SCIENCE AND RESEARCH INTERNAL REPORT N0.13

SUMMARISED PROCEEDINGS OF A BLUE DUCK CONSERVATION SEMINAR HELD AT NATIONAL WILDLIFE CENTRE, MT BRUCE ON 19-20 APRIL, 1988

Compiled by

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AGENDA

BLUE DUCK CONSERVATION SEMINAR

Tuesday. 19 April 1988

Chair:	Bob
0900	Arrival
0915 - 0930	Welcome to seminar -Bob Simpson (Wanganui)
0930 - 1000	Outline the aims of seminar Brief resume of current status -Murray Williams (DOC S&R)
1000 -1200	Results of Time Budget and Diet Studies, Clare Veltman (Massey University), Duncan Cunningham (DOC S&R), Sue Triggs (DOC S&R), Neil Hayes (Ducks Unlimited), Kerry Oates (NZ Ornithological Society of New Zealand)
1200 -1300	Lunch

Chair: Bill Simmons

1300 -1500	Regional representatives to talk on blue duck management in their region (8 x 15 minutes)
1515 -1545	Recovery Plans - Don Merton – P.E.S Directorate (Central)
1545 - 1700	Guided tour of Mt Bruce Wildlife Centre
Evening Video -	Survival Anglia's 'White water blue ducks'

Wednesday. 20 April 1988

Chair: Don Merton

0830 - 0930	Develop National Objective(s) for Blue Duck management
0945 -1200	Begin formulating National Recovery Plan based around objectives discussed earlier -discuss research/management options available
1200 -1300	Lunch
1300 -1500	Continue Morning Session
1500	Closing Address -Noel Hellyer (P.E.S Directorate, Central)

INTRODUCTION AND WELCOME: R W H SIMPSON

On behalf of the Regional Manager, Wanganui Region, Jeff Connell, I welcome you all here to the National Wildlife Centre to participate in this initial seminar on blue duck conservation. We in Wanganui are delighted to act as your hosts and feel it is appropriate that we do so because within our region the major research studies are being undertaken (by Murray Williams and others on the Manganui-a-te-ao River) and the National Wildlife Centre is actively breeding blue duck in captivity for release on Mt. Taranaki/Egmont.

We feel the time is right, perhaps even overdue, for us to co-ordinate our individual aspirations and regional conservation involvement with this species so as to collectively devise a realistic, long-term conservation strategy. Over the next two days we have the opportunity to meet the specific aims of this seminar which are:

1. To share information about the work now being done on blue duck - research, survey, management, etc.
2. To develop a national conservation strategy for the species.

In tackling the second aim we should first debate and decide upon what we seek to achieve nationally.

For example:

a) do we wish to maintain a declared number of birds in each island? OR
b) do we wish to establish new populations? OR
c) do we seek to ensure contact between existing populations?

and so on.

These and other ideas are wide open for debate -but we must make decisions and do so on all fronts by 3.00pm tomorrow afternoon! Having settled upon a national objective, we can then discuss a lower level of detail.

For example:
a) individual regional contributions
b) further research topics
c) the role of agencies other than DOC
d) the location and responsibility for various programmes.

The final step must surely be the formation of a Blue Duck Management Group with an elected nominee to prepare a national recovery plan/management plan or conservation strategy - whatever its name - in which the national objective is stated, regional activities are identified and timetabled, and other activities and/or contributions are clearly outlined.

All of you present are here because of your past or present experience and expertise with blue duck or because you have a special interest in this bird. I wish to encourage your maximum participation in the events and discussions shortly to follow.

In attempting to realise the aims of this seminar it was obvious that 'inhouse' departmental expertise was not enough. Nor is it desirable that such a discussion take place behind departmental doors. As a consequence we have invited key participants in the conservation of blue duck from across the national scene.

I have pleasure in welcoming and introducing the following participants:

Massey University - Dr Clare Veltman
Otorohanga Kiwi and Bird Park - Eric Fox
Ducks Unlimited - Jim Campbell (President), Neil Hayes (Secretary)
Ornithological Society of NZ - Brian Bell (National Council), Kerry Oates (Wellington)
Royal Forest and Bird Protection Society -apologies tendered
Acclimatiastion Societies -apologies tendered
And from the West Coast, Allan Reith, a keen blue duck enthusiast and photographer, who has donated a display on blue duck to the National Wildlife Centre.
Department of Conservation representation:

Eastern Region:	Keith Owen, Paul Jansen
Waikato Region:	Rob McCallum, Stu Moore, Phil Thompson
Wanganui Region:	Bob Halsey, John Ombler, Wayne Hutchison, Matt Cook, Bryan Williams, Janice Molloy, Bob Simpson, Martin Bell, Mike Aviss, Phil Clerke, Tim Harrington, John Heaphy, Phil Mohi, Colin Ogle
Nelson Region:	Kay Starke
Canterbury Region:	Graeme Crump, Dave Anderson, Mike Harding
West Coast Region:	Gideon Anderson

Southern and Northern Regions declined invitations to attend.
Central Office - Science and Research Directorate: Sue Triggs, Murray Williams, Duncan Cunningham, Philip Simpson, Brian Lloyd, Murray Douglas
- Protected Ecosystems and Species Directorate: Don Merton, Noel Hellyer

[In attendance for part of the seminar:
Bill Simmons (Wanganui), Derek Fields (Masterton), Allan Saunders (Waikato), David Towns (S&R Central), Richard Sadleir (Director, S&R Central)]

Finally I wish to pay a special vote of thanks to Wayne Hutchison who has done all the organisation for this seminar, and to Martin Bell, who as Officer-in-charge of the National Wildlife Centre, has made all the on-site arrangements.

RESEARCH REPORTS:

1. Status, Productivity and Conservation of Blue Duck (Murray Williams)

Blue Duck is endemic to New Zealand. It is one of a small group of species that has been in New Zealand so long that its evolutionary origins are obscure and has no obvious relatives anywhere else in the world.

It is a river specialist, spending the whole of its life within the confines of the river channel, thus occupying a habitat so difficult that only 3 other species of ducks worldwide do likewise. The rivers we know them to exist on range from small side streams, a metre or two wide, to the large glacial-fed rivers of the West Coast, rivers with marked seasonal flows and subjected to horrendous freshes. Clearly it is a species with remarkable adaptability.

(a) Status

Today, blue ducks occupy but a fraction of their former range, especially in the more densely populated and modified North Island of New Zealand.

Its national population has not been established with precision but probably lies within the range 2000 -4000 individuals. The bulk of this population, and especially within the North Island, comprises numerous and isolated remnants, to such an extent that only 2 locations are known in the North Island where the number of interacting individuals exceeds 100.

The vast majority comprise isolates of 50 birds or fewer.

The fragmentation of the population has been brought about by the enforced retreat of the bird to river headwaters within forested high altitude catchments.

The alienation of lowland waters, a consequence, mostly, of pastoral farming, increased siltation of the slower-moving waters, and the destruction of riparian woodland, has effectively trapped birds in these headwater areas.

For a species that disperses, it seems, solely along water courses, impoundments such as hydro dams, and long sections of alienated lowland river are effective barriers to downriver dispersal and hence dispersal throughout a river's full catchment.

Thus, the blue duck population over most of New Zealand may now be viewed as a series of small, non-interacting remnants, a classic symptom of a species in decline.

(b) PRODUCTIVITY

How productive are these population remnants?

I can report on an 8 year study on the Manganui-a-te-ao River -a river containing one of our largest known remnants - 36 to 40 breeding pairs.

The study is of the residents of an 8km section of river, variously containing 4 -7 breeding pairs and up to 10 juveniles.

Productivity is low. Clutches range from 3 to 7 eggs with the average being 5.4. The most frequently laid clutch is 5 eggs, laid over an 8 - 10 day period and incubated by the female for 32 -35 days; 70% of nests hatch, the 2 principal destructive agents being floods which inundate nests established in caves, and predation of the more accessible on-shore nests.

Young spend their full life on the river deriving their predominantly insect food initially from the edges of riffles, but later venturing into the truly white water zones. Despite the vigilance and care of both adults while caring for their young, brood separation during floods is a major proximate cause of duckling loss, and mustelid predation also plays its part.

