

SCIENCE AND RESEARCH
INTERNAL REPORT NO. 89

**MINUTES OF THE
2ND ANNUAL MEETING OF
THE BLUE DUCK LIAISON GROUP**

compiled by

Murray Williams

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Science and Research Division, Department of Conservation,
P O Box 10-420, Wellington

Meeting Venue: University of Canterbury Field Station, Cass, Arthur's Pass.

Dates: 10-12 July 1990

In Attendance:

Murray Williams (Meeting Convenor), DOC (Science and Research)
Grant Dumbell, Ducks Unlimited
Clare Veltman, Massey University
John Galilee, DOC (East Coast Conservancy)
Paul Jansen, DOC (Bay of Plenty Conservancy)
Rob McCallum, DOC (Tongariro/Taupo Conservancy)
Wayne Hutchinson, DOC (Wanganui Conservancy)
John Heaphy, DOC (Wanganui Conservancy)
John Lysle, DOC (West Coast Conservancy)
Dave Barker, DOC (West Coast Conservancy)
Alan Reith, Hokitika
John Andrew, DOC (Canterbury Conservancy)
Euan Kennedy, DOC (Canterbury Conservancy)
Steve Phillipson, DOC (Arthur's Pass)
Ray Smith, DOC (Arthur's Pass)
Bruce McKinlay, DOC (Otago Conservancy)
Nick Torr, DOC (Te Anau/Southland Conservancy)
Alan Saunders, DOC (Threatened Species Unit)
Duncan Cunningham, DOC (Science and Research)
Mark Simmons, Invercargill

Part-Attendance:

Mike Harding, Forest and Bird
Peter Simpson, DOC (Arthur's Pass)

Meeting Content:

1. Receive and discuss annual activities report from each Department of Conservation conservancy.
2. Receive and discuss interim and final reports of research projects.
3. Receive and discuss a report from the 'Captive Breeding Group' and to respond to the recommendations of that group.
4. Consider role and participation of Forest and Bird in activities.
5. Review timetable of activities outlined in the 'Blue Duck Conservation Strategy' and respond to events that have deviated from that timetable.
6. Consider new research/management activities
7. Consider operation and effectiveness of Blue Duck Liaison Group.

Content of this Report:

All papers tabled at the meeting are included in this report. Conservancy reports are reproduced exactly as tabled and are followed by a brief "meeting comment" which summarises the essence of the discussion of the report

Research reports were by and large, tabled without comment. They, too, are reproduced exactly as tabled:

The report of the "Captive Breeding Group" is included as well as a copy of the minutes of their meeting in May 1990. Decisions arising from the recommendations of that group follow their report and minutes.

Other matters discussed are recorded in summary form - emphasis being placed on the decisions made rather than detailing the content of the preceding discussion.

CONSERVANCY REPORTS

1. BAY OF PLENTY (compiled by Paul Jansen)

Following the recommendations of the last blue duck recovery group meeting held in Ohakune the Bay of Plenty Conservancy did not establish any monitoring sites.

The study areas previously established within the Motu, Waioeka, and Waipoa Rivers have become the responsibility of the East Cape Conservancy and it is not known whether any follow up work has been conDUCKted since these populations were first assessed.

Records of blue duck sighted within the conservancy have been collected over the past year and these have been passed on to the operator of the blue duck data base in Wellington at intervals.

FUTURE WORK

A survey of the Whirinaki River (head waters of the Rangataiki River) is planned for spring 1990. Scattered records of blue duck have been received and it is hoped that the survey will provide information on numbers within the Whirinaki System.

A request for assistance has been received from the Te Kuiti field centre (part Waikato Conservancy) to search streams draining the western flanks of the Hauhangaroa Range for birds. The streams are small and the assistance of a trained dog to locate birds will be of advantage. The survey is scheduled to take place in late 1990.

East Coast Conservancy has also requested assistance with monitoring the established study populations of the Motu, Waioeka and Waipoa Rivers.

