DETERMINE THE DISTRIBUTION AND INFILTRATION OF TROUT IN AND AROUND THE ISLANDS.
- (2) TO ASSESS THE QUANTITY AND SIZE OF BROWN TROUT, SALMO TRUTTA SALMONIDAE, IN THE VARIOUS RIVERS AND DETERMINE ANY MIGRATORY HABITS.
- (3) TO ASCERTAIN IF ATLANTIC SALMON, SALMO SALAR SALMONIDAE, ARE PRESENT IN THE RIVERS.
- (4) TO EXAMINE SUITABILITY OF SPAWNING AREAS FOR MIGRATORY FISH AND THEIR DEVELOPMENT.
- (5) TO ASSESS THE AVAILABILITY AND APPROXIMATE QUANTITY OF THE FAUNA AS FOOD FOR FISH IN THE VARIOUS RIVERS.
- (6) TO CONSIDER IF THE ANGLING POTENTIAL AND FACILITIES ARE SUFFICIENT AND AVAILABLE FOR ATTRACTING TOURISTS FROM OVERSEAS TO THE ISLANDS.
- (7) TO ASCERTAIN IF THE MARINE FISHERIES CAN CONTRIBUTE TO FOOD RESOURCES AND SEA ANGLING.



## INTRODUCTION

THIRTY-FIVE YEARS AGO, THERE WERE NO SALMONIDS IN THE FALKLAND ISLANDS; TODAY, THE PROGENY OF BROWN TROUT INTRODUCED DURING AND SINCE THE SECOND WORLD WAR ARE TO BE FOUND IN MANY OF THE RIVERS. DURING THE YEARS FROM 1960 TO 1964, SEA TROUT AND ATLANTIC SALMON OVA ARRIVED IN THE ISLANDS FROM ENGLAND. THERE IS NO EVIDENCE TO SHOW THAT SALMON HAVE DEVELOPED FROM THESE OVA. THERE IS EVIDENCE THAT SEA TROUT ARE PRESENT, WHICH MAY BE THE RESULT OF THIS IMPORTATION.

HAVING BEEN CONCERNED INITIALLY WITH THE SELECTION, INCUBATION AND TRANSPORTATION OF SALMON AND SEA TROUT OVA TO THE ISLANDS, IT HAS BEEN OF PARTICULAR INTEREST TO ME TO VISIT AND SURVEY SOME OF THE RIVERS WHERE THEY WERE INTRODUCED AND INVESTIGATE THE LIFE HISTORIES OF IMMATURE AND ADULT FISH IN THEM. WHILST MY VISIT WAS BRIEF, I HAVE BEEN ABLE TO ASSESS MOST ASPECTS OF THE VIABILITY OF THE MIGRATORY FISHERIES AND MAKE SUGGESTIONS AS TO HOW THE RIVER HABITAT MIGHT BE IMPROVED AND FISH STOCKS INCREASED. MY BRIEF WAS ALSO TO INVESTIGATE THE SEA FISHERIES AROUND THE ISLANDS AND THE POSSIBLE DEVELOPMENT OF ANGLING AS AN ATTRACTION TO TOURISTS.

I ARRIVED IN STANLEY ON 13TH FEBRUARY, 1973, AND RETURNED HOME ON 16TH MARCH, 1973, WHICH WAS ALL TOO SHORT A TIME TO STUDY IN DEPTH THE MANY ASPECTS OF FISH HUSBANDRY APPLICABLE TO THE FALKLANDS. THE INVESTIGATION WAS MADE MORE DIFFICULT BY A LACK OF PUBLISHED LITERATURE AND BACKGROUND INFORMATION ON THE BIOLOGY OF THE RIVERS AND THE FISH IN THEM. THIS IS UNDERSTANDABLE BECAUSE THE INDIGENOUS FRESHWATER FISHERIES WERE OF LITTLE ECONOMIC VALUE.

I AM INFORMED THAT, PRIOR TO THE INTRODUCTION OF BROWN TROUT, SALMO TRUTTA SALMONIDAE, APLOCHITON ZEBRA APLOCHITONIDAE WERE PRESENT IN ALL RIVERS, AS WERE GALAXIAS MACULATUS GALAXIIDAE, BUT NOW THEY HAVE BEEN SUPPLANTED IN CERTAIN RIVERS BY THIS EXOTIC SPECIES. FROM A NATURALIST'S VIEWPOINT, THIS IS A TRAGEDY FOR THEY ARE THE ONLY TWO FRESHWATER FISH INDIGENOUS TO THE ISLANDS. FORTUNATELY, THE A. ZEBRA HAS NOT BEEN COMPLETELY EXTERMINATED FOR THERE ARE A NUMBER OF LAKES, INCLUDING LORENZO POND AND LAKE SULLIVAN, WHERE THEY STILL PREDOMINATE. G. MACULATUS

CAN STILL BE FOUND IN MANY RIVERS AND FEEDER STREAMS ENTERING THE LAKES. I FEEL THESE TWO SPECIES SHOULD BE PRESERVED AS NATURAL FAUNA OF THE ISLANDS AND EVERY EFFORT MADE TO SUSTAIN THEIR HABITAT; EXOTIC SPECIES SHOULD NOT BE INTRODUCED INTO ANY LAKE WHERE A. ZEBRA AND G. MACULATUS ARE PRESENT.

EXPERIMENTAL INTRODUCTION OF EXOTIC SPECIES CAN BE EITHER TO THE BENEFIT OR DETRIMENT OF THE HABITAT. (THIS ALSO APPLIES TO THE ACCIDENTAL INTRODUCTION OF AN EXOTIC SPECIE, AS CAN BE SEEN IN THE CASE OF THE BLUE BOTTLE (BLOW FLY) CALLIPHORA ERYTHROCEPHALA, WHICH HAS PROLIFERATED AND BECOME A NUISANCE IN THE ISLANDS.) AS THE ESTABLISHMENT OF SEA TROUT AND BROWN TROUT IS A FAIT ACCOMPLI, EVERY EFFORT SHOULD BE MADE, IN THE NEXT TEN TO TWENTY YEARS, TO IMPROVE THEIR RIVER HABITAT AND THEREBY OBTAIN THE GREATEST ECONOMIC ADVANTAGE FROM THEIR PRESENCE.

I HOPE THIS REPORT WILL BE OF ASSISTANCE IN FORMULATING FUTURE POLICY REGARDING FISHERIES IN THE ISLANDS.

SECTION I - GENERAL

CHAPTER I

THE FALKLAND ISLANDS

(A) GENERAL DESCRIPTION

THE FALKLAND ISLANDS ARE ABOUT THE SIZE OF WALES AND LIE IN THE SOUTH ATLANTIC BETWEEN 51° AND 53° SOUTH LATITUDE, SOME 7,500 MILES FROM ENGLAND. THE TWO MAIN ISLANDS - THE EAST AND WEST FALKLANDS - ARE SITUATED ABOUT 300 MILES EAST AND TO THE NORTH OF THE STRAITS OF MAGELLAN AND ARE SEPARATED FROM EACH OTHER BY THE FALKLAND SOUND. THEY ARE SURROUNDED BY ABOUT 200 SMALLER ISLANDS (MAP 1). THE AREAS OF THE ISLANDS ARE:-

EAST FALKLAND AND ADJACENT ISLANDS	2,610 SQUARE MILES
WEST FALKLAND AND ADJACENT ISLANDS	2,090 SQUARE MILES
	<hr/>
	4,700 SQUARE MILES

THEY HAVE DEEPLY INDENTED COASTLINES AND POSSESS MANY HARBOURS AND ANCHORAGES. THE TERRAIN IS HILLY, ATTAINING ITS MAXIMUM ELEVATION OF 2,312 FEET IN MOUNT USBORNE ON THE EAST FALKLAND. THE ENTIRE COUNTRY IS WILD MOORLAND, INTERRUPTED BY OUTCROPS OF ROCK AND PECULIAR COLLECTIONS OF ANGULAR BOULDERS CALLED "STONE RUNS". THE SOIL IS CHIEFLY PEAT. THE ISLANDS ARE BARE, FOR THERE ARE NO TREES, AND THE SCENERY RESEMBLES THAT OF THE SHETLAND ISLANDS, OFF SCOTLAND.

STANLEY, SITUATED ON EAST FALKLAND, IS THE CAPITAL OF THE ISLANDS AND THE ONLY TOWN. THE COLONY IS DIVIDED INTO SHEEP FARMS OR RANCHES, WHICH VARY IN AREA FROM 3,600 TO 400,000 ACRES, AND SMALLER SETTLEMENTS HAVE BEEN ESTABLISHED AS HEADQUARTERS FOR THE VARIOUS FARM STATIONS. OF THESE, GOOSE GREEN IS THE LARGEST.

MOST HOUSES IN STANLEY HAVE FLOWER AND VEGETABLE GARDENS TYPICAL OF THOSE IN ENGLAND BUT, APART FROM THE CAPITAL, THERE IS NO CULTIVATION EXCEPT IN THE IMMEDIATE VICINITY OF THE FARM SETTLEMENTS AND SHEPHERDS' HOUSES, WHERE VEGETABLES AND, IN SOME PLACES, GRASS FOR HAY ARE GROWN.

(B) CLIMATE

THE ISLANDS ARE SUBJECT TO STRONG SOUTH-WESTERLY WINDS AND RAPID DAILY VARIATIONS IN TEMPERATURE OCCUR. THIS IS CAUSED BY AIR MASSES AND FRONTS, WHICH ARE GENERATED IN THE ANDES, PASS OVER THE PATAGONIAN PLATEAU AND THEN OVER 300 MILES OF COLD SEA TO THE FALKLAND ISLANDS. THIS INFLUENCES THE FALKLANDS' CLIMATE CONSIDERABLY.

GENERALLY, THE WEATHER IS CLOUDY WITH AN AVERAGE OF 2 HOURS' SUNSHINE A DAY IN MIDWINTER AND 7 HOURS' IN MIDSUMMER. THE SUN SHINES FOR ABOUT 1,600 HOURS A YEAR, COMPARED WITH 1,400 HOURS APPROXIMATELY IN ENGLAND. AT TIMES, IT IS BRILLIANT AND CAN CAUSE SUNBURN IN QUITE A SHORT TIME. FOG IS RELATIVELY RARE, EXCEPT ON THE HIGH GROUND. RAIN FALLS ON ONE OR TWO DAYS OUT OF THREE, WITH AN ANNUAL FALL OF ABOUT 28 INCHES; A THIRD OF THE RAIN FALLS IN FREQUENT AND SOMETIMES HEAVY SHOWERS DURING THE SUMMER MONTHS, DECEMBER - JANUARY. THUNDER-STORMS ARE COMPARATIVELY RARE. SNOW FALLS ON SOME 50 DAYS PER ANNUM BUT ONLY COVERS ALL THE LAND ON ABOUT 30 DAYS IN THE YEAR. GENERALLY, SNOWFALLS ARE LIGHT AND OFTEN MELT BY NOON.

AS A CONSEQUENCE OF THE LARGE AMOUNT OF CLOUD, EXTREMES OF SEASONAL TEMPERATURE ARE UNUSUAL; 70<sup>0</sup> FAHR. IN SUMMER IS RARELY EXCEEDED AND THE MINIMUM SELDOM FALLS BELOW 24<sup>0</sup> FAHR. IN WINTER. THE AVERAGE TEMPERATURE FOR THE WHOLE OF THE YEAR IS ABOUT 42<sup>0</sup> FAHR., WITH A MEAN OF 57<sup>0</sup> FAHR. DURING THE DAY IN SUMMER AND A MEAN OF 31<sup>0</sup> FAHR. IN WINTER. A MOST UNPLEASANT FEATURE OF THE CLIMATE IS THE PERSISTENCE OF STRONG WINDS OF A MEAN VELOCITY BETWEEN 17 AND 22 M.P.H. WIND-SPEEDS OF 25 M.P.H. DEVELOP ON ABOUT TWO DAYS OUT OF THREE AND ABOUT 40 M.P.H. IS REACHED ON ONE DAY IN ABOUT EVERY EIGHT. SEVERE GALES ARE EXCEPTIONAL.

THE CLIMATE, WHEN COMPARED WITH THAT OF ENGLAND, IS MORE EXTREME AND NOTICEABLE FEATURES OF THE WEATHER ARE THE RAPID CHANGES WHICH CAN OCCUR IN A FEW HOURS. THE ATMOSPHERE IS CLEAN, CRISP AND CLEAR.

(c) OTHER INFORMATION

SOME OF THE INFORMATION LIKELY TO BE OF PARTICULAR INTEREST TO INTENDING TOURISTS TO THIS BRITISH COLONY IS SUMMARISED BELOW:-

(1) POPULATION. THE POPULATION OF THE ISLANDS NUMBERS APPROXIMATELY 2,000 AND IS ALMOST ENTIRELY OF BRITISH ORIGIN. ENGLISH IS THE MAIN LANGUAGE.

(2) PASSPORTS. PASSPORTS OF THE COUNTRY OF ORIGIN ONLY ARE REQUIRED FOR ENTRY TO THE ISLANDS, UNLESS OTHERWISE SPECIFIED, BUT AN ARGENTINIAN SUPPLEMENTARY PASSPORT IS AT PRESENT REQUIRED BEFORE INHABITANTS AND VISITORS CAN LEAVE THE ISLANDS VIA ARGENTINA.

(3) CURRENCY. THE CURRENCY OF THE ISLANDS IS SIMILAR TO THAT OF GREAT BRITAIN. FOREIGN CURRENCY MAY BE EXCHANGED AT THE APPROPRIATE RATE IN STANLEY.

(4) TRAVEL. UNTIL RECENT YEARS, TRAVEL TO AND FROM THE ISLANDS INVOLVED FAIRLY LONG SEA JOURNEYS. SINCE THE BUILDING OF AN AIR STRIP ON EAST FALKLAND, HOWEVER, IT IS POSSIBLE TO REACH THE ISLANDS BY TAKING THE ONCE-WEEKLY FLIGHT (MONDAYS), RUN BY LINEAS AEREAS DEL ESTADO, FROM COMMODORO RIVADAVIA IN ARGENTINA. STANLEY IS ALSO A PORT OF CALL ON THE SCHEDULE OF SOME SEA CRUISES.

(5) HOTEL ACCOMMODATION. AT PRESENT, ACCOMMODATION FOR TOURISTS IS SOMEWHAT LIMITED FOR THERE ARE ONLY TWO RESIDENTIAL HOTELS. I STAYED AT THE UPLAND GOOSE HOTEL IN STANLEY, WHICH IS BEING ENLARGED AND REFURBISHED, AND FOUND IT COMFORTABLE.

(6) SHOPPING FACILITIES. THE SHOPPING FACILITIES IN STANLEY PROVIDE FOR MOST NEEDS AND THE COSTS OF FOOD AND MOST OTHER GOODS COMPARE FAVOURABLY WITH THOSE IN GREAT BRITAIN.

(7) TRANSPORT. EXCEPT IN AND AROUND THE TOWNSHIP OF STANLEY, THERE ARE NO ROADS; THUS, ACCESS TO THE SETTLEMENTS IS DIFFICULT AND SLOW. TRAVEL IS ACCOMPLISHED MAINLY BY LAND ROVERS. THE AVERAGE SPEED OF TRAVEL

IS ABOUT 4 M.P.H. SOME OF THE TRACKS ACROSS THE ISLANDS ARE SHEWN IN MAP 1 AND NEARLY ALL ARE ROUGH AND SPONGY. DETOURS ACROSS THE PEATY TERRAIN HAVE TO BE MADE FREQUENTLY TO AVOID BEING "BOGGED DOWN".

TWO BEAVER 7-8 SEATER SEA PLANES DAILY PROVIDE INTER-ISLANDS FLIGHTS, ENABLING PASSENGERS TO ALIGHT AT POINTS FROM WHICH OVERLAND TRANSPORT CAN CONVEY THEM TO THE SETTLEMENTS. THIS IS AN INVALUABLE SERVICE FOR INHABITANTS AND VISITORS.

(8) MEDICAL CARE. THERE ARE TWO MEDICAL OFFICERS RESIDENT IN THE ISLANDS AND THE HOSPITAL AT STANLEY CAN COPE WITH MOST CASES, APART FROM THE MOST SERIOUS WHEN TREATMENT IS AVAILABLE IN BUENOS AIRES OR MONTEVIDEO.

(9) INTERNAL COMMUNICATION. THE WHOLE OF THE ISLANDS ARE PROVIDED WITH AN EXCELLENT SYSTEM OF RADIO TELEPHONE COMMUNICATION.

## CHAPTER 2

### FISH SPECIES IN THE FALKLAND ISLANDS

#### (A) INDIGENOUS SPECIES

THERE ARE ONLY TWO INDIGENOUS FRESHWATER FISH SPECIES IN THE RIVERS OF THE FALKLAND ISLANDS WHEREAS WELL OVER TWO DOZEN DIFFERENT SPECIES CAN BE FOUND IN THE BRITISH ISLES. THEY ARE THE APLOCHITON ZEBRA APLOCHITONIDAE, KNOWN LOCALLY AS THE "TROUT", AND THE GALAXIAS MACULATUS GALAXIIDAE, A MUCH SMALLER FISH OFTEN REFERRED TO IN THE ISLANDS AS THE "MINNOW". THESE TWO FISH BEAR NO OUTWARD RESEMBLANCE TO THE BRITISH BROWN TROUT AND MINNOW.

A. ZEBRA (PLATE 2) IS FOUND FAIRLY WIDELY DISTRIBUTED ON THE SOUTHERN AMERICAN COAST. G. MACULATUS HAS A SIMILAR DISTRIBUTION BUT ITS SPECIES IS TO BE FOUND IN OTHER COOL SOUTHERN HEMISPHERE COUNTRIES. BECAUSE OF THEIR RESTRICTED DISTRIBUTION, THESE TWO FISHES HAVE BEEN FOUND TO BE SUSCEPTIBLE TO ENVIRONMENTAL CHANGE AND PARTICULARLY TO THE INTRODUCTION OF EXOTIC SPECIES.

TWO OTHER SPECIES OF FISH ENTER THE FALKLAND ISLANDS' RIVERS FROM THE SEA AT CERTAIN TIMES OF THE YEAR. THESE ARE:-

(1) GALAXIAS ATTENATUS GALAXIIDAE, LOCALLY KNOWN AS THE "SMELT", A FISH SIMILAR IN SIZE AND SPAWNING BEHAVIOUR TO THE SPARLING, WHICH ENTERS SOME ESTUARIES AROUND THE COASTLINE OF BRITAIN, AND

(2) ELEGINUS FALKLANDICUS NOTOTHENIIDAE, COMMONLY KNOWN TO THE INHABITANTS AS THE "MULLET". THIS IS A SEA FISH WHICH GROWS TO A LARGE SIZE AND ITS DISTRIBUTION EXTENDS FROM THE RIO PLATA ON THE EAST COAST OF THE ARGENTINE TO NORTHERN CHILE ON THE WEST COAST. IN THE ESTUARIES OF THE FALKLANDS, FISH UP TO 20 LBS. IN WEIGHT HAVE BEEN RECORDED AND FISH WEIGHING BETWEEN 3 AND 14 LBS. ARE COMMON. THE LARGER FISH, WHEN CAUGHT ON ROD AND LINE, FIGHT AS WELL AS ATLANTIC SALMON.

(B) EXOTIC SPECIES

(1) INTRODUCTION OF BROWN TROUT

IN 1935-7, ARGENTINA SUCCEEDED IN ESTABLISHING, IN SOME OF THE TIERRA DEL FUEGO RIVERS, BROWN TROUT, SALMO TRUTTA SALMONIDAE, AMERICAN BROOK TROUT, SALVELINUS FONTINALIS SALMONIDAE, AND RAINBOW TROUT, SALMO GAIRDNERI SALMONIDAE. IN 1939, THE FALKLAND ISLANDS' GOVERNMENT DECIDED TO INVESTIGATE WHETHER THESE SPECIES COULD BE SUCCESSFULLY INTRODUCED INTO SOME OF THE RIVERS IN THE TWO MAIN ISLANDS.

THE FIRST ATTEMPT TO INTRODUCE TROUT INTO THE FALKLANDS WAS MADE DURING THE SECOND WORLD WAR WHEN SMALL QUANTITIES OF EYED OVA OF BROWN TROUT, BROOK TROUT AND RAINBOW TROUT WERE OBTAINED FROM CHILE AND INCUBATED IN A HASTILY-BUILT HATCHERY NEAR STANLEY. THE RAINBOW TROUT DID NOT SURVIVE BUT THE BROWN TROUT PROSPERED. UNFORTUNATELY, EARLY RECORDS OF IMPORTATIONS WERE DESTROYED BY FIRE.

IN AUGUST, 1947, 30,000 TROUT OVA, A GIFT FROM THE CHILEAN GOVERNMENT, FROM A HATCHERY AT LAUTARO, WERE FLOWN TO MONTEVIDEO AND THEN TAKEN BY SHIP TO STANLEY. THE EGGS WERE SAID TO BE OVA FROM SALMO FARIO (SOMETIMES (WRONGLY) USED AS SPECIES NAME FOR BROWN TROUT); ACTUALLY, THEY CAME FROM SALMO TRUTTA, WHICH IS THE ONLY SPECIES OF EUROPEAN TROUT OCCURRING IN THE WESTERN HEMISPHERE. RECORDS DO NOT SHOW IN DETAIL THE STREAMS WHICH WERE STOCKED WITH FRY BUT IT IS BELIEVED THAT MOST WERE PUT INTO THE MOODY BROOK, NEAR STANLEY, AND SOME IN THE MURRELL RIVER. NONE WERE PLACED IN RIVERS ON THE WEST FALKLAND.

IN THE SAME YEAR - 1947 - THE SURREY TROUT FARM IN ENGLAND DESPATCHED 10,000 BROWN TROUT OVA BY AIR FROM LONDON TO MONTEVIDEO AND THENCE BY SHIP TO STANLEY, WHERE THEY ARRIVED IN JANUARY, 1948. THEREAFTER, 15,000 EGGS WERE SENT, ARRIVING IN STANLEY IN JANUARY, 1949, 10,000 IN 1950, 1951 AND 1952. ONE OF THE CONSIGNMENTS OF EGGS FROM 2-3 LBS. WILD TROUT WERE OBTAINED FROM A LAKE NEAR HASLEMERE, SURREY, AND THE OTHERS FROM COBBINSHAW LOCH IN THE PENTLAND HILLS SOME 20 MILES SOUTH OF EDINBURGH. IT IS UNDERSTOOD THAT NO SEA TROUT HAD ACCESS TO



THE RIVERS OR LOCHS FROM WHICH THE OVA CAME. THUS, IN ALL, 85,000 OVA WERE RECEIVED IN THE ISLANDS FROM 1947 TO 1952 BUT, UNFORTUNATELY, NOTHING IS POSITIVELY KNOWN OF THE NUMBERS THAT DEVELOPED TO FRY OR WHERE THEY WERE PLANTED OUT.

IN 1954, ANGLERS FLOAT-FISHING WITH MUTTON FOR APLOCHITON ZEBRA BEGAN TO CATCH BROWN TROUT AND, IN 1955, SCALES FROM THESE FISH WERE SENT TO ENGLAND FOR AGE DETERMINATION. THE READINGS SHewed THAT THE ONE-YEAR OLD TROUT MEASURED 5 TO  $6\frac{1}{2}$  INCHES (12 TO 16 CMS.), TWO-YEAR OLD 6 TO  $8\frac{1}{2}$  INCHES (15 TO 21 CMS.), THREE-YEAR OLD 10 TO  $12\frac{1}{2}$  INCHES (24 TO 28 CMS.), AND FOUR-YEAR OLD FROM 9 TO  $13\frac{1}{2}$  INCHES (23 TO 30.2 CMS.). SOME FISH OVER THREE YEARS OF AGE HAD SPAWNED AND THEIR GROWTH RATES WERE SIMILAR TO THOSE OF BROWN TROUT IN THE NORTH AND WEST OF ENGLAND.

ON THE 25TH FEBRUARY, 1956, NINE YEARS AFTER THE FIRST INTRODUCTION OF THE OVA AND FRY, MR. N.K. CAMERON CAUGHT A  $3\frac{1}{2}$  LBS. TROUT ON A WET FLY IN THE MALO RIVER; LATER, HE CAUGHT NINE MORE FISH, VARYING IN WEIGHT FROM  $1\frac{1}{2}$  TO  $2\frac{3}{4}$  LBS. BY APRIL, 1957, SPINNING RODS AND FIXED SPOOL REELS HAD BECOME POPULAR AND MANY FISH WERE BEING CAUGHT. IN THE TWO ANGLING SEASONS FROM 1957 TO 1959, 300 TO 400 FISH, VARYING IN WEIGHT FROM  $1\frac{1}{2}$  TO 12 LBS. WERE TAKEN FROM THE MURRELL RIVER, NEAR PORT STANLEY BUT THESE FISH, AND THOSE CAUGHT IN A FEW OTHER RIVERS, APPEARED TO HAVE BEEN FEEDING IN THE SEA AND RESEMBLED SEA TROUT.

DURING 1960-67, SCALES FROM FISH TAKEN FROM RIVERS IN THE EAST FALKLANDS WERE EXAMINED BY DR. MARGARET BROWN AND MR. W.G. HARTLEY IN ENGLAND AND DETAILS OF THEIR FINDINGS ARE REFERRED TO LATER IN THIS REPORT.

## (2) INTRODUCTION OF ATLANTIC SALMON AND SEA TROUT

BECAUSE BROWN TROUT APPEARED TO HAVE DEVELOPED A SEA RUNNING HABIT, IT SEEMED LOGICAL THAT ATLANTIC SALMON, *SALMO SALAR* SALMONIDAE, COULD ALSO BE ESTABLISHED IN THE FALKLANDS WITH A REASONABLE PROSPECT OF SUCCESS. SALMON EGGS SUCCESSFULLY TRANSPORTED TO NEW ZEALAND HAD RESULTED IN ATLANTIC SALMON BEING ESTABLISHED IN THE TE ANAU RIVER.

THESE FISH, HOWEVER, DID NOT DEVELOP THE HABIT OF MIGRATING TO SEA. WOULD THE SAME APPLY TO PROGENY DEVELOPED FROM SALMON OVA INTRODUCED INTO THE FALKLAND ISLANDS? WITH NEW ZEALAND BEING SOME TEN DEGREES NEARER TO THE EQUATOR THAN THE FALKLANDS, IT WAS THOUGHT THAT MARINE CONDITIONS MIGHT BE MORE SUITABLE FOR SALMON AT 52°S THAN AT 40°S.

IN 1959, ARRANGEMENTS WERE MADE FOR AN EXPERIMENTAL BATCH OF 60,000 SALMON EGGS TO BE SENT OUT FROM THE LANCASHIRE RIVER BOARD'S HATCHERIES IN ENGLAND. AS A FIRST STEP, THE EGGS WERE DEVELOPED TO THE EYED STAGE IN THE LABORATORIES OF THE MINISTRY OF AGRICULTURE, FISHERIES AND FOOD IN LONDON AND MORTALITY DURING INCUBATION WAS HIGH. BY DECEMBER 17TH, OUT OF 60,000 EGGS, ONLY 22,000 SURVIVED. THESE WERE DESPACHED TO THE FALKLAND ISLANDS ON THE S.S. "KISTA DAN" AND ARRIVED IN STANLEY ON JANUARY 15TH, 1960. TRAVELLING LOSSES WERE 5 PER CENT AND, FROM THE REMAINDER, 30 TO 40 SURVIVED TO THE ALEVIN STAGE BUT DIED BEFORE THEY BECAME FRY. (SEE TABLE 1, PAGE 17.)

THE NEXT YEAR, A FURTHER 60,000 EGGS OF SALMON AND SEA TROUT WERE OBTAINED FROM THE LANCASHIRE RIVER BOARD AND INCUBATED IN THE MINISTRY'S LABORATORIES IN LONDON WITH HIGH LOSSES. THE SURVIVORS WERE SENT FROM LONDON ON JANUARY 16TH, 1961, ARRIVING IN STANLEY ON JANUARY 26TH. AT THAT TIME, THE WEATHER IN THE FALKLANDS WAS EXCEPTIONALLY HOT AND THE WATER ENTERING THE HATCHERY WAS OVER 60°FAHR. THE SEA TROUT OVA HAD HATCHED BY THE TIME THE BOXES WERE OPENED AND 15,000 SEA TROUT ALEVINS AND 3,000 SALMON OVA WERE IMMEDIATELY PLANTED OUT IN KASHMIR BOXES IN THE MALO AND SAN CARLOS RIVERS ON EAST FALKLAND AND IN THE WARRAH RIVER ON THE WEST. THE SALMON EGGS IN THE KASHMIR BOXES DEVELOPED NORMALLY AND THERE WAS HOPE THAT SOME MIGHT GO TO SEA AS SMOLTS IN SEPTEMBER OR OCTOBER OF 1962, TO RETURN AS GRILSE DURING THE EARLY MONTHS OF 1964.

NEAR THE END OF 1961, 50,000 SALMON OVA WERE PROVIDED BY THE LANCASHIRE RIVER BOARD BUT THEY DIED DURING INCUBATION IN THE MINISTRY'S LABORATORIES IN LONDON. TO OVERCOME THIS SETBACK, THE BOARD SUPPLIED 20,000 SALMON AND 8,000 SEA TROUT OVA. THESE WERE FULLY "EYED" IN THEIR HATCHERIES AND FLOWN OUT DIRECT FROM MANCHESTER ON JANUARY 15TH, 1962, ARRIVING IN MONTEVIDEO ON JANUARY 16TH. THEY WERE TRANSFERRED TO

R.M.S. "DARWIN" AND ARRIVED AT STANLEY IN EXCELLENT CONDITION ON JANUARY 25TH. THIS METHOD OF INCUBATING AND TRANSPORTING OVA TO THE FALKLAND ISLANDS REDUCED LOSSES CONSIDERABLY. THE SALMON OVA WERE PLANTED OUT IN STREAMS, IN KASHMIR BOXES, BUT NO ACCURATE RECORDS WERE KEPT AS TO WHERE THEY WERE RELEASED. THE SEA TROUT OVA WERE NOT SO ADVANCED AND A FEW WERE DEVELOPED TO THE FRY STAGE IN THE HATCHERY AT STANLEY.

THE SAME METHODS WERE USED FOR SENDING SALMON OVA IN JANUARY, 1963, WHEN 40,000 SALMON EGGS WERE INCUBATED TO THE EYED STAGE IN THE HATCHERIES OF THE LANCASHIRE RIVER BOARD, SENT TO MANCHESTER AND DESPATCHED TO MONTEVIDEO BY AIR ON JANUARY 31ST. IN SPITE OF THE AEROPLANE BEING HELD UP FOR 12 HOURS IN DAKAR, 36,000 EGGS ARRIVED SAFELY IN STANLEY ABOARD THE R.M.S. "DARWIN" ON FEBRUARY 8TH. WITH THE HELP OF HELICOPTERS FROM H.M.S. "PROTECTOR", 24,000 WERE PLANTED OUT IN KASHMIR BOXES IN STREAMS IN THE EAST FALKLAND ON THE SAME DAY. ON FEBRUARY 11TH, THE REMAINING 12,000 WERE PLANTED OUT IN KASHMIR BOXES IN WEST FALKLAND STREAMS, EXCEPT FOR ONE BOX WHICH WAS PLANTED IN A STREAM NOT FAR FROM STANLEY. NO SEA TROUT OVA WERE SENT IN 1963, BECAUSE OF SCARCITY IN THE BOARD'S HATCHERIES.

THE SAME PROCEDURE WAS ADOPTED IN 1964; 30,000 SALMON EGGS, AGAIN INCUBATED IN THE HATCHERIES OF THE LANCASHIRE RIVER BOARD, WERE DESPATCHED FROM LONDON ON JANUARY 23RD, ARRIVING IN EXCELLENT CONDITION AT STANLEY ON JANUARY 31ST. OF THIS BATCH, 27,000 SURVIVED THE JOURNEY.

EIGHT YEARS HAVE NOW ELAPSED SINCE THE LAST BATCH OF ATLANTIC SALMON OVA ARRIVED SAFELY IN THE FALKLAND ISLANDS BUT, AS YET, ADULT SALMON HAVE NOT BEEN SEEN OR CAUGHT. THE PROBABLE REASONS FOR THIS WILL BE DISCUSSED LATER IN THIS REPORT.

NO SEA TROUT OVA WERE INTRODUCED INTO THE FALKLAND ISLANDS PRIOR TO 1961 AND AN 11 LBS. SEA TROUT CAUGHT ON THE MALO RIVER IN 1963 MUST HAVE BEEN THE RESULT OF BROWN TROUT SPAWNING IN 1958. SEA TROUT HAVE DEVELOPED FAIRLY WIDESPREAD THROUGHOUT THE ISLANDS AND FISH OF HEAVY WEIGHT ARE BEING CAUGHT IN AND ABOVE THE TIDAL LIMITS OF MANY OF THE RIVERS.

(3) OVA AND FRY PLANTINGS

DETAILS OF BROWN TROUT, SEA TROUT AND ATLANTIC SALMON OVA SUPPLIED TO THE FALKLAND ISLANDS AND THE NUMBER OF SURVIVORS ARRIVING AT STANLEY, DURING THE YEARS FROM 1947 TO 1964, ARE SHOWN IN TABLE I.

TABLE I

NUMBERS OF BROWN TROUT, SEA TROUT AND ATLANTIC SALMON OVA SUPPLIED TO THE FALKLAND ISLANDS AND NUMBERS OF SURVIVORS ON ARRIVAL AT STANLEY, 1947/64

YEAR	BROWN TROUT	SURVIVORS	SEA TROUT	SURVIVORS	ATLANTIC SALMON	SURVIVORS
1947	30,000	UNKNOWN	-	-	-	-
1948	10,000	DO.	-	-	-	-
1949	15,000	DO.	-	-	-	-
1950	10,000	DO.	-	-	-	-
1951	10,000	DO.	-	-	-	-
1952	10,000	DO.	-	-	-	-
1953/9	----- NO DELIVERIES -----					
1960	-	-	-	-	60,000	21,000 (DIED F.I.)
1961	-	-	20,000	15,000	40,000	3,000
1962	-	-	8,000	7,000	(50,000 (20,000	DIED LONDON (18,000)
1963	-	-	-	-	40,000	36,000
1964	-	-	-	-	30,000	27,000
TOTAL	85,000		28,000	22,000	240,000	105,000

NOTE: THE NUMBERS OF OVA OBTAINED FROM SALMON AND SEA TROUT PER POUND OF BODY WEIGHT VARIES marginally FROM FISH TO FISH BUT APPROXIMATELY 650 SALMON OVA PER POUND OF BODY WEIGHT AND 950 SEA TROUT OVA PER POUND OF BODY WEIGHT WOULD BE A REASONABLE ASSESSMENT. USING THIS ASSESSMENT, OVA WHICH SURVIVED THE JOURNEY TO THE FALKLAND ISLANDS WOULD APPROXIMATE TO THE PRODUCT OF 130 HEN SALMON AND 30 HEN SEA TROUT.

I COULD NOT OBTAIN ACCURATE INFORMATION OF THE NUMBERS OF FRY, THEIR SPECIES AND WHERE INTRODUCED INTO THE FALKLAND STREAMS NOR COULD I FIND ANY EVIDENCE OF BIOLOGICAL SURVEYS MADE PRIOR TO PLANTING OUT OF OVA AND FRY. SOME RECORDS HAVE BEEN PROVIDED BY MR. GEORGE STEWART OF

BLUFF COVE, EAST FALKLAND. HIS LOCATIONS OF BROWN AND SEA TROUT FRY PLANTINGS ARE ITEMISED IN TABLE 2 AND DETAILS OF PLANTING OF SALMON FRY ARE GIVEN IN TABLE 3.