Annual productivity to fledging has varied from a low of zero to a high of 2.6 per pair. Over the 8 years, 42 breeding attempts reared a total of 59 young to fledging, an average of 1.4 per pair per year.

Not only does this average figure hide important annual variations, it also hides the considerable variation between pairs.

PRODUCTIVITY OF PAIRS

	Individual Pairs						
Total Fledglings	11	21	2	7	14	4	1
No. Breeding Attempts	8	8	5	3	8	5	5
Mean per Attempt	1.4	2.6	0.4	2.3	1.6	0.8	0.2

This table illustrates that the residents of particular sections of the river are highly variable in their performance: some with long breeding histories have averaged 2 or more young per year for 8 years. Three pairs each with a minimum of 4 years breeding have raised fewer than 1 fledging per year.

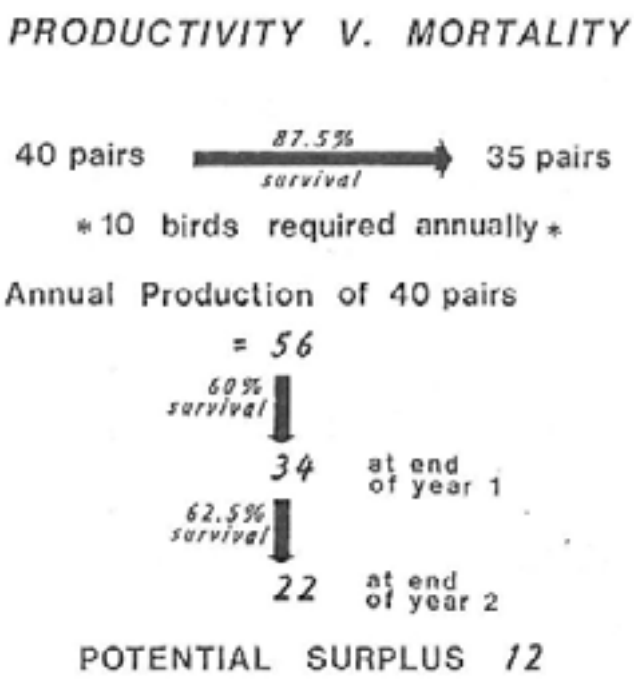
High variability is also emphasised by 19 of the 42 breeding attempts, that is 45% of them, failing to raise a single chick.

Established breeders, those who have occupied territories for a year or more, are long-lived. The annual survival rate is 87.5% which means that only 1 in 8 will disappear each year.

Juveniles survive the immediate post-fledgling period well: 86% remain alive 6 months after brood separation, but when the adults become more possessive of their territories as breeding approaches, juveniles are actively hounded, and only 60% remain alive after 12 months.

In the second year a similar survival rate applies so that at the end of year 2 only 40% of any year's cohort remain. By that time some birds may not have established themselves - they disappear, for I have yet to find an unestablished 3 year old.

A simplistic productivity-mortality comparison is illustrated below



If the average productivity of the 7 study pairs is applied to the river's total breeding population of about 40 pairs, then at the end of year 212 birds may remain alive over and above the number required to replace dead breeders.

But this is a population average. There have been 4 years in the past 8 where the productivity may not have been sufficient to produce any surplus at all. Any increase in the number of breeding pairs has followed an outstandingly productive year, not an average or below average one.

Productivity seems to be characteristically erratic and the highly productive years may assume very considerable importance in this species f long-term population dynamics.

Even the distribution of successful breeding within the river's population may be important. Juveniles do not disperse widely. They spend their first 6 months on or close to their natal areas and only move more widely when harrassed by adults prior to the breeding season.

But even this enforced dispersal promotes only limited movement. No progeny of the study area have been located more than 8 territories distant from their natal area, and no surviving member of 30 pre-1984 young has established itself as a breeder more than 5 territories from home.

This lack of dispersal can lead to a high level of inbreeding and cause all available space on the river not to be fully colonised and exploited.

Thus, in summary, the principal biological characteristics of blue duck are:

(a) a long-lived species;
(b) low and erratic productivity; and
(c) restricted pattern of dispersal and settlement.

Its principal population characteristics are:

(a) it exists as numerous isolates; and
(b) most populations contain 50 birds or fewer.

The management dilemma is one of how to exploit these biological characteristics and how to redress theanomolies and inherent danger of the present distribution.

(c) Conservation

Three broad approaches seem possible. These are:

1. To establish new populations in areas presently without birds but where an interacting population in excess of 100 birds could be established.

2. To fuel such a programme ways of enhancing the productivity of existing populations and a properly tested captive breeding programme are needed.

3. Concentrate on habitat enhancement of lowland rivers where their re-occupation by blue duck will ensure communication between some existing isolates.

There are some limited possibilities for population establishment, notably within one national park. But even within this area, communication between watersheds may be difficult unless the birds overfly ridgetops at the very head of watercourses -and we presently have no firm evidence that they will do this.

Otherwise, the only other option is to put them back into some forest parks from whence they recently disappeared and for reasons we are still unaware of.

Assuming a population establishment programme is possible, then a source of birds is required.

One source is the present small isolates. They have no medium or long-term future where they are. The adults may be immediately transferred, or, over a longer term, all their progeny could be salvaged and translocated.

The other approach would be to attempt to raise the productivity of some of the larger existing populations. Long life and low and erratic productivity are characteristics of New Zealand endemic birds. At least blue duck attempt to breed every year which is more than some do.

The poultry farming approach to rare species management where clutches are removed to induce renesting, and eggs are hatched and the chicks raised in captivity for ultimate release back into the wild is extremely demanding of manpower and has yet to be shown as a viable technique for our larger and slow-breeding endemic species (eg. takahe) although clearly it has worked for Chatham Island black robins. Even if this approach were practicable, which I believe it is not other than on a very tiny local scale, it has less to recommend it than doing everything in captivity. Even captive breeding is fraught with practical and post-release problems, but nevertheless it is a viable option and deserving of a fair and adequate trial.

Increasing wild productivity may have but 2 possible approaches and even then they may only be possible at some localities. These approaches are:

1. A stock management approach whereby poor breeders are removed (and translocated) and the settlement of progeny of long-term successful breeders is encouraged. This, of course, assumes that it is the birds, not the territory that is the cause of the present low productivity.

2. Lower the present breeding density, perhaps by as much as 20% on the assumption that space is a factor limiting juvenile survival and settlement. If juvenile survival is enhanced, this may offer an increased number of river- wise but unestablished birds for transfer.

Habitat restoration is not a widespread option. It is simply not feasible to reverse the predominant land use in the lowlands, a source of much of New Zealand's economic wealth. Restoration of streamside woodland may be possible in some parts of some catchments, especially if the land is in public ownership. However, the target areas need to be carefully chosen and perhaps limited to those where the re-establishment of communication between nearby population isolates can be restored.

Overshadowing all this are genetic considerations. This species, by virtue of its poor dispersal and restricted pattern of settlement may be prone to a high level of natural inbreeding. If this is so, then the problem of isolation, from a genetic standpoint, may be less serious. Nevertheless it is an issue worth flagging and one that warrants investigation into the heterozygosity of the existing population remnants.

Blue duck is a unique beast with a long if poorly understood evolutionary history, inhabiting, what for a duck, is a pretty unusual habitat. It is also a species in trouble and on the basis of its present fragmented distribution, especially in the North Island, could well be regarded as endangered. Time, hopefully, is still on our side, and collectively, with a common focus we could reverse blue ducks decline in both numbers and range. The challenge of this seminar is to achieve that common focus and to develop a series of effective management approaches. It is entirely possible to prevent this species from being tomorrows relict and conservation emergency like kakapo, and kokako!

2. Genetic Aspects of Blue Duck Conservation (Sue Triggs)

The preservation of genetic diversity is one of three major components of conservation as defined by the World Conservation Strategy (1980). However, conservation genetics is a very new field, methods for assessing genetic diversity have only been developed over the last two decades.

Small, isolated populations are the main concern of conservation genetics, as these populations have a high rate of loss of natural genetic diversity. Two genetic problems can arise in small, isolated populations, inbreeding and loss of genetic variation. Intense inbreeding commonly leads to an increased incidence of genetic diseases and deformities and decreased productivity, while loss of genetic variation may decrease the long-term adaptability of the species.