The Northern limit of blue duck falls within the Bay of Plenty in the Wairoa and Kaituna River systems. These two populations are truly relic and may be of interest in determining expansion or decline in over all numbers of the species. I would appreciate comment from the recovery group as to the value of instigating a monitoring scheme in one or both of these catchments.

Meeting Comment: Wairoa and Kaituna River populations are worthy of monitoring so as to assess their potential for enhancement by introduction of other birds.

2. WAIKATO (compiled by Suzanne Clegg)

Blue duck work carried out in the Waikato Region between March 1989 and March 1990.

1. Re-survey of the Ongarue River, Pureora.

This river was initially searched in February 1989 when 3 pairs and one single bird were found over an 8 km stretch of river. On December 4th 1989 it was re-surveyed and 2 pairs, one with 3 juveniles, were found, over the same stretch. It was difficult to try to correlate the presumed territories of the first survey with those of the second.

2. Survey of the Okahukura River, Pureora.

In March 1990 we conducted a survey down a 6km stretch of the Okahukura River. Blue ducks had been reported in the past from this river however, on this survey, none were found. Blue duck faeces were found where we first entered the river but nowhere else although the river looked to be suitable habitat for blue duck. There have since been reports of blue ducks further upstream from our survey area.

3. Survey of the Mangatu Stream, Pureora.

On March 22nd 1990 we surveyed a 6.5 km stretch of this river. Two pairs and two single birds were located.

Comments

1. Access: Our main criteria for choosing monitoring rivers has been ease of access. Although most of the rivers and streams in Pureora Forest Park contain blue duck, they pose difficulties in obtaining easy, quick access to their headwaters. Many of the rivers would also be difficult to survey due to the terrain. Some require part walking, part floating and, in the case of the Waihaha River for example, are not traversable at all in places. Access, however, remains the basic stumbling block.
2. Threatened populations: None of the rivers within the Forest Park are threatened by, say, logging in the headwaters, however the populations themselves remain threatened by predators and possibly food competitors. Within pine plantations outside the Park, however, several blue duck sightings have been made and these birds are most likely under threat. Their habitat may be totally destroyed in the near future and they could be considered for transfer to other rivers or for use in captive breeding programmes.
3. Estimates of blue duck numbers: observations of blue ducks during surveys are very much due to chance. Allowing for travel time to the headwaters of the river, and the time involved in traversing the stretch of river, the survey ends up

being carried out between, say, 8.30am and 3.00 or 4.00pm - probably the worst possible time for finding blue ducks. Thus, I feel we are not getting a very good estimate of true numbers, nor are we achieving any useful monitoring. It would seem that the only useful information gained from surveys at present is:

1. Knowledge of the presence of juveniles (although this is also by chance)
2. Observation of faeces, indicating presence of blue ducks, whether or not they are observed.

Blue ducks are frequently reported by the public (mostly hunters) and DOC employees in the field. They are followed up where necessary to determine exact locations and numbers. This has helped us build up a picture of the distribution of the species and is useful when selecting rivers to monitor.

Recommendations

1. For future surveys, we should use a dog trained to find blue duck. Paul Jansen (Rotorua) and Steve McGill (Taumarunui) have offered to help us in this respect if we cannot find anyone locally.
2. Continue monitoring the Ongarue and Mangatu Rivers twice yearly.
3. Choose another river to monitor in place of the Okahukura. Very little blue duck sign was found in the area searched and to continue further upstream would pose more access problems.
4. Determine exact locations of blue ducks in pine areas so that they are known and the birds can be shifted in the future if necessary.

Meeting Comment: Need for field assistance and guidance was noted and was volunteered by neighbouring conservancies (Bay of Plenty, Wanganui). The importance of the Ongarue population was emphasised and was considered to be the priority area.

3. EAST CAPE (compiled by John Galilee)

1. Introduction

Through the 1989/90 year there has been a limited amount of activity on blue duck conservation within the conservancy. The recent restructuring has resulted in a change of personnel, and the two conservancy office staff appointed to cover the protected species field have had little previous involvement with blue duck conservation.