TABLE 2

PROBABLE LOCATIONS OF BROWN AND SEA TROUT OVA AND FRY PLANTINGS, 1948/62

YEAR	SPECIES	PROBABLE LOCATIONS OF TROUT OVA & FRY PLANTINGS
1948	BROWN TROUT	HILL COVE, CHARTRES, PORT HOWARD*, MALO, MURRELL
1949/50	DO.	FOX BAY EAST & WEST, HILL COVE, PORT SAN CARLOS, ELEPHANT BEACH, SAN CARLOS, LORENZO POND, SWAN INLET, FITZROY, KIDNEY POND, PEBBLY POND, JOHNSON HARBOUR
1950/51	DO.	PEBBLE ISLAND, CHARTRES, HILL COVE, DARWIN, PORT HOWARD*, PORT STEPHENS, MALO, PORT SAN CARLOS, FITZROY
1951/52	DO.	MALO, SWAN INLET, DARWIN, NORTH ARM, PORT SAN CARLOS, MURRELL
1952/53	DO.	LORENZO POND, MURRELL, MALO, JOHN'S BROOK, FITZROY, SWAN INLET, NORTH ARM, PEBBLY POND, KIDNEY POND
1961	SEA TROUT	MAC'S PADDOCK BROOK
1962	DO.	FELTON'S STREAM, MILE POND, ROUND POND, PEBBLY POND, SALVADOR CAMP (A FEW ONLY)

\* WARRAH RIVER

TABLE 3

PROBABLE LOCATIONS OF SALMON OVA AND FRY PLANTINGS, 1961/64

YEAR	TOTAL NO. OF OVA & FRY	PROBABLE LOCATIONS OF SALMON OVA & FRY PLANTINGS
1961	3,000	JOHN'S BROOK, PASA MANEAS, PORT HOWARD*
1962	18,000	JOHN'S BROOK, PASA MANEAS, PORT HOWARD*, HILL COVE, DEAN'S RIVER (PORT STEPHENS), FITZROY, MURRELL, SALVADOR CAMP, STREAM ENTERING BRAZO MAR
1963	36,000	JOHN'S BROOK, PASA MANEAS, PORT HOWARD*, HILL COVE, DEAN'S RIVER (PORT STEPHENS), FITZROY, MURRELL
1964	27,000	JOHN'S BROOK, PASA MANEAS, PORT HOWARD*, HILL COVE, DEAN'S RIVER (PORT STEPHENS), FITZROY

\* WARRAH RIVER

SECTION 2 - AN INVESTIGATION INTO THE MIGRATORY FISHERIES

CHAPTER 3

MATERIALS AND METHODS USED IN INVESTIGATING  
THE MIGRATORY FISHERIES OF THE FALKLAND ISLANDS

(A) MATERIALS

BEFORE VISITING THE FALKLAND ISLANDS, THOUGHT WAS GIVEN TO THE PROBLEM OF OBTAINING SAMPLES OF BROWN TROUT, SEA TROUT AND SALMON (IF ANY) OF ALL SIZE GROUPS FROM THE VARIOUS RIVERS, AS THESE WERE NECESSARY FOR INVESTIGATING THE LIFE HISTORIES OF THE FISH. IN ADDITION, FISH OF A SUITABLE SIZE FOR ANGLING WERE KNOWN TO BE PRESENT IN THE BRACKISH WATERS OF LOWER REACHES OF THE RIVERS AND IN TIDAL WATERS AND SAMPLES OF THESE FISH WERE REQUIRED ALSO.

IT WAS DECIDED TO OBTAIN FISH SAMPLES BY USING ELECTRO FISHING GEAR ALLIED TO AN ELECTRIC GENERATOR CAPABLE OF PRODUCING ELECTRICAL IMPULSES BOTH IN THE RIVERS AND IN THE ESTUARIES. IT WAS KNOWN THAT THE ELECTRICAL CONDUCTIVITY OF THE WATER WAS LOW AND THE PH WELL BELOW NEUTRAL (PH7); IT WAS CALCULATED THAT THE SALINITIES OF THE WATER IN THE UPPER TIDAL REACHES WOULD BE ABOUT 14<sup>0</sup>/00. PRIOR TO MY INVESTIGATION, NO ELECTRO FISHING EQUIPMENT HAD EVER BEEN USED IN THE ISLANDS BUT, BECAUSE OF THE CHEMICAL COMPOSITION OF THE RIVER AND TIDAL WATER, IT WAS FELT THAT STANDARD EQUIPMENT WAS NOT LIKELY TO PRODUCE ELECTRIC FIELDS WIDESPREAD ACROSS THE RIVERS. ANOTHER CONSIDERATION WAS THAT THE EQUIPMENT HAD TO BE SMALL AND LIGHT ENOUGH IN WEIGHT TO MAKE IT PORTABLE AND GENERALLY SUITABLE FOR HAND CARRYING ACROSS ROUGH TERRAIN.

TO MEET ALL THESE REQUIREMENTS, A SPECIAL PIECE OF EQUIPMENT WAS CONSTRUCTED WHICH COULD BE TRANSPORTED BY AIR AS ACCOMPANIED BAGGAGE. IT CONSISTED OF A PULSE UNIT CONTAINED IN A BOX MEASURING 10 x 7.75 x 6.25 INCHES AND OPERATED FROM A 300 WATT. 240 VOLTS 50 Hz. A.C. GENERATOR. FOUR ALTERNATIVE OUTPUTS WERE PROVIDED:-

- (1) 240 v. 50 Hz. A.C.
- (2) 240 v. D.C.
- (3) A TRAIN OF  $\frac{1}{2}$ -WAVE PULSES AT 50 Hz. PEAKING TO 330 v. APPROXIMATELY.
- (4) A TRAIN OF CAPACITOR DISCHARGE PULSES OF APPROXIMATELY 16 M/SEC. DURATION AT A NOMINAL 20 Hz. PEAKING TO 350 v. APPROXIMATELY.

THE DESIGN OF THE CAPACITOR DISCHARGE OUTPUT ENABLED THE UNIT TO BE USED EFFECTIVELY IN SITUATIONS WHERE A LOW POWER GENERATOR WOULD NORMALLY OVERLOAD. THE REST OF THE ELECTRO FISHING EQUIPMENT CONSISTED OF TWO COLLAPSIBLE STAINLESS STEEL ELECTRODES ATTACHED TO TWO SECTIONAL WOODEN HANDLES, 5 FEET IN LENGTH, AND CONNECTED TO LIGHTWEIGHT P.V.C. CABLE.

DURING PRELIMINARY TESTS, THE PULSES STUNNED ELVERS, SMALL FLAT FISH AND SHRIMPS IN THE TIDAL LIMITS OF A RIVER AT SITES WHERE THE STANDARD GENERATOR OUTPUT ON ALTERNATING CURRENT OR DIRECT CURRENT WAS INEFFECTIVE. TESTS CONDUCTED AT OTHER SITES, WHERE THE GENERATOR COPEDED ADEQUATELY WITH THE LOADING, SHEWED THE CAPACITOR DISCHARGE PULSES TO BE AT LEAST AS EFFECTIVE AS D.C. FOR DRAWING FISH FROM PATCHES OF WEED AND FROM BENEATH STONES AND TREE ROOTS IN AND ADJOINING RIVER BANKS, WITH THE ADVANTAGE THAT THE FISH CAME TO THE ELECTRODES FASTER AND TENDED TO RECOVER MORE QUICKLY THAN WHEN D.C. WAS USED.

THIS EQUIPMENT, WHEN TESTED IN THE RIVERS OF THE FALKLAND ISLANDS, ONLY JUST SUFFICED TO GIVE AN EXTENSIVE ELECTRIC FIELD BUT IT WAS CAPABLE OF OBTAINING FISH FROM 2 TO 27 INCHES IN LENGTH FOR SAMPLING PURPOSES, AS SHEWN LATER IN THIS REPORT. THE ELECTRO FISHING GEAR AROUSED A GREAT DEAL OF INTEREST AND, AS IT CAUGHT SO MANY FISH IN SUCH A SHORT TIME, THE FUTURE USE OF SUCH EQUIPMENT BY UNAUTHORISED PERSONS SHOULD BE PROHIBITED IN THE ISLANDS BY THE ENACTMENT OF LEGISLATION.

ANCILLARY EQUIPMENT WAS REQUIRED FOR THE INVESTIGATION AND THIS CONSISTED OF:-

- (1) FINE GILL NETS OF SWEDISH ORIGIN, HAND AND BIOLOGICAL SAMPLING NETS
- (2) PH TESTING EQUIPMENT AND THERMOMETERS
- (3) DISSOLVED OXYGEN REAGENTS
- (4) A LOVIBOND COMPARATOR
- (5) DISSECTING INSTRUMENTS AND MICROSCOPE
- (6) SCALE ENVELOPES, PLASTIC BAGS, SAMPLE BOTTLES AND CONTAINERS
- (7) WATERPROOF CLOTHING AND WADERS.

THE WHOLE OF THE EQUIPMENT, INCLUDING THE GENERATOR, PULSE UNIT, ELECTRODES AND 400 METRES OF ELECTRIC CABLE, WAS STOWED IN A METAL BOUND WOODEN BOX, MEASURING 36 X 18 X 15 INCHES, WHICH WEIGHED 120 KILOS WHEN PACKED. APART FROM A TEMPORARY DIFFICULTY ON THE OUTWARD JOURNEY, WHEN IT WAS REMOVED FROM THE AIRCRAFT AT VIEDMA IN SOUTH AMERICA, THE BOX ARRIVED WITHOUT MISHAP AT STANLEY IN THE FALKLAND ISLANDS. UNFORTUNATELY, FOR THE RETURN JOURNEY, THE BOX, NOW CONTAINING SAMPLES AS WELL AS EQUIPMENT, COULD NOT BE FLOWN BACK TO ENGLAND AND INSTEAD WAS SHIPPED TO SOUTHAMPTON, WHERE IT ARRIVED SAFELY DURING THE MONTH OF APRIL.

(B) METHODS

THREE OPERATORS WERE REQUIRED TO USE THE ELECTRO FISHING EQUIPMENT, TWO OF WHOM HELD THE ELECTRODES IN THE WATER AND WADED SLOWLY DOWNSTREAM. ANY FISH COMING WITHIN THE ORBIT OF THE ELECTRIC FIELD WAS LIFTED FROM THE WATER IN A HAND NET. ALL THE FISH THUS CAUGHT WERE SEXED, WHERE POSSIBLE, MEASURED, WEIGHED AND HAD SCALES REMOVED. SAMPLES OF THE STOMACHS AND GUTS WERE ALSO TAKEN AND PACKED IN SAMPLE CONTAINERS FOR LATER INVESTIGATION.

SAMPLES OF FLORA FROM THE STREAM BED WERE PLACED IN PLASTIC CONTAINERS FOR IDENTIFICATION. IT HAD BEEN INTENDED TO TAKE BED SAMPLES OF THE FAUNA FROM 1 SQUARE METRE SECTIONS OF THE RIVERS BY PLACING PLANKTON NETS DOWNSTREAM OF THE AREAS WHICH WERE THEN DISTURBED BUT IT WAS FOUND THAT, DUE TO THE PREVALENCE OF LIVERWORT ON THE RIVER BED, A TRUE MEASURE OF THE INVERTEBRATE FAUNA PRESENT COULD NOT BE OBTAINED FROM THE SQUARE METRE SAMPLING AREAS. EVEN WHEN THE SAMPLING AREAS WERE INCREASED IN SIZE TO 3 METRES IN LENGTH BY 1 METRE IN WIDTH, VALID SAMPLES WERE DIFFICULT TO OBTAIN BECAUSE OF THE LIVERWORT. ANALYSIS OF THE STOMACH CONTENTS OF THE FISH, HOWEVER, GAVE AN ACCURATE MEASURE OF THE AVAILABLE FOOD RESOURCES.

THE DISSOLVED OXYGEN SATURATION OF THE WATER IN THE VARIOUS RIVERS WAS DETERMINED BY THE WINKLER METHOD AND BY TITRATION AND THE PH WAS DETECTED BY B.D.H. INDICATORS.



## CHAPTER 4

### THE MIGRATORY FISH RIVERS OF THE FALKLAND ISLANDS

IN THE TIME AVAILABLE, IT WAS IMPOSSIBLE FOR ME TO STUDY IN DEPTH ALL THE RIVERS AND STREAMS OF THE FALKLAND ISLANDS, ESPECIALLY AS THE TERRAIN MADE ACCESS TO MANY OF THEM EXTREMELY DIFFICULT. THIS MEANT THAT, WHILST I WAS ABLE TO EXAMINE PHYSICALLY MOST OF THE MAJOR RIVERS LIKELY TO CONTAIN MIGRATORY FISH, MANY OF THEIR TRIBUTARIES AND HEADWATERS COULD ONLY BE SEEN FROM LOW-FLYING AIRCRAFT AND MANY MINOR STREAMS COULD NOT BE VISITED AT ALL. MY FINDINGS CONCERNING THE PHYSICAL NATURE OF THE RIVERS EXAMINED, TOGETHER WITH DETAILS OF FISH CAUGHT IN THEM BY ELECTRO FISHING METHODS, ARE GIVEN BELOW.

THE LENGTHS OF RIVER GIVEN ARE APPROXIMATE ONLY AND HAVE BEEN ESTIMATED TO THE UPPER LIMIT ABOVE WHICH ANGLING IS LIKELY TO BE OF LITTLE VALUE. THE DISTANCES FROM STANLEY ARE ALSO APPROXIMATE.

#### (A) EAST FALKLAND

##### (1) MURRELL (6 MILES FROM STANLEY) (PLATE 3)

THE HEADWATERS OF THIS RIVER FALL BETWEEN THE TWO SISTERS AND MOUNT CHALLENGER RANGE OF HILLS. IT IS ABOUT 8 MILES LONG AND VARIES IN WIDTH FROM 8 TO 10 FEET AT ITS SOURCE TO 70 FEET AT A POINT NEAR TO TIDAL WATER. APART FROM A FEW LOCALISED FAST-FLOWING SECTIONS, IT IS SLOW-FLOWING, PASSING BETWEEN OVER-HANGING PEAT BANKS ABOUT 3 TO 4 FEET HIGH. THERE ARE VERY FEW POOLS OVER 5 FEET IN DEPTH AND THE "LIES" FOR FISH ARE FOUND NEAR TO THE BENDS IN THE RIVER, WHERE LAND HAS BEEN ERODED. FOR MOST OF ITS LENGTH, APART FROM THE TIME WHEN THE RIVER IS IN FLOOD, ITS AVERAGE DEPTH IS ABOUT 24 INCHES.

THE PH, WHEN TESTED, WAS 6.5 AND THE SATURATION LEVEL OF DISSOLVED OXYGEN 110%.

LARGE BOULDERS IN THE RIVER BED ARE SPARSE AND THE GRAVEL SIZE VARIES FROM 1 TO 4 INCHES, WITH THE SMALLER SIZE PREDOMINATING. THE WHOLE OF THE GRAVEL IS COMPACTED AND STABLE AND ONLY IN A FEW PLACES WAS IT FOUND TO BE LOOSE, FREE OF SILT AND OF A TYPE WHICH WOULD

PLATE 3



A SECTION OF THE MURRELL RIVER

PLATE 4



THE LOWER REACHES OF THE SAN CARLOS RIVER

ALLOW SPAWNING TO TAKE PLACE. (A REPORT ON THE PROBLEM OF SILT AS IT AFFECTS OVA AND ALEVINS MAY BE SEEN IN APPENDIX 1). ELECTRO FISHING SHOWED THAT SOME FISH WERE REPRODUCING AND A TOTAL OF 35 IMMATURE AND ADULT FISH WERE CAUGHT. THIS CATCH IS DISCUSSED LATER IN THE REPORT.

ACCESS TO THE LOWER REACHES OF THE MURRELL IS REASONABLY GOOD (BY FALKLANDS' STANDARDS) AND THE HIGH QUALITY OF THE FISH CAUGHT, TOGETHER WITH ITS PROXIMITY TO STANLEY, MAKES THIS SMALL RIVER A POSSIBLE VENUE FOR THE TOURING ANGLER.

(2) SAN CARLOS (40 MILES FROM STANLEY) (PLATE 4)

THIS RIVER, WHICH HAS ONE OF THE LARGEST WATERSHEDS IN THE WHOLE OF THE ISLANDS, IS ABOUT 30 MILES LONG FROM SOURCE TO MOUTH.

THE HEADWATERS FALL INTO TWO CATEGORIES:-

(1) THE MOUNTAIN FED SECTION EMANATING FROM MOUNT USBORNE, RODEO, RABBIT AND JOCKS RANGE OF MOUNTAINS. THE MAIN FEEDER IS DOUGHERTY'S STREAM, WHICH RECEIVES THE INFLOW FROM SOME FOURTEEN SUB-TRIBUTARIES, THE MAJORITY OF WHICH ARE LAND DRAINAGE RUN-OFF CHANNELS.

(2) NEAR THE THIRD CORAL, DOUGHERTY'S STREAM BECOMES THE SAN CARLOS RIVER AND BEGINS TO RECEIVE DRAINAGE FROM FLAT, PEATY LAND ENCLOSED IN AREAS KNOWN AS THE THIRD CORAL EAST, BOMBILLA, HOME FLOCK, NEW HOUSE AND CASHEY'S HILL.

FURTHER TRIBUTARIES ENTER THE TIDAL REACH OF THE RIVER FROM THE INNER AND OUTER VERDE AREAS.

THE SAN CARLOS RIVER DOES NOT HAVE THE FAST-FLOWING CHARACTERISTICS OF THE MALO RIVER, WHICH FLOWS THROUGH HIGH GORGES NEAR THE ESTUARY, NOR DOES IT APPEAR TO HAVE THE SAME DEGREE OF FISH PRODUCTIVITY. WHEN FISHED ELECTRICALLY, A UNIT OF 700 YARDS OF RIVER PRODUCED 9 BROWN TROUT OF 7 TO 19 INCHES IN LENGTH. NO MIGRATORY SMOLTS WERE CAUGHT ALTHOUGH A FEW BRIGHT, SILVERY FISH WERE SEEN ONE MILE ABOVE THE TIDAL LIMIT; THESE MIGHT HAVE BEEN SEAWARD-GOING TROUT.

THE RIVER IS DEVOID OF BOULDERS, RUNS OR LONG STICKLES. BED

GRAVEL IS COMPACTED AND SMALL (AVERAGE SIZE UP TO 2 INCHES). THE WATER IS PEATY AND HAD AN OXYGEN SATURATION LEVEL OF 98%, WHEN TESTED; THE PH WAS 6.0. AQUATIC INVERTEBRATE FAUNA IS NOT ABUNDANT.

(3) SWAN INLET (35 MILES FROM STANLEY)

THIS STREAM IS ABOUT 9 MILES LONG, INCLUDING THE PORTIONS COMPRISED OF TIDE WASHED BASINS AND CREEKS. IN THE MID AND UPPER REACHES, A NUMBER OF SMALL LAKES EMPTY INTO TRIBUTARIES KNOWN AS THE CANAL, CERITOS ARROYO, BLACK ARROYO AND MUSTARD ARROYO. THE CATCHMENT OF MUSTARD ARROYO AND L. ANTIOJA FALLS WITHIN THE WICKHAM HEIGHTS RANGE OF MOUNTAINS, WHICH IS APPROXIMATELY 2,000 FEET ABOVE SEA LEVEL. L. ANTIOJA IS THE LARGER OF THE TWO STREAMS AND ENTERS THE TIDAL PART NEAR MOUNT PLEASANT.

POOLS SUITABLE FOR HOLDING FISH IN NUMBERS ARE PRESENT BUT, UPSTREAM OF THE POINT WHERE THE CANAL AND SWAN INLET CONVERGE, THERE ARE VERY FEW STRETCHES OF WATER WHICH WOULD ATTRACT ANGLERS. THERE ARE A FEW SECTIONS OF FAST-FLOWING RIVER AND A PORTION OF THE TIDE WASHED REACH BELOW THE SWAN INLET HOUSE IS ATTRACTIVE AND PRODUCED A VARIETY OF GOOD SIZED SEA TROUT, WHEN ELECTRO FISHED. THESE ARE DISCUSSED LATER IN THE REPORT.

AS WITH OTHER RIVERS IN THE ISLANDS, THE WATER IS COLOURED WITH PEAT. THE PH, WHEN TESTED, WAS 6.5 AND THE DISSOLVED OXYGEN SATURATION 92%.

L. ANTIOJA WAS EXAMINED TO ASCERTAIN ITS VALUE AS A NURSERY STREAM FOR IMMATURE FISH. ELECTRO FISHING PRODUCED 11 IMMATURE TROUT, SHOWING THAT THIS STREAM MAY BE USED FOR SPAWNING.

(4) MALO (25 MILES FROM STANLEY) (PLATES I AND II)

THIS RIVER RISES IN THE WICKHAM HEIGHTS AND WHITES MOUNTAIN RANGE OF HILLS. IT IS ABOUT 17 MILES LONG, EXCLUDING THE PASA MANEAS WHICH IS THE MAIN TRIBUTARY. OTHER TRIBUTARIES WHICH EMPTY INTO THE

MAIN RIVER ARE:-

THE GOLDEN STREAM, AND 5 UNNAMED FEEDERS (LEFT BANK),  
THE BOUNDARY BROOK (RIGHT BANK),  
THE COLORADO BROOK (RIGHT BANK),  
THE CENTRE BROOK, AND 3 UNNAMED FEEDERS (RIGHT BANK).

IN ITS UPPER REACHES, THE MALO IS NARROW (10 TO 12 FEET WIDE), SLOW-FLOWING AND UNINTERESTING. FROM TOP MALO HOUSE, IT INCREASES IN WIDTH AND CONTINUES TO DO SO DOWNSTREAM TO ITS CONFLUENCE WITH THE PASA MANEAS. DOWNSTREAM OF THE CONFLUENCE, THE CHARACTER OF THE RIVER CHANGES MARKEDLY. THE BED BECOMES STREWN WITH FAIRLY LARGE BOULDERS AND ASSOCIATED POOLS ARE PRESENT. FINALLY, THE RIVER FLOWS INTO A TIDAL REACH ENCLOSED BETWEEN HIGH STONE CLIFFS; AT THIS POINT, IT IS TYPICAL OF A SCOTTISH HIGHLAND STREAM AND PROVIDES EXCELLENT ANGLING FOR SEA TROUT AND MULLET. IF THIS AREA HAD A PREFABRICATED MODERN FISHING LODGE OF A TYPE PRODUCED BY, SAY, MESSRS. W.H. COLT & CO., LTD., ASHFORD, KENT, ENGLAND, IT COULD ATTRACT MANY TOURING ANGLERS.

THE RIVER HAS A FAIRLY GOOD FLOW OF FRESH WATER; EXCEPT IN TIMES OF SPATE, IT IS NOT COLOURED BY PEAT. THE PH, WHEN TESTED, WAS 6.0 AND THE DISSOLVED OXYGEN SATURATION 105%.

GRAVEL IN THE RIVER BED IS NOT AS COMPACTED AS IN SOME OF THE OTHER RIVERS IN THE ISLANDS BUT THE SILT LOADING IS HIGH. DESPITE THE SILT, TROUT DO SPAWN WITH SOME SUCCESS HERE BECAUSE 72 IMMATURE AND ADULT FISH WERE OBTAINED BY ELECTRO FISHING A 200 YARDS SECTION. OF THIS NUMBER, 24 WERE TAKEN BACK TO ENGLAND FOR FURTHER EXAMINATION AND ARE DISCUSSED LATER IN THIS REPORT.

(5) FITZROY (23 MILES FROM STANLEY)

THIS SMALL RIVER IS ABOUT 6 MILES LONG, FLOWING DOWN FROM THE WICKHAM HEIGHTS TO ENTER THE ESTUARY UPSTREAM OF ROCK POINT. IT HAS A MEAGRE FLOW OF FRESH WATER.

THE PH, WHEN TESTED, WAS 6.6 AND THE DISSOLVED OXYGEN SATURATION 87%. BED GRAVEL IS COMPACTED AND ONLY IN A FEW ZONES IS IT

LOOSE AND SUITABLE FOR REDD CUTTING.

ELECTRO FISHING DID NOT PRODUCE ANY APLOCHITON ZEBRA BUT A FEW GALAXIAS MACULATUS WERE OBTAINED; 7 SEA TROUT, BETWEEN 1 AND  $1\frac{1}{2}$  LBS. IN WEIGHT, WERE CAUGHT IN THE UPPER LIMITS OF THE TIDAL SECTION OF THE RIVER. IN MY OPINION, THE RIVER FLOW IS TOO LOW TO SUPPORT LARGE STOCKS OF FISH.

(6) FRYING PAN CREEK (PEAK RIVER) (27 MILES FROM STANLEY)

THIS RIVER, WHICH IS ABOUT 5 MILES LONG, IS APPROXIMATELY 20 FEET WIDE UPSTREAM OF THE HIGHEST LIMIT OF TIDAL WATER. IT IS FED BY A NUMBER OF VERY SMALL WATERCOURSES AND DITCHES AND A SMALL VOLUME OF WATER ENTERS THE RIVER FROM MOUNT PLEASANT POND.

UNLIKE THE OTHER RIVERS OF THE ISLANDS, IT HAD A FAIRLY HIGH PH (7.2), WHEN TESTED, AND IS SLIGHTLY ALKALINE. THE DISSOLVED OXYGEN SATURATION WAS  $78\frac{1}{2}\%$ . BED GRAVEL IS SMALL, VARYING IN SIZE BETWEEN  $\frac{3}{4}$  OF AN INCH AND 2 INCHES WITH THE LESSER SIZE PREDOMINATING; IT IS NOT HEAVILY COMPACTED AND DOES NOT HAVE A HIGH SILT CONTENT. THIS COULD BE A VALUABLE SPAWNING STREAM FOR TROUT.

BY ELECTRO FISHING A 200 YARD STRETCH OF RIVER, 107 BROWN TROUT, BETWEEN 2 AND  $8\frac{1}{4}$  INCHES IN LENGTH, AND 3 SEA TROUT, AVERAGING 2 LBS. WERE CAUGHT.

WHILST THIS IS A NURSERY STREAM OF VALUE TO THE AREA, IT IS NOT LIKELY TO ATTRACT A LARGE NUMBER OF ANGLERS NOR WILL IT SUPPORT INTENSIVE ROD FISHING.

(7) PEDRO (35 MILES FROM STANLEY)

THIS RIVER IS ABOUT 8 MILES LONG, WHEN MEASURED FROM THE BIG MOUNTAIN. IN SPITE OF EIGHT FEEDER STREAMS, THE FLOW IS NOT GREAT IN VOLUME AND THERE IS AN ABSENCE OF POOLS, EXCEPT IN THE MUCH DEEPER TIDAL SECTION.

THE PH, WHEN TESTED, WAS 6.0 AND THE DISSOLVED OXYGEN SATURATION 92%. BED GRAVEL IS OF A SUITABLE SIZE FOR SPAWNING AND ONLY COMPACTED IN SECTIONS.

ELECTRO FISHING OVER A 600 YARD STRETCH PRODUCED 24 BROWN TROUT, THE LARGEST OF WHICH WAS 11 INCHES IN LENGTH. ONE OF THE TROUT WAS PARASITIZED WITH NEMATODES, WHILST ANOTHER WAS ABOUT TO SPAWN. THESE FISH ARE DISCUSSED LATER IN THE REPORT. NO SEA TROUT WERE CAUGHT.

(B) WEST FALKLAND

(1) WARRAH (70 MILES FROM STANLEY) (PLATE 5)

THE MAIN RIVER IS ABOUT 12 MILES LONG, WHEN MEASURED TO A POINT AT PURVIS HILL, AND ITS HEADWATERS ARE APPROXIMATELY 500 FEET ABOVE SEA LEVEL. THE MAJORITY OF THE TRIBUTARIES RISE ALSO ABOUT 500 FEET ABOVE SEA LEVEL AND EMPTY INTO THE MAIN RIVER ON THE LEFT BANK WHEN LOOKING DOWNSTREAM. THE NAMED TRIBUTARIES ARE:-

- (1) DIRTY DITCH,
- (2) PONCHO HILL STREAM,
- (3) HOLE STREAM,
- (4) MOUNT EDGEWORTH STREAM, AND
- (5) HORSESHOE STREAM.

TRIBUTARIES (1) AND (2), AND SEVEN SMALLER UNNAMED FEEDERS, FLOW FROM THE MUFFLER JACK MOUNTAIN AND PONCHO HILL, WHICH ARE ABOUT 1,500 FEET ABOVE SEA LEVEL. TRIBUTARIES (3), (4) AND (5), AND THREE SMALLER UNNAMED STREAMS, RISE IN THE MOUNT EDGEWORTH RANGE OF HILLS, MOUNT ROBINSON AND RAT CASTLE; THESE HILLS ARE BETWEEN 500 AND 1,500 FEET ABOVE SEA LEVEL.

ON THE RIGHT BANK OF THE WARRAH, FLOWS ARE INCREASED WITH WATER COMING FROM THE CLAY MOUNTAIN AND THE MOUNT MARIA RANGE OF HILLS. IN THE CLAY MOUNTAIN ARE TWO SMALL LAKES, WHICH EMPTY INTO THE BLACK HILL STREAM. A SMALLER LAKE EMPTIES INTO THE LITTLE BLACK HILL STREAM, WHILST, ON THE "EVERGREEN FLATS", A FURTHER SMALL TRIBUTARY IS SUPPLIED WITH WATER FROM THE RED POND. COLLECTIVELY, ALL THESE WATERCOURSES CONVERGE AT GREEN HILL BRIDGE, ON THE WARRAH, THENCE TO FLOW TO THE FISH



PLATE  
5

APPROACHING THE WARRAH RIVER



PLATE  
6

A TYPICAL STREAM IN THE FALKLAND ISLANDS



PLATE  
7

A TYPICAL SALMONID REACH



HOLE, WEST OF GREEN HILL. NEAR WARRAH CORNER, THE RIVER IS APPROXIMATELY 150 FEET WIDE AND, FROM HERE, IT VARIES IN WIDTH TO A GREATER OR LESSER DEGREE UNTIL IT EMPTIES INTO THE ESTUARY AND THENCE THE SEA, NEAR TO THE OLD HOUSE AND PURVIS HOUSE PADDOCK. IN ADDITION TO THE LARGE AFOREMENTIONED TRIBUTARIES, A NUMBER OF DRAINAGE DITCHES CONTRIBUTE SMALL QUANTITIES OF WATER TO THE MAIN STREAM.

THE PH, WHEN TESTED, WAS 6.4 AND THE DISSOLVED OXYGEN SATURATION 100%. BED GRAVEL AVERAGES 2 INCHES IN SIZE IN THE LOWER AND MID REACHES, IS HEAVILY COMPACTED AND APPEARS TO HAVE BEEN UNDISTURBED BY THE INFREQUENT SPATES AND FLOOD WATERS. BROWN TROUT AND SEA TROUT WOULD HAVE DIFFICULTY IN SPAWNING SUCCESSFULLY IN THIS GRAVEL.

IN 300 YARDS OF RIVER, 27 BROWN TROUT WERE CAUGHT BY ELECTRO FISHING AND THE LARGEST OF THESE WAS 10 INCHES LONG. THEY ARE DISCUSSED LATER IN THIS REPORT.

THE MID AND LOWER REACHES OF THIS RIVER ARE IDEAL FOR ANGLING, BEING WELL SUPPLIED WITH GOOD QUALITY RUNS, STICKLES AND POOLS. SUITABLY DEVELOPED, THE RIVER WOULD BE CAPABLE OF ATTRACTING TOURING ANGLERS.

(2) CHARTRES (90 MILES FROM STANLEY) {PLATES 8, 9 AND 10}

THIS RIVER IS ABOUT 17 MILES LONG AND HAS MANY TRIBUTARIES. ITS MAIN SOURCE IS THE RIGHT TRIBUTARY COMING FROM THE GREEN MOUNTAINS, APPROXIMATELY 1,000 FEET ABOVE SEA LEVEL, BUT A NUMBER OF SMALLER LAKE-FED TRIBUTARIES, FLOWING FROM THE MANADA PADDOCK, THE HOME FLOCK AND LITTLE CHARTRES, MAKE A VALUABLE CONTRIBUTION TO THE MAIN RIVER FLOW. AT THE CONFLUENCE OF THE RIGHT AND LEFT TRIBUTARIES, THE RIVER IS ABOUT 70 FEET WIDE AND A VARIETY OF POOLS, VARYING IN DEPTH FROM 5 TO 8 FEET, ARE PRESENT. THROUGHOUT ITS LOWER LENGTH, IT HAS A LARGE NUMBER OF GOOD FISH HOLDING POOLS, GRAVELLY SHALLOWS AND STICKLES.

AS IN THE WARRAH RIVER, THE BED GRAVEL IS OF A GOOD SIZE BUT IS COMPACTED AND CONTAINS A HIGH PROPORTION OF SILT. THE PH, WHEN TESTED, WAS 6.8 AND THE DISSOLVED OXYGEN SATURATION 82%.



PLATE  
8



PLATE  
9



PLATE  
10

THE UPPER AND MID REACHES AND ESTUARY OF THE  
CHARTRES RIVER

IN A 200 YARD STRETCH OF RIVER, 17 BROWN TROUT AND SEA TROUT WERE CAUGHT BY ELECTRO FISHING, THE SEA TROUT VARYING BETWEEN 4 AND 22 INCHES IN LENGTH. UNFORTUNATELY, MOST OF THE FISH WERE PARASITIZED BY NEMATODES. THEY ARE DISCUSSED LATER IN THIS REPORT. DURING MY VISIT, TWO ANGLERS FROM BEUNOS AIRES WERE FISHING THIS WATER AND, ON EACH OF TWO DAYS, THEY CAUGHT SEA TROUT OF A GOOD SIZE.

OF ALL THE RIVERS SEEN ON WEST FALKLAND, THIS IS THE ONLY ONE WHERE ACCESS IS REASONABLY GOOD. THE RIVER IS CAPABLE OF BEING DEVELOPED AND ATTRACTING TOURING ANGLERS IN NUMBERS.

### (3) OTHER RIVERS AND STREAMS

ON WEST FALKLAND, THERE ARE A NUMBER OF RIVERS AND STREAMS WHICH MIGHT BE SUITABLE FOR ANGLING, THOUGH THEY WOULD NEED TO BE SURVEYED BEFORE THEIR VALUE COULD BE ASSESSED. THESE INCLUDE:-

(A) FIRST, SECOND AND THIRD ARROYO AND GIBRALTAR STREAM (120 MILES FROM STANLEY). THEY ALL EMPTY INTO LARGE TIDAL LAGOONS, WHICH DISCHARGE INTO THE SEA, VIA CHAFFERS GULLET NEAR TO LUCAS POINT. THEIR HEADWATERS ARE ABOUT 500 FEET ABOVE SEA LEVEL.

(B) LEICESTER STREAM AND CHEEKS PASS (120 MILES FROM STANLEY); THEY ENTER LAKE HAMMOND, THENCE TO FLOW INTO PORT EDGAR.

(C) RIVER DOYLE (110 MILES FROM STANLEY), WHICH RISES IN THE MOUNT SULLIVAN, MOUNT PHILOMEL AND MOUNT DOYLE RANGE OF HILLS. EAST OF THE RIVER, THERE ARE A NUMBER OF SMALL LAKES.

(D) CROOKED INLET (105 MILES FROM STANLEY). THIS STREAM RISES IN THE MOUNT ADAM RANGE OF HILLS AND EMPTIES INTO THE ESTUARY NEAR TO THE ROY COVE SETTLEMENT.

(E) DOREE AND PILOT STREAMS AND BLACKBURN RIVER (90 MILES FROM STANLEY). THESE RISE IN THE MOUNT ADAM AND MOUNT EDGEWORTH RANGE OF HILLS AND EMPTY INTO THE ESTUARY AT THE GARDEN PASS, NEAR SOUND BRIDGE.

(c) LAFONIA

IN LAFONIA, THERE ARE A NUMBER OF LAKES AND STREAMS, INCLUDING HUNTER'S ARROYO, MAPPA BIG ARROYO, ORQUETA ARROYO, ARROW HARBOUR ARROYO, DEEP ARROYO CREEK AND BRAZO LA MAR. NONE OF THESE STREAMS EMANATE FROM ANY RANGE OF HILLS - ALL ARE BELOW THE 500 FEET CONTOUR LINE. THEY ARE LAND DRAINAGE CHANNELS EMPTYING INTO SEA-WASHED CREEKS.

UNFORTUNATELY, LACK OF TIME PRECLUDED INVESTIGATION OF THEIR FISHERY POTENTIAL BUT, HAVING SEEN THEM FROM THE AIR, I FEEL THAT SUCH A SURVEY SHOULD BE CARRIED OUT.

CHAPTER 5

EXAMINATION OF FISH SAMPLES TAKEN FROM THE RIVERS

SAMPLES OF FISH WERE OBTAINED AS SHEWN IN TABLE 4. OF THESE, 84 TROUT, AS CAUGHT AND VARYING IN SIZE AND WEIGHT, WERE SENT BACK TO ENGLAND FOR DETAILED BIOLOGICAL AND PATHOLOGICAL ANALYSIS, AS WERE 2 APLOCHITON ZEBRA AND 10 GALAXIAS MACULATUS. FROM 72 OF THE REMAINING TROUT, AND FROM 2 ELEGINUS FALKLANDICUS, SCALES WERE TAKEN AND ALSO SENT BACK TO ENGLAND.