Habitat destruction has lead to fragmentation of blue duck populations, particularly in the North Island. Recent studies by Murray Williams, which suggest that inbreeding and limited dispersal may be common in blue duck populations, give cause for concern over the genetic status of populations of blue duck. Using biochemical techniques, including DNA fingerprinting and protein electrophoresis, Murray and I aim to quantify inbreeding, dispersal, population structure, and genetic diversity, both in the Manganui-a-te-ao study area and in a population of blue ducks from a habitat that has suffered a minimum of disturbance.

Initial results confirm an exceptionally high level of inbreeding in the Manganui-a-te-ao population. Collection of blood samples from other populations and genetic analysis of samples will continue in 1988/89.

3. Population study, upper Manganui-a-te-ao River (Kerry Oates)

This is a part-time and sparetime study in which I and my colleague Mark attempt to

1. count the number of blue ducks on a defined section of the Managanui-a-te-ao River within the boundary of Tongariro National Park

2. determine the size and limits of blue duck territories within the study area
3. determine breeding success, population dynamics and the effect of predators.

Visits to the study area are made once every month and started in July 1986. The full length of the study area is covered at least twice on each visit and each sighting of a bird is plotted on to large scale maps. The sighting pattern builds up over time and so serves to define the limits of each pair's territory.

The study area takes about 1 hour to traverse and comprises 41 pools and riffles. Three pairs are thought to be resident in the area.

In 1986/87, 1 pair fledged 2 young (1 male, 1 female) while pair 2 apparently did not breed (female appeared to be a juvenile). Nothing was known about pair 3.

In 1987/88 Pair 1 appeared with 5 chicks at the end of and 80 days later 2 fledglings on the point of flying remained. Pair 2 did not produce chicks and may have lost their nest, moulting in February and March. Pair 3 were confirmed present in October 1987 but not seen subsequently. Two chicks 2/3rds grown were seen in this area in February 1988.

Predator trapping to catch rats, stoats etc has proved ineffective. After 12 months we caught no vermin even though we have seen rats and stoats in the area.

We have found both males and females to respond strongly to decoys. Females show agitation, calling at the decoy and charging it. Males have pecked and thumped decoys. This activity is most pronounced in early spring prior to breeding activity.

Further work will centre around catching and banding birds, and recording their behaviour and breeding in more detail.

4. National Survey of Blue Duck Distribution (Duncan Cunningham)

BACKGROUND

1 Early Surveys

In 1973 (Mauri Ora 1:37-42) Fordyce and Tunnicliffe published the results of a preliminary survey of blue ducks in the South Island. The final results, published in 1976 (Mauri Ora 4:79-85) by Fordyce showed a patchy distribution closely associated with hilly country and inversely related to alluvium deposits.

The Ornithological Society of New Zealand published the Provisional Bird Atlas in 1976 using data gathered by members from 1969 onwards. The information was published in map form, based in presence in 10,000 yard grid squares and again showed patchy distribution for blue duck. The final atlas was published in 1985 showing blue duck presence in many more grid squares but still lacked the precision needed to make an accurate assessment of the status of the species.

2 This Survey

Started as a private project in 1983 by a desire to know more about the overall distribution and status of the bird.

Thus it was important to make it a national survey rather than confine it to a district or island and to get recent information to assess present status. No attempt was made to gather historical data.

3 Other Surveys

Wildlife Service staff in the Rotorua area began surveying local rivers as early as 1981. Their survey methods included white water rafting, use of helicopters and talking to local farmers. A tremendous amount of very useful information was gathered from an area which extended roughly from Ohakune to the East Cape.

Staff in a few of the National Parks began collecting information on birds in the parks from the public. Some of this has been included in this survey.

AIM

1 Establish Present Distribution

The main aim was to establish an accurate and up-to-date base-line of data with which all future data will be compared. Whenever possible only 1980s information have been used but 1970s data have been accepted when no other were available.

2 Establish Active Data base

A computerised database was the obvious way of storing the information. A system with fast access to, retrieval and entry of, data is a vital tool for both managers and researchers. Nationwide access to the data base will be achieved when becomes fully established.

3 Publication

There is now sufficient national coverage to work up the data for publication, probably in 'Notornis' late 1988 or early 1989. A shortened version will also appear in the Federated Mountain Clubs' Bulletin. This is a highly desirable aim of the project as the information will reach the contributors to the project.

METHODS

1 Data Collection

Information on sightings was requested from a variety of outdoor recreationists, mainly trampers, climbers and hunters. The main advertising thrust was by articles in the FMC Bulletin. Articles requesting information were also placed in the OSNZ News, Forest and Bird, Rod and Rifle, and the New Zealand Woman's Weekly.

2 Data Handling

Initially all records were entered into a card-file system indexed according to the NZMS 1 series map number on which the sighting occurred. Once all the data had been entered onto the computer, the card system was abandoned.

RESULTS

1 The Data Base

To date the data base holds over 1,400 records: North Island >600 records; South Island >800 records. The records are sorted in the order of island, map number, catchment and stream. Localities for most records are plotted to six figure references and 10,000 yard grid squares. Dates, sources and brief notes are included (Figure 1).

A great many of the records come from popular tramping and hunting areas such as the Waipakahi River (Kaimanawa) and the Roaring Lion River (North West Nelson.) Other sighting numbers are boosted by repeat surveys.

2 The Distribution Maps

The maps (Figures 2 and 3) show presence in 10,000 yard grid squares. They are not an indication of density, presence of blue duck in a square may be represented by a single bird. What the maps do show is a very discontinuous distribution of blue duck in both islands.

In the South Island this may be close to a natural distribution (although somewhat reduced; Fordyce 1976). The North Island populations have probably become more divided by habitat disturbance and removal.