2. Distribution survey

Unsolicited records of blue duck sightings have been regularly received, some of which have yet to be added to the Blue Duck Distribution Database. All field staff have been requested to forward records of sightings by themselves, or members of the public.

It is intended to establish and maintain that portion of the database covering the conservancy in our Gisborne office.

An inventory of blue duck numbers in selected tributaries of the Mohaka River was performed by Keith Hawkins (DOC, Wairoa). This concentrated on those tributaries for which few or no recent records had been received. The updating of information from this catchment was an integral part of the preparation of DOC's evidence in support of the ultimately successful application for the granting of a National Water Conservation Order over the Mohaka. This has since been appealed by Electricorp, who during the course of the proceedings rejected the relevance of blue duck records older than 4 years. It is intended to update such records in advance of submission against the appeal.

Much of the above survey work was carried out in areas now managed by Hawkes Bay and Bay of Plenty Conservancies.

Consideration is being given to updating records from a number of other catchments within the conservancy e.g. the Waiapu.

3. Population monitoring

During November 1988, a monitoring programme was established in the old Eastern Region which met the requirements of the 1988 Conservation Strategy, namely the monitoring of three populations of different size and habitat quality. The results of the first baseline survey was reported to the Liaison Group at the Turangi meeting in 1989.

Concurrent with the survey, 21 individuals from two of the three catchments were banded. The three catchments (the Motu, Waioeka and Waipaoa) adjoin each other, and thus offer an opportunity to assess 'inter catchment' population interactions. To date none of the banded individuals have been sighted.

The resurvey of the selected populations has been budgeted for in the 1990/91 conservancy Business Plan, and it is accorded high priority. As part of the survey, it is intended to relocate as many of the banded individuals as possible. Consideration will also be given to banding further individuals, as an unsatisfactory number were banded in the Waioeka catchment, and none from the Waipaoa.

4. Habitat protection

Two areas containing waterways with resident blue duck populations are currently being advocated by the conservancy as suitable for purchase by the department. One block includes a 5km stretch of the Whitikau Stream, an upper tributary of the Motu, and containing a population selected for inclusion in the population monitoring programme. The second area is coming up for sale by tender in August, and includes lengthy stretches of the Te Hoe and Waiau Rivers immediately to the south of Te Urewera National Park.

5. Buddleia

Recent work by the Forest Research Institute, Rotorua, on buddleia within Te Urewera has highlighted the lack of information about the impact that buddleia is having on blue duck populations. Buddleia is continuing to spread throughout the northern and western sectors of the National Park, and is also present in parts of the Urutawa and

Raukumara Forests. To date the establishment of buddleia has been restricted to the greywacke country, where it establishes a permanent presence on the gravelly banks alongside streams. Often, once it has reached maturity it completely overhangs the waterway.

Our conservancy is uncertain about the impact of buddleia. Is it a problem? What effect does it have on stream invertebrates, and can blue duck continue to utilise streams dominated by buddleia? If buddleia is having an effect on blue duck populations, perhaps by reducing the amount of habitat potentially available to them, then the issue should be addressed now.

Meeting Comment:

- a) Deterioration of habitat as a result of *Buddleia* invasion may be symptomatic of other deleterious changes in the catchment. Are there records elsewhere of loss or reduction of blue duck from waterways flanked by *Buddleia*? John Galilee asked to seek details from other conservancies and to circulate review results.
Action: John Galilee

- b) Concern was expressed about the attempt by Electricorp to invalidate distribution records older than 4 years. Given the longevity of this species, and its high site-tenacity, such a hypothesis seems without any justification. The response of East Coast conservancy to this challenge is sought. Suggested that East Coast evidence about blue duck presented to support the Mohaka conservation order application be circulated to all conservancies. Similarly, blue duck evidence presented at the Wanganui River Flows appeal hearing should also be widely circulated.
Action: John Galilee, Murray Williams

4. HAWKES BAY (compiled by John Adams)

The blue duck survey card scheme continues to provide information from hunters and trappers in our Park areas. A picture is emerging however indicating that as a survey technique it does have its limitations. When plotting these reports onto our base maps it becomes clear that the majority of these come from close to huts and campsites (i.e. where people spend most of their leisure time alongside rivers). It is most unlikely that these areas are coincidentally the best, and in some cases the only, inhabited blue duck territories on these river systems.