TABLE 4  
FISH SAMPLES OBTAINED FROM VARIOUS LOCATIONS

SOURCE	SPECIES	No. CAUGHT BY ELECTRO FISHING	No. OBTAINED FROM ANGLERS ETC	TOTAL	No. OF WHOLE FISH TO ENGLAND	No. OF SETS OF SCALES TO ENGLAND
PEDRO	TROUT	24	-	24	3	8
CHARTRES	TROUT	38	-	38	9	8
MURRELL	TROUT	35	2	37	10	10
FRYING PAN CREEK	TROUT	110	-	110	11	3
KING'S BROOK	TROUT	17	-	17	15	-
MALO	TROUT	72	-	72	24	13
"	E. FALKLANDICUS	-	2	2	-	2
SWAN INLET	TROUT	26 *	-	26	12	13
WARRAH	TROUT	27	-	27	-	7
SAN CARLOS	TROUT	9	1	10	-	10
FITZROY $\emptyset$	TROUT	7	-	7	-	-
LORENZO POND	A. ZEBRA	-	2	2	2	-
" "	G. MACULATUS	10	-	10	10	-
TOTALS		375	7	382	96	74

NOTES:

\* 11 IMMATURE TROUT FROM L. ANTIOJA NOT INCLUDED  
 $\emptyset$  A FEW G. MACULATUS FROM FITZROY " "

1. THE TOTAL CATCH OBTAINED BY ELECTRO FISHING INCLUDED MANY IMMATURE TROUT (FROM 1.75 TO 2.5 INCHES), WHICH WERE RETURNED ALIVE TO THE RIVERS FROM WHICH THEY WERE OBTAINED, AND A NUMBER OF LARGER TROUT WHICH WERE DISSECTED ON SITE TO ASCERTAIN THE STAGE OF SPAWNING DEVELOPMENT REACHED.
2. KING'S BROOK IS A SMALL STREAM AND APPEARS TO HAVE LITTLE ANGLING POTENTIAL. IT HAS NOT BEEN INCLUDED IN CHAPTER 4.
3. THE GALAXIUS MACULATUS AND ONE OF THE APLOCHITON ZEBRA WERE SENT TO PROFESSOR ALWYNNE WHEELER AT THE BRITISH MUSEUM FOR IDENTIFICATION AND VERIFICATION OF THE SPECIES AND I AM GREATLY INDEBTED TO HIM FOR HIS HELP.
4. NOTE 1, PAGE 37, REFERS TO 16 FISH, INCLUDED IN THE TOTAL NUMBER OF FISH OBTAINED BY ELECTRO FISHING FROM THE CHARTRES RIVER, WHICH WERE BURIED.

WHEREVER POSSIBLE, FISH WERE SEXED, WEIGHED AND MEASURED. MORE THAN 2,000 SCALES WERE EXAMINED TO DETERMINE THE GROWTH RATES OF THE FISH AND THEIR

RIVER AND SEA FEEDING HABITS. WHERE POSSIBLE, OVARIES AND GONADS WERE EXAMINED. STOMACHS, GUTS AND MUSCULATURE WERE INSPECTED FOR PARASITES.

(A) FOOD AND FEEDING HABITS

(1) ANALYSIS OF STOMACH CONTENTS

TABLE 5 SHEWS THE DIET OF TROUT IN THE FALKLAND ISLANDS AND THE PERCENTAGE OCCURRENCE OF AVAILABLE FOOD, AS FOUND IN THE STOMACHS OF THE FISH SAMPLES. THE FISH ARE MAINLY BOTTOM FEEDERS.

TABLE 5  
PERCENTAGE OCCURRENCE OF FOOD FOUND  
IN THE FALKLAND TROUT

GAMMARUS .....	44%
PLANT DEBRIS .....	27%
TERRESTRIAL INSECTS .....	14%
CHIRONOMID LARVAE .....	5%
CADDIS NYMPHS .....	5%
OSTRACODS .....	2%
BEETLES .....	1%
WATER SNAILS .....	0.8%
SPHAERIUM .....	0.4%

NOTE: GAMMARUS - FRESHWATER SHRIMPS  
CHIRONOMIDS - MIDGE LARVAE  
CADDIS - FLY LARVAE  
OSTRACODS - MINUTE CRUSTACEANS  
SPHAERIUM - FRESHWATER BIVALVE  
MOLLUSCS

THE MOST PREVALENT FOOD FOR TROUT IN THE FALKLAND ISLANDS IS THE GAMMARUS, OF WHICH 44% OF THE TOTAL FOOD CONSUMED WAS COMPRISED. EXAMINATION OF THE FISH AND RIVER BED SURVEYS SHEW THAT GAMMARUS IS ABUNDANT IN ALL THE RIVERS OF THE ISLANDS.

GAMMARUS IS THE MAIN GENUS OF GAMMARIDAE, WHICH IS THE MOST

IMPORTANT FAMILY OF FRESHWATER SHRIMPS (AMPHIPODA). FRESHWATER SHRIMPS LIVE IN ALMOST ALL TYPES OF WATER HAVING ABUNDANT DISSOLVED OXYGEN AND A HIGH LIME CONTENT. (IT IS INTERESTING TO NOTE THAT, IN THE FALKLAND ISLANDS, THE GAMMARUS ARE LIVING IN RIVERS OF LOW PH.) ALTHOUGH VERY ACTIVE, THEY CAN USUALLY BE FOUND UNDER STONES; IT IS RARE TO FIND THEM BELOW A DEPTH OF 6 FEET. GAMMARIDAE NORMALLY SWIM ON THEIR SIDES AND THEIR BODIES ARE Laterally compressed. THEIR FOOD CONSISTS, IN THE MAIN, OF LIVING AND DECAYING VEGETATION, DETRITUS AND DEAD ANIMALS.

REPRODUCTION TAKES PLACE THROUGHOUT THE YEAR. THE MALE, WHICH IS LARGER, CLASPS THE FEMALE'S BACK FOR ABOUT A WEEK BEFORE MATING AND THE EGGS, WHICH VARY IN NUMBER FROM 20 TO MORE THAN 1,000 ACCORDING TO AGE, FOOD SUPPLY AND HABITAT CONDITIONS, ARE LAID AND FERTILISED IN AN OPEN-ENDED TUBE, (FORMED BY WIDE LAMELLAE ON BOTH SIDES OF THE SECOND AND FOURTH THORACIC SEGMENTS LEANING TOGETHER), ALONG THE VENTRAL SURFACE OF THE FEMALE. WHEN THE YOUNG HATCH FROM THE EGGS, THEY ARE ALREADY ALMOST FULLY DEVELOPED AND THEY MOULT ABOUT TEN TIMES UNTIL THEY REACH FULL MATURITY (EVERY 5 TO 7 DAYS IN SUMMER BUT MUCH LESS OFTEN IN WINTER). DEVELOPMENT OF THE YOUNG TAKES 2-3 WEEKS IN SUMMER AND LONGER IN WINTER; THEY FREQUENTLY DEVELOP IN MASSES IN FAVOURABLE WATER - OVER 400 HAVE BEEN COUNTED IN 1 SQUARE METRE.

GAMMARUS ARE ABUNDANT IN THE TUFTS OF VEGETATION TO BE FOUND ADHERING TO STONES IN THE RIVER BED. SAMPLES OF THIS VEGETATION, WHICH IS PREVALENT IN MANY OF THE RIVERS IN THE ISLANDS, WERE BROUGHT BACK TO ENGLAND AND SENT TO EAST GERMANY FOR IDENTIFICATION BY THE ANTARCTIC EXPERT, DR. R. GROLLE, OF FRIEDRICH SCHILLER UNIVERSITY. HE HAS IDENTIFIED THE PLANT AS A LIVERWORT, CLASMATOCOLEA VERMICULARIS (LEHM.) GROLLE, AND A DESCRIPTION CAN BE FOUND IN REV. BRYOL. ET LICH. 29, P. 78 (1960); I AM GREATLY INDEBTED TO DR. GROLLE FOR HIS HELP. AS THE LIVERWORT IS THE MAIN HABITAT FOR THE FRESHWATER SHRIMP IN THE ISLANDS, THE FISH, WHEN FORAGING FOR THIS TYPE OF FOOD, WILL INGEST A CERTAIN PROPORTION OF VEGETABLE FRAGMENTS. PLANT DEBRIS, AMOUNTING TO 27%, WAS FOUND IN MOST OF THE STOMACHS. IT IS MOST IMPORTANT THAT THIS LIVERWORT BE MAINTAINED FOR IT IS THE PRIME HABITAT FOR THE GAMMARUS; AS SUCH, IT IS A VITAL PART OF THE FOOD CHAIN FOR THE FALKLAND TROUT.

GENERALLY, THE RIVERS AND STREAMS IN THE FALKLAND ISLANDS ARE FREE FROM WEEDS BUT, IN ISOLATED PATCHES, A NARROW LEAVED WEED WHICH IS BLACKISH IN COLOUR IS FOUND. THIS, AS YET, HAS NOT BEEN IDENTIFIED ACCURATELY.

THERE ARE NO TREES IN THE FALKLANDS AND VERY FEW SPECIES OF TERRESTRIAL INSECTS, APART FROM THE "BLUEBOTTLE". AQUATIC LARVAE IS SCARCE AND CONDITIONS ARE COMPLETELY DIFFERENT TO THOSE IN ENGLAND, WHERE THE RIVERS HAVE LARGE POPULATIONS OF AQUATIC INSECT LARVAE AND NYMPHS OF MANY DIFFERENT KINDS. TERRESTRIAL INSECTS, AMOUNTING TO 14% IN THE CASE OF THE FISH SAMPLES, FORM PART OF THE DIET OF THE FALKLAND TROUT AND A FEW PLECOPTERA AND EMPHEMEROPTERA (FLIES) HAVE BEEN IDENTIFIED. LARVAL STAGES OF THE SPECIES WERE FOUND IN THE STREAM BED AND IN THE LIVERWORT, AS ALSO WERE A NUMBER OF SMALL, RED WORMS OF 1.5 CMS. IN LENGTH, BUT NONE WERE FOUND IN THE STOMACHS AND GUTS OF THE TROUT FOR THEY WOULD BE QUICKLY DIGESTED. PARTLY DIGESTED MOTHS WERE FOUND IN A FEW FISH AND ALSO THE REMAINS OF A SMALL INVERTEBRATE KNOWN LOCALLY AS A "JUMP JACK". THIS DELPHACID LIVES IN TUFTS OF GRASS ON LAND ADJOINING THE RIVERS.

TABLE 5 ITEMISES THE LESSER QUANTITIES OF OTHER TYPES OF FOOD FOUND IN THE FISH SAMPLES, WITH A FEW CHIRONOMIDS, CADDIS, OSTRACODS, BEETLES, WATER SNAILS AND SPHAERIUM FORMING A LESS SIGNIFICANT PART OF THE FOOD SUPPLY.

THE ANALYSIS CARRIED OUT INDICATES THAT THE TROUT FEED ON WHATEVER FOOD IS AVAILABLE TO THEM AND THEY ARE NOT SELECTIVE IN THEIR FEEDING HABITS.

TABLE 6 SHEWS THE RELATIVE ABUNDANCE OF THE VARIOUS ORGANISMS CONSUMED BY THE TROUT FROM 0+ TO 5+ YEARS OF AGE. IT IS INTERESTING TO NOTE THAT EVEN THE 0+ FISH SEARCH FOR IMMATURE GAMMARIDAE, FOR PLANT DEBRIS IN THE GUTS OF THESE SMALL FISH WAS OFTEN FOUND. THE DIET OF THE 1+ TO 2+ FISH DID NOT VARY MARKEDLY FROM THAT OF THE 0+ GROUP, WHICH SHEWS THERE IS LITTLE VARIETY.



TABLE 6

STOMACH CONTENTS OF TROUT  
TAKEN FROM RIVERS OF THE FALKLAND ISLANDS

RIVER	CODE	FISH LENGTHS & WEIGHTS		SEX	PLANT DEBRIS	GAMMARUS	OSTRACODS	CADDIS	TERRESTRIAL INSECTS	BEETLES	CHIRONOMIDS	SPHAERIUM	WATER SNAILS
		CENTIMETRES	GRAMMES										
PEDRO	A 1	21.9	73.69	M	***	***							
"	A 2	10.0	19.34	F		**			***				
"	A 3	22.8	106.0	M		***							
CHARTRES	A 4	17.0	52.0	F	*	**							
"	A 5	25.0	127.0	F	*	***				*			*
"	A 6	12.2	24.0	F	**		*						
"	A 6A	9.0	9.0	M				***					
"	A 6B	12.0	23.0	F	*	**	*						
"	A 6C	13.8	36.0	F	**	*	**						
"	A 6D	14.0	NW	M	*	*							
"	A 6E	9.0	NW	NS		**		*	*				
"	A 7	13.5	23.0	M		**							
MURRELL	A 8	35.0	35.5	M		**							
"	A 8A	16.0	36.2	F		**		*					
"	A 9	15.5	35.4	F		*		*	***		*	*	
"	A 9A	13.8	23.5	F					***	*			
"	A 10	13.2	23.7	F	**	**				*	*		
"	A 11	12.2	21.3	F	**			*					
"	A 12	12.5	21.8	M	**						*		
"	A 13	10.0	8.2	F	**								
"	A 14	8.5	6.2	NS			EMPTY STOMACH AND GUT						
"	A 14A	15.2	34.2	F	*	**							
FRYING PAN	A 15	12.0	14.0	F		**							
"	A 16	12.0	13.9	F		***			**		**		
"	A 17	12.0	16.5	F		**							
"	A 18	10.2	11.4	M		**							
"	A 19	18.0	54.9	M	**		*	**	*				
"	A 19A	17.0	51.2	F	**	***		***					
"	A 20	13.4	20.5	M	***						**		
"	A 21	13.2	23.1	F	***				**		*		
"	A 22	13.5	23.1	F	**	*			**				
"	A 23	11.5	18.9	M		**			*		*		
"	A 24	10.0	10.6	F			EMPTY STOMACH AND GUT						
KINGS BROOK	A 25	10.2	9.1	F	**								
"	A 26	10.9	12.7	NS		**							
"	A 27	11.0	13.4	M			EMPTY STOMACH AND GUT						

M = MALE; F = FEMALE; NS = NOT SEXED; NW = NOT WEIGHED / CONTINUED

TABLE 6 (CONTINUED)

RIVER	CODE	FISH LENGTHS & WEIGHTS		SEX	PLANT DEBRIS	GAMMARUS	OSTRACODS	CADDIS	TERRESTRIAL INSECTS	BEETLES	CHIRONOMIDS	SPHAERIUM	WATER SNAILS
		CENTIMETRES	GRAMMES										
KINGS BROOK (CONT.)	A28	10.5	11.4	M		**							
	A29	10.0	8.8	F		**							
"	A30	10.2	10.3	F		**					*		
"	A31	9.0	8.1	NS		*							
"	A32	7.3	4.3	NS	**								
"	A33	7.3	4.5	NS	**	**		*					
"	A34	6.8	3.4	NS	**								
"	A35	6.4	3.6	NS	*	***							
MAL O	A36	6.2	2.3	NS	*	**							
"	A37	6.7	3.4	NS	*	***			**				
"	A38	6.8	3.5	NS	**	*							
"	A39	6.9	3.5	NS	**	*							
"	A40	6.7	2.9	NS	*	*			*				
"	A41	5.8	2.0	NS	**	*							
"	A42	6.3	2.1	NS	*								
"	A43	6.3	2.7	NS	*	*							
"	A44	6.0	2.4	NS	*	*			**				
"	A45	6.0	2.7	NS	*								
"	A46	6.0	1.8	NS	*	*							
"	A46A	65.0	4530.0	M									*
"	A46B	36.0	658.0	F			EMPTY STOMACH AND GUT						
"	A46C	44.0	1380.6	F			EMPTY STOMACH AND GUT						
"	A46D	39.0	788.2	F			EMPTY STOMACH AND GUT						
"	A46E	49.0	1685.6	F			EMPTY STOMACH AND GUT						
"	A46F	47.0	1546.1	M			EMPTY STOMACH AND GUT						
"	A46G	58.0	2765.4	F			EMPTY STOMACH AND GUT						
"	A47	13.7	25.4	F	***								
"	A48	14.3	25.9	M	***				*				
"	A49	13.8	26.2	F	**	**			*				
"	A50	13.5	24.0	F	*	**					*		
"	A51	12.8	17.9	M	***	***							
"	A52	12.3	17.0	M	**	**							
SWAN INLET	A53	12.7	19.0	F	*				*				
"	A54	14.7	26.5	F		***		*		*			
"	A55	19.0	61.8	F		**			*				
"	A56	7.4	5.0	NS	*	**							
"	A57	8.2	7.9	NS	**								

M = MALE; F = FEMALE; NS = NOT SEXED

/CONTINUED

TABLE 6 (CONTINUED)

RIVER	CODE	FISH LENGTHS & WEIGHTS		SEX	PLANT DEBRIS	GAMMARUS	OSTRACODS	CADDIS	TERRESTRIAL INSECTS	BEETLES	CHIRONOMIDS	SPHAERIUM	WATER SNAILS
		CENTIMETRES	GRAMMES										
SWAN	A58	6.4	3.0	NS	*	*							
INLET	A59	7.2	4.2	NS	*	*							
(CONT.)	A60	6.8	4.0	NS									
"	A61	13.8	22.6	F		***							
"	A62	17.5	41.2	M	**	**							
"	A63	40.5	711.1	M									
"	A64	38.0	708.5	F									
KINGS	A65	47.5	1883.0	M	**	***							
BROOK	A66	33.0	606.0	F	*	**							
"	A67	29.0	421.0	F	*	***							
"	A68	28.0	403.0	F	***	*							

M = MALE; F = FEMALE; NS = NOT SEXED

\*\*\* ABUNDANT      \*\* FREQUENT      \* RARE

NOTES

1. A FURTHER 16 FISH, VARYING IN SIZE FROM 14.0 CMS. TO 17.0 CMS., WERE TAKEN FROM THE CHARTRES RIVER, OF WHICH 7 WERE PARASITIZED WITH NEMATODES IN THE MUSCULATURE, AND ALL 16 FISH WERE BURIED.

2. APART FROM THE WEIGHTS RECORDED FOR THE FISH, REFERENCES A46A TO A46G AND A63 TO A68 INCLUSIVE, THE WEIGHTS SHOWN ARE THE DEHYDRATED BODY WEIGHTS AFTER ALL ORGANS HAD BEEN REMOVED. THE FISH, WITH THE EXCEPTIONS MENTIONED ABOVE, WERE NOT WEIGHED WHEN CAPTURED BUT WERE IMMEDIATELY PLACED IN FORMALIN FOR TRANSPORTATION TO ENGLAND.

3. I HAVE COMPARED THE CONDITION FACTOR OF THE FALKLAND SEA TROUT WITH THAT OF ENGLISH FISH AND, BY USING THE FORMULA  $WEIGHT = \frac{LENGTH^3 \times CF}{100,000}$ , HAVE FOUND THAT THE CONDITION FACTOR IN THE FALKLAND SEA TROUT IS ABOUT THREE TIMES HIGHER THAN IN ENGLISH SEA TROUT. THIS IS PROBABLY DUE TO THE ABUNDANCE OF FOOD IN THE SEA OFF THE ISLANDS.

4. THE SMALLEST NUMBER OF OVA COUNTED (300) WAS FOUND IN A FISH MEASURING 12 CMS. THE LARGEST NUMBER OF OVA (5,640) WAS FOUND IN A FISH MEASURING 58 CMS.

(2) TERRITORIAL BEHAVIOUR, SURVIVAL AND PREDATION

EVIDENCE WAS FOUND SHEWING THAT LARGER TROUT WERE PREDATING ON THEIR LESSER SIZED COUNTERPARTS. THE REMAINS OF TROUT MEASURING 2.7 AND 4.25 INCHES WERE FOUND IN THE STOMACHS OF TROUT MEASURING 6.25 AND 10.0 INCHES RESPECTIVELY, WHICH MAY BE ATTRIBUTABLE TO ANY OF THE FOLLOWING REASONS FOR PREDATION IN TROUT:-

- (A) EXTREME HUNGER,
- (B) LACK OF VARIETY IN DIET,
- (C) AVAILABILITY, AS FOOD, OF LESSER SIZED TROUT,
- (D) ENCROACHMENT ON THE TERRITORY OF PREDATING FISH, AND
- (E) A COMBINATION OF ALL THE ABOVE FACTORS.

BROWN TROUT, IN RUNNING WATER, ARE SOLITARY AND STRONGLY TERRITORIAL FISH. TERRITORIAL INSTINCTS ARE SUPPRESSED IF LARGE NUMBERS ARE KEPT TOGETHER, AS IN A FISH HATCHERY, BUT, IN NORMAL CIRCUMSTANCES IN A RIVER, TROUT WILL SPACE THEMSELVES OUT AND DEFEND THEIR TERRITORY ACCORDING TO THEIR CAPACITY TO DO SO. IN PRACTICE, ANY GIVEN AREA OF WATER WILL ACCOMMODATE ONLY A GIVEN NUMBER OF TROUT.

AS TROUT GROW, AGGRESSION INCREASES WHICH PRODUCES DOMINANT AND SUB-DOMINANT GROUPS. TERRITORY HELD BY A SUB-DOMINANT CAN BE TAKEN OVER BY THE DOMINANT. THE TERRITORY NEED NOT NECESSARILY BE PART OF A RIVER SECTION OF A PARTICULAR SIZE; IT CAN BE LOCATED IN AN AREA WITH A DEFINITE BOUNDARY SUCH AS A LARGE STONE, OR A BEND IN THE RIVER BANK WITH ITS ASSOCIATED POOL OR EVEN A ZONE BELOW A SMALL FEEDER STREAM. ANY FISH ENCROACHING ON THE TERRITORY WILL, DEPENDING ON ITS DOMINANCE STATUS, BE DRIVEN OFF. AS TROUT GROW LARGER, SO THE AREA OF THE TERRITORY IS EXTENDED AND THIS PRODUCES A CHAIN REACTION, WITH DISPLACED TROUT DISPLACING OTHER TROUT FROM THEIR TERRITORIES. THE RESULT FOR THOSE FISH AT THE END OF THE CHAIN IS STARVATION AND DEATH, UNLESS ACCESS TO A SUITABLE FOOD SUPPLY CAN BE FOUND. PREDATION OF TROUT ON ITS OWN SPECIES, IN THE FALKLAND ISLANDS, IS RELATED TO THE TERRITORIES IN WHICH THE FISH FIND THEMSELVES.

DOMINATION BY ONE FISH USUALLY RESULTS IN OTHER FISH MOVING

DOWNSTREAM AND, IF THE RIVER HAS ACCESS TO THE SEA, THEY WILL ULTIMATELY REACH BRACKISH WATER WHERE THEY CAN DEVELOP AS SLOB TROUT. THERE ARE NO PHYSIOLOGICAL DIFFERENCES BETWEEN SLOB TROUT AND SEA TROUT WHICH WOULD HELP TO DISTINGUISH ONE FROM THE OTHER AND IDENTIFICATION IN THEIR CASE IS MUCH MORE DIFFICULT THAN WHEN DIFFERENTIATING BETWEEN TROUT AND SALMON, BUT THE DIFFERENCES IN OUTWARD APPEARANCE MAY BE SEEN QUITE CLEARLY IN THE TWO FISH SHEWN IN PLATE 12. WHILST THERE MAY BE NO PHYSICAL DIFFERENCES IN THE FISH, THE CHANGES IN THE FOOD SUPPLY AND THE SALT WATER PRODUCES THE VISUAL DIFFERENCES SHEWN.

USUALLY, IF THERE IS A PLENTIFUL SUPPLY OF FOOD IN A RIVER SYSTEM, TROUT WILL STAY IN IT BUT, IF THERE IS A SHORTAGE OF THE RIGHT SIZE OF FOOD, THEY WILL MIGRATE SEAWARDS. THIS, OF COURSE, ALWAYS PRE-SUPPOSES THAT A FISH MIGRATING OUT TO SEA CAN DEVELOP AND ADJUST ITS OSMO REGULATORY FUNCTIONS TO ALLOW IT TO PASS FROM FRESH WATER TO SALINE WATER.

MY INVESTIGATIONS SHEW THAT THE NATURAL FOOD RESOURCES IN THE RIVERS OF THE ISLANDS ARE INADEQUATE TO PRODUCE LARGE BROWN TROUT.

(B) FECUNDITY

OVARIES TAKEN FROM 68 FEMALE FISH WERE EXAMINED TO ASCERTAIN THE NUMBERS OF OVA PRESENT, WHICH WERE RELATED TO THE LENGTH, AGE AND WEIGHT OF THE FISH. UNFORTUNATELY, A FULL AND COMPLETE ANALYSIS OF FECUNDITY WAS NOT POSSIBLE IN THE TIME AVAILABLE BUT ALL THE FISH EXAMINED SHEWED A WIDE VARIATION IN THE NUMBERS OF OVA CONTAINED IN THE OVARIES DUE, NO DOUBT, TO THE DIFFERENT QUANTITIES OF FOOD CONSUMED.

THE TOTAL WEIGHT OF EACH FISH EXAMINED, WHEN CORRELATED TO ITS PHYSICAL CONDITION, HAD SOME BEARING UPON THE NUMBERS OF EGGS PRESENT. THE BETTER FED FISH HAD MORE EGGS AND WERE, IN ALL CASES, FAR MORE MATURE. FOR EXAMPLE, A TROUT MEASURING  $5\frac{1}{2}$  INCHES AND WEIGHING ABOUT 6.5 OZS. TAKEN FROM THE FRYING PAN STREAM, WAS ALMOST RIPE AND ABOUT TO SPAWN BUT A SEA TROUT, MEASURING 19 INCHES AND WEIGHING 3 LBS., TAKEN FROM THE MALO RIVER, WAS FAR FROM RIPE AND WOULD PROBABLY HAVE SPAWNED

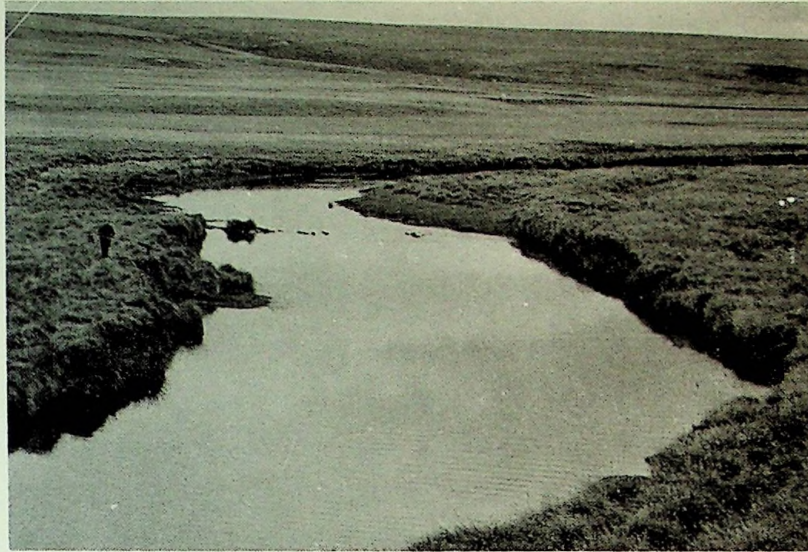
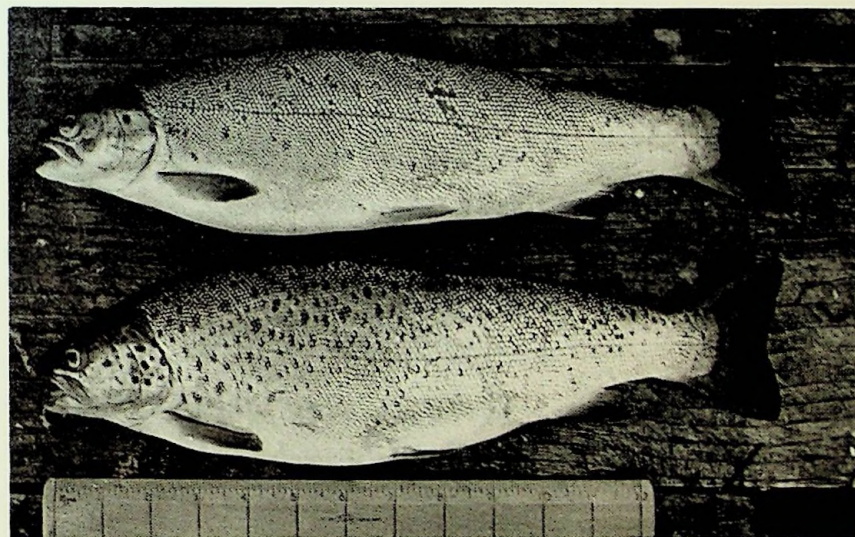


PLATE  
11

THE MID REACH OF THE MALO RIVER



(A)

PLATE  
12

(B)

A SEA TROUT (A) AND A SLOB TROUT (B) TAKEN FROM THE  
UPPER SALINE LIMITS OF THE MALO ESTUARY, NEAR THE GORGE

SOMEWHERE AROUND THE END OF MAY; IN THE FORMER FISH, OVA NUMBERED 600, IN THE LATTER, 2,000.

IT WAS SOMEWHAT SURPRISING TO DISCOVER  $5\frac{1}{2}$  INCHES TROUT RIPE AND READY TO SPAWN IN MARCH. HOWEVER, THE RIVERS IN THE ISLANDS HAVE A LOW FOOD POTENTIAL AND, AS TROUT OF  $5\frac{1}{2}$  INCHES AND UPWARDS IN SIZE ARE SPAWNING, IT IS ESSENTIAL THAT THESE SMALL FISH BE CAREFULLY SAFEGUARDED FOR THE FUTURE WELLBEING OF FISH STOCKS. THEIR OFFSPRING SHOULD BE ALLOWED TO MOVE FREELY DOWNSTREAM TO MIGRATE SEAWARDS AND RETURN AS LARGE SEA TROUT. UNFORTUNATELY, THERE ARE INDICATIONS THAT UNDERSIZED FISH ARE BEING TAKEN BY ANGLERS AND I SAW, IN DEEP FREEZE CABINETS AROUND THE ISLANDS, A NUMBER OF TROUT, VARYING FROM 4 TO 7 INCHES IN LENGTH, AWAITING HUMAN CONSUMPTION; THESE FISH SHOULD NEVER HAVE BEEN RETAINED. THE LAW IN ENGLAND IS RIGIDLY ENFORCED AGAINST THE TAKING OF UNDERSIZED FISH AND WATER BAILIFFS ARE VIGILANT IN PREVENTING THEIR RETENTION. IN THE FALKLANDS, AT PRESENT, THE FISHERIES CANNOT BE SO SUPERVISED AND THE FUTURE DEVELOPMENT OF THE FISHERIES MUST NECESSARILY DEPEND UPON THE VIGILANCE OF FISHERY OWNERS, CAMP MANAGERS AND SHEPHERDS. UNLESS STRICTER CONTROL IS EXERCISED AGAINST THE TAKING OF ALL SMALL TROUT, AN INCREASE IN THE STOCK OF SEA GOING TROUT MAY BE RETARDED.

I COULD NOT OBTAIN ANY FACTUAL INFORMATION AS TO THE ACTUAL TIMES WHEN THE FISH SPAWN IN THE RIVERS OF THE FALKLAND ISLANDS. AN EXAMINATION OF THE GONADS AND OVARIES INDICATED TO ME THAT MAY AND JUNE ARE THE MAIN SPAWNING MONTHS.

(c) PARASITISM

WITH THE EXCEPTION OF PARASITIZED FISH TAKEN FROM THE PEDRO AND CHARTRES RIVERS AND LORENZO POND, FISH FROM THE OTHER RIVERS WERE FREE OF INFESTATIONS. OUT OF A TOTAL OF 17 MIGRATORY AND NON-MIGRATORY TROUT TAKEN FROM A 200 YARD STRETCH OF THE CHARTRES RIVER, 11 - OR 64% - WERE FOUND TO BE PARASITIZED; OF A FURTHER 16 TROUT OBTAINED FROM THE CHARTRES RIVER, 7 WERE FOUND TO BE PARASITIZED, AND ALL 16 FISH WERE BURIED.

IN ALL THE PARASITIZED FISH, ONLY NEMATODES (ROUNDWORMS) WERE

FOUND. THESE WERE ENCYSTED IN THE MUSCULATURE, SURROUNDED BY A HAEMORRHAGIC ZONE MEASURING APPROXIMATELY 2.5 CMS. IN DIAMETER. THE PARASITES COULD EASILY BE TEASED OUT OF THE FLESH. SOME WORMS FROM THE CHARTRES RIVER, WHICH HAD BEEN PRESERVED IN FORMALIN FOR SOME CONSIDERABLE TIME, WERE GIVEN TO ME BY MR. J. PECK AND FOUND TO BE OF THE SAME GENUS AS THE WORMS TAKEN FROM THE FRESHLY CAUGHT FISH.

SPECIMENS OF THE WORMS WERE SENT TO THE PARASITIC WORMS SECTION OF THE BRITISH MUSEUM (NATURAL HISTORY), CROMWELL ROAD, LONDON, WHERE THEY WERE SEEN BY DR. M.T. HARRIS; I AM GREATLY INDEBTED TO HIM FOR HIS HELP. HE HAS IDENTIFIED THEM AS THE LARVAL STAGE OF PORROCAECUM SP., THE ADULTS OF WHICH MAY BE FOUND IN THE GUTS OF SEALS, WHALES AND PISCIVOROUS BIRDS. THE COMMONEST FORM AROUND THE COASTS OF THE BRITISH ISLES IS PROBABLY P. DECIPIENS (KRABBE, 1878), WHICH IS A PARASITE IN THE STOMACH OF SEALS.

THE LIFE CYCLE OF THE PARASITES INDICATES THAT PREDATION BY SEALS AND BIRDS ON MIGRATORY TROUT TAKES PLACE, ESPECIALLY ON THE CHARTRES AND PEDRO RIVERS. DURING MY VISITS TO THE RIVERS, SEALS WERE SEEN IN THE ESTUARIES ADJOINING SWAN INLET, MALO AND CHARTRES RIVERS. AT PRESENT, I CANNOT SEE HOW THE LIFE CYCLE OF THE PARASITES CAN BE BROKEN AND IT IS POSSIBLE THAT PARASITIZED TROUT WILL, ULTIMATELY, BE FOUND IN OTHER RIVERS OF THE FALKLANDS.

THOROUGH COOKING WILL DESTROY THE PARASITES BUT IT IS DOUBTFUL IF SMOKING OF FISH WILL HAVE THE SAME RESULT.