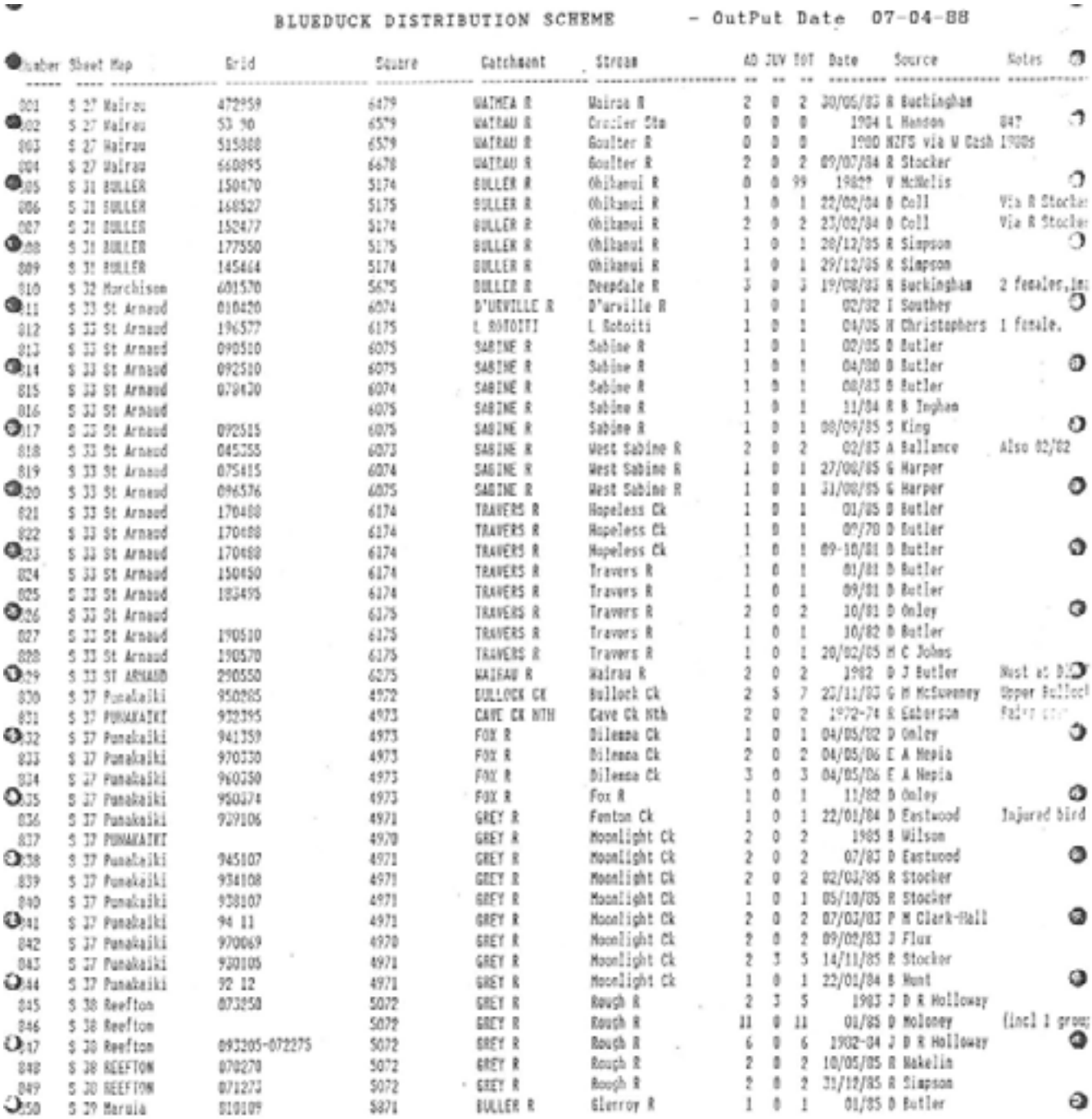
COMMENTS

The results of this survey quite clearly show that the discontinuous distribution in the South Island, shown by Fordyce (1976), is also true for the North Island. A patchy distribution for a bird whose dispersal behaviour is still largely unknown, may have quite serious long-term effects on the genetic viability of scattered, remnant populations. It is generally accepted that most blue duck dispersal occurs within the catchment and that because they have never been seen far from rivers with known populations, they do not disperse over land. However there are reports of blue duck appearing on farm and town duck ponds, mountain tarns and heads of some Canterbury rivers. To get there the birds must have flown over land, in some instances over considerable distance and altitude.

This survey has revealed a number of concentrations of blue ducks which appear to be healthy populations based on two or more catchments which do not connect. Indeed, the rivers systems may flow in opposite directions from a central dividing ridge.

A blue duck population centred on a watershed may be equally as viable, or vulnerable, as one based on a system. I suggest that blue ducks are not solely dependent on the catchment for dispersal and propose three methods of dispersal:

Fig. 1 Section of data base print-out



BLUEDUCK DISTRIBUTION SCHEME - OutPut Date 07-04-88

Number	Sheet Map	Grid	Square	Catchment	Stream	AD	JUV	TOT	Date	Source	Notes
001	S 27 Wairau	472959	6479	WAIMEA R	Wairau R	2	0	2	30/05/83	R Buckingham	
002	S 27 Wairau	53 90	6579	WAIRAU R	Crozier Stm	0	0	0	1904	L Handon	047
003	S 27 Wairau	515080	6579	WAIRAU R	Goulter R	0	0	0	1900	NZFS via W Cash	1900s
004	S 27 Wairau	660895	6678	WAIRAU R	Goulter R	2	0	2	09/07/84	R Stocker	
005	S 31 BULLER	150470	5174	BULLER R	Ohikanui R	0	0	99	1982?	V McNelis	
006	S 31 BULLER	160527	5175	BULLER R	Ohikanui R	1	0	1	22/02/84	B Coll	Via R Stocker
007	S 31 BULLER	152477	5174	BULLER R	Ohikanui R	2	0	2	23/02/84	B Coll	Via R Stocker
008	S 31 BULLER	177550	5175	BULLER R	Ohikanui R	1	0	1	20/12/85	R Simpson	
009	S 31 BULLER	145464	5174	BULLER R	Ohikanui R	1	0	1	29/12/85	R Simpson	
010	S 32 Murchison	601570	5675	BULLER R	Deepdale R	3	0	3	19/08/83	R Buckingham	2 females,1m
011	S 33 St Arnaud	010420	6074	D'URVILLE R	D'urville R	1	0	1	02/82	I Southey	
012	S 33 St Arnaud	196577	6175	L ROTOITI	L Rotoiti	1	0	1	04/85	H Christophers	1 female.
013	S 33 St Arnaud	090510	6075	SABINE R	Sabine R	1	0	1	02/85	B Butler	
014	S 33 St Arnaud	092510	6075	SABINE R	Sabine R	1	0	1	04/80	B Butler	
015	S 33 St Arnaud	070620	6074	SABINE R	Sabine R	1	0	1	08/83	B Butler	
016	S 33 St Arnaud		6075	SABINE R	Sabine R	1	0	1	11/84	R B Ingham	
017	S 33 St Arnaud	092515	6075	SABINE R	Sabine R	1	0	1	08/09/85	S King	
018	S 33 St Arnaud	045255	6073	SABINE R	West Sabine R	2	0	2	02/83	A Ballance	Also 02/82
019	S 33 St Arnaud	075415	6074	SABINE R	West Sabine R	1	0	1	27/08/85	G Harper	
020	S 33 St Arnaud	096576	6075	SABINE R	West Sabine R	1	0	1	31/08/85	G Harper	
021	S 33 St Arnaud	170480	6174	TRAVERS R	Hopeless Ck	1	0	1	01/85	B Butler	
022	S 33 St Arnaud	170480	6174	TRAVERS R	Hopeless Ck	1	0	1	09/70	B Butler	
023	S 33 St Arnaud	170480	6174	TRAVERS R	Hopeless Ck	1	0	1	09-10/81	B Butler	
024	S 33 St Arnaud	150480	6174	TRAVERS R	Travers R	1	0	1	01/81	B Butler	
025	S 33 St Arnaud	180495	6174	TRAVERS R	Travers R	1	0	1	09/81	B Butler	
026	S 33 St Arnaud		6175	TRAVERS R	Travers R	2	0	2	10/81	D Onley	
027	S 33 St Arnaud	190510	6175	TRAVERS R	Travers R	1	0	1	10/82	B Butler	
028	S 33 St Arnaud	190570	6175	TRAVERS R	Travers R	1	0	1	20/02/85	M C Johns	
029	S 33 ST ARNAUD	200550	6075	WAIRAU R	Wairau R	2	0	2	1982	D J Butler	Must at D
030	S 37 Punakaiki	950085	4972	BULLOCK CK	Bullock Ck	2	5	7	22/11/83	G M McSweeney	Upper Bullock
031	S 37 PUNAKAIKI	932395	4973	CAVE CK NTH	Cave Ck Nth	2	0	2	1972-74	S Laberson	Paler
032	S 37 Punakaiki	941359	4973	FOX R	Dilemma Ck	1	0	1	04/85/82	D Onley	
033	S 37 Punakaiki	970230	4973	FOX R	Dilemma Ck	2	0	2	04/05/86	E A Nepia	
034	S 37 Punakaiki	960250	4973	FOX R	Dilemma Ck	3	0	3	04/05/86	E A Nepia	
035	S 37 Punakaiki	950374	4973	FOX R	Fox R	1	0	1	11/82	D Onley	
036	S 37 Punakaiki	929106	4971	GREY R	Fenton Ck	1	0	1	22/01/84	D Eastwood	Injured bird
037	S 37 PUNAKAIKI		4970	GREY R	Moonlight Ck	2	0	2	1985	B Wilson	
038	S 37 Punakaiki	945107	4971	GREY R	Moonlight Ck	2	0	2	07/83	D Eastwood	
039	S 37 Punakaiki	934108	4971	GREY R	Moonlight Ck	2	0	2	02/03/85	R Stocker	
040	S 37 Punakaiki	938107	4971	GREY R	Moonlight Ck	1	0	1	05/10/85	R Stocker	
041	S 37 Punakaiki	94 11	4971	GREY R	Moonlight Ck	2	0	2	07/03/83	P M Clark-Hall	
042	S 37 Punakaiki	970069	4970	GREY R	Moonlight Ck	2	0	2	09/05/83	J Flux	
043	S 37 Punakaiki	930105	4971	GREY R	Moonlight Ck	2	3	5	14/11/85	R Stocker	
044	S 37 Punakaiki	92 12	4971	GREY R	Moonlight Ck	1	0	1	22/01/84	B Hunt	
045	S 38 Reefton	073050	5072	GREY R	Rough R	2	3	5	1983	J D R Holloway	
046	S 38 Reefton		5072	GREY R	Rough R	11	0	11	01/85	D Moloney	(incl 1 group
047	S 38 Reefton	092205-072275	5072	GREY R	Rough R	6	0	6	1982-84	J D R Holloway	
048	S 38 REEFTON	070270	5072	GREY R	Rough R	2	0	2	10/05/85	R Wakelin	
049	S 38 REEFTON	071273	5072	GREY R	Rough R	2	0	2	31/10/85	R Simpson	
050	S 39 Maruia	010109	5871	BULLER R	Glenroy R	1	0	1	01/85	D Butler	