All our staff are aware of the importance of blue duck and a good number of reports are being made by them during the course of their duties. No other survey work has been carried out over the past year but all Field Centres are intending to proceed with systematic surveys for blue duck this financial year.

Plans to complete a comprehensive survey on the Ngaruroro River this financial year may have to be delayed because of funding cuts. This river was to have been the subject of a Water Conservation Order, the blue duck information being required in support of our application.

Other valuable information is also coming to hand as a result of the public's increased awareness of the nature of the blue duck populations. Some significant sightings have been provided by concerned hunters and trappers quite independently of the survey card scheme. It is intended to further publicity to the threatened status of the blue duck and to prepare a regional management strategy for the species.

Nothing further to report but perhaps the Department (Blue Duck management Liaison Group!!) could consider giving greater emphasis to the plight of blue duck through increased public awareness efforts. What better time to do this than in conjunction with the publication of Murray John's Blue Duck Book.

Meeting comment: Strong support expressed for the planned surveys. This is one area where distribution data are scarce and where potential for reestablishment is high.

5. TONGARIRO/TAUPO (compiled by Rob McCallum)

The 1989/90 year was one of constant activity on our Blue Duck Project with several studies in various stages continuing in the Conservancy.

1. December 1989 Survey

The Tongariro River, Wanganui Headwaters, Waione Stream, Mangatepopo Stream, Okupata Stream, Whakapapa River and Whakapapaiti Rivers were surveyed extensively by staff on and/or in tubes. Detailed results of this survey are available but can be summarised thus;

-all major waterways which could possibly harbour Blue Duck have now been surveyed. With the exception of the Otanawairua catchment and the Wanganui above SH 47, only a few minor streams remain unchecked. It is anticipated these will be added to the December 90 survey.

-breeding occurred on all three rivers this year (Tongariro, Wanganui and Whakapapa).

-The presence of Blue Duck above the Wanganui intake and their apparent absence for a considerable distance below would indicate that water diversion has reduced the value of the river in terms of Blue Duck habitat (by some 15kms). The population appears to be concentrated around major confluences. The low number of birds may be the result of unnatural flows.

-There appears to be a lower density of Blue Duck below the Whakapapa intake than immediately above it, however, at least two pairs are breeding below the diversion.

-This survey observed large amounts of sign (feathers and faeces) and highlighted that time of day combined with survey weather conditions is crucial to observation success. It is granted that due to the territorial nature of the ducks that location of large amounts of sign is almost as good as a visual sighting but it

was found that the use of a trained dog was extremely successful in locating birds that would otherwise have been missed. It is recommended that foot teams use a dog possible in future.

2. Invertebrate Sampling - Kevin Collier

Conservancy staff provided logistics support to Kevin Collier in his work on invertebrate sampling. This work which was completed in late January 1990 sampled the Mangatepopo, Okupata, Whakapapanui, Makotote, Waimarino, Mangawhero, Mangateitei, Tokiahuru, Wanganui and Mangaturuturu catchments. Data is expected to be available in late 1990, early 1991.

3. Manganui-a-te-ao Survey - Murray Williams

The final survey of the Manganui-a-te-ao River was completed in late March by Dr Murray Williams and Conservancy staff. This completes Murrays 10 year population study -a milestone in the Blue Duck world. In May, Murray presented a seminar to Conservancy staff on his work in the area to present the findings that a decade of field work had yielded.

It is noted that Johnny Nations Chocolate Afghan sales have plummeted with Murrays absence from the Conservancy.

4. OSNZ Study - Upper Manganui-a-te-ao

This project has completed another breeding season and is continuing into its fourth year.