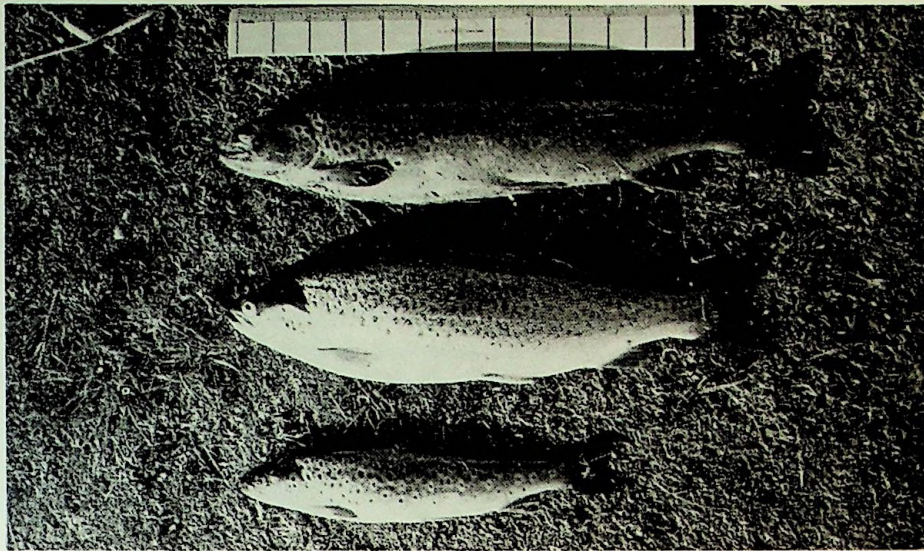


PLATE  
13

TROUT CAUGHT IN THE MURRELL BY ELECTRO FISHING



PLATE  
14

TROUT CAUGHT IN THE MALO BY ELECTRO FISHING

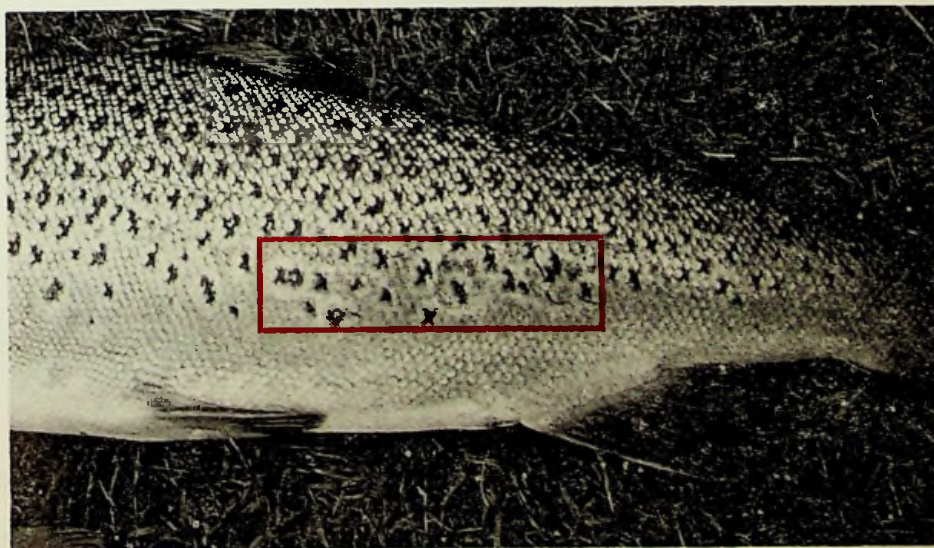


PLATE  
15

SCAR TISSUE ON 10 LBS. SEA TROUT ARISING FROM INJURY CAUSED  
BY SEALS OR OTHER PREDATORS

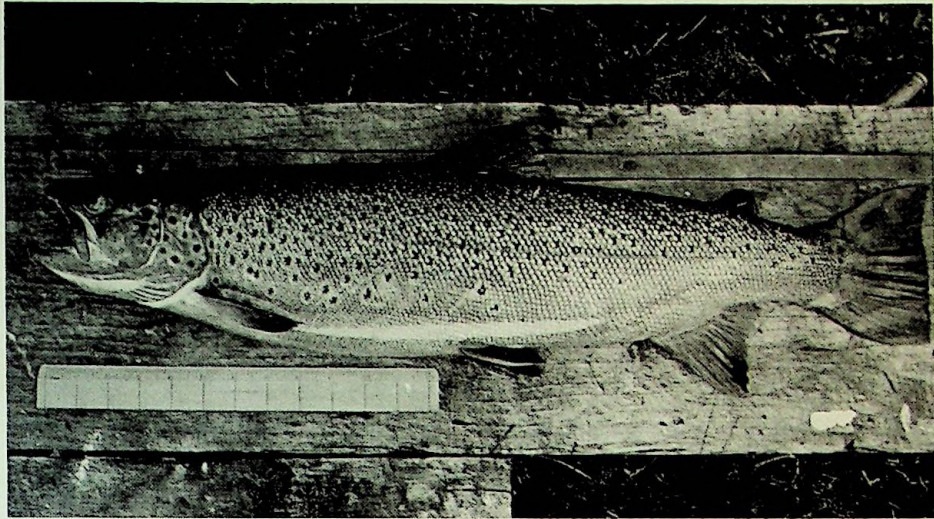


PLATE  
16

(REF.  
B35)

10 LBS. SEA TROUT FROM THE MALO RIVER

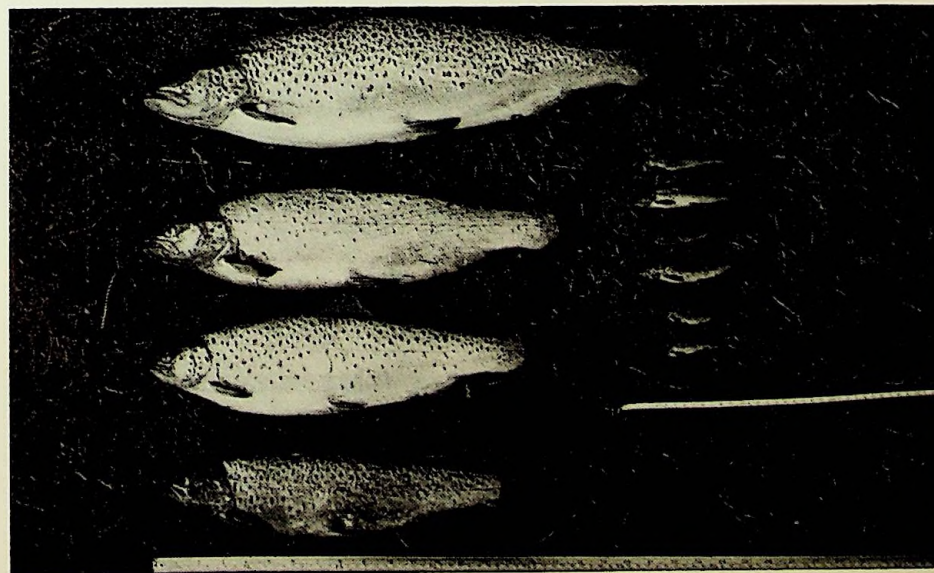


(REF.  
B31)

PLATE  
17

(REF.  
B32)

SEA TROUT, WEIGHING 10 & 8 LBS. RESPECTIVELY, FROM THE MALO RIVER



(REF.  
B34)

(REF.  
B33)

PLATE  
18

(REF.  
B30)

(REF.  
B41)

SEA TROUT CAUGHT IN THE CHARTRES RIVER BY ELECTRO FISHING

ERRATUM - CAPTION TO PLATE 18  
"CHARTRES" SHOULD READ "MALO"

## CHAPTER 6

### THE VALUE OF SCALE READING AS A MEANS OF DETERMINING GROWTH RATES AND AGES OF TROUT

THERE ARE A NUMBER OF METHODS BY WHICH THE AGES AND GROWTH RATES OF FISH CAN BE DETERMINED. IN THE CASE OF TROUT, THE MOST COMMON METHOD USED IS TO TAKE SCALES FROM THE FISH AND STUDY THE NUMBERS OF RINGS, OR BANDS, THAT APPEAR ON THEM AS THESE RINGS RELATE TO PERIODS OF GROWTH. WHERE THE FISH SCALES DO NOT GIVE A COMPLETE LIFE HISTORY, IT CAN BE OBTAINED FROM THE OTOLITH, A SMALL BONE LYING BEHIND THE EYES, OR FROM THE OPERCULUM, THE BONY STRUCTURE OF THE GILL COVER. ONLY IN ONE CASE WAS IT NECESSARY TO EXAMINE THE OTOLITH IN THE FALKLAND TROUT; THIS WAS A TROUT OBTAINED FROM THE KINGS BROOK ON THE DOUGLAS SETTLEMENT AND IS REFERRED TO LATER IN THIS CHAPTER.

DURING INITIAL STAGES OF GROWTH, THE FISH FRY (IMMATURE FISH) PRODUCE SCALE TISSUE ON THE BODY AND, WHEN IT IS COMPLETELY FORMED, IT IS PRESENT DURING THE LIFETIME OF THE FISH. FISH SCALES CONSIST OF:-

- (1) AN OUTER, CALCIFIED SECTION, WHICH IS IN CONTACT WITH WATER, AND
- (2) AN INNER, LESS CALCIFIED SECTION, EMBEDDED IN THE EPIDERMIS.

THE PARTS OF THE SCALE USED IN ASSESSING AGE AND GROWTH ARE:-

- (1) THE FOCUS, OR NUCLEUS, WHICH IS A SMALL CENTRAL ZONE LYING WITHIN THE AREA OF THE FIRST CIRCULAR RING, AND
- (2) FURTHER CONCENTRIC CIRCULAR RINGS, OFTEN REFERRED TO AS CIRCULI, WHICH APPEAR UPON THE ANTERIOR SECTION OF THE SCALE EMBEDDED IN THE EPIDERMIS.

THE NUCLEUS AND THE CIRCULI CAN BE SEEN IN PLATE 19.

WHEN FISH GROW RAPIDLY, THE CIRCULI ARE SPACED WIDELY APART BUT, WHEN GROWTH IS SLOW, THEY ARE CLOSER TOGETHER. THE NUMBERS OF THE RINGS AND THEIR GENERAL CONFIGURATION INDICATES THE AGE AND GROWTH PATTERNS OF THE FISH. DIFFERENCES IN THE WIDTHS OF THE SPACINGS BETWEEN THE RINGS DENOTE SEASONAL TIMES OF FEEDING; WIDE SPACINGS INDICATE THE PERIODS OF SUMMER GROWTH AND NARROW SPACINGS, WINTER GROWTH. WHEN FISH HAVE SPAWNED, THE PERIPHERY OF THE SCALE SOMETIMES ERODES TO LEAVE A SPAWNING

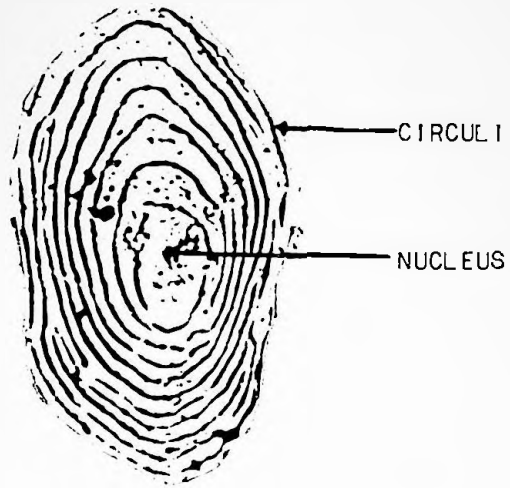


PLATE 19 (REF. A58)  
SCALE FROM 0+ TROUT

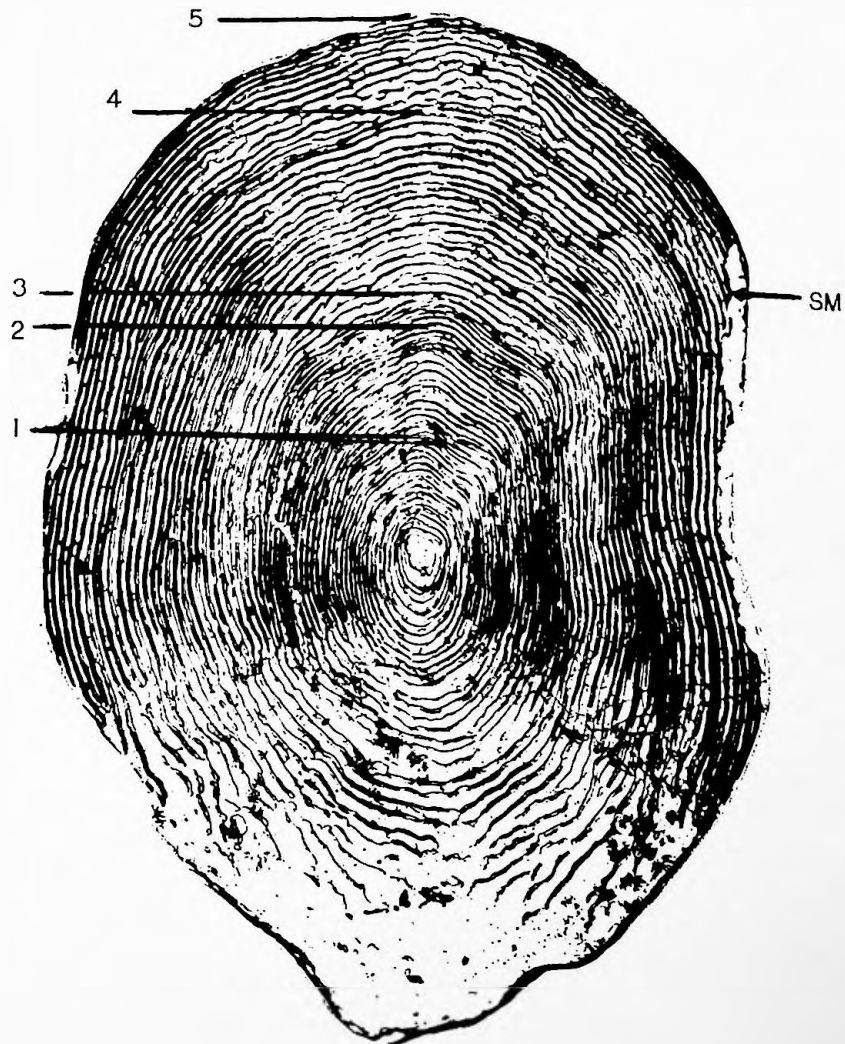


PLATE 20 (REF. A25a)  
SCALE FROM SEA TROUT  
? 3 YEARS RIVER LIFE + 2 YEARS SEA LIFE  
CAUGHT MALO 1961

MARK ON THE SCALE. THIS SCAR TISSUE, WHICH CAN BE SEEN IN PLATE 20, (SM), IS THE RESULT OF SOME PHYSIOLOGICAL CHANGE IN THE FISH WHICH IS PRODUCING A LARGE MASS OF OVA OR SPERM AT A TIME WHEN IT IS NOT TAKING NOURISHMENT.

WHEN THE ORIGINAL SCALES ON THE BODY OF AN IMMATURE FISH ARE LOST, EITHER AS A RESULT OF PREDATION BY OTHER FISH OR ANIMALS OR BECAUSE OF INJURY ASSOCIATED WITH EXTREMES IN RIVER FLOWS, REPLACEMENT SCALES WILL QUICKLY DEVELOP OVER THE EXPOSED TISSUE. THESE REGENERATED SCALES, HOWEVER, WILL NOT REPRODUCE THE ORIGINAL CENTRES FROM WHICH THE EARLY STAGES OF GROWTH CAN BE DETERMINED. PLATE 19 SHEWS A NORMAL SCALE TAKEN FROM AN IMMATURE TROUT AND PLATE 21 A REGENERATED SCALE FROM WHICH THE TRUE CENTRE IS MISSING.

DURING THE SURVEY, AND SUBSEQUENTLY, OVER 2,000 SCALES WERE REMOVED FROM 156 TROUT TO ASCERTAIN THEIR COMPLETE LIFE HISTORIES. THE NUMBERS OF SCALES TAKEN WERE FAR IN EXCESS OF THE NUMBERS NORMALLY REQUIRED FOR ANALYSIS BECAUSE A PRELIMINARY EXAMINATION REVEALED THAT 90% OF ALL THE SCALES HAD REGENERATED. FOR SOME UNKNOWN REASON, AN EXTREMELY LARGE NUMBER OF IMMATURE FISH IN THE FALKLAND ISLANDS' RIVERS SUSTAIN INJURY IN THEIR EARLY STAGES OF DEVELOPMENT. DETAILS OF ALL IMMATURE AND ADULT FISH EXAMINED ARE EMBODIED IN TABLE 9, WHICH CAN BE FOUND AT THE END OF THIS CHAPTER.

TO ELIMINATE ERROR IN DETERMINING THE LIFE HISTORIES OF THE TROUT, THE RINGS IN ALL THE SCALES WERE COUNTED TO FIND IF ANY CONSISTENT ANNUAL GROWTH PATTERN WAS PRESENT. THE AGE GROUPINGS OF THE FISH ARE SHEWN BELOW:-

FISH UP TO ONE YEAR OF AGE .....	0+ GROUP
FISH UP TO TWO YEARS OF AGE .....	1+ GROUP
FISH UP TO THREE YEARS OF AGE .....	2+ GROUP

THE RESULTS OF THE INVESTIGATIONS INTO THE NUMBERS OF RINGS ON

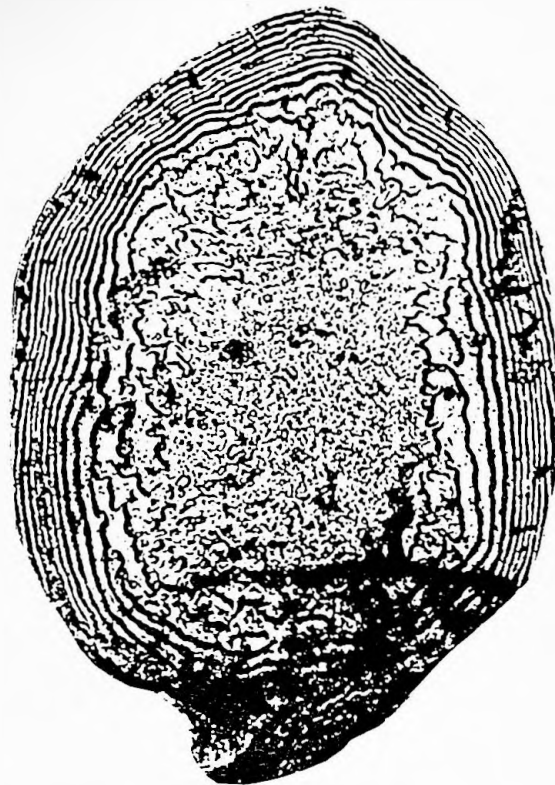


PLATE 21  
TYPICAL REGENERATED SCALE COMMON  
TO FISH IN ALL RIVERS



PLATE 22 (REF. B39)  
SCALE OF SLOB TROUT SHEWING REGULARLY  
SPACED FEEDING BANDS—3 YEARS RIVER LIFE,  
4+ YEARS SEA LIFE

THE SCALES ARE SHEWN IN TABLE 7, AND A TYPICAL SCALE FROM A 2 YEAR OLD FISH IS SHEWN IN PLATE 24.

TABLE 7

NUMBERS OF RINGS ON SCALES OF  
FALKLAND TROUT AT DIFFERENT AGES

YEAR OF GROWTH	DEFINITION	NUMBER OF CIRCULI ON SCALES	AVERAGE LENGTH OF FISH
ONE YEAR	0+	7 TO 11	2.75 INS. ( 7 CMS.)
TWO YEARS	1+	10 TO 16	5.2 INS. (13 " )
THREE YEARS	2+	10 TO 16	7.1 INS. (18 " )

THE LENGTHS OF THE FISH COMING WITHIN THE VARIOUS YEAR CLASSES HAVE BEEN ANALYSED AND THE AGE/LENGTH RELATIONSHIP OF ALL THE FISH CAN BE SEEN IN TABLE 8.

TABLE 8

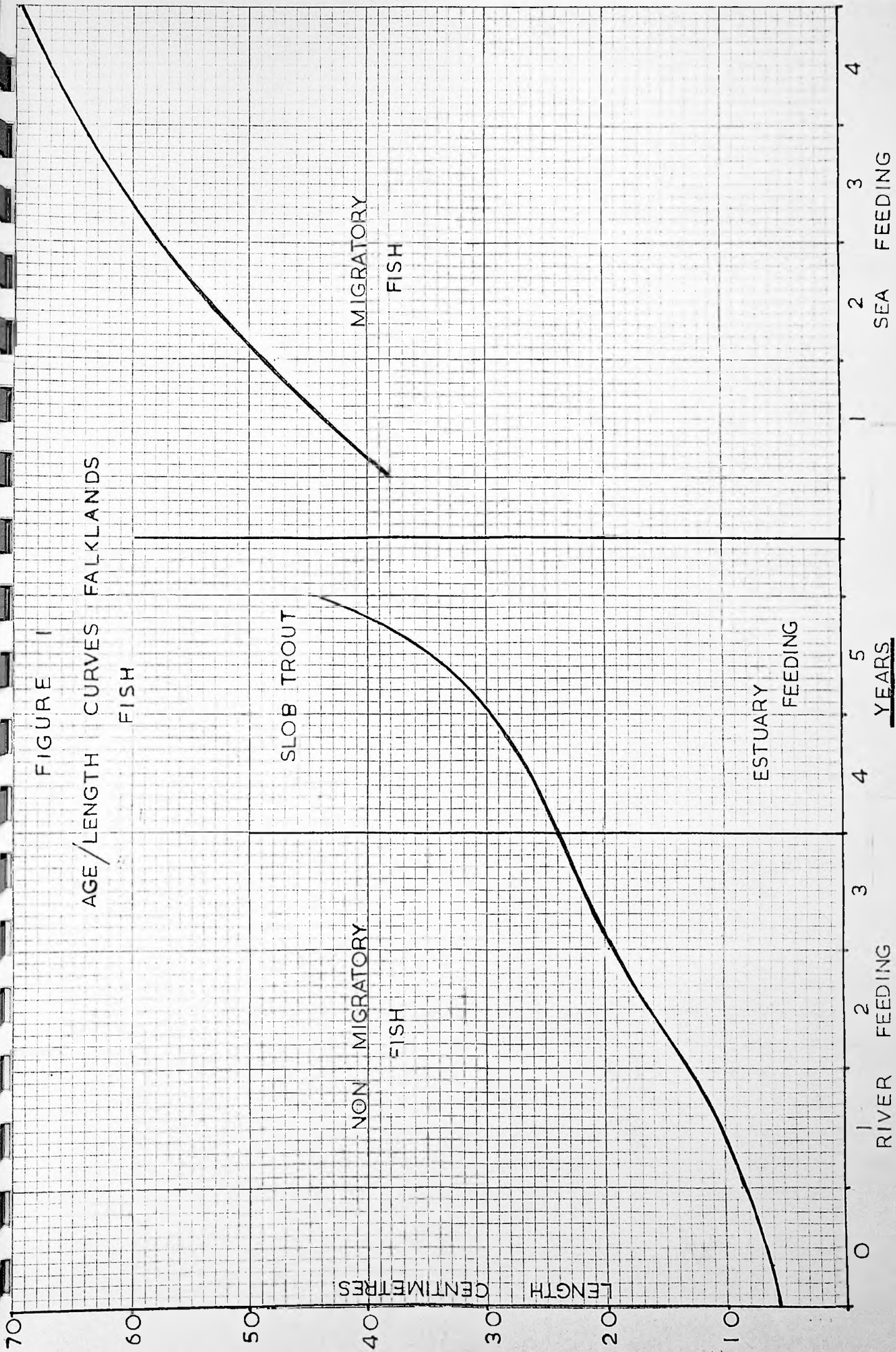
GROWTH OF TROUT IN THE FALKLAND ISLANDS

NON-MIGRATORY TROUT			MIGRATORY TROUT		
RIVER FEEDING	LENGTH IN CENTIMETRES		SEA FEEDING	LENGTH IN CENTIMETRES	
YEARS	MINIMUM	MAXIMUM	YEARS	MINIMUM	MAXIMUM
0+	5.8	8.2	1	37.5	48.0
1	8.5	14.7	2	37.0	67.0
2	12.2	22.8	3	55.0	66.0
3	16.5	25.0	4	-	73.0
4	20.5	30.5			
5	29.0	46.0			

NOTE: THE TOTAL AGES OF THE MIGRATORY FISH CAN BE OBTAINED BY THE ADDITION OF 3 YEARS TO THE AGES OF THE NON-MIGRATORY TROUT.

FROM TABLE 8, IT HAS BEEN POSSIBLE TO PRODUCE GROWTH CURVES FOR MIGRATORY AND NON-MIGRATORY FISH AND FOR SLOB TROUT AND THESE ARE GIVEN IN FIGURE 1 OVERLEAF.

FIGURE 1  
AGE / LENGTH CURVES FALKLANDS  
FISH





FROM FIGURE 1, IT IS POSSIBLE TO STATE THAT:-

(A) THE ACCELERATED FEEDING AND ASSOCIATED GROWTH DURING THE SEA LIFE OF THE FALKLAND ISLANDS' SEA TROUT IS COMPARABLE WITH THE GROWTH RATES OF SEA TROUT FEEDING IN THE SEA AROUND THE COASTLINE OF THE BRITISH ISLES;

(B) THE MAJORITY OF SEA TROUT IN THE FALKLAND ISLANDS MIGRATE SEAWARDS AT THREE YEARS OF AGE, AS OPPOSED TO TWO YEARS IN THE BRITISH ISLES;

(C) THE LENGTH OF THE TROUT IN THE FALKLAND ISLANDS AT TIME OF MIGRATION SEAWARDS IS SIMILAR TO THAT OF THE NON-MIGRATORY TROUT IN THE RIVERS OF THE ISLANDS;

(D) SLOB TROUT, WHICH DO NOT ATTAIN THE SAME LENGTH AS THE SEA TROUT RETURNING FROM THE SEA, FEED IN THE LOWER TIDAL PARTS OF THE RIVERS.

THE RESTRICTED FOOD SUPPLIES IN THE RIVERS IS LIKELY TO BE ONE OF THE REASONS FOR SLOB TROUT BEING FOUND IN THE ESTUARIES. ALL THE SCALES TAKEN FROM THESE ESTUARY-FEEDING FISH SHEWED A REGULAR INCREMENT IN FEEDING DURING THE SUMMER MONTHS AND THIS CONSTANT RATE OF GROWTH, AS SEEN IN PLATE 22, IS DUE, NO DOUBT, TO THE STABILITY OF THE FOOD SUPPLIES IN THE ESTUARIES. PLATE 20 SHEWS A TYPICAL SCALE FROM A SEA TROUT WHICH HAS FED IN OCEANIC WATER AND THE ACCELERATION IN GROWTH DUE TO THE FOOD RESOURCES IN THE SEA CAN BE CLEARLY SEEN. WHEN THE SCALE IN PLATE 22 IS COMPARED WITH THE SCALE IN PLATE 20, THE DIFFERENCES IN GROWTH BETWEEN SLOB TROUT AND SEA TROUT ARE OBVIOUS.

AN ANALYSIS OF ALL THE SCALE READINGS IN TABLE 9 SHEWS THAT MOST OF THE SEA TROUT MIGRATE SEAWARDS AT 3+ YEARS OF AGE, WITH A FAR LESSER NUMBER MIGRATING AT 2+ YEARS; THE RATIO OF MIGRATION BETWEEN THESE TWO GROUPS IS 6.725 TO 1. OF THE 156 SETS OF TROUT SCALES EXAMINED, 32 SETS CAME FROM FISH WHICH HAD MIGRATED OUT TO SEA, WHERE THEY FED FOR PERIODS VARYING FROM PARTS OF 1 YEAR UP TO 4 YEARS. THESE FISH WERE TRUE SEA TROUT AND NOT SLOB TROUT AND ARE LISTED IN TABLE 9 UNDER THE APPROPRIATE REFERENCES AS SHOWN IN PLATES 12, 16, 17 & 18. FIVE SEA TROUT, AGED BETWEEN 6 AND 8 YEARS AND WEIGHING BETWEEN

8 AND 10 LBS., OBTAINED FROM THE MALO RIVER, CAN BE SEEN IN THE PLATES.

MOST OF THE SCALES TAKEN FROM THE RIVER FEEDING FISH HAD NO CLEARLY DEFINED WINTER BANDS, THE LACK OF WHICH IS ATTRIBUTABLE TO A SHORTAGE OF FOOD IN THE RIVERS DURING THE WINTER MONTHS OR TO LOW RIVER TEMPERATURES. THE SCALE SHOWN IN PLATE 23 ILLUSTRATES THIS POINT. THE ABSENCE OF THE WINTER BAND IS SOMEWHAT UNIQUE ALTHOUGH IT HAS BEEN KNOWN TO OCCUR IN A FEW INSTANCES IN FISH IN SOME WATERS IN THE BRITISH ISLES.

MY ANALYSES OF THE SCALES CORRESPOND CLOSELY WITH THE FINDINGS OF DR. MARGARET BROWN, BIOLOGIST TO THE SALMON AND TROUT ASSOCIATION IN THE UNITED KINGDOM, WHO ANALYSED 9 SETS OF SCALES IN 1960, AND WITH THOSE OF MR. W.G. HARTLEY, OF THE MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, LONDON, WHO REPORTED ON SEVERAL SETS OF SCALES AT VARIOUS TIMES.

DURING THE SURVEY, ONLY ONE LARGE BROWN TROUT, MEASURING 19 INCHES IN LENGTH AND WEIGHING 2 LBS., WAS CAPTURED. THIS CAME FROM THE KINGS BROOK ON THE DOUGLAS SETTLEMENT. THE FISH HAD ESTABLISHED A TERRITORY IN A POOL 2 FEET 6 INCHES DEEP IN A STREAM 5 FEET WIDE. ONE HUNDRED YARDS UPSTREAM OF THE POOL, 20 SMALL TROUT, MEASURING BETWEEN  $2\frac{1}{4}$  AND  $2\frac{3}{4}$  INCHES IN LENGTH, WERE CAPTURED AND IT IS LIKELY THAT THE LARGE TROUT WOULD HAVE PREDATED ON THE SMALLER FISH AS THEY MOVED DOWNSTREAM THROUGH THE POOL, ALTHOUGH NO TROUT REMAINS WERE FOUND IN ITS STOMACH OR GUT. SCALES WITH COMPLETE CENTRES COULD NOT BE FOUND ON THIS FISH BUT AN EXAMINATION OF THE OTOLITH SHEWED THAT IT WAS OVER 7 YEARS OF AGE.

IF FISH STOCKS ARE TO DEVELOP STILL FURTHER IN THE FALKLAND ISLANDS, IT IS IMPORTANT THAT COMPLETE AND ACCURATE RECORDS OF FISH CAUGHT EACH SEASON BE KEPT. FISH SHOULD BE MEASURED, WEIGHED AND SEXED AND SCALES REMOVED FROM A POINT MIDWAY BETWEEN THE HEAD AND THE FRONT OF THE DORSAL FIN (SEE BELOW). IF THE SCALES COULD NOT BE "READ" IN THE ISLANDS, ARRANGEMENTS MIGHT BE MADE FOR THIS TO BE DONE IN ENGLAND.





PLATE 23 (REF. B58)  
SCALE FROM BROWN TROUT WITH NO  
CLEARLY DEFINED WINTER BANDS



PLATE 24 (REF. A50)  
SCALE FROM TWO YEARS OLD  
BROWN TROUT (X 60)  
9 CIRCULI IN FIRST YEAR,  
15 IN SECOND YEAR

TABLE 9

ANALYSIS OF SCALES  
REMOVED FROM FALKLAND TROUT

RIVER	CODE	FISH		SEX	AGE IN YEARS
		LENGTHS CENTIMETRES	& WEIGHTS GRAMMES		
PEDRO	A 1	21.9	73.69	M	2+
"	A 2	10.0	9.34	F	1+
"	A 3	22.8	106.0	M	2+
CHARTRES	A 4	17.0	52.0	F	2+
"	A 5	25.0	127.0	F	3+
"	A 6	12.2	24.0	F	CC
"	A 6A	9.0	9.0	M	CC
"	A 6B	12.0	23.0	F	2+
"	A 6C	13.8	36.0	F	2+
"	A 6D	14.0	NW	M	CC
"	A 6E	9.0	NW	NS	CC
"	A 7	13.5	23.0	M	2+
MURRELL	A 8	15.0	35.5	M	2+
"	A 8A	16.0	36.2	F	2+
"	A 9	15.5	35.4	F	2+
"	A 9A	13.8	23.5	F	FISH DAMAGED
"	A 10	13.2	23.7	F	2+
"	A 11	12.2	21.3	F	2+
"	A 12	12.5	21.8	M	2+
"	A 13	10.0	8.2	F	1+
"	A 14	8.5	6.2	NS	1+
"	A 14A	15.2	34.2	F	2+
FRYING PAN	A 15	12.0	14.0	F	1+
"	A 16	12.0	13.9	F	1+
"	A 17	12.0	16.5	F	1+
"	A 18	10.2	11.4	M	1+
"	A 19	18.0	54.9	M	2+
"	A 19A	17.0	51.2	F	2+
"	A 20	13.4	20.5	M	2+
"	A 21	13.2	23.1	F	2+
"	A 22	13.5	23.1	F	2+
"	A 23	11.5	18.9	M	1+
"	A 24	10.0	10.6	F	1+
KINGS BROOK	A 25	10.2	9.1	F	1+
"	A 26	10.9	12.7	NS	1+
"	A 27	11.0	13.4	M	1+
"	A 28	10.5	11.4	M	1+
"	A 29	10.0	8.8	F	1+
"	A 30	10.2	10.3	F	1+
"	A 31	9.0	8.1	NS	1+
"	A 32	7.3	4.3	NS	0+

M = MALE; F = FEMALE; NS = NOT SEXED; NW = NOT WEIGHED  
CC = CLEAR CENTRE IN SCALE (NOT AGED)

/CONTINUED

TABLE 9 (CONTINUED)

RIVER	CODE	FISH LENGTHS & WEIGHTS		SEX	AGE IN YEARS
		CENTIMETRES	GRAMMES		
KINGS BROOK (CONT.)	A33	7.3	4.5	NS	0+
" "	A34	6.8	3.4	NS	0+
" "	A35	6.4	3.6	NS	0+
MALO	A36	6.2	2.3	NS	0+
" "	A37	6.7	3.4	NS	0+
" "	A38	6.8	3.5	NS	0+
" "	A39	6.9	3.5	NS	0+
" "	A40	6.7	2.9	NS	0+
" "	A41	5.8	2.0	NS	0+
" "	A42	6.3	2.1	NS	0+
" "	A43	6.3	2.7	NS	0+
" "	A44	6.0	2.4	NS	0+
" "	A45	6.0	2.7	NS	0+
" "	A46	6.0	1.8	NS	0+
" "	A46A	65.0	4530.0	M	3 : 2+
" "	A46B	36.0	658.0	F	3 : 3+
" "	A46C	44.0	1380.6	F	3 : 1+
" "	A46D	39.0	788.2	F	3 : 1+
" "	A46E	49.0	1685.6	F	CC
" "	A46F	47.0	1546.1	M	3 : 1+
" "	A46G	58.0	2765.4	F	3 : 3+
" "	A47	13.7	25.4	F	1+
" "	A48	14.3	25.9	M	1+
" "	A49	13.8	26.2	F	1+
" "	A50	13.5	24.0	F	1+
" "	A51	12.8	17.9	M	1+
" "	A52	12.3	17.0	M	1+
SWAN INLET	A53	12.7	19.0	F	1+
" "	A54	14.7	26.5	F	1+
" "	A55	19.0	61.8	F	2+
" "	A56	7.4	5.0	NS	0+
" "	A57	8.2	7.9	NS	0+
" "	A58	6.4	3.0	NS	0+
" "	A59	7.2	4.2	NS	0+
" "	A60	6.8	4.0	NS	0+
" "	A61	13.8	22.6	F	1+
" "	A62	17.5	41.2	M	2+
" "	A63	40.5	711.1	M	3 : 2+
" "	A64	38.0	708.5	F	5+
KINGS BROOK	A65	47.5	1883.0	M	7+*
" "	A66	33.0	606.0	F	5+
" "	A67	29.0	421.0	F	4+
" "	A68	28.0	403.0	F	4+

\* FROM OTOLITH EXAMINATION

M = MALE; F = FEMALE; NS = NOT SEXED;  
 CC = CLEAR CENTRE IN SCALE (NOT AGED);  
 3 : 2+ = 3 YEARS RIVER LIFE AND 2+ YEARS SEA LIFE

/CONTINUED

TABLE 9 (CONTINUED)

RIVER	CODE	FISH		SEX	AGE IN YEARS
		LENGTHS CENTIMETRES	& WEIGHTS GRAMMES		
CHARTRES	B 1	45.0	1160.0	F	3 : 2+
"	B 2	40.0	811.0	F	3 : 1+
"	B 3	37.0	840.0	F	2+ : 2+
"	B 4	34.0	672.6	F	3 : 2SM+
"	B 5	41.0	821.4	F	CC : 2+
"	B 6	46.0	1265.2	F	3 : 2+
"	B 7	58.0	1396.4	M	2+ : 3+
"	B 8	43.0	1090.0	F	2+ : 2+
SAN CARLOS	B 9	23.0	NW	M	CC
SWAN INLET	B10	55.0	1830.7	F	3 : 3
" "	B11	27.0	NW	M	4
WARRAH	B12	23.0	NW	M	CC
"	B13	25.5	NW	F	CC
"	B14	23.5	NW	F	CC
"	B15	23.5	NW	F	4
"	B16	23.5	NW	F	4
"	B17	23.5	NW	M	4
"	B18	23.5	NW	M	CC
MURRELL	B19	65.0	3160.4	F	3 : 3+
"	B20	51.5	1596.3	F	3 : 2+
"	B21	46.0	1241.9	F	2+ : 2+
"	B22	43.0	920.1	M	3 : SM+
"	B23	14.0	NW	F	2+
"	B24	13.5	NW	F	2+
"	B25	13.0	NW	M	2+
"	B26	12.5	NW	M	2+
"	B27	10.0	NW	M	1+
"	B28	9.0	NW	NS	1+
MALO	B29	25.0	NW	F	4
"	B30	48.0	1626.4	F	3 : 1+
"	B31	68.5	4600.0	M	3 : 2SM+SM+
"	B32	66.0	3496.7	F	3 : 3+
"	B33	58.0	2650.8	F	3 : 3+
"	B34	57.0	2812.4	F	3 : 2+
"	B35	67.0	4570.3	M	3 : 2+
"	B36	30.5	NW	M	4
"	B37	40.0	560.8	F	3 : 0+
"	B38	36.0	583.1	F	3 : 0+
"	B39	73.0	4103.6	F	3 : 4+
"	B40	37.5	960.2	F	3 : 1+
"	B41	38.0	809.3	F	3 : 1+
SWAN INLET	B42	22.0	NW	M	4
" "	B43	29.0	NW	F	5?
" "	B44	31.0	550.0	F	5?