Fig.2 North Island: presence of blue duck in 10,000 yard grid squares

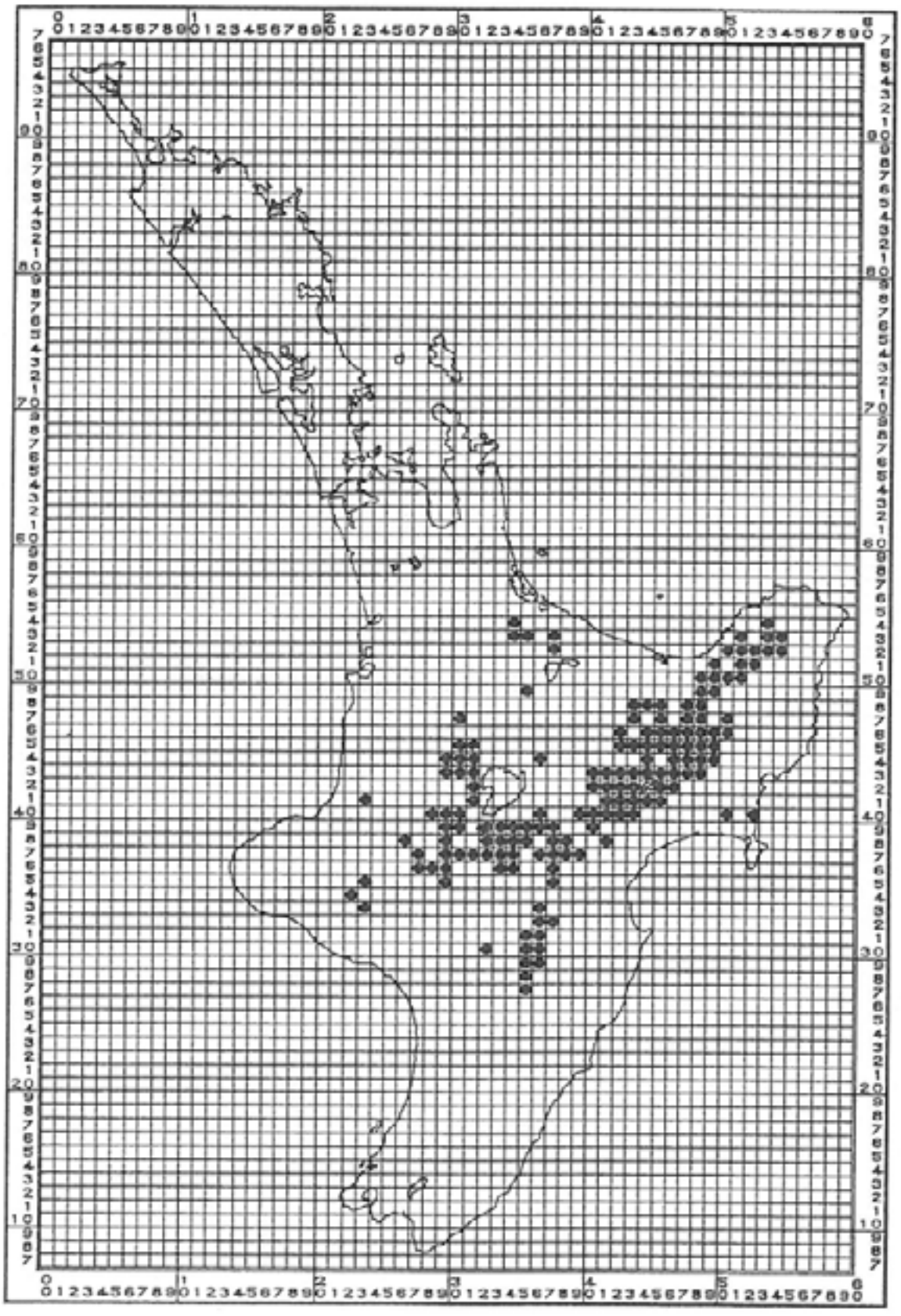
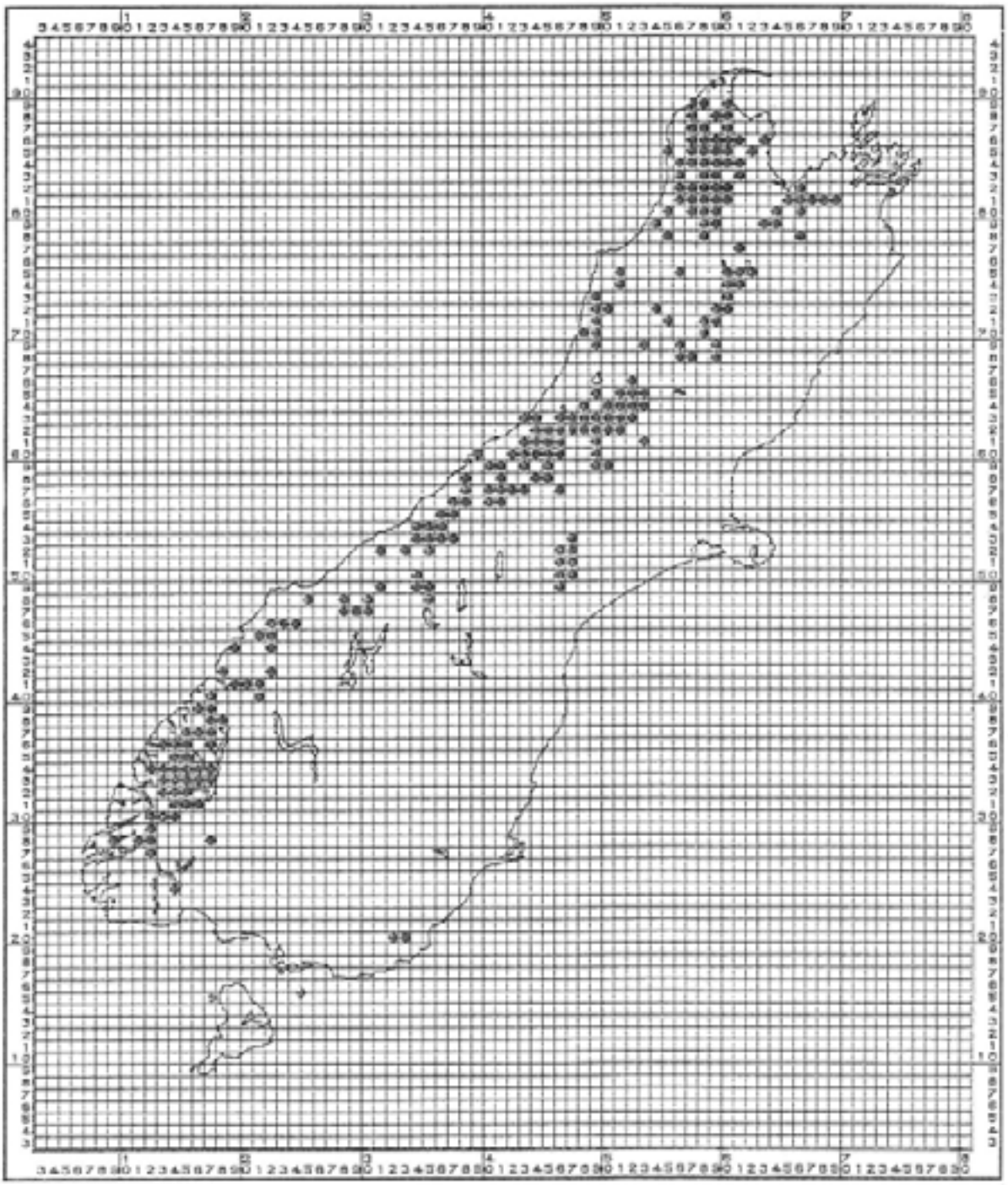


Fig. 3 South Island: presence of blue duck in 10,000 yard grid squares



1. Catchment: Young and adults ousted from territories move only within the natal catchment. Habitat disturbance downstream will restrict access to other branches of the catchment.