5. Dispersal Survey - Duncan Cunningham/Murray Douglas

Staff are providing logistics support to S&R staff conducting the Dispersal Survey. Although this survey is only just entering the field phase, it is expected that Conservancy staff will be providing a sizeable amount of support in capture operations, radio tracking (both ground and aerial) as well as field observations.

6. Conservancy Database

Tongariro/Taupo Conservancy Protection/Use crew have placed the Blue Duck recording systems on computer. There are currently 121 cards on record. This system is compatible with the one operating at Head Office.

Meeting comment: Considerable admiration for efforts of this conservancy were expressed. Blue duck and abundance better known here than elsewhere in New Zealand. It was noted that considerable expertise related to river issues existed within this conservancy which could be of help to others faced with conservation orders etc. Suggested that details of all materials presented at tribunals about blue duck be circulated to other conservancies.

Action: Murray Williams

6. WANGANUI (compiled by Wayne Hutchison)

Over the past twelve months, the area of responsibility for blue duck management in the Wanganui Conservancy (Region) has been significantly reduced with departmental restructuring. The Wanganui Conservancy does not now include the Ruahine or Tararua ranges.

Blue duck management is currently aimed at the Manganui o te ao river and Egmont National Park with survey of the Waitotara and Omaru area of Whanganui National Park planned this summer.

Manganui o te ao River (John Heaphy to discuss)

- 1) John Rich from Lincoln College has written his proposal on 'what management strategies should be devised to allow protection and enhancement of the natural environment of the Manganui o te ao river, while still allowing a recreation experience with no loss of landowner income, rights, or privileges?'

John has commenced his study by interviewing various people who will be affected by management of the river, e.g. landowners, recreational users, etc. He has also constructed exclosure plots along the river to measure regeneration within these against grazed riparian strips.

- 2) The department has shot 135 goats off the riparian margins of the central Manganui o te ao during spring last year. Goats are no longer a problem with only a dozen left in the higher country away from the river.
- 3) The Ruatiti Domain Management Plan has been written and implemented.

The Raetihi District Council has funded improvements to the domain to the tune of \$25,000 this year. It is that improvements to the domain will encourage the public to use the facilities and consequently take the pressure off the rest of the river.

- 4) The rafting pact adopted by rafting companies using the river is working well and now appears to be an established event rather than an experiment.
- 5) Negotiations are currently underway with a landowner on the Manganui o te ao who may be keen on a landswap to the benefit of both parties.

The piece of interest to DOC involves prime riparian habitat and at this stage may not cost DOC any money.

- 6) Discussions are also currently underway with the Raetihi District Council on reclassification of Manganui o te ao riparian road reserve to a more appropriate land classification (possibly crown control). The District Council appears to be favourable to this at this stage.

- 7) A survey of the Manganui o te ao population was carried out in March 1990.

Numbers were way down on what was expected. A large number of pairs (15) were not sighted. Droppings were also scarce or absent in many of these expected territories. The counting technique was exactly the same as previous surveys and the only other possibility for such an apparent decline is the very large flood down the Manganui o te ao at the beginning of March which could have affected distribution in the short term.

Egmont National Park

The Egmont blue duck population is monitored on a formal and informal basis. Regular searches are carried out approximately 3-4 times a year. Staff engaged on wild animal control work and park duties are versed in blue duck identification and are the source of continued sightings and updates.

Currently we are aware of one pair and a lone bird (all banded) on the Manganui river; 1 pair (1 banded) is alternating between Lake Dive and the Puneho River (near the lake); a lone bird sighted on the Waiwhakaiho river (unable to confirm bands); and two unsubstantiated reports of a bird in the Maketawa stream and a bud in the Bell area on the Stony River.

Regular checks are made on the Lake Dive pair by DOC hunters and track crews particularly during summer. The presence of these birds creates much correspondence in the Lake Dive hut log book.

Other Work

Records and sightings are being compiled and entered on the database.

The Waitotara catchment of the Whanganui National Park will be surveyed this summer to confirm numbers.