M = MALE; F = FEMALE; NS = NOT SEXED; NW = NOT WEIGHED /CONTINUED  
 CC = CLEAR CENTRE IN SCALE (NOT AGED); SM = SPAWNING MARK  
 3 : 2+ = 3 YEARS RIVER LIFE AND 2+ YEARS SEA LIFE

TABLE 9 (CONTINUED)

RIVER	CODE	FISH		SEX	AGE IN YEARS
		LENGTHS CENTIMETRES	& WEIGHTS GRAMMES		
SWAN INLET (CONT.)	B45	34.0	607.0	F	5
" "	B46	25.0	NW	M	4
" "	B47	20.0	NW	F	3
" "	B48	22.0	NW	F	4
" "	B49	37.0	542.1	M	5
" "	B50	49.0	1304.6	F	6
" "	B51	22.0	NW	F	3
" "	B52	25.0	NW	F	3
FRYING PAN (PEAK)	B53	37.0	794.5	F	5
" " "	B54	43.0	982.1	M	5
" " "	B55	37.0	920.1	M	5+
MALO	B56*	NM	5200.0	NS	4
" "	B57*	NM	4360.0	NS	4
PEDRO	B58	20.5	NW	F	4
" "	B59	16.5	NW	F	3
" "	B60	28.0	NW	M	3
" "	B61	28.0	NW	M	CC
" "	B62	20.0	NW	M	3
" "	B63	24.0	NW	F	4
" "	B64	24.0	NW	F	4
" "	B65	20.5	NW	M	3
SAN CARLOS	B66	20.5	NW	M	3
" "	B67	20.0	NW	F	3
" "	B68	23.0	NW	M	3
" "	B69	22.0	NW	M	3
" "	B70	50.0	1322.7	F	3 : 3
" "	B71	30.0	826.3	M	5
" "	B72	43.0	1174.6	F	5
" "	B73	46.0	690.2	M	5
" "	B74	22.0	NW	M	3

\* B56 AND B57 = ELEGINUS FALKLANDICUS

M. = MALE; F = FEMALE; NS = NOT SEXED; NW = NOT WEIGHED  
 CC = CLEAR CENTRE IN SCALE (NOT AGED); NM = NOT MEASURED  
 3 : 3 = 3 YEARS RIVER LIFE AND 3 YEARS SEA LIFE

#### NOTES

1. THE PREFIX "A" REFERS TO FISH SCALES REMOVED FROM COMPLETE FISH BROUGHT BACK TO ENGLAND; THE PREFIX "B" REFERS TO FISH SCALES REMOVED FROM FISH IN THE FALKLAND ISLANDS.

2. PLEASE SEE NOTE 2, PAGE 37, FOR AN EXPLANATION OF THE WEIGHTS OF FISH WITH THE PREFIX "A". THE WEIGHTS OF FISH WITH THE PREFIX "B" ARE THOSE WHICH APPLIED AT THE TIME OF CAPTURE WITH ALL THE ORGANS IN SITU.

## SECTION 3 - SALMON IN THE FALKLAND ISLANDS

### CHAPTER 7

#### INTRODUCTION OF SALMON INTO THE SOUTHERN HEMISPHERE

BEFORE EXAMINING THE MANY PROBLEMS ATTENDANT UPON THE INTRODUCTION OF SALMON INTO RIVERS IN THE SOUTHERN HEMISPHERE AND THE DIFFICULTIES OF DEVELOPING STOCKS OF SEA-GOING SALMON IN THOSE RIVERS, IT MAY BE HELPFUL TO GIVE A FEW BRIEF DETAILS OF THE ATLANTIC AND PACIFIC SALMON SPECIES.

#### (1) ATLANTIC SALMON

THERE IS ONLY ONE SPECIES OF ATLANTIC SALMON - SALMO SALAR SALMONIDAE. IT IS FOUND ON BOTH SIDES OF THE ATLANTIC AND IS PRESENT, IN VARYING INTENSITIES, IN THE NETHERLANDS, FRANCE, NORTHERN SPAIN, PORTUGAL, GERMANY, THE BRITISH ISLES, THE BALTIC, SCANDINAVIA, ICELAND, GREENLAND AND FROM LABRADOR IN CANADA TO MASSACHUSETTS IN THE UNITED STATES OF AMERICA.

MIGRATORY SALMON (AS OPPOSED TO LAND-LOCKED SALMON) ASCEND THE HEADWATERS OF RIVERS DURING OCTOBER AND NOVEMBER TO SPAWN AND THEIR OFFSPRING GO TO SEA AFTER THEY HAVE FED IN THE RIVERS FOR ABOUT 2 YEARS. THEY RETURN TO THE RIVERS AFTER 2 TO 3 YEARS WHEN THEY WEIGH BETWEEN 7 AND 10 LBS.

THIS SPECIES IS NOT PRESENT IN THE SOUTHERN HEMISPHERE AND ATTEMPTS TO INTRODUCE IT INTO AUSTRALIA AND NEW ZEALAND HAVE FAILED. THERE IS NO EVIDENCE TO SHEW THAT THE EFFORTS MADE TO INTRODUCE AND ESTABLISH ATLANTIC SALMON IN THE FALKLAND ISLANDS HAVE BEEN SUCCESSFUL ALTHOUGH THE STREAMS AND RIVERS, IN CERTAIN AREAS OF THE ISLANDS, ARE SUITABLE FOR THEIR DEVELOPMENT.

#### (2) PACIFIC SALMON

THERE ARE 6 SPECIES OF PACIFIC SALMON WHICH MIGRATE AND FULL INFORMATION CONCERNING THEIR LIFE CYCLES CAN READILY BE FOUND IN PUBLISHED LITERATURE AND ESPECIALLY IN THE BOOK "THE SALMON" BY DR. J.W. JONES, FROM WHICH TABLE 10 HAS BEEN COMPILED.



TABLE 10  
PACIFIC SALMON SPECIES

SPECIES	COMMON NAME	DISTRIBUTION
1. ONCORHYNCHUS MASOU	MASOU	JAPAN, FAIRLY ABUNDANT IN STREAMS OF HOKKAIDO
2. O. KISUTCH	COHO OR SILVER	FROM JAPAN TO ALASKA AND SOUTH TO MONTEREY BAY, CALIFORNIA, NOW ESTABLISHED IN MAINE.
3. O. KETA	DOG OR CHUM	FROM KAMCHATKA TO ALASKA AND SOUTH TO SAN FRANCISCO, CALIFORNIA.
4. O. TSCHAWYTSCHA	SPRING, KING, QUINNAT, SACRAMENTO, COLUMBIA RIVER, TYEE OR CHINOOK	FROM NORTHERN CHINA TO ALASKA AND SOUTH TO VENTURA RIVER, SOUTHERN CALIFORNIA. INTRODUCED BUT NOT ESTABLISHED IN MAINE.
5. O. NERKA	SOCKEYE, RED OR BLUEBACK	JAPAN TO ALASKA AND SOUTH TO KLAMATH RIVER, CALIFORNIA. INTRODUCED INTO SEVERAL STATES, INCLUDING MAINE.
6. O. GORBUSCHA	PINK OR HUMPBACK	NORTHERN JAPAN TO ALASKA AND SOUTH TO LA JOLLA, CALIFORNIA

BRIEFLY, THEIR LIFE HISTORIES ARE AS FOLLOWS:-

1. MASOU SALMON SPAWN IN THE RIVERS LATE IN THE YEAR, SOME IN THE HEADWATERS AND SOME NEAR TO TIDAL WATER. THE YOUNG GO TO SEA SOON AFTER HATCHING AND, AFTER ABOUT 4 YEARS' SEA FEEDING, WEIGH APPROXIMATELY 12 LBS.
2. COHO SALMON SPAWN IN SMALL RIVERS A SHORT DISTANCE FROM THE SEA, WITH THE MAJORITY OF THE OFFSPRING REMAINING IN THE RIVERS FOR ONE YEAR BEFORE MIGRATING OUT TO SEA. THEY RETURN AFTER 2 TO 3 YEARS AS ADULT FISH, WEIGHING FROM 6 TO 14 LBS.

3. CHUM SALMON ARE LATE RUNNING FISH, ENTERING THE RIVERS IN AUTUMN. AS WITH COHO, CHUM SALMON SPAWN IN THE VICINITY OF TIDAL WATER. THE YOUNG GO TO SEA SOON AFTER HATCHING AND REACH MATURITY AFTER APPROXIMATELY 4 YEARS' SEA FEEDING, WHEN THEY WEIGH FROM 8 TO 15 LBS.
4. QUINNAT OR CHINOOK SALMON SPAWN IN LATE SPRING OR EARLY SUMMER AND THEIR OFFSPRING GO TO SEA DURING THE FIRST YEAR OF THEIR LIFE. THEY DEVELOP RAPIDLY IN THE SEA AND, AFTER 3 TO 8 YEARS' SEA FEEDING, CAN VARY IN WEIGHT FROM 10 TO 40 LBS.
5. SOCKEYE SALMON SPAWN IN HEADWATER STREAMS WHICH ENTER LAKES AS FAR AWAY AS 2,000 MILES FROM THE SEA. THE YOUNG DESCEND INTO THE LAKES TO FEED AND REMAIN FOR ONE YEAR BEFORE MIGRATING SEAWARDS. MATURITY IS REACHED IN 5 TO 6 YEARS WHEN THEY WEIGH ABOUT 8 LBS.
6. HUMPBACK SALMON SPAWN NEAR TO TIDAL WATER; THE FRY GO TO SEA AND ATTAIN MATURITY IN TWO YEARS AT WHICH TIME THEY WEIGH ABOUT 3-5 LBS.

UNLIKE THE ATLANTIC SALMON, A FEW OF WHICH SURVIVE TO SPAWN A SECOND OR THIRD TIME, ALL PACIFIC SALMON DIE AFTER SPAWNING.

DUE PARTLY TO THEIR COMMERCIAL VALUE, MANY ATTEMPTS HAVE BEEN MADE TO INTRODUCE PACIFIC SALMON TO FOREIGN WATERS, INCLUDING THOSE OF THE EASTERN UNITED STATES OF AMERICA, EASTERN CANADA, FRANCE, GERMANY, RUSSIA, ITALY, FINLAND, CHILE, ARGENTINA, NEW ZEALAND AND HAWAII. ON THE NORTH AMERICAN CONTINENT, SOME SUCCESS HAS BEEN ACHIEVED IN DEVELOPING SEA GOING POPULATIONS IN MAINE, NEW BRUNSWICK AND ONTARIO AND IT IS UNDERSTOOD THAT THERE HAVE BEEN OTHER, MINOR, SUCCESSES IN CHILE AND NEW ZEALAND. IN NEW ZEALAND, CHINOOK SALMON HAVE DEVELOPED IN THE RIVER WAITAKE AND, FROM THIS RIVER, IT IS BELIEVED THAT THEY HAVE NOW SPREAD TO OTHER RIVERS OF THE SOUTH ISLAND. (I HAVE BEEN IN TOUCH WITH THE NEW ZEALAND GOVERNMENT TO OBTAIN FACTUAL INFORMATION CONCERNING THE DEGREE OF SUCCESS OF THIS EXPERIMENT AND AM STILL AWAITING DETAILS.)

THE VARYING DEGREES OF SUCCESS IN INTRODUCING PACIFIC SALMON INTO VARIOUS COUNTRIES ARE THOUGHT TO DEPEND UPON THE TEMPERATURE AND SALINITY TOLERANCES OF THE WATER WHICH FALL WITHIN THE RANGES ENCOUNTERED BY THE

FISH IN THEIR NATIVE WATERS. APART FROM THE PROBABLE MINOR SUCCESS IN NEW ZEALAND, THERE ARE STILL NO PACIFIC SALMON IN THE SOUTHERN HEMISPHERE.

#### INTRODUCTION OF SALMON INTO THE FALKLAND ISLANDS

AS CAN BE SEEN FROM THE CHAPTER ON FISH SPECIES IN THE RIVERS OF THE FALKLAND ISLANDS, SOME 80,000 VIABLE EGGS FROM ATLANTIC SALMON WERE PLANTED OUT IN VARIOUS RIVERS THROUGHOUT THE ISLANDS. HAD ANY OF THE OVA IMPLANTED FROM 1960 TO 1964 SURVIVED TO REACH THE SMOLT STAGE, MIGRATION TO SEA WOULD HAVE TAKEN PLACE AFTER 2-3 YEARS OF RIVER FEEDING. THUS, FISH HATCHED FROM OVA PLANTED OUT IN 1964 WOULD HAVE MIGRATED OUT TO SEA IN 1967; IF THEY HAD FED FOR 4+ YEARS IN THE SEA (THE LONGEST PERIOD OF SEA FEEDING FOUND IN THE LARGER OF THE SEA TROUT TAKEN FROM THE ISLANDS' RIVERS), THEY WOULD HAVE RETURNED AS ADULT SALMON IN 1972.

AFTER CAREFUL EXAMINATION OF THE FISH CAUGHT AND SEEN IN THE RIVERS DURING MY INVESTIGATIONS, I FOUND NO EVIDENCE TO SHEW THAT THE ATLANTIC SALMON HAS ESTABLISHED IN ANY OF THE RIVERS AND THE LOCAL THEORY THAT THIS SPECIES IS PRESENT CANNOT BE SUBSTANTIATED. (A MOST UNUSUAL SCALE WAS REMOVED FROM A FISH, POSSIBLY A HYBRID, CAUGHT BY H.E. THE GOVERNOR ON THE MALO RIVER AND THIS PARTICULAR FISH IS DISCUSSED IN APPENDIX 2.)

BROWN TROUT AND SEA TROUT ARE NOW PRESENT IN THE RIVERS AND, WHILST THE FOOD SUPPLIES ARE NOT PROLIFIC, THEY DO SUPPORT SALMONIDS. GRAVEL IN THE RIVERS, ALTHOUGH COMPACTED, IS OF A SIZE SUITABLE FOR TROUT SPAWNING AND, ALTHOUGH THE SUITABLE SALMON SPAWNING AREAS ARE RESTRICTED IN AREA, THERE ARE LOCALISED ZONES WHERE THEY COULD SPAWN AND PRODUCE OFFSPRING. JUDGING FROM THE WAY THE SEA TROUT DEVELOP AFTER FEEDING IN THE SEA, THERE IS NO LACK OF FOOD POTENTIAL FOR SALMON IN THE SEA OFF THE FALKLAND ISLANDS. IN VIEW OF THESE FACTORS FAVOURABLE TO THE ESTABLISHMENT OF THE SPECIES, WHY ARE THERE NO ATLANTIC SALMON IN THE ISLANDS? FURTHER, WHY ARE THERE NO MIGRATING ATLANTIC SALMON PRESENT IN THE SOUTHERN HEMISPHERE?

RESEARCH IS STILL BEING CARRIED OUT BY MANY FISHERY BIOLOGISTS INTO THE "HOMING" INSTINCT OF SALMON AND THE METHODS WHEREBY THEY RETURN TO THEIR NATAL STREAMS AND MANY THEORIES HAVE BEEN PROPOUNDED AND MUCH CONTROVERSY ENGENDERED CONCERNING THEIR MIGRATION HABITS AND SWIMMING CAPABILITIES. POSTULATIONS ABOUT THEIR JOURNEYS TO AND FROM THE OCEANIC FEEDING GROUNDS EMBRACE SUCH FACTORS AS NAVIGATION BY THE SUN, MAGNETIC INFLUENCES, WATER VELOCITIES, WIND DRIFT AND GYRALS IN THE SEA. I HAVE GIVEN MUCH THOUGHT TO THE REASONS WHY SALMON HAVE NOT ESTABLISHED IN THE FALKLAND ISLANDS AND SUGGEST THAT A STUDY OF MAP 2 MAY GIVE A LEAD TO ONE OF THE REASONS.

THE SECTIONS MARKED IN RED ON THE MAP ARE THE COASTLINES WHERE ATLANTIC AND PACIFIC SALMON ARE NOW TO BE FOUND; THAT PART COLOURED BLUE SHEWS THE MAIN HABITATS FOR SEA-FEEDING SALMON, COD, HERRINGS, HAKE AND FLAT FISH. IT IS IN THESE AREAS THAT FOOD IS AVAILABLE IN QUANTITY FOR SALMON AND OTHER FISH. THE ARROWS ON THE MAP GIVE A GENERAL OUTLINE OF THE MOVEMENTS OF THE VARIOUS OCEANIC "DRIFTS" AS THEY OCCUR IN THE NORTHERN AND SOUTHERN HEMISPHERES, THE MOST IMPORTANT BEING THOSE PRODUCED BY PERMANENT OR PREDOMINANT WINDS.

IT HAS BEEN KNOWN FOR SOME CONSIDERABLE TIME THAT SOME FISH AND THE LARVAE OF CERTAIN SPECIES CAN AND DO DRIFT PASSIVELY FROM ONE LAND MASS TO ANOTHER. I THINK THAT SALMON MAY BEHAVE SIMILARLY IN THEIR MIGRATION TO AND FROM THEIR NATAL RIVER. MOST CURRENTS IN THE SEA ARE GYRATIONAL BY NATURE AND IT MAY BE POSTULATED THAT A MIGRATING SALMON ENTERING A GYRAL WILL EVENTUALLY RETURN TO THE POINT AT WHICH IT ENTERED. IT WOULD BE EXTREMELY DIFFICULT TO PROVE THIS HYPOTHESIS AND, UNTIL MORE IS KNOWN, THE THEORY SHOULD BE TREATED WITH CAUTION. IF CORRECT, THE SUCCESSES IN THE INTRODUCTION OF CHINOOK SALMON INTO CALIFORNIAN AND JAPANESE WATERS MAY BE DUE, IN PART, TO THE GYRALS ROTATING IN THE NORTH PACIFIC, THE ALASKAN AND CALIFORNIAN DRIFTS.

BY STUDYING THE GYRALS BROADLY INDICATED IN MAP 2, IT WILL BE SEEN THAT NEAR THE FALKLAND ISLANDS, WHERE THE WIND IS PERMANENT, THE GYRALS ARE MOVING TOWARDS THE AGULHAS AND BENGAL CURRENTS, TO MEET UP WITH THE SOUTH EQUATORIAL AND BRAZILIAN CURRENTS. THUS, ASSUMING THE



PASSIVE DRIFT HYPOTHESIS TO BE REASONABLE, SALMON LEAVING THE FALKLAND ISLANDS' RIVERS WOULD BE CARRIED INTO A WATER TEMPERATURE ( $25^{\circ}$  CENT.) WHICH COULD BE LETHAL TO THEM. ALTERNATIVELY, IF THEY ENTERED THE WEST WIND DRIFT, THEY WOULD MOST LIKELY PASS THE SOUTHERNMOST POINT OF NEW ZEALAND BETWEEN  $50^{\circ}$  AND  $60^{\circ}$  S., SEVERAL THOUSAND MILES FROM THE FALKLANDS. EVEN IF THEY ENTERED ONE OF THE TWO GYRALS OFF ANTARTICA (AS SHEWN BETWEEN  $60^{\circ}$  E. AND  $68^{\circ}$  W.), THEY COULD LOSE THEIR ORIENTATION TO THE FALKLAND ISLANDS BECAUSE THERE IS NO RETURN CURRENT. IT MAY WELL BE THAT THE ABSENCE OF SUITABLE GYRALS NEAR THE FALKLANDS IS A REASON FOR SALMON NOT BEING PRESENT.

TO UNDERSTAND FULLY THE IMPLICATIONS OF THIS THEORY, IT SHOULD BE UNDERSTOOD THAT SEA TROUT BEHAVIOUR IN THE SEA IS DIFFERENT FROM THAT OF SALMON, FOR WHERE THE FORMER TRAVEL TO FEEDING GROUNDS IN COASTAL REGIONS NOT FAR FROM THEIR NATAL STREAMS, SALMON MIGRATE SOME HUNDREDS OF MILES TO THEIR OCEANIC FEEDING GROUNDS. (IT IS NOW KNOWN THAT SALMON FROM THE BRITISH ISLES TRAVEL TO FEEDING GROUNDS OFF GREENLAND.) THE QUESTION NOW ARISES - WHY DO SALMON TRAVEL TO THESE FAR-OFF REGIONS WHEN MOST SEA TROUT ARE ABLE TO FEED SUCCESSFULLY IN COASTAL AREAS? (THERE ARE RECORDS OF EXCEPTIONAL SEA TROUT WEIGHING ABOVE 28 LBS. BEING CAUGHT IN EUROPE.) THE ANSWER MAY BE IN THE STAGE OF EVOLUTION THAT HAS BEEN REACHED BY THE RESPECTIVE SPECIES OR IN THE SWIMMING CAPABILITIES OF THE IMMATURE FISH MIGRATING SEAWARDS. IT MAY BE THAT THE FISH DRIFT IN THE SEA WATER IN WHICH THEY FEED AS LONG AS IT SUITS THEIR PHYSIOLOGICAL DEMANDS. WHATEVER THE REASON, MY THEORY IS THAT THE BEHAVIOUR OF SALMON IS SUBJECT TO SOME CONTROLLING MECHANISM WHICH ENABLES THEM TO JOIN OR LEAVE A GYRAL IN THE SEA AT A TIME COINCIDENTAL WITH THEIR FEEDING, WINTERING AND SPAWNING CYCLE. UNFORTUNATELY, WHILST CIRCUMSTANTIAL EVIDENCE MAY SUGGEST THAT THE DRIFT HYPOTHESIS IS A NOT UNREASONABLE ONE, THERE IS NO DATA YET AVAILABLE WHICH CAN PROVE OR DISPROVE THIS THEORY.

HAVING BRIEFLY DESCRIBED THE MIGRATING BEHAVIOUR OF SALMON AND SEA TROUT, ONE IS IMPELLED TO ASK IF IT IS ADVISABLE TO TRY AGAIN TO INTRODUCE ATLANTIC SALMON INTO THE FALKLAND ISLANDS. ON THE EVIDENCE AND INFORMATION AVAILABLE, I WOULD ADVISE AGAINST SUCH A PROJECT AND MY REASONS ARE SUMMARISED AS FOLLOWS:-

1. THE AREAS OF RIVER IN WHICH GRAVEL OF A SUITABLE SIZE FOR SALMON SPAWNING CAN BE FOUND ARE LIMITED.
2. THE FOOD CHAINS IN THE RIVERS ARE NOT NUMEROUS, AS CAN BE SEEN IN TABLE 6. IMMATURE ATLANTIC SALMON MUST FEED IN THE RIVERS FOR APPROXIMATELY TWO, POSSIBLY THREE, YEARS BEFORE THEY MIGRATE SEAWARDS AND, BECAUSE FOOD IS SCARCE IN THE RIVERS, TO RE-INTRODUCE THIS SPECIES NOW MIGHT PREJUDICE THE EXISTING AND SOMEWHAT TENUOUS STOCKS OF SEA TROUT.
3. THE FLOWS IN THE RIVERS ARE NOT SUFFICIENT TO DRAW FISH IN QUANTITY INTO THE UPPER HEADWATERS TO SPAWN, WHICH MEANS THAT MOST OF THE ADULT FISH WILL SPAWN IN THE MID REACHES OF THE RIVERS. AS A RESULT, THE WHOLE OF THE RIVER SYSTEMS ARE NOT BEING FULLY UTILISED BY THE FISH STOCKS. ATLANTIC SALMON, IN PARTICULAR, REQUIRE SPECIFIC VOLUMES OF WATER FOR THEIR UPSTREAM MIGRATION (SEE PROCEEDINGS OF INSTITUTE OF WATER ENGINEERS, 1969 - "THE WATER REQUIREMENTS OF SALMON" BY L. STEWART) AND, AS THE RAINFALL OF THE ISLANDS ONLY AVERAGES SOME 30 INCHES PER ANNUM, IT IS DOUBTFUL WHETHER THE REQUIRED FLOWS ARE PRODUCED NATURALLY IN THE FALKLAND RIVERS.

A POSSIBLE ALTERNATIVE WOULD BE TO CONSIDER INTRODUCING A SPECIES OF SALMON SUCH AS THE CHINOOK, WHICH DEPOSITS ITS OVA IN THE UPPER LIMITS OF TIDAL WATER AND PRODUCES PROGENY WHICH MIGRATE TO SEA AS FRY, THUS OBTAINING THE UTMOST BENEFIT FROM FOOD SOURCES IN THE SEA WITHOUT DEPLETING FOOD RESERVES IN THE RIVERS. CHINOOK SALMON IS THE ONLY MIGRATING SALMON SPECIES TO BE ESTABLISHED IN THE SOUTHERN HEMISPHERE AND IT WOULD BE AN INTERESTING EXPERIMENT TO TRY AND INTRODUCE IT INTO THE FALKLAND ISLANDS. HOWEVER, ADEQUATE FINANCE OVER A NUMBER OF YEARS AND, IN PARTICULAR, A KNOWLEDGEABLE FISHERY BIOLOGIST WOULD BE NECESSARY FOR SUCH AN EXPERIMENT AND, BEFORE SUCH A SCHEME WAS CONSIDERED, I WOULD ADVISE THAT A COMPLETE APPRAISAL AND ASSESSMENT OF THE BENEFITS ARISING FROM THE INTRODUCTION OF CHINOOK SALMON INTO THE WAITAKE RIVER IN NEW ZEALAND BE CARRIED OUT.

IN ANY EVENT, I WOULD ADVOCATE IMPROVING AND DEVELOPING THE SEA TROUT FISHERIES ALREADY ESTABLISHED. ONE MAY WELL ASK WHY, WHEN SEA TROUT OF 10 LBS. AND UPWARDS ARE BEING CAUGHT, AS AT PRESENT, IT IS NECESSARY TO INTRODUCE A FURTHER EXOTIC SPECIES.

SECTION 4 - OTHER ASPECTS OF MIGRATORY FISHERIES

CHAPTER 8

CATCHES OF TROUT IN SOME RIVERS  
IN THE FALKLAND ISLANDS

(A) DOUGLAS SETTLEMENT RECORDS

MY THANKS ARE EXTENDED TO MR. HARLAND GREENSHIELDS FOR PROVIDING THE RECORDS INCLUDED IN THIS PART OF THE REPORT.

TABLE I SHOWS THAT A NUMBER OF PERSONS FISHED ON 80 DAYS FROM 27TH NOVEMBER, 1966, TO 25TH MARCH, 1972. THE RIVERS IN WHICH THE FISH WERE CAUGHT ARE ALSO SHEWN. DURING THIS PERIOD, A TOTAL OF 401 FISH WERE CAUGHT, INCLUSIVE OF 24 APLOCHITON ZEBRA FROM LORENZO POND, THE LARGEST LAKE ON THE SETTLEMENT. THE AVERAGE CATCH PER ANGLING EFFORT PER PERSON WAS BETWEEN 6 AND 7 FISH.

TABLE II

RECORDS OF FISH CAUGHT ON THE  
DOUGLAS SETTLEMENT, 1966-72

<u>DATE</u>	<u>RIVER</u>	<u>NO. OF FISH</u>	<u>TOTAL WEIGHT</u>		<u>WEIGHT OF LARGEST</u>	
			<u>LBS.</u>	<u>OZS.</u>	<u>LBS.</u>	<u>OZS.</u>
27.11.66	SAN CARLOS	4	1	12		8
10.12.66	KINGS BROOK	5	1	2		5 $\frac{1}{2}$
11.12.66	CLAY DITCH	25	4	13		6
11.12.66	CLAY DITCH	15	3	0		6 $\frac{1}{4}$
11.12.66	KINGS BROOK	2		6 $\frac{1}{4}$		4
12.12.66	CLAY DITCH	4		6		3
12.12.66	CLAY DITCH	4		10		4
12.12.66	CLAY DITCH	4		11		3 $\frac{1}{2}$
18.12.66	CLAY DITCH	15	2	14		5 $\frac{3}{4}$
2. 1.67	LORENZO POND	2		9		5 $\frac{1}{2}$
5. 1.67	KINGS BROOK	7	2	2		7 $\frac{1}{2}$
6. 1.67	CLAY DITCH	2		9 $\frac{1}{4}$		5 $\frac{1}{4}$
6. 1.67	CLAY DITCH	8	1	12 $\frac{3}{4}$		4 $\frac{3}{4}$
6. 1.67	CLAY DITCH	23	4	13 $\frac{1}{4}$		5 $\frac{1}{4}$
7. 1.67	SAN CARLOS	3	1	15	1	1 $\frac{1}{2}$
19. 1.67	LORENZO POND	3	1	1		7
20. 1.67	PEDRO	1	3	3	3	3
21. 1.67	SAN CARLOS	9	3	5 $\frac{1}{4}$		8 $\frac{1}{2}$
21. 1.67	SAN CARLOS	16	4	14		7 $\frac{1}{4}$
29. 1.67	SAN CARLOS	2	8	4	6	8
29. 1.67	SAN CARLOS	3	3	4	2	12
29. 1.67	SAN CARLOS	2	5	12	3	0
29. 1.67	SAN CARLOS	1	5	8	5	8
29. 1.67	SAN CARLOS	3	1	0		6

CONTINUED



TABLE II (CONTINUED)

DATE	RIVER	NO. OF FISH	TOTAL WEIGHT		WEIGHT OF LARGEST	
			LBS.	OZS.	LBS.	OZS.
4. 2.67	MALO	1	7	0	7	0
11. 2.67	SAN CARLOS	1	6	2	6	2
11. 2.67	SAN CARLOS	4	1	7		7 $\frac{1}{2}$
26. 2.67	LORENZO POND	5	2	2		10 $\frac{1}{2}$
12. 3.67	SAN CARLOS	1	1	3	1	3
19. 3.67	SAN CARLOS	3	2	10	2	0
19. 3.67	SAN CARLOS	4	9	4	3	3
19. 3.67	SAN CARLOS	6	11	1	2	11
2. 4.67	SAN CARLOS	9	17	5	4	4
9. 4.67	SAN CARLOS	12	17	5	4	14 $\frac{1}{2}$
16. 4.67	SAN CARLOS	2	2	14	2	2
16. 4.67	SAN CARLOS	1		8		8
16. 4.67	SAN CARLOS	1		6		6
16. 4.67	SAN CARLOS	NOT RECORDED	2	11	1	10
16. 4.67	SAN CARLOS	11	16	8	3	2
23. 4.67	SAN CARLOS	17	17	9	4	1
30. 4.67	SAN CARLOS	11	11	15	2	10
30. 12.67	SAN CARLOS	1	3	0	3	0
7. 1.68	LORENZO POND	5	1	8		7 $\frac{1}{2}$
4. 2.68	SAN CARLOS	4	2	15	1	15
4. 2.68	SAN CARLOS	1	4	9	4	9
4. 2.68	SAN CARLOS	1	4	6	4	6
25. 2.68	SAN CARLOS	2	5	6	3	6
25. 2.68	SAN CARLOS	4	17	6	6	0
4. 3.68	LORENZO POND	2	1	0 $\frac{1}{2}$		9
17. 3.68	SAN CARLOS	10	17	9	5	0
5. 1.69	SAN CARLOS	1	3	6	3	6
17. 1.69	UPPER MALO	1	3	0	3	0
23. 2.69	SAN CARLOS	25	9	14	2	2
2. 3.69	SAN CARLOS	9	22	3	4	12
16. 3.69	SAN CARLOS	3	9	15	5	7
16. 3.69	SAN CARLOS	5	11	6	4	0
6. 4.69	LORENZO POND	7	3	3		9
17. 9.69	PEDRO	1	1	8	1	8
17. 9.69	PEDRO	1	1	6	1	6
2. 11.69	SAN CARLOS	1	2	3	2	3
25. 4.71	SAN CARLOS	1	5	2	5	2
25. 4.71	SAN CARLOS	1	4	8	4	8
4. 9.71	SAN CARLOS	4	3	2	1	0
11. 9.71	SAN CARLOS	3	1	11		10
11. 9.71	SAN CARLOS	5	9	14	3	14
11. 9.71	SAN CARLOS	4	9	3	3	13
14. 9.71	PEDRO	1	4	2	4	2
14. 9.71	PEDRO	1	----- NOT RECORDED -----			
14. 9.71	PEDRO	1	----- NOT RECORDED -----			
26. 9.71	SAN CARLOS	4	8	14	5	0
1. 10.71	SAN CARLOS	7	16	12	4	4
1. 10.71	SAN CARLOS	2	4	8	3	0
1. 10.71	SAN CARLOS	4	6	4	2	0

CONTINUED

TABLE 11 (CONTINUED)

DATE	RIVER	NO. OF FISH	TOTAL WEIGHT		WEIGHT OF LARGEST	
			LBS.	OZS.	LBS.	OZS.
Oct. 71	SAN CARLOS	3	2	15	1	7
Oct. 71	SAN CARLOS	2	4	5	2	10
---- NOT RECORDED ----		4	3	2	?2	0
13. 2.72	SAN CARLOS	2	6	8	4	8
13. 2.72	SAN CARLOS	2	6	4	4	0
19. 3.72	SAN CARLOS	3	15	4	7	0
19. 3.72	SAN CARLOS	4	9	0	3	0
25. 3.72	SAN CARLOS	4	19	12	7	0
25. 3.72	SAN CARLOS	3	9	4	3	8

OF THE TOTAL OF 401 FISH, THE RECORDS SHEW THAT MANY MUST HAVE BEEN UNDER THE 10 INCHES SIZE LIMIT SPECIFIED IN THE TROUT AND SALMON FISHING REGULATIONS, 1964. THIS DOES NOT MEAN, HOWEVER, THAT UNDERSIZED FISH WERE RETAINED BY THE ANGLERS AND, DOUBTLESS, THE SMALLER FISH, WEIGHING ONLY A FEW OUNCES, WERE RETURNED TO THE WATER.

IN MOST CASES, SPINNING OR THE BOTTOM FISHING METHOD WAS USED FOR CATCHING FISH; NONE WERE RECORDED AS HAVING BEEN TAKEN ON ARTIFICIAL FLIES. WHERE BOTTOM OR STREAM FISHING TACTICS WERE ADOPTED, THE BAIT MOST COMMONLY USED WAS MUTTON ALTHOUGH, ON ONE OCCASION, FISH EYES WERE USED.

THE HIGHEST NUMBERS OF FISH WERE CAPTURED ON TWO OCCASIONS:-

1) 11TH DECEMBER, 1966, WHEN 25 FISH, TOTALLING 4 LBS. 13 OZS. AND AVERAGING 3 OZS. EACH, WERE CAUGHT IN THE CLAY DITCH, AND

2) 23RD FEBRUARY, 1969, WHEN A SIMILAR NUMBER OF FISH, WEIGHING 9 LBS. 14 OZS. AND AVERAGING A LITTLE OVER 6 OZS., WERE CAUGHT IN THE SAN CARLOS; THE LARGEST OF THESE WAS 2 LBS. 2 OZS. (THESE ARE, OF COURSE, THE HIGHEST NUMBERS OF FISH CAUGHT BY INDIVIDUAL ANGLERS.)

(B) THE FALKLAND ISLANDS COMPANY DARWIN SETTLEMENT RECORDS

THE RECORDS GIVEN OVERLEAF ARE THOSE PROVIDED BY MR. BRUCE HARDCASTLE, MANAGER OF THIS SETTLEMENT, AND I WOULD LIKE TO THANK HIM FOR PROVIDING THIS INFORMATION.

TABLE 12 ITEMISES FISH CAUGHT MOSTLY AT SWAN INLET AND THEIR WEIGHTS FROM 3RD SEPTEMBER, 1972, TO FEBRUARY, 1973.

TABLE 12  
RECORDS OF FISH CAUGHT ON THE  
DARWIN SETTLEMENT, 1972/3

<u>SEPTEMBER,</u> <u>1972</u> FISH		<u>OCTOBER,</u> <u>1972</u> FISH		<u>NOVEMBER,</u> <u>1972</u> FISH		<u>DECEMBER,</u> <u>1972</u> FISH		<u>JANUARY,</u> <u>1973</u> FISH		<u>FEBRUARY,</u> <u>1973</u> FISH	
LBS.	OZS.	LBS.	OZS.	LBS.	OZS.	LBS.	OZS.	LBS.	OZS.	LBS.	OZS.
2	12	2	0	1	4	5	12	6	8	2	12
2	0	1	1		12		8x12	4	8	3	8
1	13	2	2		4		6x 6	1	12	4	8
1	4		10		8				12	2	0
1	2	1	1		10				12	2	8
1	12		8		4					2	4
1	0		12		6						12
	13		5		5						8 x 12
	12	2	5		9						4
	11	1	4		5					1	2
	10		8							1	12
	8		9							1	4
	7		6							2	2
	6		6								12
	5		6								4
	5	1	0								4
	4	1	0								4
			7							2	2
			10							3	8
			4							3	4
			5							5	2
			6							5	2
			5							1	8
			5								4
		1	4								
		1	0								

THE AVERAGE WEIGHT OF FISH CAUGHT IS APPROXIMATELY 18 OUNCES.