2. Watershed: Birds ousted from territories or whole catchments move over ridges, probably via saddles, into other catchments. Habitat disturbance or vegetation removal in the upper parts of the catchment may restrict this kind of movement.

3. Random Scatter: Young birds ousted from natal catchment disperse widely. These birds may have become lost and exhausted during a night-time flight and landed on the nearest water at day-break.

The future of blue duck depends on the management of the remaining populations and their habitat. Knowledge of their distribution is now much clearer and, armed with a readily accessible data base, we can begin to monitor selected populations and follow the overall national trends. Research into habitat requirements, dispersal, population genetics and captive breeding should be an essential part of the management strategy for long term expansion of wild populations.

5. Time Budget and Habitat Studies (Clare Veltman)

A series of studies involving students and staff at Massey University have attempted to analyse the relationship between blue ducks and their river habitat.

Between April and August 1985, Diane Noda and Patricia attempted to define the habitat requirements of blue ducks on Manganui-a-te-ao River using a sampling technique pioneered in New Zealand by Robertson's study of the habitat requirements of wetland birds in the River catchment. Each duck sighting became a 22 digit code describing location, type of water, activity, locomotion, position in relation to near rocks and the size of those rocks. Invertebrate and faecal samples were also collected. Their results were:

a) most feeding by blue ducks was concentrated in riffles,
b) riffles comprised, on average, 61% of each pair's territory,
c) riffles at the geometric centre of the territory were the most preferred feeding sites,
d) the most frequently used feeding method was head-dipping (into shallow water),
e) head-dipping in riffles occurred most frequently immediately downstream of an exposed rock,
f) cased caddis and larvae were the predominant invertebrates in two riffles and comprised a high proportion of the identifiable fragments in the faeces,
g) after fledging, juveniles tended to disperse upstream.

As a direct result of finding that blue ducks foraged predominantly in riffles, it was decided to look more closely at the invertebrate fauna of this zone of the river.

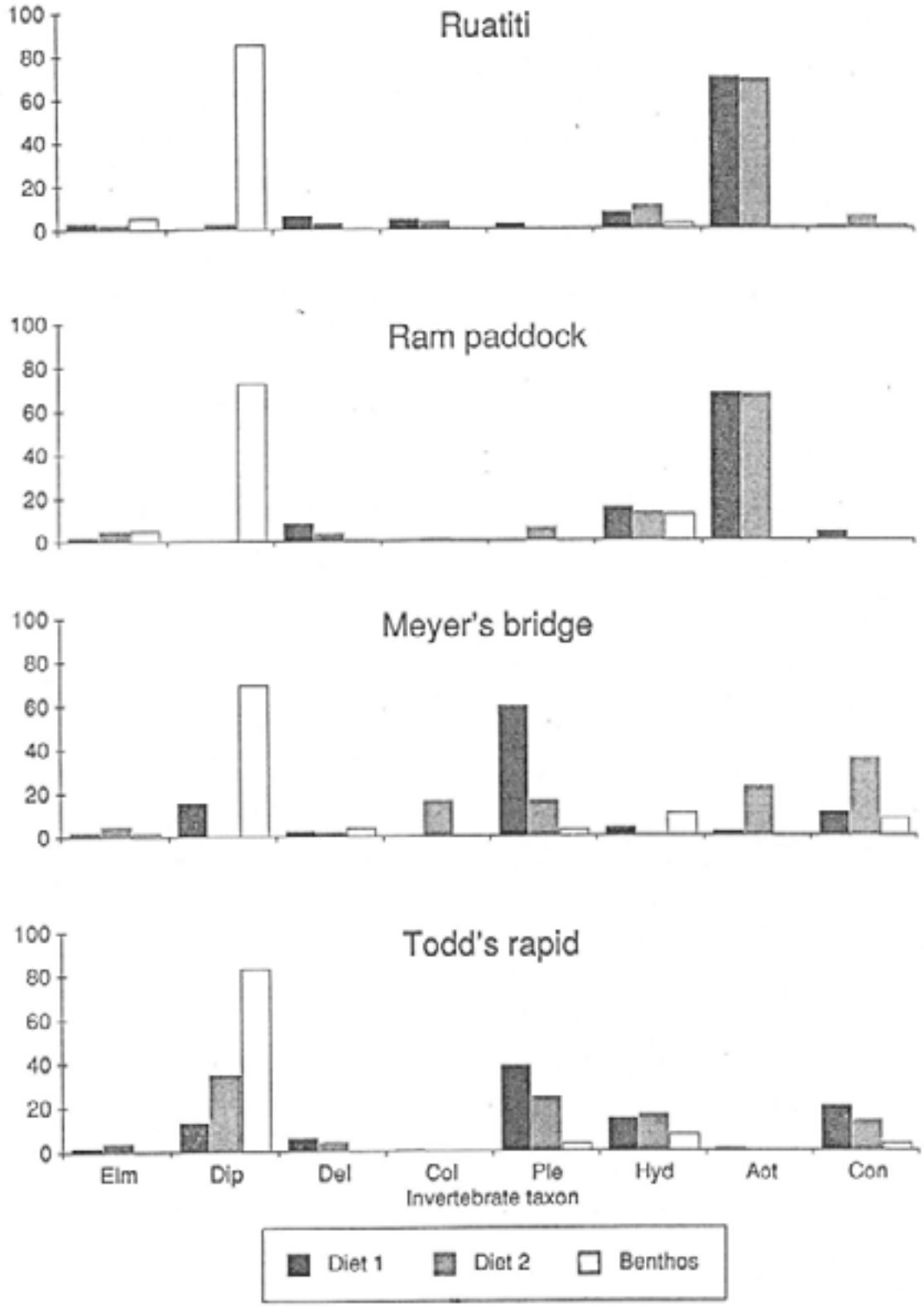


Figure 4: Percentage composition of freshwater invertebrates in 2 faecal samples (Diet 1,2) and benthic samples from 4 riffles on the Manganui-o-te-ao River. (Elm=Emphemeroptera; Dip=Diptera, Del=Delatidium, Ple=Plecoptera, Hyd=Hydropsychidae

Marie Haskell and Ian Henderson sampled invertebrates with a novel surface area sampler from rocks during May 1986. The physical factors investigated were site (four riffles were sampled along the length of the study area), size of rock (18-30 cm, 30-60 cm, 60 cm+), and position on the rock (top, back, side, front). In addition, water velocity and depth were measured as each sample was taken.

Five major faunal groups were collected in this way. They were Diptera, Trichoptera, Ephemeroptera, Plecoptera and Coleoptera.

The biomass of these animals at each sampling site was not affected by differences in the water depth or its velocity, except for the larvae of chironomid midges. Emphemeroptera were amassed on the backs of rocks, Diptera used the tops of rocks, and Plecoptera were on the sides of rocks. Biomass tended to decrease upstream. In contrast to the fauna available, blue ducks used some invertebrates more often than others. As shown in Figure 4 the mayflies Deltidium and Coloboriscus and stoneflies were more frequently encountered in the faecal samples than would be predicted from their biomass in the riffle. Likewise, the three caddis groups Hydropsychidae, Aoteapsyche and Confluens were preferred dietary items.

Blue duck were, therefore, not foraging for prey in direct relation to their biomass in the river, and appeared to be selective predators. The question of competition with trout through dietary overlap has been raised before but never quantitatively investigated. It is timely to do so now.

A third study involving Clare Veltman and Murray Williams sought to analyse time and space use by two pairs during the 1986 breeding season in order to highlight more precisely the birds' habitat use at a critical time in the annual cycle. The principal results were:

a) the behaviour of male and female is highly synchronous,
b) most feeding occurs morning and evening; sleeping is the usual activity in the middle of the day,
c) immediately prior to laying, females spent upward of 40% of each daylight period feeding, the male standing guard most of that time,
d) feeding and other activities tend to become restricted to one pool and one riffle close to and during nesting, these locations being immediately adjacent to the nest site,
e) pairs with young ducklings ranged more widely within the territory than did failed breeders or pairs whose ducklings were half-grown or larger.