Meeting comment: Mt Egmont liberations need a more methodical monitoring and a greater local commitment to the task. There is a need to build on past liberations and extend the programme (see later).

7. WELLINGTON (compiled by Tim Harrington)

Within the Wairarapa we have carried out two field trips following up the release of a pair of birds in the Park River on 13th April 1989. Within approximately six hours of this pair of birds being released the male (a wild bird of unknown adult age) had returned the 26 kilometres to the farm where it had been living for the last six months. The female was a captive bred bird, six months of age. It is highly unlikely that this bird followed the catchment system back to this point, as this would not have only required a flight of over twice the direct distance, but also well out into the Wairarapa plains just south of Carterton.

Approximately a month later however, two birds and then a single bird were reported from the vicinity of the release site. No bands were reported from any of these birds by the observers. A field trip into the area in July which thoroughly searched all the headwater catchments of this area revealed nothing, and no further sightings have been reported. Several blue duck identification notices have been put up in huts in the area. A summer search of the Mangatarere Stream and the keen eyes of local residents have failed to turn up any further sightings of the male to date.

We are hopeful to launch another search over the spring of this year concentrating again on the headwaters of the Waiohine River and to follow up as quickly as possible any sighting reports with our own searches.

I feel the Tararuas offer many locations suitable for blue duck. Over the past ten years there have been many unconfirmed sightings all from the central river systems of the park and areas not frequently visited by the public eg the headwaters of the Otaki, Waiohine and Waingawa Rivers. The Tararuas do offer a viable site for the re-establishment of a blue duck population.

8. NELSON/MARLBOROUGH (compiled by Ian Miller)

Efforts have been patchy this year at best, with a number of counts raising more question-marks than hard data.

December

A problem with the early summer survey period was its coinciding with the deadline for first order CRI survey, as most field centre staff responsible for species work are also responsible for CRI. Therefore, counts that were undertaken during the period were belated (mid-late December), and probably overlapped with the moult, making them less reliable.

Flora Stream - only 2 pairs seen.

Slate River - fleeting glimpses of 2 furtive birds only. Local miners had seen reasonable numbers prior to the survey. The birds' behaviour strongly suggested they were moulting.

Riwaka south branch - this stream was surveyed as a result of what subsequently appeared to be 'misinformation' as to the numbers of birds present. A family of 2 adults and 5 young were seen, as well as a single adult. This ties in with local accounts of 2 pairs on the relatively short stretch of suitable water.

March-April

Goulter River (Mt Richmond Forest Park) - a major effort from Bill Cash and Phil Clarke who surveyed the whole river and the lower stretches of all the major sidestreams over 3 days, for 1 pair and one lot of faecal sign. Phil concluded that he doubted that there were more than 3 pairs in the entire system. We may have to look elsewhere for a more compact "small" population!

Riwaka south branch - 3 adults (2 o, 1^o) together.

Flora -1 pair only (day was cold, overcast, and later windy). There have subsequently been a number of sightings on other parts of the stream, with several birds seen in the course of a day.

Slate River -all attempts made to re-count this river were prevented by a series of floods.

Conclusions

- 1) The Flora counts in particular have raised questions over the comparability of one-off surveys. Are we getting a sufficiently accurate picture on each occasion to make valid comparisons?
- 2) No banding has been undertaken as yet, but both the Flora and Riwaka south branch would be ideal sites, especially with a view to producing information on dispersal of young.

Meeting Comment: The Flora Stream area appears to have potential as a monitoring site and should proceed as soon as possible. Involvement of OSNZ members in field monitoring should be considered.

Marlborough appears not to feature in discussions or plans. It remains a major "gap" in distribution information and should be addressed.

9. WEST COAST (compiled by John Lysle, Dave Barker)

Field work commenced in January 1990. We intended to band Blue Duck populations in the Moeraki River in South Westland, Styx River near Hokitika and the Kakapo River, a tributary of the Karamea.