(c) THE FALKLAND ISLANDS ANGLING CLUB'S RECORDS

THE RECORDS KEPT BY THIS CLUB ARE EXTREMELY VALUABLE AND CREDIT IS DUE TO MR. R.D. CLEMENTS, HONORARY SECRETARY TO THE CLUB, FOR HIS DILIGENCE IN COMPILING THEM.

THE CLUB WAS FORMED IN AUGUST, 1969, AND TABLE 13 SHOWS ITS MEMBERSHIP SINCE THAT DATE.

TABLE 13

MEMBERSHIP OF THE FALKLAND ISLANDS  
ANGLING CLUB, 1969/73

YEAR	ADULT MALE	ADULT FEMALE	JUNIORS	HONORARIES	VISITORS	TOTAL
1969/70	45	5	8	14	-	72
1970/71	31	4	2	25	-	62
1971/72	27	4	4	25	1	61
1972/73	26	4	3	12	8	53

AN ENTRANCE FEE TO THE CLUB CONFERS LIFE MEMBERSHIP BUT NO MEMBER IS PERMITTED TO FISH UNLESS A CURRENT SUBSCRIPTION HAS BEEN PAID.

THE MEMBERS OF THIS CLUB FISH MAINLY ON THE MALO AND MURRELL RIVERS, THE LATTER RIVER BEING ONLY A SHORT DISTANCE FROM STANLEY AND THE FORMER 30 MILES AWAY. CERTAIN MEMBERS OF THE CLUB HAVE BUILT A FISHING LODGE AT THE SIDE OF THE MALO RIVER, ADJACENT TO THE UPPER LIMITS OF TIDAL WATER; THIS PROVIDES SHELTER, FEEDING AND SLEEPING ACCOMMODATION FOR ABOUT 8 ANGLERS. THE CLUB IS TO BE CONGRATULATED ON THE INITIATIVE SHOWN AND ALSO ON THE POLICY OF STIMULATING INTEREST AMONGST JUNIOR MEMBERS AND SCHOOLBOYS.

TABLE 14 ITEMISES CATCHES OF FISH AND THEIR WEIGHTS ON THE MALO RIVER. IT IS DIFFICULT TO ANALYSE THE CATCHES PER UNIT FISHING EFFORT BUT THE TOTAL AVERAGE WEIGHT OF THE FISH CAUGHT DURING THE YEARS SHOWN, I.E. 1969-73, IS OF INTEREST. IT WOULD HAVE BEEN MOST USEFUL, FOR THE PURPOSE OF ANALYSIS, TO HAVE HAD RECORDS OF THE LENGTHS OF FISH CAUGHT.

TABLE 14

RECORDS OF FISH CAUGHT BY MEMBERS  
OF THE FALKLAND ISLANDS ANGLING CLUB, 1969/73  
(MALO RIVER)

SEPTEMBER		OCTOBER		NOVEMBER		JANUARY		FEBRUARY		MARCH		APRIL	
DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH
LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.	
<u>1969/70</u>													
4TH	9 8	13TH	4 0	15TH	2 8	NIL		4TH	4 0	7TH	4 0	10TH	1 8
	6 0	15TH	3 0		2 0			7TH	6 8		3 8		7 12
	6 8		4 8		1 8			8TH	2 8	8TH	3 0	11TH	5 8
	2 12		1 0		<u>1 0</u>				2 12		1 0		3 0
5TH	2 8		1 0		<u>7 0</u>				4 4	26TH	2 0	12TH	5 8
	3 0		5 12						4 0	27TH	7 8	18TH	3 0
	4 0		5 8					9TH	11 0		1 0		1 12
6TH	9 0		2 8					13TH	8 0		1 8	19TH	2 8
	9 0		2 0					14TH	8 4		4 8		1 8
14TH	1 12		3 0					19TH	1 8		4 8		2 0
	1 0		2 8					21ST	3 12		1 8		7 8
15TH	3 8		3 0					22ND	9 8	28TH	10 8		3 8
	9 6		3 8						11 0		5 0	20TH	10 8
	5 0	16TH	5 0						9 0		4 8		<u>11 4</u>
	2 8		1 0						5 0		<u>12 0</u>		<u>66 12</u>
16TH	8 6		4 8						2 0		66 0		
	3 0		2 0						<u>93 0</u>				
	1 10		3 12										
	2 0		3 0										
	2 0		1 0										
	4 0		5 0										
	5 0		2 0										
	<u>5 0</u>	17TH	6 0										
	106 12		3 12										
			3 12										
			8 8										
			5 0										
		18TH	4 12										
			8 8										
			3 8										
			5 0										
			6 8										
			7 0										
		23RD	6 8										
			6 0										
			1 0										
		24TH	2 10										
			2 0										
			1 8										
			2 12										
			1 8										
			1 4										
			4 0										
			1 0										
			1 0										

CONTINUED

TABLE 14 (CONTINUED)

SEPTEMBER		OCTOBER		NOVEMBER		JANUARY		FEBRUARY		MARCH		APRIL	
DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH
LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.	
1969/70 (CONTINUED)													
		24TH CONT.	2 0										
			2 12										
			1 8										
			5 0										
		25TH	3 0										
			1 12										
			2 4										
			6 0										
			1 0										
			1 0										
			3 8										
			4 0										
			2 0										
			3 0										
			1 8										
			2 0										
		28TH	2 0										
			1 8										
		29TH	4 4										
			8 8										
			5 8										
		30TH	1 0										
			6 12										
			233 10										
1970/71													
1ST	9 0	5TH	2 4	4TH	6 0	17TH	3 4	5TH	3 0	2ND	5 8		NIL
TO	2 0		1 8		6 0		3 4		7 8		3 8		
4TH	4 0		5 0		6 0			6TH	4 4		9 8		
	3 0		5 4	5TH	4 0				6 0		7 8		
	4 8		2 8		1 8			9TH	3 6	3RD	2 8		
	5 0		2 0		2 0			11TH	1 8		11 0		
	4 0	12TH	2 0		1 8				1 8		11 8		
	2 0		2 0		1 8			26TH	9 8		8 8		
	5 0		1 8	6TH	1 0				7 8	4TH	12 0		
	7 0	13TH	7 0		3 0				4 8		14 8		
	10 8		5 4		32 8				10 8		13 8		
	5 8		2 8						7 8		7 4		
	4 8		2 4						66 10		5 8		
	4 0	14TH	9 2								5 8		
	3 8	16TH	5 0								6TH	3 4	
	1 8		2 0								4 0		
	5 0		4 0								11TH	6 0	
	3 8		3 12								12TH	4 8	
	4 8		2 0								8 8		

CONTINUED

TABLE 14 (CONTINUED)

SEPTEMBER		OCTOBER		NOVEMBER		JANUARY		FEBRUARY		MARCH		APRIL	
DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH
LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.	
<u>1970/71 (CONTINUED)</u>													
1ST	6 8	16TH	2 0							12TH	1 8		
TO	3 0	CONT.	1 8							CONT.	10 0		
4TH	9 0		2 0								5 0		
CONT.	1 0		3 0							13TH	7 0		
	1 8		2 0								4 0		
	1 8		2 0								4 4		
	1 8		1 0								3 8		
	1 0	17TH	5 0								6 12		
	2 0		4 8								4 0		
	3 0		2 0								6 8		
15TH	4 8		2 0								12 0		
	7 4		3 8							14TH	7 0		
16TH	2 8		1 8								6 8		
18TH	4 8		1 8								5 12		
	4 8		2 8								4 0		
	4 8		2 0							24TH	6 0		
	4 12		1 8								5 0		
	8 0		1 8								3 0		
	6 0		1 8								2 8		
	2 0		5 4							28TH	8 0		
	4 0		1 8								2 8		
	9 0		1 8								6 4		
	6 8		1 0								1 0		
	8 0		3 0								2 0		
	9 0		4 8								3 8		
	5 0		5 8								4 0		
19TH	6 0		1 4							29TH	6 8		
	5 0		6 8								3 0		
	5 4	18TH	7 8								2 8		
	3 8		2 0								1 0		
	6 0		3 8								3 8		
	5 8		2 0								<hr/>		
	4 0		3 12								292	0	
	4 0		1 12								<hr/>		
	1 8		1 4										
	5 0		1 8										
	1 0		1 4										
	9 8		2 0										
	3 0		10 0										
	1 8	19TH	2 0										
	1 8		2 8										
	3 8		2 4										
	4 0		1 12										
20TH	1 8	20TH	2 0										
	1 0		2 0										
	2 8		2 8										
	5 0	21ST	6 8										

CONTINUED

TABLE 14 (CONTINUED)

SEPTEMBER		OCTOBER		NOVEMBER		JANUARY		FEBRUARY		MARCH		APRIL	
DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH	DAY	FISH
LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.	
<u>1970/71 (CONTINUED)</u>													
20TH	1 8	21ST	6 0										
CONT.	3 0	CONT.	4 0										
	2 8		4 8										
	1 8		3 0										
	2 0	22ND	1 12										
	5 0		2 0										
	4 0		2 0										
21ST	4 0		1 8										
	3 8		1 8										
	<u>314 4</u>		3 8										
			1 8										
			8 0										
		24TH	7 4										
			1 4										
			<u>244 2</u>										
<u>1971/72</u>													
3RD	10 8	2ND	3 0	10TH	1 8	23RD	1 4	6TH	4 8	1ST	3 0	1ST	5 0
	2 0		1 8		3 0		<u>1 4</u>	19TH	4 0		1 0	4TH	5 8
4TH	5 8		2 0	11TH	2 8		<u>1 4</u>		9 4		3 0	22ND	18 0
11TH	2 0		5 0		1 0				7 0		7 4		8 8
	4 0		5 8		1 8			20TH	2 12	10TH	7 8		1 8
	4 4	3RD	14 0		1 8				4 0		2 4		<u>1 0</u>
	3 0		9 0		1 8				7 0	11TH	4 0		<u>39 8</u>
	5 0		8 8		1 0				5 12		1 4		
12TH	7 12		2 8		1 8				5 0		2 0		
	2 8	4TH	5 8		<u>13 8</u>			22ND	3 0	16TH	1 8		
	10 0		2 8						15 8	17TH	9 8		
	2 0		2 8						9 8	18TH	2 4		
	7 4		3 0						10 0		1 4		
	7 0		6 0						12 8	26TH	6 0		
	4 8		4 8						16 0		<u>51 12</u>		
	3 8		3 0						10 0				
13TH	7 12		6 0						1 8				
	3 0	15TH	4 0						23RD	6 8			
	4 0		10 0						5 0				
	4 8		4 0						26TH	1 0			
	5 8		2 8						2 8				
	3 8		2 0						27TH	6 8			
	3 12		3 0						28TH	9 0			
14TH	13 0		3 0							1 8			
	6 8		3 0							2 0			
	3 4		3 0							9 8			
	4 8		1 8							29TH	7 8		

CONTINUED



TABLE 14 (CONTINUED)

<u>SEPTEMBER</u>		<u>OCTOBER</u>		<u>NOVEMBER</u>		<u>JANUARY</u>		<u>FEBRUARY</u>		<u>MARCH</u>		<u>APRIL</u>	
<u>DAY</u>	<u>FISH</u>	<u>DAY</u>	<u>FISH</u>	<u>DAY</u>	<u>FISH</u>	<u>DAY</u>	<u>FISH</u>	<u>DAY</u>	<u>FISH</u>	<u>DAY</u>	<u>FISH</u>	<u>DAY</u>	<u>FISH</u>
LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.	
1971/72 (CONTINUED)													
14TH	5 0	15TH	6 0					29TH	3 8				
CONT.	3 8	CONT.	4 0					CONT.					
	3 4		1 8										
	3 0		1 0						181 12				
	2 0		1 8										
	4 0		2 0										
	4 8		2 8										
	6 0	16TH	2 0										
	7 0		4 0										
	6 0		4 0										
	6 0		7 0										
	1 8		4 0										
15TH	1 0		2 8										
	4 0		1 8										
	4 0		3 0										
	4 8		1 0										
	4 0	17TH	3 0										
	1 8		2 0										
	4 8		7 8										
19TH	2 4		2 0										
21ST	3 12		7 0										
22ND	5 4		4 0										
	5 4		3 0										
	1 8		3 0										
	1 8		2 8										
	1 0		1 8										
	6 0		2 0										
	3 8		4 0										
	2 8	30TH	5 8										
	3 8		2 0										
	7 0	31ST	8 8										
	254 4		7 8										
			4 0										
			1 8										
			176 8										
1972/73													
7TH	5 0	20TH	2 8	NIL		NIL		1ST	2 12	NIL		NIL	
	1 8		8 8					2ND	2 8				
8TH	2 0		12 12						3 12				
	2 8		2 0						10 0				
9TH	4 8		4 0					3RD	8 0				
	1 8	21ST	8 12						4 12				

CONTINUED

TABLE 14 (CONTINUED)

<u>SEPTEMBER</u>		<u>OCTOBER</u>		<u>NOVEMBER</u>		<u>JANUARY</u>		<u>FEBRUARY</u>		<u>MARCH</u>	
<u>DAY</u>	<u>FISH</u>	<u>DAY</u>	<u>FISH</u>	<u>DAY</u>	<u>FISH</u>	<u>DAY</u>	<u>FISH</u>	<u>DAY</u>	<u>FISH</u>	<u>DAY</u>	<u>FISH</u>
LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.		LBS. OZS.	
<u>1972/73 (CONTINUED)</u>											
9TH	6 0	21ST	2 0					3RD	3 8		
CONT.	2 8	CONT.	1 4					CONT.	3 0		
26TH	4 4	22ND	8 0					4TH	2 8		
	15 0		1 0					6TH	2 8		
28TH	4 8	23RD	1 0						1 0		
	4 8		6 8						1 0		
	53 12		8 0					7TH	2 8		
			8 0						1 8		
			14 0					9TH	5 0		
			4 4						1 8		
			6 8						2 4		
			4 8						2 0		
			4 0					10TH	17 0		
			2 0						18 0		
			16 0						5 8		
			1 0						2 4		
			2 0						1 0		
			3 8						1 8		
			6 0					13TH	4 0		
			4 0						4 12		
		24TH	4 8						3 8		
			1 0						3 0		
			9 0						4 0		
			6 4					14TH	8 0		
			3 0						9 0		
			1 8						5 0		
			165 4						5 0		
									4 0		
									3 12		
									1 0		
									3 8		
									4 0		
									2 0		
									12 0		
									2 0		
									3 0		
									15TH	3 0	
									11 0		
									10 0		
									4 0		
									4 0		
									16TH	2 0	
									5 8		
									10 0		
									17TH	1 12	
									3 8		

CONTINUED

TABLE 14 (CONTINUED)

<u>SEPTEMBER</u>	<u>OCTOBER</u>	<u>NOVEMBER</u>	<u>JANUARY</u>	<u>FEBRUARY</u>	<u>MARCH</u>	<u>APRIL</u>
<u>DAY FISH</u>	<u>DAY FISH</u>	<u>DAY FISH</u>	<u>DAY FISH</u>	<u>DAY FISH</u>	<u>DAY FISH</u>	<u>DAY FISH</u>
LBS.OZS.	LBS.OZS.	LBS.OZS.	LBS.OZS.	LBS.OZS.	LBS.OZS.	LBS.OZS.
		<u>1972/73 (CONTINUED)</u>				
				17TH	2 0	
				CONT.	1 12	
				18TH	9 0	
				24TH	1 0	
					1 12	
				25TH	9 0	
					<u>264 0</u>	

THE CATCHES SHEWN IN TABLE 14 HAVE BEEN ANALYSED AND THE AVERAGE WEIGHTS OF THE FISH, DURING THE PERIOD FROM 1969 TO 1973, ARE SHEWN IN TABLE 15.

TABLE 15

AVERAGE WEIGHT OF FISH CAUGHT BY MEMBERS  
OF THE FALKLAND ISLANDS ANGLING CLUB  
ON THE MALO RIVER. 1969/73

YEAR	NUMBER OF FISH	WEIGHT OF FISH		AVERAGE WEIGHT (APPROX.)
		LBS.	OZS.	
1969/70	140	573	2	4.0 LBS.
1970/71	228	952	12	4.1 LBS.
1971/72	177	718	8	4.0 LBS.
1972/73	234*	974	12	4.1 LBS.

\* SUBJECT TO VERIFICATION BY F.I.A.C.

TABLE 15 SHEWS THAT THE AVERAGE WEIGHT OF THE FISH, WHEN RELATED TO THE TOTAL NUMBERS AND WEIGHT OF FISH CAUGHT, IS REASONABLY CONSTANT. TABLE 16 SHEWS THAT FISH OF GREATER WEIGHT HAVE DEVELOPED SINCE 1969 AND AN ANALYSIS OF RECORDS SHEWS THAT THE NUMBERS OF FISH CAUGHT, BETWEEN 8 AND 18 LBS., ARE INCREASING IN NUMBER.

TABLE 16

NUMBERS OF FISH WEIGHING BETWEEN 8 AND 18 LBS.  
CAUGHT BY MEMBERS OF THE FALKLAND ISLANDS  
ANGLING CLUB ON THE MALO RIVER, 1969/73

YEAR	WEIGHT RANGE	NUMBERS OF FISH CAUGHT
1969/70	8 LBS. TO 12 LBS. MAX.	18
1970/71	8 LBS. TO 15 LBS. MAX.	24
1971/72	8 LBS. TO 18 LBS. MAX.	20
1972/73	8 LBS. TO 18 LBS. MAX.	30*

\* UP TO AND INCLUDING MARCH 5TH, 1973

NOTES:

1. ALTHOUGH "NIL" RETURNS ARE SHEWN FOR MARCH AND APRIL, 1973, ON PAGE 67, FISH CATCH FIGURES AMOUNTING IN WEIGHT TO 171 LBS. 4 OZS. FOR MARCH AND 275 LBS. 0 OZS. FOR APRIL HAVE BEEN RECEIVED, BUT ITEMISED DAILY FISH CATCHES ARE NOT AVAILABLE TO ME FOR THESE MONTHS. A LATE RETURN HAS ALSO BEEN RECEIVED IN RESPECT OF SEPTEMBER, 1972, AMOUNTING TO 45 LBS. 8 OZS. (NOT ITEMISED) AND THIS WEIGHT SHOULD BE ADDED TO THE TOTAL WEIGHT FOR SEPTEMBER, 1972 SHEWN ON PAGE 68 TO MAKE A GRAND TOTAL OF 99 LBS. 4 OZS. THE TOTAL WEIGHT OF THE CATCH FOR THE 1972/73 SEASON AMOUNTS TO 974 LBS. 12 OZS.
2. THERE ARE A FEW MINOR DISCREPANCIES IN THE TOTALS OF THE CATCH FIGURES AS SUPPLIED TO ME BUT THESE HAVE BEEN IGNORED IN MY ANALYSES.
3. I HAVE NO INFORMATION ON THE CONSISTENCY OF THE FISHING EFFORT AND IT WOULD BE USEFUL, FOR FUTURE ANALYSES, IF THE ANGLERS FISHING EACH MONTH COULD RECORD THEIR FISHING TIME IN ADDITION TO THEIR CATCHES OF FISH. THIS COULD BE A TIME-CONSUMING EXERCISE BUT IT WOULD ENABLE MORE ACCURATE ASSESSMENTS TO BE MADE CONCERNING THE PRODUCTIVITY OF THE FISHERIES.

## CHAPTER 9

### SOME LEGAL AND FINANCIAL ASPECTS

#### (A) RIPARIAN OWNERSHIP

APART FROM A FEW INSTANCES WHERE, I AM GIVEN TO UNDERSTAND, CROWN RIGHTS PERTAIN TO RIVERS SUCH AS THE MOODY VALLEY BROOK, MULLETT CREEK AND PART OF THE MURRELL RIVER, ALL THE RIVERS IN THE ISLANDS ARE OWNED BY THE VARIOUS CAMPS.

THE FOLLOWING INFORMATION APPLICABLE TO OWNERSHIP OF FISHERIES IN ENGLAND MAY BE OF INTEREST:-

COMMON FISHERY - THE RIGHT OF PUBLIC FISHING IN TIDAL WATERS.

COMMON OF FISHERY - WHERE TWO OR MORE PERSONS SHARE THE SAME RIGHT OF FISHING.

CORPOREAL FISHERY - WHERE THE SAME PERSON OWNS THE SOIL AND THE FISHING RIGHTS. IT MAY BE EITHER A SEVERAL FISHERY OR A COMMON OF FISHERY.

EXCLUSIVE FISHERY - ANOTHER TERM FOR SEVERAL FISHERY.

FISHERY - USED IN TWO DIFFERENT SENSES AT LAW - VIZ. (1) THE RIGHT TO FISH IN A GIVEN PLACE; AND (2) THE PLACE WHERE THE RIGHT OF FISHING IS EXERCISED.

FISHERY IN GROSS - A RIGHT OF FISHING NOT ATTACHED TO THE OWNERSHIP OF ANY LAND.

INCORPOREAL FISHERY - WHERE THE FISHING RIGHTS AND THE SOIL ARE OWNED BY DIFFERENT PERSONS.

SEVERAL FISHERY - A SOLE AND EXCLUSIVE RIGHT OF A PERSON TO THE FISHING, WHETHER OR NOT HE OWNS THE SOIL.

SOIL - WHEN USED IN CONNECTION WITH FISHING RIGHTS, IT IS THE LAND OVER WHICH THE WATER STANDS, FLOWS OR EBBS AND FLOWS.

#### (B) FISHERY REGULATIONS

IN 1964, TO PREVENT THE OVER-EXPLOITATION OF THE SPARSE STOCKS OF MIGRATORY FISH, THE TROUT AND SALMON FISHING REGULATIONS WERE MADE BY THE THEN GOVERNOR, WITH THE ADVICE OF THE EXECUTIVE COUNCIL. THE REGULATIONS ARE AS FOLLOWS:-

(COPY)

FALKLAND ISLANDS.

THE FISHERIES ORDINANCE (CAP.27)  
REGULATIONS  
(UNDER SECTION 3 OF THE ORDINANCE)

C. HASKARD  
GOVERNOR

No. 5 of 1964

HIS EXCELLENCY THE GOVERNOR IN EXERCISE OF THE POWERS VESTED IN HIM BY SECTION 3 OF THE FISHERIES ORDINANCE, IS PLEASED BY AND WITH THE ADVICE OF THE EXECUTIVE COUNCIL TO MAKE THE FOLLOWING REGULATIONS.

CAP. 27

1. THESE REGULATIONS MAY BE CITED AS THE TROUT AND SALMON FISHING REGULATIONS, 1964.

SHORT TITLE

2. IN THESE REGULATIONS, UNLESS THE CONTEXT OTHERWISE REQUIRES:-

INTERPRETATION

"WATER" INCLUDES ANY LAKE, POND, STREAM, RIVER OR ESTUARY THEREOF;

"OPEN SEASON" MEANS BETWEEN THE 31ST DAY OF AUGUST AND THE 1ST DAY OF MAY FOLLOWING;

"PRIVATE LAND" MEANS ANY LAND HELD OR OCCUPIED UNDER A GRANT, LEASE OR RIGHT OF OCCUPANCY;

"ROD AND LINE" MEANS SINGLE ROD OR LINE;

"SALMON" INCLUDES ALL MIGRATORY FISH OF THE SPECIES SALMO SALAR AND SALMO TRUTTA AND COMMONLY KNOWN AS SALMON AND SEA TROUT RESPECTIVELY OR ANY PART OF SUCH FISH;

"TROUT" MEANS NON-MIGRATORY TROUT OF THE SPECIES SALMO TRUTTA LIVING IN FRESH WATERS OR ESTUARIES, BUT DOES NOT INCLUDE ANY FISH OF THE FAMILY APLOCHITONIDAE, COMMONLY KNOWN AS TROUT IN THE COLONY;

"UNCLEAN" IN RELATION TO ANY FISH MEANS THAT THE FISH IS ABOUT TO SPAWN, OR HAS RECENTLY SPAWNED AND HAS NOT RECOVERED FROM SPAWNING.

3. IT SHALL BE UNLAWFUL FOR ANY PERSON TO ENTER UPON PRIVATE LAND FOR THE PURPOSE OF FISHING FOR, CAPTURING OR KILLING TROUT AND SALMON UNLESS THE PERMISSION OF THE OWNER OR HIS AGENT OR THE OCCUPIER OF SUCH LAND SHALL HAVE BEEN FIRST OBTAINED.

TRESPASS AN  
OFFENCE

(CONTINUED)

4. (1) THE COLONIAL SECRETARY SHALL GRANT LICENCES TO STANLEY RESIDENTS TO FISH FOR TROUT AND SALMON, WITH ROD AND LINE DURING THE OPEN SEASON.

ISSUE OF  
LICENCES

(2) FARM MANAGERS SHALL GRANT LICENCES TO PERSONS IN THEIR EMPLOY TO FISH FOR TROUT, OR SALMON WITH ROD AND LINE, DURING THE OPEN SEASON.

PROVIDED THAT SUCH LICENCES SHALL NOT CONFER ON THE HOLDER PERMISSION TO ENTER UPON PRIVATE LAND FOR THE PURPOSE OF FISHING FOR TROUT AND SALMON UNLESS PERMISSION HAS BEEN FIRST OBTAINED IN ACCORDANCE WITH REGULATION 3 ABOVE.

PROVIDED ALSO THAT ANY LICENCE SO GRANTED MAY BE REVOKED IF THE CONDITIONS OF THE LICENCE HAVE NOT BEEN OBSERVED.

5. THE GOVERNOR MAY LIMIT THE NUMBER OF LICENCES TO BE ISSUED DURING ANY ONE SEASON.

LIMITATION  
OF LICENCES

6. UNLESS AUTHORISED BY LICENCE NO PERSON SHALL TAKE, OR ATTEMPT TO TAKE MORE THAN 12 TROUT PER DAY.

LIMIT OF 12  
TROUT PER DAY

7. NO PERSON SHALL FISH FOR, TAKE, KILL OR ATTEMPT TO TAKE OR KILL ANY TROUT OR SALMON BY ANY MEANS, EXCEPT BY ROD AND LINE DURING OPEN SEASON, UNDER A LICENCE GRANTED UNDER REGULATION 4 HEREOF.

GENERAL  
PROTECTION OF  
TROUT

8. NO PERSON SHALL, FOR THE PURPOSE OF FISHING FOR TROUT AND SALMON USE ANY FISH ROE.

PROHIBITION OF  
USING ROE

9. (1) NO PERSON SHALL -

UNCLEAN TROUT

(A) KNOWINGLY TAKE, KILL, OR INJURE, OR ATTEMPT TO TAKE, KILL OR INJURE ANY TROUT OR SALMON WHICH IS UNCLEAN WITHIN THE MEANING OF THESE REGULATIONS;  
OR

(B) TAKE, KILL, OR INJURE, OR ATTEMPT TO TAKE, KILL OR INJURE ANY TROUT OR SALMON, LESS THAN TEN INCHES IN LENGTH, OR

TROUT OF LESS  
THAN TEN INCHES  
IN LENGTH

(C) TAKE OR ATTEMPT TO TAKE TROUT OR SALMON WITH ANY NET IN ANY ESTUARY.

PROHIBITION  
ON NETTING IN  
ESTUARIES

(2) THIS REGULATION SHALL NOT APPLY TO ANY PERSON WHO TAKES A TROUT OR SALMON ACCIDENTALLY AND RETURNS IT TO THE WATER WITH THE LEAST POSSIBLE INJURY.

10. NO PERSON SHALL WILFULLY DISTURB ANY SPAWN OR SPAWNING TROUT OR SALMON, OR ANY BED, BANK OR SHALLOW ON WHICH ANY SPAWN OR SPAWNING TROUT OR SALMON MAY BE.

DISTURBING  
FISH SPAWNING

(CONTINUED)

11. (1) NO PERSON SHALL FISH WITH BAIT, SPINNER OR ANY MEANS OTHER THAN A FLY ABOVE THE BRIDGE AT THE OLD NAVAL WIRELESS STATION IN THE STREAM KNOWN AS THE MOODY BROOK OR IN ANY OF THE TRIBUTARIES THEREOF. MOODY BROOK RESERVE

(2) NO PERSON SHALL FISH IN THE STREAM KNOWN AS THE MOODY BROOK OR IN ANY OF THE TRIBUTARIES THEREOF WITHOUT A FLYFISHING LICENCE ISSUED BY THE COLONIAL SECRETARY.

12. A PERSON AUTHORISED BY THE GOVERNOR SHALL NOT BE LIABLE TO ANY PENALTY IN RESPECT OF THE CONTRAVENTION OF THE FOREGOING REGULATIONS IF UNDERTAKEN FOR THE PURPOSE OF THE ARTIFICIAL PROPAGATION OF TROUT, OR FOR SOME SCIENTIFIC PURPOSE APPROVED BY HIM. SAVING FOR ACTS FOR ARTIFICIAL PROPAGATION OR SCIENTIFIC PURPOSES

13. ANY PERSON CONTRAVENING THESE REGULATIONS SHALL BE LIABLE TO THE PENALTIES LAID DOWN IN SECTION 5 CHAPTER 27 OF THE LAWS OF THE FALKLAND ISLANDS. PENALTIES

14. THE FISHERIES REGULATIONS, 1952, ARE HEREBY REVOKED. REVOCATION OF REGULATIONS No. 1 OF 1952

MADE BY THE GOVERNOR IN COUNCIL ON THE 23RD DAY OF OCTOBER, 1964.

H.L. BOUND  
CLERK OF THE EXECUTIVE COUNCIL

IN ENGLAND AND WALES, A FISHING LICENCE GIVES TO THE LICENSEE THE "RIGHT" TO CARRY A FISHING ROD AND NOT A "RIGHT" TO USE IT WITHOUT PERMISSION. REGULATION No. 4, SUB-SECTION (2) OF THE TROUT AND SALMON FISHING REGULATIONS, 1964, COVERS THIS POINT IN THE FALKLAND ISLANDS.

THE REGULATIONS ARE REASONABLY WELL CONCEIVED AND ATTEMPT TO PRESERVE THE FISHERIES BY MEANS OF REASON AS OPPOSED TO LEGAL COMPULSION. I WAS UNABLE TO ASCERTAIN HOW MANY INFRINGEMENTS OF THE REGULATIONS, IF ANY, HAD OCCURRED SINCE THEIR INCEPTION OR HOW MANY PROSECUTIONS HAD BEEN TAKEN AGAINST ANGLING OFFENDERS. THE LACK OF SUCH INFORMATION INDICATES TO ME THAT THE INHABITANTS, COLLECTIVELY, REGARD THE FISHERIES AS AN ASSET. MY DISCUSSIONS WITH RIPARIAN OWNERS AND ANGLERS REVEALED A KEEN DESIRE ON THEIR PART TO DEVELOP AND IMPROVE THE STOCKS OF MIGRATORY FISH AND PREVENT OVER-EXPLOITATION BY PLACING VOLUNTARY RESTRICTIONS UPON THEMSELVES, ALTHOUGH I COULD NOT FULLY RECONCILE THESE SENTIMENTS WITH THE LARGE NUMBERS OF UNDERSIZED TROUT THAT WERE BEING TAKEN AND RETAINED BY ANGLERS. I WOULD RE-ITERATE THE IMPORTANCE OF RETURNING UNDERSIZED FISH TO THE WATER IN ACCORDANCE WITH THE REGULATIONS.



(c) FISHERY FINANCE

IT IS DIFFICULT TO ADMINISTER, MAINTAIN AND IMPROVE MIGRATORY FISHERIES WITHOUT ADEQUATE FINANCIAL RESOURCES AND, AS THE TROUT AND SALMON FISHING REGULATIONS DO NOT IMPOSE LICENCE FEES ON ANGLERS, THERE IS NO REGULAR SOURCE OF INCOME TO FINANCE THIS WORK. APART FROM GIFTS OF TROUT AND SALMON OVA RECEIVED FROM CHILE AND ENGLAND, THE COSTS OF ESTABLISHING AND DEVELOPING MIGRATORY FISHERIES, AND ADMINISTERING THEM, HAVE BEEN MOSTLY MET BY THE GOVERNMENT OF THE FALKLAND ISLANDS. WHEN SPEAKING TO INTERESTED PARTIES, I FOUND THAT THERE WAS MUCH FEELING AND SUPPORT FOR DEVELOPING THE MIGRATORY FISHERIES STILL FURTHER BUT NO UNANIMOUS SUPPORT FOR ESTABLISHING A REGULAR SOURCE OF INCOME TOWARDS THIS END.

OBTAINING SUFFICIENT FINANCES IS A PROBLEM IN ENGLAND AND WALES ALSO. IN 1948, WHEN THE RIVER BOARDS WERE CONSTITUTED, CONTRIBUTIONS TO THEIR FINANCES IN RESPECT OF MIGRATORY FISHERIES WERE OBTAINED FROM FOUR SOURCES.

- (1) REVENUE FROM ROD ANGLERS,
- (2) REVENUE FROM NETSMEN FISHING FOR MIGRATORY FISH,
- (3) FISHERY RATES LEVIED UPON RIPARIAN OWNERS, AND
- (4) CONTRIBUTIONS FROM THE GENERAL RATES FUND.

THIS IS STILL THE CASE WITH THE RIVER AUTHORITIES WHICH REPLACED THE RIVER BOARDS AND THE SAME SYSTEM WILL PREVAIL IN THE NEWLY CONSTITUTED REGIONAL WATER AUTHORITIES WHICH WILL, IN TURN, REPLACE THEM.

WHILST (2) ABOVE CANNOT BE CONSIDERED AS A POSSIBLE MEANS OF OBTAINING FISHERY REVENUE IN THE FALKLAND ISLANDS AT PRESENT, IT MAY BE OF VALUE TO CONSIDER WHETHER THE SAME, OR SIMILAR, SOURCES OF INCOME AS (1), (3) AND (4) ABOVE ARE VALID IN THE ISLANDS.

(1) REVENUE FROM ROD ANGLERS

AS PREVIOUSLY STATED, THE REGULATIONS DO NOT IMPOSE LICENCE FEES ON ANGLERS. RECORDS KEPT BY THE CONSTABULARY AT STANLEY SHEW THAT 11 SPECIAL LICENCES TO FISH WITH FLY ON THE MOODY BROOK WERE ISSUED UP

TO FEBRUARY 28TH, 1973, AND 183 ORDINARY FISHING LICENCES WERE ISSUED IN 1972. THE TOTAL NUMBERS OF PERMITS ISSUED TO ANGLERS BY THE MANAGERS OF ALL THE SETTLEMENTS IS UNKNOWN TO ME BUT RECORDS OF THE DOUGLAS SETTLEMENT SHEW THAT 9 WERE ISSUED IN 1966, 8 IN 1967, 5 IN 1968, 6 IN 1969, 6 IN 1971 AND 3 IN 1972.

DISCUSSIONS I HAVE HAD ON LICENSING CHARGES WITH SOME OF THE OWNERS AND MANAGERS OF THE SETTLEMENTS HAVE EVOKED STRONG FEELINGS OF SUPPORT FOR THEIR INSTITUTION AND, ALTERNATIVELY, ANTAGONISM. IN SOME SETTLEMENTS, IT WAS FELT THAT ALL SHEPHERDS AND OTHER EMPLOYEES SHOULD BE EXEMPTED FROM LICENSING, THE ARGUMENT BEING BASED UPON THE LACK OF RECREATION IN THE VARIOUS CAMPS. A CONTRARY VIEW WAS EXPRESSED THAT, AS THE GENERAL POPULATION HAD CONTRIBUTED MONEY, THROUGH THE ISLANDS' FINANCES, TO COVER SOME OF THE COSTS OF ESTABLISHING FISH STOCKS, IT WAS REASONABLE TO IMPOSE A CHARGE FOR A FISHING LICENCE, WITH FEW OR NO EXCEPTIONS.

THE FALKLAND ISLANDS' ANGLING CLUB HAS APPRECIATED THE DIFFICULTIES OF OBTAINING SUFFICIENT INCOME TO DEVELOP THE FISHERIES AND HAS SUGGESTED TO THE GOVERNMENT THAT A ROD LICENCE FEE OF £1.00 PER ANNUM SHOULD BE PAYABLE. AT PRESENT, THIS FEE WOULD ONLY PRODUCE A GROSS INCOME OF APPROXIMATELY £250 PER ANNUM, FROM WHICH CHARGES WOULD HAVE TO BE DEDUCTED FOR PRINTING LICENCES, COLLECTING DUES AND ASSOCIATED ADMINISTRATIVE COSTS. EVEN SUCH A SMALL INCOME WOULD, HOWEVER, REDUCE GOVERNMENT-SUBSIDISED COSTS AT PRESENT INCURRED IN PRINTING AND ISSUING FREE LICENCES.