One observation pertinent to management is that because of the highly synchronous behaviour of members of a pair, it may be more sensible to translocate blue ducks as mated pairs rather than as singles.

6. Contribution of Ducks Unlimited (Neil Hayes)

Ducks Unlimited's involvement with blue ducks goes back to the late 1970's when two members each received a pair of birds and Operation ‘Whio’ was launched - an attempt to reverse the decline ducks by breeding birds in captivity and releasing them into suitable wild areas.

For numerous reasons, the captive breeding side of the project has not, so far, flourished but in other directions, DU feels its interest and involvement has been of some value. We have

a) actively promoted concern for the long-term survival of blue duck;
b) financially supported research by Jan Eldridge in 1978 (research results reported in Wildfowl Vols 36 and 37);
c) provided logistic and social support to Prof. Frank McKinney during his studies in 1980;
d) financially assisted Massey University's blue duck research programme;
e) assisted visiting UK Churchill Fellow Rod Hall in his efforts to obtain 2 pairs of blue duck for the Wildfowl Trust (Slimbridge) in 1986 (one of these females is currently on eggs!);
f) over the past ten years, made numerous submissions on need to protect blue duck habitat and were actively involved in supporting the Manganui-a-te-ao River conservation order application.

As with brown teal we see captive breeding as vital to the long-term survival of blue ducks. Having a 'bank' of birds in captivity is a safety measure, it allows the production of birds for release, it permits detailed study as well as actively helping in public education.

Captive breeding has been an integral factor in the recovery of several waterfowl species world wide when combined with creation and restoration of habitat, hunter education and predator control. With blue duck, habitat creation and restoration present a great problem, as does predator control.

DU's suggestions to this seminar are:

a) that a comprehensive recovery plan be produced;

b) that plan should cover habitat preservation proposals, propose a research programme to identify suitable areas for population establishment, provide for a comprehensive captive breeding programme and ensure the management of the recovery programme.

Ducks Unlimited has amongst its members persons with experience in the aviculture of rare waterfowl and in our view blue ducks present no major avicultural problems. We are very keen to assist with the conservation and recovery of the unique blue duck.

REGIONAL REPORTS

1. Eastern Region (Paul Jansen)

A distribution scheme commenced approximately 3 years ago. It is a card-based system with all sightings periodically being plotted on large-scale maps. All these sightings have been included in the national scheme maintained by Duncan Cunningham. Surveys have been made of various rivers and streams as time permits and data added to the distribution scheme. Surveys of rivers in the Gisborne area are intended, particularly those in which blue duck occur in a predominantly pastoral landscape.

2. Waikato Region (Stu Moore)

The monitoring of blue duck on the Tongariro River commenced in 1984 prior to commissioning of the power scheme when 30 birds were identified and 22 of them banded. A further survey in 1987 identified only 4 pairs and no sightings elsewhere of banded birds. Further monitoring is planned.

A card-based distribution scheme is underway with cards located in most huts in the Kaimanawas. A region-wide distribution scheme is planned but with most activity centred within the Tongariro district.

3. Wanganui Region

(a) Taranaki District (Matt Cook)

Several rivers draining Mt Taranaki/Egmont have been surveyed to determine their suitability for establishing new populations using captive-reared and translocated wild birds. The Waiwakaiho and Manganui Rivers appear the best.

Six captive-reared birds were released onto Manganui River in April 1987 after first being held for 3 days in a river-side pen. Birds dispersed upstream and were not seen again although in November 1987 two birds were reported in the adjacent Tepopo Stream. These could not be relocated.

The inability to follow the birds after release highlights the necessity to have radios securely fitted to them prior to release.

(b) Wanganui District (Bob Halsey)

Most activity has centred around the Manganui-a-te-ao River by providing extensive logistic support for the research programme there and in pursuing the national water conservation order for the river. Further activity will centre on protection of riparian forest along the river and support for the research work.

A district-wide recording scheme is envisaged.

(c) Hawkes Bay District (Phil Mohi)

A survey scheme is already in existence with survey cards placed in all forest huts and provided to interest groups. There appear to be few birds in the district mostly in Kaweka Forest Park where perhaps only 12 birds now remain.

4. Nelson/Marlborough Region (Kay Starke)

An embryonic recording scheme is in place but it is not co-ordinated regionally. Photos of blue duck and cards have been placed in all huts within NW Nelson Forest Park and sightings requested. A recent survey of the Stanley and Lindsay Rivers located 7 birds, but was hampered by Cyclone Bola.

5. Canterbury Region (Mike Harding)

No regional programmes on blue duck although there is considerable interest in commencing one.

The bird mapping scheme within Arthur's Pass National Park includes blue duck. Request for sightings are made at park H.Q. and resulted in 80 sightings from public last year, mostly from popular tramping routes.

A private study (outside of work time) by Mike Harding includes surveys of isolated rivers, especially those from which birds have not been reported for several years, a detailed study of biology and breeding of 3 pairs on Otira River and will shortly be expanded to include a diet study.

There is evidence of decline within the Park; blue duck are no longer present on the Sudden River. Birds are occasionally seen on mountaintop tarns and suggest movement across the main divide.

6. West Coast Region (Gideon Anderson)

There is no active management of this species, nor is there an idea of the numbers or distribution of blue duck on the Coast. It is intended to survey all rivers, from Karamea to Cascade as time and money permits, the blue duck survey being done in association with other inventory work. These surveys will offer an opportunity for training staff from other regions in survey techniques. Initial surveys are proposed later this year.

7. Northern Region

Blue ducks do not occur within this region.

8. Southern Region

No representative present: this is an important region for the species, being located throughout and with remnant populations in the Catlins and near Hauroka and Manowai.

General Discussion

The need for distribution surveys was emphasised and several speakers supported a uniform card system nationally with all data eventually being incorporated into the national survey scheme. Duncan Cunningham advised it was his intention to have the national survey available to everyone on DOCNET so that all records could be added at district or regional offices.

Paul Jansen and John Heaphy expressed need for greater local PR to advise of interest in blue duck sightings and to encourage public participation.

Richard Sadleir highlighted need for monitoring of populations over long-term, perhaps 3 per region (should comprise one extensive population, one of medium size, and one small isolated population). Monitoring should complement initial surveys.

SPECIES RECOVERY PLANS: D V MERTON

These documents had their origins in USA and were first recommended as basis for planning in NZ in 1977. Plan includes statements of national and regional objectives and detail of how those objectives can be achieved. Detail includes timetables, responsibilities for tasks, manpower and money requirements.

Ten plans now in varying stages of preparation, none yet complete. Plans tending to be a single resource document on the species including all biological details known and distribution past and present. Most are far too large.

Need for plans to be brief and to the point, to look forward not back, is stressed.

The recommended approach is to prepare an 'interim' recovery plan with short-term objectives that are able to be achieved in 2 -3 years. A reassessment then follows, perhaps another seminar of the present type, after which another version of the 'interim' plan is prepared.

GENERAL DISCUSSION

Noel Hellyer questioned the need for a blue duck recovery plan. There were many species more endangered than blue duck which had higher priority for such a plan. Why was it being given such priority? It had never been managed before. There was a need to determine priorities for the preparation of management plans for endangered species.

Stu Moore, Paul Jansen, Richard Sadleir responded expressing support for concept of the plan. Richard Sadleir recognises the need for priorities in management planning but stressed that, given the department's present resources, absence of priorities should not delay preparation of individual species plans. Recent concern over status of various species (eg kiwi, kokako, blue duck) by managers and scientists has resulted in initiatives like this workshop - such enthusiasm should be translated into interim management plans and their implementation. Such plans and actions can be later reviewed within a system of priorities. John highlighted value of any interim plan to assist district planning or in planning procedures. Murray Williams asked how a national overview for the management of any species could be achieved without a plan -did PES directorate have a co-ordinating role? Noel Hellyer responded advising it was not the role of PES to provide national direction, that priorities were now set regionally and that any attempt to impose a national direction was against the spirit of the Department. Stu Moore and Paul Jansen both stressed the value of inter-regional co-ordination and co-operation and the need for direction.

A lengthy discussion ensued in which the value and necessity for a recovery plan for blue duck was given strong support, especially to provide a sense of common purpose. It was agreed that the developemt of a plan should proceed.

DEVELOPMENT OF MANAGEMENT PLAN FOR BLUE DUCK:

1. Defining National Objective

Seminar participants formed 4 small working groups each of which attempted to define a national objective for conservation of blue duck. Suggestions reported back were:

1. To reverse the decline and fragmentation of the national blue duck population and to restore it to a level where it is no longer threatened, with management to proceed immediately by (i) the establishment of a blue duck recovery team and (ii) a commitment to implement its recommendations.

2. To arrest the decline in numbers and range of blue duck in New Zealand by (i) maintaining and enhancing existing populations, and (ii) establishing new viable populations.

3. To maintain as many viable wild populations of blue duck as possible and to enhance and restore blue duck habitats and populations.

After a brief general discussion it was agreed that suggestion (2) would be the declared national objective.

2. Components Required To Achieve National Objective

Seminar participants formed 4 small working groups each of which attempted to define, at a general level, the principal activities which, collectively, would achieve the national objective. Suggestions reported back by the groups were:

Group 1: (a) establish present status and distribution of species using standard techniques:
(b) establish a national recovery team to co-ordinate and focus regional activities and prepare management plan;
(c) identify research needs -to include habitat requirements, productivity, genetic status of populations, impact of trout, dispersal and predator control:
(d) evaluate management techniques and options eg. habitat protection and enhancement, captive breeding and release, manipulation of wild populations, predators and their control.

Group 2: (a) determine status and distribution nationally:
(b) monitor 'representative' populations regionally according to a nationally agreed standard technique and timetable;
(c) protect, by whatever means, existing values of riverine ecosystems in which blue duck occur or could occur and enhance these where possible;
(d) identify locations at which new populations could be established and attempt that establishment;
(e) conduct research aimed at identifying methods of population nd habitat enhancement, and population establishment, and apply the results of that research.

Group 3: (a) develop techniques for measuring population size and status;
(b) identify factors that limit population size (a research task);
(c) develop enhancement procedures for populations and habitats:
(d) identify, regionally, critical populations and monitor these.

Group 4: (a) monitor representative populations regionally;
(b) conduct national distribution and population assessment using standard methodology and integrate results into a national data base;
(c) maintain and enhance riparian forest vegetation;
(d) control water characteristics of important blue duck rivers;
(e) undertake extensive public education and public relations;
(f) undertake population manipulation using relocation, captive breeding and release;
(g) perhaps undertake predator control.

There was an obvious degree of unanimity in the topics advanced namely the need for a national survey to determine distribution, monitoring of representative populations, protection and enhancement of habitat, establishment of new populations and the need for research on some management techniques.

Considerable discussion ensued, much of it dealing with specific techniques, eg. methods of survey. It was accepted that the broad headings of agreement reached in this exercise should be the focus for the next round of discussion but that all topics should be specified in the later management plan so as to give managers a range of activities which they could implement immediately and inexpensively.

3. Management and Research Methods

Seminar participants again formed 4 working groups. In this round, techniques relevant to each of the components outlined above were to be identified and listed so as to provide detail for the eventual management plan. The following is a summary of the main points arrived at after comparison of all 4 group lists.

(a) survey of distribution
- can be readily included with other departmental work;
- a task the public and interest groups can help with;
- based upon a reporting card system -highly preferable if same card used in all regions/districts;
- existing national distribution record scheme should be made available nationally via DOCNET and Science and Research Directorate (Wellington) formally requested to maintain it;
- particular emphasis to be placed on areas which appear as gaps in presently known distribution;
- specific target date (perhaps 2 years) set for completion of regional or district surveys.

(b) population monitoring

- establish three monitoring areas in each region;
- one population should be within a large catchment where birds are plentiful and not under threat, a second population should be of modest size (10 -15 prs) and the third locality should be a threatened population isolate;
- survey of these populations should be done twice yearly (pre-breeding and post-breeding) according to a nationally consistent method and timetable;
- other characteristics of the habitat should be collected at same time so as to identify environmental changes that may influence blue duck numbers;
- inter-regional training may be necessary in first instance to ensure uniformity of approach.

(c) habitat protection and enhancement

-involves basic actions to protect water quality, quantity and continuity of flow;
- water and soil actions involve, amongst others, water rights, conservation orders, covenants, town and country planning procedures, purchase, district scheme zoning, advocacy etc.;
- riverbed maintenance involves protection from metal extraction, mining, pollution, etc.;
- riparian vegetation protection or re-establishment by variety of existing land protection procedures;
- particular attention applied to land outside of the DOC estate, priority to areas in which blue ducks now or potentially could occur.

(d) research

- determine genetic structure and dispersal of blue ducks by biochemical means;
- determine population dynamics of and habitat use by blue ducks in pristine South Island location (all existing management ideas are based on a single North Island study in a 'modified' environment and so may not be typical for blue duck over much of its present range);
- identify factors that have caused the demise of blue ducks in catchments from which they have recently disappeared;
- assess impact of predators and, especially, competitors (eg. trout);
- by manipulation, determine ways of increasing productivity of wild populations (eg. egg removal and re-nesting, removal of non-productive pairs etc.).

(e) population establishment and enhancement

- determine, by experiment, survival of captive-reared birds when released into wild;
- if above successful, establish major captive breeding programme;
- identify potential areas for establishment of new populations;
- identify small remnant populations where enhancement should proceed:
- identify populations from which wild birds may be cropped either for captive breeding stock and/or for population establishment;
- attempt population establishment and enhancement of remnant populations.

(f) public education
- possible at local, district and regional level with little effort or cost;
- interest groups targeted;
- Survival Anglia's 1/2 hr film on NZ Television later in year seen as useful focal point for national awareness (eg. article in Listener, community service video advertisement asking for public sightings of bird etc.)
- major book - to incorporate existing distribution details, biological information and management plan together with numerous high quality photographs. Sponsorship could be sought.

GENERAL DISCUSSION

(a) Need for Blue Duck Recovery Team

The need for a group of people to act as facilitators and maintain momentum on blue duck work received extensive discussion. Stu Moore and Paul Jansen both emphasised the need for a co-ordinated approach. Noel Hellyer stated Central Office Directorates give guidance to regions but regions set their own priorities and central co-ordination was not how DOC functioned. Stu Moore identified the Principal E M officer in each region as key regional position. Neil Hayes felt the lack of central co-ordination was a major factor in causing no progress following 1985 Wildlife Service sponsored seminar on blue duck. He strongly urged formation of a recovery team.

It was a general view that some mechanism for inter0regional co-ordination was required. It was left to Murray Williams when drafting the interim recovery plan, to make proposals to achieve that co-ordination.

(b) Immediate Activity

Paul Jansen advised that several people were seeking direction for immediate implementation of some management activities. Noel suggested that Eastern Region could now compare blue duck numbers in Eastern Urewera Park with results of surveys conducted by Wildlife Service in the early He suggested all regions and districts could immediately move to identify blue duck habitat outside of the DOC estate, all fieldstaff could be made aware of blue duck and encouraged to report sightings. Local public relations activities could be initiated.

(c) Draft Recovery Plan

It was left to Murray Williams to prepare both a summary of the seminar and a draft recovery plan. The plan would be widely circulated for comment, especially from seminar participants. Plan should also include list of people with expertise in blue duck survey techniques, should propose methods for communication and maintaining momentum.

(d) Training In Techniques

Kay Starke requested guidance on survey techniques. Murray Williams suggested the planned West Coast survey would be an excellent opportunity for a co-operative survey and for arriving at common survey methods.

FINAL COMMENTS: N R HELLYER

Commended Wanganui region in its initiative in setting up the seminar. Seminars of this type were seen as an excellent way to arrive at a common approach to species management. This had been an especially vital seminar with positive contributions from the floor and a high level of enthusiasm for the subject. The real issues had been identified and the preparation of the draft management plan would be a major step forward to assist regional planning.