ROD LICENCE FEES APPLICABLE TO ENGLAND AND WALES WILL BE FOUND IN APPENDIX 3. MY RECOMMENDATIONS CONCERNING LICENSING CHARGES IN THE FALKLAND ISLANDS MAY BE SEEN IN THE APPROPRIATE SECTION AT THE END OF THIS REPORT.

(2) FISHERY RATES LEVIED UPON RIPARIAN OWNERS

A COPY OF REGULATIONS CONCERNING RATING OF FISHERIES, THE SUBSTANCE OF WHICH IS APPLICABLE THROUGHOUT ENGLAND AND WALES, WILL BE FOUND IN APPENDIX 4. THE MAXIMUM FISHERY CONTRIBUTION PERMITTED IN ENGLAND AND WALES, AT PRESENT, IS 25 PENCE IN THE POUND.

AS YET, THERE ARE FEW FISHERIES IN THE FALKLAND ISLANDS WHICH COULD COMMAND A HIGH FISHERY RENTAL BUT, AS A POINTER TO FUTURE FISHING POTENTIAL, I UNDERSTAND THAT FOUR ANGLERS FROM BEUNOS AIRES, IN FEBRUARY, 1973, PAID ABOUT £300 FOR 14 DAYS' FISHING AROUND THE VARIOUS SETTLEMENTS. AS YET, SUCH FISHING TRIPS ARE NOT COMMON BUT THERE ARE INDICATIONS THAT THEY COULD INCREASE AS A RESULT OF IMPROVED TRAVELLING FACILITIES TO THE ISLANDS. HOWEVER, UNLESS PROGRESSIVE POLICIES, SUPPORTED BY ADEQUATE FINANCES, ARE ADOPTED, IT IS UNLIKELY THAT THE FISHERIES WILL ATTRACT THE TOURIST ANGLER IN NUMBERS.

A PROPORTION OF THE FINANCES REQUIRED COULD BE OBTAINED BY MEANS OF FISHERY RATES LEVIED UPON RIPARIAN OWNERS OF MIGRATORY FISHERIES. SUCH FISHERIES ARE AN ASSET TO A SETTLEMENT. SHOULD NOT THE MAINTENANCE OF THAT ASSET REQUIRE A FINANCIAL CONTRIBUTION, BASED ON A RATING ASSESSMENT, TO BE MADE? THIS IS A QUESTION NOT EASILY ANSWERED BUT IS ONE TO WHICH THE EXECUTIVE COUNCIL SHOULD DIRECT ITS ATTENTION. TO ASSIST THE EXECUTIVE COUNCIL, I WOULD ADVISE THE SETTING UP OF A SMALL ADVISORY COMMITTEE CONSISTING OF H.E. THE GOVERNOR OR HIS REPRESENTATIVE, TWO RIPARIAN OWNERS AND TWO MEMBERS OF ANGLING ASSOCIATIONS.

### (3) CONTRIBUTIONS FROM THE GENERAL RATES FUND

IN ENGLAND AND WALES, A LARGE PROPORTION OF FISHERY INCOME IS OBTAINED FROM THE GENERAL RATES FUND AND IS LEVIED AS A PRECEPT UPON THE COUNTY AND COUNTY BOROUGH COUNCILS. IF TOURISTS VISIT THE ISLANDS IN EVER-INCREASING NUMBERS, IT MIGHT BE THOUGHT APPROPRIATE TO PRECEPT ON THE GENERAL RATES FUND, OR ITS EQUIVALENT, FOR FISHERY DEVELOPMENT AND MAINTENANCE.

I AM INFORMED THAT THE PER CAPITA INCOME IS ONLY ABOUT £500 PER ANNUM AND THE APPROXIMATE REVENUE ACCRUING FROM TAXATION ABOUT £150,000 PER ANNUM. THE SIZE OF THE POPULATION AND THE NUMBER OF HERADITAMENTS IN THE ISLANDS PRECLUDES ANY MAJOR FINANCIAL SUPPORT FOR THE IMPROVEMENT AND DEVELOPMENT OF THE FISHERIES. IT IS PRACTICALLY POSSIBLE TO LEVY A CHARGE UPON THE RATEABLE VALUE OF ALL THE CAMPS, COMMERCIAL AND DOMESTIC PROPERTIES, WHICH WOULD ALLOW SOME MINOR RIVER IMPROVEMENT WORKS TO BE

CARRIED OUT, BUT OBJECTIONS TO SUCH A SYSTEM COULD BE ANTICIPATED. IF THE RIVERS, MOST OF WHICH ARE IN PRIVATE OWNERSHIP, WERE TO BE IMPROVED MODESTLY BY THE OWNERS (USING THE SERVICES OF SETTLEMENT WORKERS, SAY) TO A DEGREE THAT WOULD ATTRACT TOURISTS TO THE FALKLAND ISLANDS, THEN BENEFIT TO A MAJOR PART OF THE COMMUNITY COULD RESULT AND SOME SUBSIDISATION MIGHT BE APPLIED TO IMPROVING A DEVELOPING NATURAL RESOURCE. RECOMMENDATIONS CONCERNING POSSIBLE IMPROVEMENTS MAY BE FOUND IN THE APPROPRIATE SECTION IN THIS REPORT BUT ONE AREA WHERE A SUBSIDY COULD BE OF HELP WOULD BE IN THE PROVISION OF RESIDENTIAL FISHING LODGES NEAR CERTAIN RIVERS, AS MENTIONED IN THE SECTION ON TOURISM/ANGLING.

CHAPTER 10  
RIVER AND CHANNEL IMPROVEMENTS

HAVING REGARD TO THE LIMITED FINANCE LIKELY TO BE AVAILABLE AND THE SHORTAGE OF MANPOWER AND NATURAL BUILDING MATERIALS IN THE FALKLAND ISLANDS, LITTLE CAN BE DONE TO IMPROVE THE REGIME OF THE VARIOUS RIVERS AND SO REALISE THEIR FULL POTENTIAL AS FISHERIES. THE CONSTRUCTION OF CROYS AND CHECK WEIRS WOULD BE EXTREMELY COSTLY AND THE PROBLEMS OF CARRYING OUT MAJOR FISHING IMPROVEMENTS IN THE RIVERS ARE MADE MORE COMPLEX BECAUSE OF ACCESS DIFFICULTIES. HOWEVER, THERE ARE A FEW MINOR MODIFICATIONS WHICH COULD BE CARRIED OUT WITHOUT TOO MUCH DIFFICULTY.

ONE IMPROVEMENT WOULD BE THE LOOSENING OF GRAVEL IN THE SPAWNING AND MID REACHES OF THE RIVERS. BECAUSE OF THE NATURE OF THE CATCHMENTS, THE GRAVEL HAS BECOME SO COMPACTED OVER THE YEARS THAT FISH HAVE DIFFICULTY IN LOOSENING THE SUB STRATE IN WHICH THEY MUST SPAWN. IF RIPARIAN OWNERS COULD ARRANGE FOR GRAVEL IN SELECTED SECTIONS UP TO 100 YARDS IN LENGTH TO BE LOOSENEED BY MEANS OF STEEL TINES TOWED BEHIND TRACTORS, THIS WOULD OPEN UP THE SUB STRATE AND PROVIDE MORE TERRITORIES FOR FISH, INCREASE THE FISH FOOD POTENTIAL AND CREATE BETTER CONDITIONS FOR FISH SPAWNING. THE WORK SHOULD BE CARRIED OUT IN THE MONTH OF APRIL.

ANOTHER IMPROVEMENT, USING TRACTORS, WOULD BE THE "BULLDOZING" OF GRAVEL FROM AREAS OF THIN WATER INTO HEAPS AT A 30° ANGLE TO THE FLOW, THUS DEFLECTING THE WATER INTO NARROWER CHANNELS. THIS WORK WOULD HAVE THE EFFECT OF CREATING "LIES" AND POOLS FOR FISH AND COULD BE OF VALUE WHEN CARRIED OUT IN SUCH PLACES AS IN THE VICINITY OF GORING HOUSE ON THE CHARTRES RIVER AND NEAR WARRAH HOUSE ON THE WARRAH RIVER.

IF FISHING CHECK WEIRS WERE MADE FROM THE STONES IN THE BED OF THE MALO RIVER AND SITUATED UPSTREAM OF THE EXISTING FISHING HUT, THEY WOULD EXTEND THE FISHING AREA WHICH IS AT ITS BEST WHEN TIDAL INFLUENCES UPLIFT THE WATER LEVEL. SIMILAR WEIRS CONSTRUCTED IN THE MURRELL RIVER WOULD ALSO BE OF GREAT ADVANTAGE.

THERE ARE MANY OTHER ZONES WHERE WORKS COULD BE OF DECIDED BENEFIT TO THE RIVERS BUT THE SIZES, TYPES AND LOCATIONS OF THESE SHOULD NOT BE PLANNED WITHOUT FURTHER INFORMATION. IF BED SURVEYS, RIVER WIDTHS AND DEPTHS ARE SENT TO ME, I WOULD BE ABLE TO MAKE SUGGESTIONS AS TO SUITABLE RIVER WORKS.

DURING MY VISIT, I WAS INFORMED OF THE PROBABILITY OF A DAM BEING BUILT ACROSS THE MURRELL RIVER TO PROVIDE WATER FOR INDUSTRIAL PURPOSES (ALGINATE PRODUCTS). SHOULD THIS SCHEME BECOME A REALITY, I WOULD SUGGEST THAT THOUGHT BE GIVEN TO THE CONSTRUCTION OF A SUITABLE FISHWAY IN THE DAM STRUCTURE. I WOULD BE PLEASED TO ASSIST IN THIS MATTER, SHOULD IT BE NECESSARY.

SECTION 5 - TOURISM AND ANGLING

CHAPTER II

TOURISM/ANGLING  
IN THE FALKLAND ISLANDS

HAVING INVESTIGATED THE MIGRATORY FISH RIVERS OF THE FALKLAND ISLANDS, CONSIDERATION MUST NOW BE GIVEN AS TO WHETHER OR NOT THEY COULD BE EXPLOITED TO THE ECONOMIC ADVANTAGE OF THE ISLANDS. THE MOST OBVIOUS FORM OF EXPLOITATION WOULD BE THAT OF ATTRACTING THE TOURIST ANGLER TO UNSPOILT AND LARGELY UNKNOWN RIVERS AND, CONSIDERING THE POPULARITY OF ANGLING VENUES IN ICELAND, NORWAY AND OTHER COUNTRIES FOR GAME FISHERMEN FROM DIFFERENT PARTS OF THE WORLD, THERE WOULD SEEM AN AVAILABLE MARKET.

I HAVE HAD DISCUSSIONS WITH ANGLERS RESIDENT IN THE ISLANDS AND OBTAINED THE FOLLOWING INFORMATION ON ANGLING CONDITIONS DURING DIFFERENT TIMES OF THE SEASON:-

- |  |   |  |
|--|---|--|
| <u>SEPTEMBER</u>                                   | - | KELTS ARE USUALLY CAUGHT IN THE RIVERS, AS ARE A FEW MAIDEN FISH. RIVER FLOWS ARE FAIRLY HIGH DURING THIS MONTH.   |
| <u>OCTOBER</u>                                     | - | RIVER FLOWS BEGIN TO DIMINISH IN VOLUME AND THE CATCHES OF KELTS ARE LESS NUMEROUS. FRESH RUN SEA TROUT ARE ENTERING THE RIVERS FROM THE SEA DURING THIS MONTH.  |
| <u>NOVEMBER, DECEMBER<br/>AND EARLY JANUARY</u>    | - | RIVER FLOWS ARE USUALLY LOW AND CATCHES ARE NOT AS GREAT AS IN THE PREVIOUS MONTHS.  |
| <u>LATE JANUARY, FEBRUARY,<br/>MARCH AND APRIL</u> | - | DURING THESE MONTHS, WHEN RIVER LEVELS ARE NORMALLY LOW, FISH ARE MAINLY CAUGHT IN THE SALT WATER REACHES AFFECTED BY THE FRESH WATER INFLOW. SHOULD SPATE FLOWS DEVELOP DURING FEBRUARY, A FAIR QUANTITY OF LARGE SEA TROUT TRAVEL UPSTREAM SOME CONSIDERABLE DISTANCE AWAY FROM THE ESTUARY. |

THE BEST FISHING MONTHS ARE SEPTEMBER, OCTOBER AND FEBRUARY.

THERE ARE FIVE RIVERS IN THE ISLANDS WHICH, IN PLACES, COULD BE UTILISED AS VENUES FOR VISITING ANGLERS AND THESE, IN ORDER OF FISHING POTENTIAL, ARE THE MALO, CHARTRES, MURRELL, WARRAH AND SAN CARLOS. OTHER STREAMS, WHICH INCLUDE THE FITZROY, SWAN INLET AND FRYING PAN CREEK, HAVE

SOME ANGLING POTENTIAL BUT NOT SUFFICIENT TO SATISFY THE DEMANDS OF THE DISCERNING FISHERMAN.

IN ORDER TO ESTIMATE THE AMOUNT OF REVENUE WHICH MAY BE OBTAINED FROM EXPLOITING THE FIVE RIVERS MENTIONED IN THE PRECEDING PARAGRAPH, I HAVE MADE THE FOLLOWING ASSUMPTIONS CONCERNING THE NUMBER OF TOURIST ANGLERS WHICH EACH COULD SUPPORT:-

MALO	-	6	PER	DAY,	6	DAYS	PER	WEEK
CHARTRES	-	6	"	"	6	"	"	"
MURRELL	-	4	"	"	6	"	"	"
WARRAH	-	4	"	"	6	"	"	"
SAN CARLOS	-	4	"	"	6	"	"	"

THESE ARE, IN MY OPINION, THE ABSOLUTE MAXIMUM NUMBERS THAT THE RIVERS COULD ACCOMMODATE AT THEIR PRESENT STAGE OF DEVELOPMENT, ESPECIALLY AS THE REQUIREMENTS OF LOCAL FISHERMEN MUST ALSO BE TAKEN INTO CONSIDERATION. LARGER NUMBERS OF ANGLERS MAY RESULT IN THE RIVERS BEING OVERFISHED, TO THE DETRIMENT OF FISH STOCKS IN THE RIVER SYSTEMS.

THE DAILY CHARGE FOR FISHING COULD NOT BE VERY HIGH IN EARLY STAGES OF TOURISM DEVELOPMENT AND I HAVE TAKEN THE AMOUNT OF £3.00 EACH PER DAY AS THE BASIS FOR MY CALCULATION. THE FISHING IS AT ITS BEST DURING SEPTEMBER, OCTOBER AND FEBRUARY AND, IF IT WAS TAKEN UP FOR 12 WEEKS @ 6 DAYS PER WEEK, THE ACCRUED INCOME WOULD BE:-

$$24 \times £3.00 \times 6 \times 12 = £5,184 \text{ PER ANNUM}$$

TO SOME, £3.00 MAY NOT SEEM A REASONABLE CHARGE FOR FISHING IN THE ISLANDS, PARTICULARLY HAVING REGARD TO THE VERY LARGE RENTALS THAT GAME FISHERIES CAN COMMAND IN EUROPE AND ELSEWHERE, BUT THE HIGH COST OF TRAVELLING TO THE ISLANDS, ESPECIALLY FROM EUROPE AND NORTH AMERICA, MUST BE TAKEN INTO ACCOUNT; A HIGH FISHERY CHARGE ADDED TO THE COSTS OF SUBSISTENCE AND TRAVELLING COULD WELL BE SO PROHIBITIVE AS TO DETER ALL BUT THE VERY WEALTHIEST OF ANGLERS. (IN ANY EVENT, IT IS LIKELY THAT THE FALKLAND ISLANDS' FISHERIES WILL ATTRACT MORE SOUTH AMERICAN ANGLERS, BECAUSE OF THE SHORTER DISTANCES INVOLVED IN REACHING THE ISLANDS.) ALSO, IN FURTHER JUSTIFICATION OF THE DAILY CHARGE OF £3.00, IT MUST BE POINTED OUT THAT, AS YET, THE FISHERIES IN THE FALKLANDS CANNOT COMPARE, IN QUALITY, WITH GAME FISHING RIVERS IN OTHER COUNTRIES.



TRAVEL TO THE FALKLANDS IS, IN FACT, ONE OF THE DRAWBACKS PREJUDICIAL TO THE RAPID DEVELOPMENT OF A TOURIST ANGLING INDUSTRY. THE R.M.S. "DARWIN", FORMERLY OPERATED BY THE FALKLAND ISLANDS' COMPANY, HAS NOW BEEN WITHDRAWN FROM SERVICE AND, IN ITS PLACE, A WEEKLY FLIGHT FROM COMMODORE RIVADAVIA CONVEYS UP TO 25 PASSENGERS TO AND FROM STANLEY. IF A MORE FREQUENT AIR SERVICE, WITH A GREATER PASSENGER-CARRYING CAPACITY, WAS INAUGURATED, THIS COULD POSSIBLY INFLUENCE THE NUMBERS OF TOURISTS TRAVELLING TO THE ISLANDS, ESPECIALLY FROM THE MAINLAND OF SOUTH AMERICA.

FURTHER, IN THE CASE OF TOURIST ANGLERS, THERE IS THE PROBLEM OF TRANSPORTING THEM TO DIFFERENT RIVERS ONCE THEY HAVE REACHED THE ISLANDS. AT PRESENT, BECAUSE OF THE LACK OF ROADS AND THE DIFFICULTY OF THE TERRAIN, OVERLAND TRANSPORT IS ACHIEVED BY THE USE OF LAND ROVERS. SEA PLANES ARE ANOTHER MODE OF TRANSPORT USED BUT THESE COULD ONLY TRANSPORT ANGLERS TO THE HIGHER REACHES OF THE ESTUARIES. IT IS DIFFICULT TO SEE HOW OVERLAND AND AIRBORNE TRANSPORT COULD BE ECONOMICALLY DEVELOPED, ESPECIALLY IN VIEW OF THE LOW ESTIMATED INCOME LIKELY TO ACCRUE DURING THE FIRST YEARS OF TOURISM DEVELOPMENT.

TO AVOID LONG AND UNCOMFORTABLE DAILY RIDES IN LAND ROVERS BETWEEN THE SETTLEMENTS AND THE RIVERS, WHICH COULD DETER ELDERLY ANGLERS IN PARTICULAR, CONSIDERATION MIGHT BE GIVEN TO THE PROVISION OF PREFABRICATED FISHING LODGES BY THE SIDES OF THE RIVERS; THESE SHOULD CONTAIN SLEEPING ACCOMMODATION, COOKING FACILITIES, BATHROOMS AND TOILETS. I HAVE LOOKED INTO THE POSSIBILITY OF EXPORTING SUITABLE BUILDINGS FROM THE BRITISH ISLES AND MESSRS. W.H. COLT SON & CO. LTD., BETHERSDEN, KENT, AND MESSRS. GUILDWAY LTD., PORTSMOUTH ROAD (A3100), GUILDFORD, SURREY, WILL SUPPLY DETAILS, IF REQUIRED, OF THEIR DESIGNS AND COSTS. (SUITABLE FISHING LODGES FOR ERECTION ON PREPARED SITES VARY FROM £5,000 TO £8,000 EX WORKS U.K.) ALTERNATIVELY, IT MAY BE POSSIBLE TO ADAPT EXISTING BUILDINGS (IF ANY) NEAR TO THE RIVERS. WHATEVER THE MEANS, EVERY EFFORT SHOULD BE MADE TO OBTAIN THE DIFFICULT TRANSPORT PROBLEM FOR, ALTHOUGH I HAVE FISHED IN MANY DIFFERENT COUNTRIES, I HAVE NEVER ENCOUNTERED SUCH DIFFICULT TERRAIN BEFORE AND IT MUST HAVE A DETRIMENTAL EFFECT ON THE DEVELOPMENT OF THE RIVERS AS TOURIST ATTRACTIONS.

THE FALKLAND ISLANDS HAVE A LOT TO OFFER TOURING NATURALISTS AS THE UNSPOILT COUNTRY IS WELL POPULATED WITH INTERESTING BIRDS AND ANIMALS, AND THE SAME FACILITIES SET UP FOR ANGLERS COULD ALSO SERVE FOR THEM. IT MAY BE THAT PACKAGE TOURS, OFFERING VISITS TO SEAL, PENGUIN AND BIRD COLONIES AS WELL AS ANGLING FACILITIES, WOULD BE THE BEST WAY OF UTILISING PRESENT NATURAL RESOURCES. PERHAPS ONE OF THE LARGE TOURIST AGENCIES COULD BE APPROACHED WITH A VIEW TO WORKING OUT A PROGRAMME WITH ALL-INCLUSIVE COSTS.

I WOULD ADVISE THAT SOME EFFORT IS MADE, BEFORE ANY LARGE SCALE EXPENDITURE IS CARRIED OUT, TO ASCERTAIN THE NUMBERS OF ANGLERS INTERESTED IN FISHING THE FALKLAND RIVERS IN, SAY, SOUTH AMERICA, WHICH IS THE NEAREST LAND MASS WITH A SUBSTANTIAL POPULATION. (ENQUIRIES MADE TO ANGLING CLUBS OR THE ENGAGEMENT OF THE SERVICES OF A MARKET RESEARCH ORGANISATION MAY BE OF ASSISTANCE HERE.) EVEN IF THE DEMAND IS FOUND TO BE CONSIDERABLE, HOWEVER, STRICT CONTROL OF THE NUMBERS ALLOWED TO FISH MUST BE ENFORCED IN VIEW OF THE PRESENT STAGE OF DEVELOPMENT OF THE FISHERIES.

HAVING SEEN MUCH OF THE COASTLINE AND TRAVELLED OUT TO SEA IN A SMALL BOAT, I CANNOT VISUALISE SEA ANGLING AROUND THE ISLANDS DEVELOPING INTO A MAJOR TOURIST ATTRACTION. THE OFFSHORE KELP GROWTH, THE WIND AND THE ROUGHNESS OF THE SEA ARE LIKELY TO DETER ALL BUT THE MOST DEDICATED SEA ANGLER.

## SECTION 6 - SEA FISHERIES

### CHAPTER 12

#### SEA FISHERIES OFF THE FALKLAND ISLANDS

IN ORDER TO ASSESS THE POTENTIAL OF THE SEA FISHERIES OFF THE FALKLAND ISLANDS, I HAVE EXAMINED LITERATURE AND SOME OF THE "DISCOVERY" REPORTS IN THE LIBRARY OF THE UNIVERSITY OF LIVERPOOL. THEY REVEALED THAT WELL OVER 50 SPECIES OF FISH WERE TO BE FOUND OFF THE FALKLANDS AND WERE COMMON TO ARGENTINA, CHILE, THE PATAGONIAN FALKLAND REGIONS AND SOUTH AFRICA, WHILST ONE OR TWO WERE COMMON TO SOUTH AUSTRALIA AND NEW ZEALAND AS WELL AS THE FALKLANDS. (THESE FISH ARE WELL DOCUMENTED AND HAVE NOT, THEREFORE, BEEN DESCRIBED IN THIS REPORT.)

DURING MY VISIT TO THE ISLANDS, MY ENQUIRIES REVEALED THAT NO DEEP SEA FISHING BOATS OPERATE FROM THERE AND ONLY INFREQUENTLY DO ONE OR TWO SMALL BOATS ENGAGE IN INSHORE FISHING. THIS IS UNDERSTANDABLE FOR THE FISH REQUIREMENTS OF THE ISLANDS' POPULATION ARE SUCH THAT ANY CONSISTENT EXPLOITATION BY LOCAL SEA FISHERMEN WOULD BE COMPLETELY UNECONOMIC. THE FISH MOST FREQUENTLY CAUGHT IN THE VICINITY OF THE COASTLINE ARE THE LOCALLY TERMED "SMELT" AND "MULLET", BOTH OF WHICH ARE EXCELLENT EATING. ON ONE OCCASION, I SAW AN EXTREMELY GOOD CATCH OF LARGE MUSSELS, THE QUALITY OF WHICH WOULD HAVE COMMANDED A HIGH PRICE IN THE FISH MARKETS OF THE BRITISH ISLES.

"MULLET" ENTER THE ESTUARIES IN GREAT NUMBERS. THEY ARE OF A SIZE UP TO 12-15 LBS. AND CAN BE CAUGHT ON ROD AND LINE BY ANGLERS. THEIR FIGHTING QUALITIES ARE SUCH THAT THIS TYPE OF FISHING COULD BE MOST ATTRACTIVE TO TOURIST ANGLERS.

ON MANY OCCASIONS, I WAS INFORMED BY LOCAL INHABITANTS OF THE ACTIVITIES OF RUSSIAN, JAPANESE AND ARGENTINIAN FISHING FLEETS, WHICH WERE SUPPOSEDLY OPERATING, TOGETHER WITH FACTORY SHIPS, OFF THE ISLANDS AND TAKING ENORMOUS QUANTITIES OF CRAB, KRILL, A TYPE OF HERRING, SKATE AND HAKE. I WAS ALSO INFORMED THAT THE ARGENTINIAN GOVERNMENT WAS CURRENTLY INVESTIGATING THE POTENTIAL OF THE HAKE RESOURCES IN THE SEA AND OTHER DEEP SEA FISHING DEVELOPMENT. (I HAVE SINCE FOUND THAT THE TERRITORIAL FISHING LIMITS OF ARGENTINA EXTEND 200 LAND MILES FROM HER COASTLINE.) NOWHERE COULD I OBTAIN FACTUAL INFORMATION UPON THE SIZES

OF THESE FISHING FLEETS, THE SPECIES OF FISH FORMING THE MAIN CATCH, THE TONNAGE OF FISH CAUGHT AND THE BASES FROM WHICH THE FLEETS OPERATE. IF MY INFORMANTS ARE CORRECT, THE RUSSIAN AND JAPANESE FISHING FLEETS WOULD BE OPERATING ROUGHLY 14,000 EQUATORIAL MILES FROM THEIR HOME PORTS.

THE DISTANCE BY SEA FROM THE BRITISH ISLES TO THE FALKLAND ISLANDS IS ABOUT 10,000 EQUATORIAL MILES. WHILST THIS DISTANCE IS FAR IN EXCESS OF THAT FROM THE BRITISH ISLES TO THE TRADITIONAL FISHING GROUNDS OFF ICELAND, IF THE PRESSURES NOW BEING EXERTED BY ICELAND TO INCREASE HER OFFSHORE FISHING LIMITS TO 50 MILES FROM HER COASTLINE MEET WITH SUCCESS, THEN IT WOULD NOT SEEM UNREASONABLE FOR BRITISH FISHING FLEETS TO CONSIDER FISHING THE WATERS OFF THE FALKLAND ISLANDS TO MAKE UP FOR THE LOST TONNAGE. MOST OF THE SEA FISH SPECIES IN THE SOUTHERN HEMISPHERE WOULD BE UNFAMILIAR TO THE INHABITANTS OF THE BRITISH ISLES BUT THEY COULD PROVE A VALUABLE SOURCE OF FISH PROTEIN.

THE PROBLEMS ASSOCIATED WITH LARGE SCALE COMMERCIAL EXPLOITATION OF THE SEAS, SUCH AS TO BE OF ECONOMIC BENEFIT TO THE FALKLANDS, CANNOT BE SPEEDILY ASSESSED. EXPERIMENTAL COMMERCIAL TEST FISHING SHOULD BE INAUGURATED IMMEDIATELY AND, IF EXPLOITATION IS FEASIBLE, THEN A SUITABLY FINANCED FISHING ORGANISATION, BASED ON SOUND COMMERCIAL PRINCIPLES, SHOULD BE DEVELOPED. THERE WOULD BE MANY INHERENT DIFFICULTIES IN THIS DEVELOPMENT, MOSTLY ASSOCIATED WITH THE REMOTENESS OF THE ISLANDS FROM THE BRITISH ISLES, BUT THEY COULD BE OFFSET, TO SOME DEGREE, BY THE MANY SUITABLE SHORE BASES FOR A FISHING FLEET (SUCH AS AJAX BAY) AND THE USE OF THE AT PRESENT DISUSED FREEZING PLANT AND FACTORY (ADJACENT TO AJAX BAY), WHICH COULD PROVIDE STORAGE, FREEZING, WASTE PROCESSING, SALES AND DISPOSAL FACILITIES. SOME OF THE MOST MODERN FISH PROCESSING FACTORIES, TO WHICH FISHING FLEETS HAVE DIRECT ACCESS, OPERATE IN NOVA SCOTIA AND NEW BRUNSWICK AND IT WOULD BE BENEFICIAL TO STUDY IN DEPTH THE OPERATIONS NOW ESTABLISHED IN THESE PARTS OF CANADA.

I HAVE GIVEN CONSIDERATION TO ALL METHODS OF FISHING WHICH COULD BENEFIT THE ECONOMY OF THE ISLANDS AND AM OF THE FIRM OPINION THAT MORE ATTENTION SHOULD BE DIRECTED TO THE EXPLOITATION OF THE COMMERCIAL DEEP SEA AND INSHORE FISHING THAN TO THE DEVELOPMENT OF TOURISM AND GAME FISHING.

IF COMMERCIAL INSHORE FISHING DOES DEVELOP, HOWEVER, CONTROL MUST BE EXERCISED OVER THE TYPES AND DESIGNS OF NETS USED WITHIN A SPECIFIED DISTANCE FROM THE COASTLINE. SUCH CONTROL WOULD BE NECESSARY TO SAFEGUARD THE DEVELOPING MIGRATORY FISHERIES.

SECTION 7 - SUMMARY

CHAPTER 13

SUMMARY

SECTION 1

CHAPTER 2

(PAGE 12) IT WOULD BE AGAINST ALL CONCEPTS OF CONSERVATION TO ALLOW THE INDISCRIMINATE DESTRUCTION OF THE APOLOCHITON ZEBRA AND GALAXIAS MACULATUS. THESE TWO FISH SPECIES SHOULD BE SAFEGUARDED AGAINST EXPLOITATION BY MAN OR EXTERMINATION BY THE INTRODUCTION OF EXOTIC SPECIES INTO RIVERS AND LAKES. (SEE ALSO INTRODUCTION, PAGES 6 AND 7)

SECTION 2

CHAPTER 3

(PAGE 20) THE TAKING OF FISH BY ELECTRO FISHING METHODS, SUCH AS I INTRODUCED INTO THE ISLANDS, COULD BE OF GREAT DETRIMENT TO THE FISH STOCKS IF USED BY UNAUTHORISED PERSONS.

CHAPTER 5

(PAGE 32) THE MOST PREVALENT FOOD FOR TROUT IN THE RIVERS OF THE FALKLAND ISLANDS IS GAMMARUS, THE FRESHWATER SHRIMP.

(PAGE 33) IN THE ISLANDS, LIVERWORT IS THE MAIN HABITAT FOR THE GAMMARUS.

(PAGE 39) AN INVESTIGATION OF THE FOOD RESOURCES IN THE RIVERS PROVED THAT THEY ARE INADEQUATE TO PRODUCE LARGE TROUT WITHOUT ESTUARY OR SEA FEEDING.

(PAGE 40) THE FISHERIES CANNOT BE SUPERVISED BY BAILIFFS, SUCH AS IS THE CASE IN THE BRITISH ISLES, AND THEIR FUTURE WELLBEING MUST DEPEND UPON THE VIGILANCE OF THE RIPARIAN OWNERS, CAMP MANAGERS AND SHEPHERDS.

(PAGE 40) UNLESS STRICTER CONTROL IS APPLIED AGAINST THE TAKING OF UNDER-SIZED FISH, AN INCREASE IN THE STOCK OF SEA GOING TROUT MAY BE RETARDED.

(PAGE 41) PARASITES, PORROCAECUM SP., WERE FOUND IN MANY OF THE FISH AND IT IS DIFFICULT TO SEE HOW THEIR LIFE CYCLE CAN BE BROKEN.

CHAPTER 6

(PAGE 43) FOR SOME UNKNOWN REASON, A LARGE PROPORTION OF IMMATURE FISH ARE INJURED IN THE EARLY STAGES OF GROWTH.

(PAGE 45) THE GROWTH OF THE FALKLAND ISLANDS' SEA TROUT IS COMPARABLE TO

THE GROWTH RATES OF SEA TROUT IN THE BRITISH ISLES; SEA TROUT IN THE FALKLAND ISLANDS MIGRATE SEAWARDS AT 3 YEARS OF AGE; THE LENGTH OF THE FALKLAND TROUT AT TIME OF MIGRATION SEAWARDS IS SIMILAR TO THAT OF THE NON-MIGRATORY TROUT IN THE ISLANDS' RIVERS; SLOB TROUT DO NOT ATTAIN THE SAME LENGTH AS THE SEA TROUT RETURNING FROM THE SEA.

(PAGE 46) THE METHODS OF RECORDING FISH CAUGHT IN THE RIVERS COULD BE GREATLY IMPROVED. SCALES SHOULD BE TAKEN FOR "READING".

### SECTION 3

#### CHAPTER 7

(PAGE 54) THERE IS NO EVIDENCE AVAILABLE WHICH SHEWS THAT THE ATLANTIC SALMON IS PRESENT IN THE RIVERS OF THE FALKLAND ISLANDS.

(PAGES 56-57) ON THE EVIDENCE AVAILABLE, THE ATLANTIC SALMON CANNOT NATURALLY DEVELOP AND PERPETUATE ITS SPECIES IN THE ISLANDS.

(PAGE 57) IT WOULD BE AN INTERESTING EXPERIMENT TO TRY AND INTRODUCE CHINOOK SALMON INTO THE FALKLAND ISLANDS BUT ADEQUATE FINANCE AND THE SERVICES OF A COMPETENT FISHERY BIOLOGIST WOULD BE REQUIRED.

### SECTION 4

#### CHAPTER 8

(PAGE 60) RECORDS SHEW THAT MANY UNDERSIZED FISH ARE BEING CAUGHT, IN CONTRAVENTION OF THE FISHERY REGULATIONS.

(PAGE 69) RECORDS OVER 4 YEARS SHEW THAT THE AVERAGE WEIGHT OF SEA TROUT IN THE MALO RIVER IS REASONABLY CONSTANT.

(PAGE 70) THE CATCHES OF FISH OF GREATER WEIGHT IN THE MALO RIVER HAVE INCREASED SINCE 1969.

#### CHAPTER 9

(PAGE 74) COLLECTIVELY, THE RIPARIAN OWNERS AND ANGLERS WISH TO SEE THE FISHERIES IMPROVE BUT I CANNOT RECONCILE THEIR SENTIMENTS WITH THE TAKING, ALBEIT UNWITTINGLY, OF SO MANY SPAWNING FISH.

(PAGE 75) THE FISHERIES CANNOT BE MAINTAINED, DEVELOPED OR IMPROVED WITHOUT ADEQUATE FINANCIAL SUPPORT.

(PAGE 76) BY APPLYING A ROD LICENCE OF £1.00 PER ANNUM TO ALL ANGLERS, IT IS UNLIKELY THAT AN ANNUAL REVENUE GREATER THAN £250 PER ANNUM WILL ACCRUE.

(PAGE 77) THE IMPOSITION OF A FISHERY RATE UPON RIPARIAN OWNERS WOULD BE DIFFICULT.

(PAGE 77) THE SIZE OF THE PRESENT POPULATION OF THE ISLANDS AND THE NUMBER OF HERADITAMENTS PRECLUDES ANY MAJOR FINANCIAL SUPPORT FOR FISHERIES FROM THE GENERAL RATES FUND.

#### CHAPTER 10

(PAGE 79) THE DIFFICULTIES ASSOCIATED WITH CARRYING OUT MAJOR WORKS IN THE RIVERS ARE AT PRESENT INSURMOUNTABLE BECAUSE OF TERRAIN AND THE LACK OF RAW MATERIALS.

(PAGE 79) LOOSENING THE GRAVEL SUB STRATE WOULD BE A MEANS OF IMPROVING CONDITIONS FOR SPAWNING FISH.

(PAGE 79) MINOR WORKS CARRIED OUT IN THE CHARTRES, WARRAH, MURRELL AND MALO RIVERS COULD IMPROVE THE ANGLING POTENTIAL.

(PAGE 80) IF THE MURRELL RIVER IS EXPLOITED FOR WATER RESOURCE DEVELOPMENT AND THE VALLEY IS ENCLOSED BY A LARGE DAM, A FISHWAY SHOULD BE INCORPORATED IN THE DAM STRUCTURE.

#### SECTION 5

#### CHAPTER 11

(PAGE 81) FIVE RIVERS - (IN ORDER OF FISHING POTENTIAL) THE MALO, CHARTRES, MURRELL, WARRAH AND SAN CARLOS - ARE VALUABLE VENUES FOR VISITING ANGLERS.

(PAGE 82) THE MAXIMUM REVENUE LIKELY TO ACCRUE FROM TOURIST ANGLERS IS IN THE REGION OF £5,000 AND THIS AMOUNT, WHEN DIVIDED BETWEEN FIVE RIPARIAN OWNERS AND THE GOVERNMENT, IS TOO SMALL AN INCOME FOR THE EFFORT AND CONTROL INVOLVED.

(PAGE 82) A DAILY FISHING CHARGE OF £3.00 IS REASONABLE, HAVING REGARD TO THE PRESENT STATE OF THE FISHERIES; THE FISHERIES OF THE FALKLAND ISLANDS CANNOT YET COMPARE WITH FISHERIES (I.E. GAME FISHERIES) OF OTHER COUNTRIES. ACCOUNT MUST ALSO BE TAKEN OF THE HIGH COST OF TRAVELLING TO THE ISLANDS.



(PAGE 83) TOURISM WILL BE DIFFICULT TO DEVELOP UNLESS EASIER AND BETTER MEANS OF TRANSPORT CAN BE MADE AVAILABLE. THIS APPLIES TO AIR SERVICES AND OVERLAND TRANSPORT.

(PAGE 83) FISHING LODGES SUITABLE FOR TOURIST ANGLERS AND NATURALISTS COULD BE EXPORTED FROM ENGLAND BUT WOULD COST £5,000-£8,000 EX WORKS U.K.

(PAGE 84) THE FALKLAND ISLANDS ARE UNSPOILT AND COULD BE A VENUE FOR ANGLERS AND NATURALISTS, AND TOURIST AGENCIES MAY BE OF ASSISTANCE IN DEVELOPING A TOURIST INDUSTRY.

(PAGE 84) IT IS UNLIKELY THAT ANGLING IN THE SEA WILL DEVELOP AS A TOURIST ATTRACTION.

## SECTION 6

### CHAPTER 12

(PAGE 85) THERE ARE OVER 50 SPECIES OF FISH IN THE SEA OFF THE FALKLAND ISLANDS.

(PAGES 85-86) I HAVE BEEN UNABLE TO OBTAIN FACTUAL INFORMATION ABOUT THE ALLEGED ACTIVITIES OF FISHING FLEETS OF OTHER NATIONS IN THE SEAS OFF THE FALKLAND ISLANDS.

(PAGE 86) MORE ATTENTION SHOULD BE DIRECTED TO THE EXPLOITATION OF THE SEA, USING THE FALKLAND ISLANDS AS A BASE FOR FISHING FLEETS, THAN TO THE DEVELOPMENT OF GAME FISHERIES AS AN AID FOR IMPROVING THE ISLANDS' ECONOMY.

(PAGE 87) SHOULD COMMERCIAL INSHORE FISHING DEVELOP, RESTRICTIONS ON THE NETS USED MAY BE NECESSARY.

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I MAKE NO APOLOGIES FOR THE LENGTH OF THIS REPORT AND THE DETAIL GIVEN. THIS IS THE FIRST TIME THAT A FULL APPRECIATION OF THE FISHERIES OF THE FALKLAND ISLANDS HAS BEEN CARRIED OUT AND THE INFORMATION NOW RECORDED MAY FORM A BASIS FOR FURTHER STUDIES BY FISHERY BIOLOGISTS IN THE FUTURE.

SECTION 8 - RECOMMENDATIONS

CHAPTER 14

RECOMMENDATIONS

1. LEGISLATION SHOULD BE ENACTED AS FOLLOWS:-

(A) THE USE OF ANY ELECTRICALLY OPERATED APPLIANCE, MACHINE OR OTHER INSTRUMENT FOR THE TAKING OF SALMO TRUTTA OR APLOCHITON ZEBRA IS PROHIBITED, PROVIDED THAT THIS SHALL NOT APPLY TO ANY PERSON ACTING IN ACCORDANCE WITH THE WRITTEN INSTRUCTIONS OF THE CHIEF SECRETARY.

(B) NO SALMON, TROUT NOR ANY OTHER EXOTIC SPECIES, NOR ANY SPAWN THEREOF FROM ANY SOURCE, MAY BE INTRODUCED INTO ANY INLAND WATER IN THE ISLANDS WITHOUT THE PREVIOUS CONSENT IN WRITING OF THE CHIEF SECRETARY. APPLICATIONS TO DO SO SHALL SPECIFY THE NUMBERS, TYPES OF FISH OR SPAWN, AGES AND SOURCE OF SUPPLY AND BE SUBJECT TO SUCH CONDITIONS AS THE CHIEF SECRETARY SHALL IMPOSE.

2. A COMMITTEE OF FIVE, COMPOSED OF HIS EXCELLENCY THE GOVERNOR OR HIS NOMINEE, TWO RIPARIAN OWNERS AND TWO ANGLERS, SHOULD BE ESTABLISHED TO ACT IN AN ADVISORY CAPACITY IN CONNECTION WITH THE FINANCIAL ASPECTS OF FISHERIES, TOURISM AND NATURE RESERVES.

3. LICENCES SHOULD BE ISSUED TO ALL PERSONS FISHING FOR MIGRATORY TROUT, NON-MIGRATORY TROUT, APLOCHITON ZEBRA AND THE LOCALLY TERMED "MULLET" AND "SMELT" AND SUCH LICENCES SHOULD HAVE EFFECT AS FOLLOWS:-

A "SPORTING LICENCE" SHOULD BE INTRODUCED, AUTHORIZING THE CARRYING OR BEING IN POSSESSION OF A GUN, RIFLE OR FISHING ROD, AND THE COST OF SUCH A LICENCE SHOULD BE £2.00 PER ANNUM. THE OPERATIVE DATES SHOULD BE FIXED TO CONFORM TO LOCAL CONDITIONS.

(A FEE OF £2.00 PER ANNUM IS REASONABLE AND SUCH A LICENCE SHOULD INCLUDE THE PRESENT CHARGES LEVIED FOR A FIREARMS CERTIFICATE OR GUN LICENCE. SPORTING LICENCES SHOULD BE ISSUED BY THE CONSTABULARY AT STANLEY.)

NOTE: IT IS IMPOSSIBLE TO ENFORCE A DECREE THAT ALL ANGLERS ON THE

CAMPS AND SETTLEMENTS TAKE OUT A FISHING LICENCE AND, IF THEY HAD TO PAY FOR A SEPARATE FISHING LICENCE, FEW WOULD DO SO; THEY WOULD NOT, HOWEVER, FOREGO THE RIGHT TO HOLD A FIREARMS CERTIFICATE OR GUN LICENCE. THIS IS THE REASON WHY I ADVOCATE THE INTRODUCTION OF A SPORTING LICENCE (IF IT IS LEGALLY POSSIBLE), WHICH WOULD ACT AS A FIREARMS CERTIFICATE, GUN LICENCE AND ROD LICENCE.

4. A MONTHLY LICENCE SHOULD BE ISSUED AT A COST OF £2.00 PER CONSECUTIVE MONTH. THIS WOULD APPLY MOSTLY TO VISITING ANGLERS.

5. PROHIBITION OF THE TAKING OF UNDERSIZED FISH CANNOT BE ENFORCED ALTHOUGH EXISTING LEGAL ENACTMENTS MAKE IT AN OFFENCE FOR THESE FISH TO BE TAKEN. CAMP OWNERS AND ANGLERS SHOULD RIGIDLY ENFORCE THE SIZE LIMITS EMBODIED IN THE REGULATIONS AND PROSECUTIONS SHOULD BE TAKEN ASSIDUOUSLY AGAINST OFFENDERS.

6. FOR AT LEAST FOUR YEARS, SCALES SHOULD BE COLLECTED FROM ALL FISH CAUGHT AND SENT TO ENGLAND FOR ANALYSIS AND REPORT. COMPLETE RECORDS SHOULD ALSO BE MAINTAINED.

7. FISH HATCHERY FACILITIES NOW ESTABLISHED NEAR THE MOODY BROOK ARE OBSOLETE AND SHOULD NOT BE DEVELOPED AT PRESENT.

8. IF FUNDS ARE AVAILABLE AND A SUPPLY OF CHINOOK SALMON OVA COULD BE OBTAINED AT NOMINAL COST FROM THE UNITED STATES OF AMERICA, CANADA OR JAPAN, THEN I WOULD RECOMMEND THAT A CONTROLLED EXPERIMENT BE CARRIED OUT ON THE MALO RIVER. BEFORE EMBARKING ON SUCH A PROJECT, HOWEVER, THE DETAILS NOW AWAITED FROM NEW ZEALAND SHOULD BE STUDIED.

9. EVERY EFFORT SHOULD BE MADE TO LOOSEN GRAVEL IN CERTAIN ZONES IN THE RIVER, CONSTRUCT CHECK WEIRS WHERE POSSIBLE AND "BULLDOZE" THE GRAVEL INTO HEAPS TO CREATE "STICKLES". THE LIVERWORT, HOWEVER, MUST NOT BE DISTURBED TO ANY MAJOR DEGREE.

10. THE CONSTRUCTION OF FISHWAYS IN ANY HIGH DAMS WHICH MAY BE BUILT ACROSS THE VALLEY OF THE MURRELL RIVER OR ANY OTHER RIVER IS RECOMMENDED.

11. I CANNOT VISUALISE HOW ANY MAJOR SOURCE OF INCOME CAN BE DERIVED FROM ANGLING TOURISM IN THE ISLANDS. THERE IS NO GUARANTEE THAT ANY CHALETS CONSTRUCTED FOR THE USE OF ANGLERS AND NATURALISTS WOULD BE FULLY UTILISED AND MONEY COULD BE WASTEFULLY EXPENDED; IN ANY EVENT, IT WOULD BE MANY YEARS BEFORE THE CAPITAL OUTLAY COULD BE FULLY RECOUPED. SHOULD THE DESIRE AND CAPITAL FOR SUCH DEVELOPMENT BE AVAILABLE, HOWEVER, THEN A SITE IN THE VICINITY OF THE MALO RIVER SHOULD BE CHOSEN. IF FINANCIAL ARRANGEMENTS COULD BE AGREED BETWEEN THE CAMP OWNERS AND THE GOVERNMENT, THIS AREA SHOULD BE THE FIRST PRIORITY. NEXT, THE CHARTRES MIGHT BE CONSIDERED AS A SECONDARY TOURIST VENUE ESPECIALLY FOR ANGLERS.

IT WOULD, IN MY OPINION, BE INADVISABLE FOR THE GOVERNMENT TO DEVELOP TOURIST FACILITIES UPON PRIVATE LAND AND FINANCE THE CONSTRUCTION OF ACCOMMODATION FOR TOURISTS WHEN THERE ARE SO MANY DISADVANTAGES TO DETRACT FROM SUCCESS.

12. IF ANGLING TOURISM IS TO BE DEVELOPED, IT CANNOT BE FULLY ORGANISED ON A LOCAL BASIS. THE CO-OPERATION OF INTERNATIONALLY RENOWNED TOURIST AGENCIES SHOULD BE SOUGHT AND INFORMATION ABOUT THE FISHERIES DISSEMINATED WIDELY. (EXTRACTS FROM MY REPORT MAY BE HELPFUL IN THIS RESPECT.)

PACKAGE TOURS ARE NOW ORGANISED TO CONVEY TOURISTS FROM EUROPE TO ANTARTICA AND THE FALKLAND ISLANDS MIGHT BE USED AS A "STOPPING POINT", ESPECIALLY IF THE AIRFIELD FACILITIES ARE IMPROVED.

13. THERE IS NO NEED, AT PRESENT, TO CURTAIL THE ANGLING SEASON NOR SHOULD IT BE EXTENDED.

14. THE FISH POTENTIAL IN THE SEA OFF THE FALKLAND ISLANDS SHOULD BE FULLY EXPLOITED AND H.M. GOVERNMENT SHOULD BE APPROACHED FORTHWITH TO FINANCE AN EXPLORATORY COMMERCIAL FISHING PROJECT TO ASCERTAIN IF THE SEA FISH COULD BE HARVESTED TO THE MUTUAL BENEFIT OF THE ISLANDS AND GREAT BRITAIN.

CONCURRENTLY, A FEASIBILITY STUDY SHOULD BE INAUGURATED TO ASCERTAIN IF AJAX BAY AND THE FACTORY FREEZING PLANT COULD BE UTILISED AND BROUGHT BACK INTO SERVICE IN CONNECTION WITH THE ACTIVITIES OF A FISHING FLEET.

## ACKNOWLEDGMENTS

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APPENDICES

APPENDIX I

(EXTRACT FROM "INVESTIGATIONS INTO MIGRATORY FISH PROPAGATION IN THE AREA OF THE LANCASHIRE RIVER BOARD" BY L. STEWART (1963))

INVESTIGATION INTO RESULTS OF OVA PLANTING

"..... REDDS WERE EXAMINED TO INVESTIGATE THE PERCENTAGE OF HATCHABILITY OF THE OVA SO IMPLANTED, AND ALSO THEIR SURVIVAL TO THE ALEVIN STAGE.

DURING 1958 IT WAS FOUND THAT A CONSIDERABLE AMOUNT OF OVA WAS LOST AS A RESULT OF SPATES FILLING THE REDDS WITH SAND AND SILT. STONES EXPOSED IN REDDS SHOWED PATCHES OF BLUE-BLACK STAINING SIMILAR TO THOSE FOUND IN THE BED OF A STREAM SUBJECTED TO ORGANIC POLLUTION. SIMILARLY DISCOLOURED STONES HAD BEEN FOUND WHEN OPENING REDDS MADE DURING 1956 AND 1957. NO DISCOLOURED STONES WERE TO BE FOUND IN THE STREAMS OTHER THAN WHERE REDDS HAD BEEN MADE. (ITALICS) FROM THIS IT WAS CONCLUDED THAT THE STAINING MUST BE THE RESULT OF DECOMPOSING OVA.

REDDS WERE CAREFULLY OBSERVED DURING OVA INCUBATION, AND WHEN ALEVINS APPEARED UNDER THE SURFACE OF THE GRAVEL FORMING THE ARTIFICIAL REDDS (MADE DURING 1959), THEN THE REDDS WERE CAREFULLY OPENED. THE REDDS HAD BECOME FILLED WITH SAND AND SILT ALMOST TO THE LEVEL OF THE SURROUNDING STREAM BED. LIVE ALEVINS WERE FOUND BURIED IN THE SAND AND SILT DOWN TO A DEPTH OF ABOUT TWO INCHES, BUT BELOW THIS DEPTH NO OVA HAD HATCHED. DISCOLOURATION OF THE GRAVEL INDICATED THAT ALL THE OVA HAD DIED.

IN THE SPRING OF 1960, IN AN EFFORT TO PROVE THAT OVA MORTALITY WAS DUE TO AN INADEQUATE OXYGEN SUPPLY CAUSED BY SILTATION, THE FOLLOWING EXPERIMENT WAS CARRIED OUT.

FIVE CYLINDERS, SIX INCHES LONG BY ONE AND A HALF INCHES IN DIAMETER, WERE MADE FROM A DIAMOND MESH PLASTIC MATERIAL. IN EACH CYLINDER ONE HUNDRED EYED OVA (ITALICS) WERE PLACED. TWO OF THE FIVE CYLINDERS WERE PLACED IN THE GRAVEL OF THE ARTIFICIAL REDD NINE INCHES BELOW STREAM BED LEVEL. THESE TWO CYLINDERS WERE COVERED WITH GRAVEL TO A DEPTH OF SIX INCHES. TWO MORE CYLINDERS WERE PLACED ON THE TOP OF THIS GRAVEL ABOUT TWO INCHES BELOW THE SURFACE OF THE STREAM BED. THESE TWO CYLINDERS WERE ALSO COVERED WITH GRAVEL.

THE FIFTH AND LAST CYLINDER WAS PLACED IN A HOLE IN THE CENTRE OF THE REDD FIVE INCHES BELOW STREAM BED LEVEL. THIS CYLINDER WAS PLANTED IN SUCH A WAY THAT IT WAS EASILY ACCESSIBLE FOR INSPECTION AT ANY TIME. THIS CYLINDER WAS REMOVED FROM THE REDD ON SEVEN OCCASIONS AND WASHED FREE OF SILT; ONLY THREE DEAD EGGS WERE FOUND DURING INCUBATION, BUT AS IT WAS DESIRED TO SIMULATE AS NEARLY AS POSSIBLE THE CONDITIONS LIKELY TO OBTAIN IN A REDD (WITH THE EXCEPTION OF THE REMOVAL OF SILT) THESE DEAD EGGS WERE NOT REMOVED.



TWENTY-SEVEN DAYS ELAPSED BETWEEN PLANTING THE FIVE CYLINDERS AND THE HATCHING OF THE EGGS. THE FOUR CYLINDERS BURIED AT DIFFERENT LEVELS AS ABOVE MENTIONED, WERE NOT INTERFERED WITH IN ANY WAY DURING INCUBATION. AFTER THE TWENTY-SEVENTH DAY, THE WHOLE OF THE REDD WAS EXCAVATED. IN THE FIFTH AND ACCESSIBLE CYLINDER A 94% HATCH HAD BEEN ACHIEVED. THE TWO CYLINDERS TWO INCHES BELOW THE STREAM BED LEVEL WERE COVERED WITH SAND AND SILT. ONE CONTAINED ELEVEN LIVE ALEVINS, TWENTY-SIX DEAD ALEVINS, AND SIXTY-THREE DEAD OVA. THE SECOND CYLINDER CONTAINED FIFTEEN DEAD ALEVINS AND EIGHTY-FIVE DEAD OVA. ALL THE DEAD OVA IN THE CYLINDERS HAD A SLIGHTLY BLUISH TINGE. WHEN THE TWO CYLINDERS NINE INCHES BELOW THE STREAM BED LEVEL WERE REMOVED IT WAS FOUND THAT ALL THE OVA HAD DIED AND WERE PUTRIFYING BEING BLUISH-BLACK IN COLOUR.

THIS EXPERIMENTAL REDD WAS MADE IN GOOD-SIZED GRAVEL, IN FAST-FLOWING WATER, AND WAS AT ALL TIMES COVERED BY A MINIMUM WATER DEPTH OF FOUR INCHES. THE 94% HATCH IN THE ACCESSIBLE CYLINDER WAS ACHIEVED SOLELY AS A RESULT OF WASHING AND REMOVING SILT. HAD THIS NOT BEEN DONE, THE OVA WOULD HAVE SUFFERED THE SAME FATE AS THOSE IN THE OTHER FOUR CYLINDERS.

IN 1960 AND 1961, MANY ARTIFICIAL REDDS HAD BEEN OPENED IN FEEDER STREAMS IN THE RIVERS HODDER, WENNING AND LUNE. CONDITIONS SIMILAR TO THOSE FOUND IN THE EXPERIMENTAL REDD AND DESCRIBED ABOVE, WERE FOUND. FROM ALL THE OVA PLANTED, 95% HAD BEEN LOST AS A RESULT OF SILTATION.

FOLLOWING ON FROM THESE INTENSIVE INVESTIGATIONS, IT HAS BEEN FOUND THAT A FAST FLOW OF WATER DOES NOT PREVENT SILTATION, BUT THE VELOCITY OF THE WATER DOES HAVE A BEARING ON WHERE THE SILT WILL ULTIMATELY BE DEPOSITED IN THE GRAVEL. THE QUANTITY AND GRANULAR SIZE OF THE SILT CARRIED DOWNSTREAM IN TIMES OF SPATE APPEARS TO BE THE MAJOR FACTOR. ARTIFICIAL REDDS WHICH HAVE BEEN MADE IN FAST-FLOWING WATER HAVE, IN TIMES OF SPATE, BECOME FILLED WITH SAND AND SILT OF A FAIRLY LARGE GRANULAR SIZE, BUT DURING LOW WATER CONDITIONS THE UPPER SURFACES OF THIS LARGE GRANULAR SILT BECOMES COVERED WITH FINE PLANT DEBRIS, WHICH OCCLUDED THE GRAVEL BENEATH.

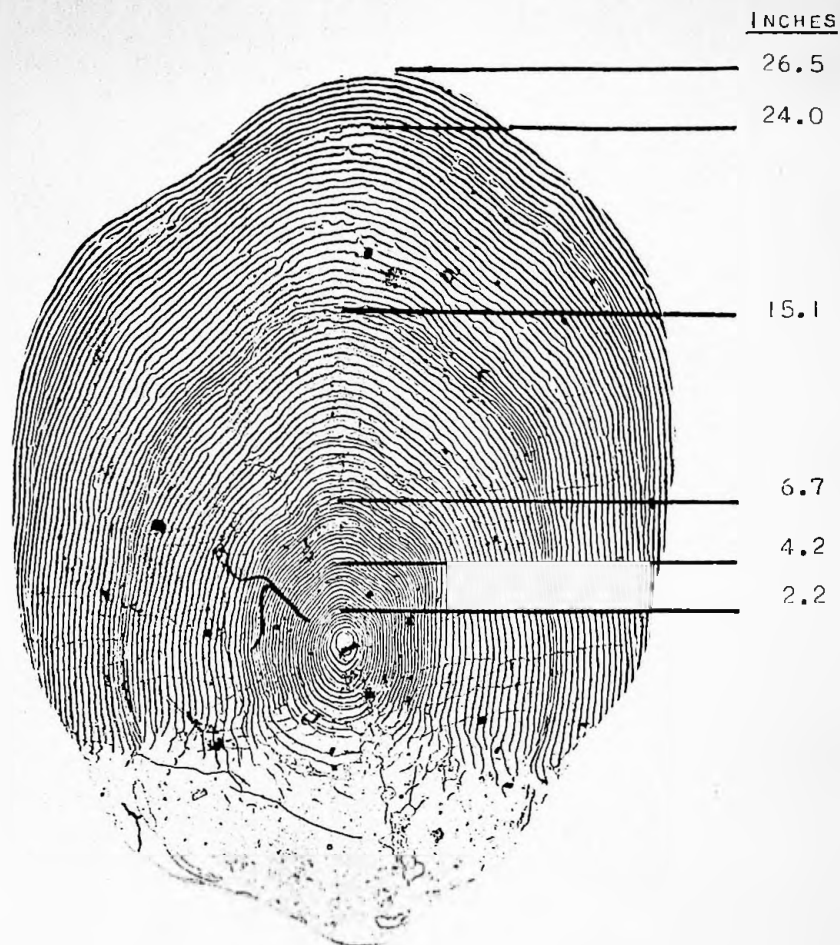
OVER THE LAST THREE YEARS, INVESTIGATIONS HAVE SHOWN THAT A FEW LIVE ALEVINS CAN ALWAYS BE FOUND IN THE SURFACE LAYERS OF THIS SILT, BUT BELOW, DEAD ALEVINS WITH PARTIALLY ABSORBED YOLK SACS ARE FOUND. (ITALICS)

IN MOST CASES THE SILT, COMPOSED OF LARGE GRAINS, 0.5 MILLIMETRES TO 1.0 MILLIMETRE IN SIZE, SEEMS TO BE PERMEABLE TO A DEPTH OF 3 INCHES WHICH ENABLES THE OVA TO HATCH AND THE ALEVINS TO DEVELOP. SMALLER PARTICLES OF PLANT DEBRIS DEPOSITED BETWEEN THE BED GRAVEL, DURING PERIODS OF LOW WATER, PROVIDES AN EFFECTIVE SEAL WHICH APPEARS TO REDUCE THE DISSOLVED OXYGEN CONTENT TO SUCH AN EXTENT THAT EGGS AND ALEVINS PERISH.

....."

NOTE: THIS INVESTIGATION RELATED TO DAMAGE CAUSED TO SALMON AND SEA TROUT OVA AND ALEVINS BY SILT IN ARTIFICIAL REDDS BUT IT WAS SUBSEQUENTLY FOUND THAT THE RESULTS OF THE INVESTIGATION WERE ALSO APPLICABLE TO NATURAL REDDS IN RIVERS IN THE BOARD'S AREA. I FIND THAT SIMILAR ADVERSE CONDITIONS ARE PRESENT IN THE RIVERS OF THE FALKLAND ISLANDS AND THIS LEADS ME TO CONCLUDE THAT MANY OF THE SEA TROUT OVA AND ALEVINS WILL BE DESTROYED BY SILT.

APPENDIX 2



SCALE REMOVED FROM A FISH CAUGHT IN THE MALO RIVER  
BY H.E. THE GOVERNOR (1973)

THE ABOVE SCALE (REFERENCE NUMBER B.35) WAS REMOVED FROM THE SEA TROUT SHOWN IN PLATE 16, FOLLOWING PAGE 41, AND IS UNUSUAL.

IT IS EXTREMELY UNLIKELY THAT THIS FISH WAS A HYBRID, I.E. PROGENY DEVELOPED FROM A SEA TROUT OVUM FERTILISED BY A SALMON PARR, BUT THE FEEDING BANDS ON THE SCALE ARE MOST UNUSUAL. THEY SHOW THAT THE FISH HAD FED FOR 3 YEARS IN THE RIVER BEFORE MIGRATING SEAWARD, WHEN IT WOULD HAVE BEEN APPROXIMATELY 7 INCHES LONG AND ABOUT 3 OZS. IN WEIGHT; IT THEN FED IN THE SEA FOR 2 YEARS AND CONSISTENTLY PUT ON WEIGHT PRIOR TO ITS CAPTURE IN THE MALO RIVER. (ON CAPTURE, NO FOOD WAS FOUND IN THE STOMACH OR GUT.) HAD THE FISH BEEN A HYBRID, IT WOULD HAVE BEEN THE PROGENY OF A SALMON PARR DEVELOPED FROM OVA PLANTED IN THE PASA MANEAS STREAM IN 1964. UNFORTUNATELY, THE FISH WAS NOT ONE OF THOSE BROUGHT BACK TO ENGLAND FOR EXAMINATION.

IN COMMON WITH OTHER SEA TROUT ENTERING THE FALKLAND ISLANDS' RIVERS FROM THE SEA, THIS FISH HAD NO SEA LICE, LEPEOPHTEIRUS SALMONIS, ON ITS BODY SUCH AS ARE FOUND ON THE BODIES OF SALMON AND SEA TROUT RETURNING FROM THE SEA TO RIVERS IN THE BRITISH ISLES.

APPENDIX 3

ROD LICENCES AND SCALE OF LICENCE DUTIES

SALMON

FOR EACH AND EVERY

SINGLE ROD AND LINE FOR THE SEASON .....	£8.00
FOR THE PERIOD FROM 1ST JULY TO THE CLOSE OF THE SEASON .....	£5.00
SINGLE ROD AND LINE FOR A WEEK .....	£2.00

FOR EACH AND EVERY

SINGLE ROD AND LINE FOR THE SEASON FOR PERSONS UNDER THE AGE OF 16 YEARS AT THE DATE OF TAKING OUT THE LICENCE ...	£2.00
---	-------

NOTE: A LICENCE TO USE A ROD AND LINE IN FISHING FOR SALMON SHALL HAVE EFFECT ALSO AS A LICENCE TO USE A ROD AND LINE FOR FISHING FOR MIGRATORY TROUT, BROWN TROUT, CHAR, FRESHWATER FISH AND EELS.

MIGRATORY TROUT

FOR EACH AND EVERY

SINGLE ROD AND LINE FOR THE SEASON .....	£2.00
SINGLE ROD AND LINE FOR THE SEASON FOR PERSONS UNDER THE AGE OF 16 YEARS AT THE DATE OF TAKING OUT THE LICENCE ...	37½P
SINGLE ROD AND LINE FOR A WEEK .....	75P

NOTE: A LICENCE TO USE A ROD AND LINE FOR FISHING FOR MIGRATORY TROUT SHALL HAVE EFFECT ALSO AS A LICENCE TO USE A ROD AND LINE FOR FISHING FOR BROWN TROUT, CHAR, FRESHWATER FISH AND EELS.

BROWN TROUT

FOR EACH AND EVERY

SINGLE ROD AND LINE FOR THE SEASON .....	£1.00
SINGLE ROD AND LINE FOR A WEEK .....	35P

NOTE: A LICENCE TO USE A ROD AND LINE FOR FISHING FOR BROWN TROUT SHALL HAVE EFFECT ALSO AS A LICENCE TO USE A ROD AND LINE FOR FISHING FOR CHAR, FRESHWATER FISH AND EELS.

FRESHWATER FISH

FOR EACH AND EVERY

SINGLE ROD AND LINE FOR THE SEASON .....	50P
SINGLE ROD AND LINE FOR THE SEASON FOR PERSONS UNDER THE AGE OF 16 YEARS AT THE DATE OF TAKING OUT THE LICENCE ...	12½P

NOTE: A LICENCE TO USE A ROD AND LINE FOR FISHING FOR FRESHWATER FISH SHALL HAVE EFFECT ALSO AS A LICENCE TO USE A ROD AND LINE FOR FISHING FOR EELS.

NOTE: THE ABOVE LICENCE FEES ARE TYPICAL OF THOSE LEVIED IN RIVER AUTHORITY AREAS THROUGHOUT ENGLAND AND WALES.

APPENDIX 4

(EXTRACT FROM STATUTORY INSTRUMENTS, 1954 No. 1132  
RIVER, ENGLAND  
SALMON AND FRESHWATER FISHERIES  
THE LANCASHIRE RIVER BOARD (FISHERIES) ORDER, 1954)\*

PART II

IMPOSITION, COLLECTION AND RECOVERY OF CONTRIBUTIONS IN RESPECT OF  
SEVERAL FISHERIES

3.-(1) SUBJECT TO THE PROVISIONS OF THIS ORDER THE RIVER BOARD MAY, IF AT ANY TIME IT SO RESOLVES, IMPOSE, COLLECT, AND RECOVER EITHER SUMMARILY AS A CIVIL DEBT OR AS A SIMPLE CONTRACT DEBT IN ANY COURT OF COMPETENT JURISDICTION, CONTRIBUTIONS IN RESPECT OF ANY YEAR ENDING ON THE 31ST MARCH TO BE PAID BY THE OWNERS OF SEVERAL FISHERIES IN THE RIVER BOARD AREA WHICH ARE SALMON FISHERIES OR TROUT FISHERIES OF THE YEARLY VALUE OF FIVE POUNDS AND UPWARDS AND THE CONTRIBUTIONS TO BE IMPOSED ON THE OWNERS OF THE FISHERIES SHALL EXCEPT AS PROVIDED IN THE SUCCEEDING PARAGRAPH OF THIS ARTICLE BE CALCULATED AT A UNIFORM AMOUNT PER POUND ON THE YEARLY VALUE OF THEIR FISHERIES. PROVIDED THAT IN ANY SUCH YEAR NO OWNER SHALL BECOME LIABLE TO PAY BY WAY OF CONTRIBUTIONS IN RESPECT OF ANY ONE FISHERY A SUM EXCEEDING THE AMOUNT OF A CONTRIBUTION CALCULATED AS AFORESAID AT THE RATE OF FIVE SHILLINGS PER POUND ON THE YEARLY VALUE OF THE FISHERY, UNLESS THE MINISTER HAS CONSENTED TO THE IMPOSITION ON FISHERY OWNERS OF CONTRIBUTIONS IN EXCESS THEREOF.

(2) FOR THE PURPOSES OF THE PRECEDING PARAGRAPH THE RIVER BOARD MAY BY RESOLUTION, IF HAVING REGARD TO ALL THE CIRCUMSTANCES OF THE CASE IT THINKS IT JUST SO TO DO -

- (A) DIVIDE THE RIVER BOARD AREA INTO DISTRICTS;
- (B) IMPOSE CONTRIBUTIONS AT DIFFERENT RATES IN DIFFERENT DISTRICTS;
- (C) REFRAIN FROM IMPOSING CONTRIBUTIONS IN ANY DISTRICT OR ANY PART THEREOF;
- (D) REMIT OR REDUCE ANY CONTRIBUTION BY SUCH AMOUNT AS IT MAY DECIDE ON ACCOUNT OF ANY TEMPORARY DAMAGE TO OR DETERIORATION IN THE FISHERY IN RESPECT OF WHICH IT IS PAYABLE.

YEARLY VALUE FOR PURPOSES OF CONTRIBUTION

4. FOR THE PURPOSES OF THIS ORDER THE YEARLY VALUE OF A SEVERAL FISHERY SHALL BE THE RENT AT WHICH THE FISHERY MIGHT REASONABLY BE EXPECTED TO LET FROM YEAR TO YEAR IF THE TENANT UNDERTOOK TO PAY ALL USUAL TENANTS' RATES AND TAXES (IF ANY) AND TO BEAR THE COST OF THE REPAIRS INSURANCES AND OTHER EXPENSES (IF ANY) NECESSARY TO MAINTAIN THE FISHERY IN A STATE TO COMMAND THAT RENT LESS ANY TITHE RENT-CHARGE PAYABLE BY THE OWNER.

5.-(1) WHERE THE OWNER OF A SEVERAL FISHERY APPEARS TO BE LIABLE TO THE IMPOSITION OF A CONTRIBUTION THE RIVER BOARD SHALL CAUSE THE YEARLY VALUE

OF THE FISHERY TO BE DETERMINED EITHER BY AGREEMENT WITH THE OWNER THERE-  
OF OR IN DEFAULT OF SUCH AGREEMENT IN MANNER PROVIDED BY THIS ARTICLE.

(2) IF THE RIVER BOARD AND THE OWNER OF A FISHERY FAIL TO AGREE AS TO THE YEARLY VALUE OF THE FISHERY THE RIVER BOARD SHALL PROVISIONALLY ASSESS THE YEARLY VALUE OF THE FISHERY AT SUCH AMOUNT AS IT THINKS REASONABLE AND NOTIFY SUCH PROVISIONAL ASSESSMENT BY REGISTERED POST TO THE REPUTED OWNER OF THE FISHERY BY NOTICE IN THE FORM (FORM 1) SET FORTH IN THE SCHEDULE HERETO. IF NO OBJECTION IN WRITING TO SUCH PROVISIONAL ASSESSMENT IS RECEIVED BY THE CLERK OF THE RIVER BOARD FROM THE REPUTED OWNER WITHIN TWENTY-ONE DAYS AFTER THE DATE ON WHICH THE NOTICE WAS POSTED THE YEARLY VALUE OF THE FISHERY SHALL FOR THE PURPOSES OF THIS ORDER BE DEEMED TO HAVE BEEN DETERMINED BY AGREEMENT AT THE AMOUNT STATED IN THE NOTICE AND THE PERSON TO WHOM THE NOTICE WAS SENT SHALL BE ENTERED IN THE REGISTER OF ASSESSMENTS AS THE OWNER OF THE FISHERY. IF OBJECTION IN WRITING IS DULY MADE BY THE REPUTED OWNER TO SUCH PROVISIONAL ASSESSMENT AND THE RIVER BOARD AND THE REPUTED OWNER OF THE FISHERY FAIL TO AGREE AS TO THE YEARLY VALUE OF THE FISHERY THE YEARLY VALUE SHALL BE DETERMINED UNDER AND IN ACCORDANCE WITH THE PROVISIONS OF THE ARBITRATION ACT, 1950(G), AS AMENDED BY ANY OTHER ENACTMENT, BY A SINGLE ARBITRATOR APPOINTED, IN DEFAULT OF AGREEMENT, ON THE APPLICATION OF EITHER PARTY BY THE MINISTER.

PROVIDED THAT IF THE AMOUNT OF THE PROVISIONAL ASSESSMENT DOES NOT EXCEED THE NET ANNUAL VALUE OF THE FISHERY FOR THE PURPOSES OF THE RATING AND VALUATION ACT, 1925(H) THEN THE REPUTED OWNER OF THE FISHERY SHALL NOT BE ENTITLED TO OBJECT THERETO, AND AS FROM THE DATE OF THE PROVISIONAL ASSESSMENT NOTICE THE AMOUNT NAMED THERIN SHALL BE DEEMED TO BE THE YEARLY VALUE OF THE FISHERY AGREED BETWEEN THE RIVER BOARD AND THE REPUTED OWNER PROVIDED THAT A COPY OF THIS PARAGRAPH IS ANNEXED TO OR ENDORSED ON SUCH NOTICE.

(3) A MEMBER OF THE RIVER BOARD SHALL NOT ACT IN RESPECT OF THE ASSESSMENT OF A FISHERY IF HE IS THE OWNER OR OCCUPIER OF SUCH FISHERY OR THE AGENT OF THE OWNER OR OCCUPIER.

\* OBTAINABLE FROM HER MAJESTY'S STATIONERY OFFICE

NOTE: THE ABOVE STATUTORY INSTRUMENT IS BASICALLY THE SAME FOR ALL RIVER AUTHORITIES THOUGHOUT ENGLAND AND WALES.