Three people and two dogs went into the Moeraki which is a high-sided valley with few Blue Duck. On the evening of arrival we split up 3 ways and located 2 pairs and a single bird. The following 2 days were spent searching with dogs but no birds were found. We left the area disappointed but also delighted that Blue Ducks could disappear so completely. We have not returned to the Moeraki.

The Styx River, near Hokitika is approx. 20 minutes drive away from base, has a good track with an easy gradient. We knew from earlier surveys and the card system that birds were present in the first 15km or so of river. To conduct our survey we decided to use volunteers from the public, an idea put to us by Southland Conservancy. Our PR/Advocacy section handled the advertising and the bookings. We took people away into the hills for 5 days, and they paid \$40 towards their food, transport and accomadation costs. The volunteers had found out about our Blue Duck work by a pamphlet advertising our surveys and from an advertisement in the "Listener". The response was good and the type of people we got was also good. Our first volunteer week was used to survey the Styx River and the neighbouring Arahura River. Because of their fitness and enthusiasm we were able to survey rough gorges that we would not have been able to survey on our own. We used people from the ConservationCorps and a couple of wage-workers to supervise the volunteers and found it necessary for the supervisors to be interested in Blue Ducks if the enthisiiasm of the volunteers was to be maintained.

I was reluctant to use volunteers for banding (in case we had a minor disaster) but in the end it worked out OK. We had volunteers returning for another week of surveying and banding. We kept in touch with Mike Harding and Steve Philipson at Arthurs Pass to ensure that we did not duplicate colour combinations.

Throughout our Blue Duck work I have used a German short hair pointer dog to locate birds and he has enabled us to locate 25-30% more animals.

We attempted a visit to the Kakapo River but were bedevilled by high rainfall and steep, deep gorges and only managed to band 3 Blue Ducks.

No further work is planned until after the breeding season although the Styx population will be monitored. We may shift away from Moeraki to headwaters near Haast thus being adjacent to Otago Blue Ducks. We may not return to the Kakapo or any other river in the Karamea catchment but instead investigate the Oporara River near Karamea. This is in limestone country and has a productive population.

Meeting Comment: Concentration of effort on key areas, especially the **Styx** population, was supported. Dispersal between catchments and "limits" of populations a key question and worthy of research involvement.

10. CANTERBURY (compiled by Mike Harding, Forest and Bird)

Background:

Detailed Blue Duck monitoring at Arthur's Pass has been confined to two study areas, the upper Otira Valley and the tributaries of the Bealey River -both tributaries of the Taramakau and Waimakariri Rivers within Arthur's Pass National Park. Colour banding of birds began in January 1989 and 12 individuals have been banded to date: 7 in the Otira (4 male, 3 female) and 5 in the Mingha River (3 male, 1 female, and 1 juvenile).

Results:

1. Otira River:

- Two the 3 pairs remain, one pair disappeared in March 89.
- Two further birds have appeared in the study area: a male in Sept 89, which was banded before moving on, and a female in Jan 90 which has not been relocated. (The male was later sighted in the Deception River and more recently in the Mingha).
- Birds have bred successfully at this site for several years but only one (unsuccessful) breeding attempt has occurred in the last two seasons.
- Birds utilize the whole length of the river throughout the year.
- The two pairs have retained their territories since banding.
- Birds occasionally rest and feed on Lake Misery, an alpine tarn on the main divide (Arthur's Pass).
- There was no change in numbers of adult Whio present after aerial sowing of 1080 baits for possums.

2. Mingha River:

- All 4 adult birds banded remain in the study area (3 males and 1 female)
- Territories and pair bonds have changed each season.
- Young have been raised at the same location in the Mingha each season by different parents but only one juvenile has been banded.
- The Coast to Coast endurance event coincides with the breeding season but monitoring has been insufficient to comment on possible impacts.
- A lone male banded in the Otira River was located in the Mingha in May 1990. This is the first definite record of a bird crossing the main divide.

3. General:

- Birds have disappeared from the Bealey River over the last two years.
- There are at least 3 pairs in the Edwards River, and at least one pair in the East Edwards, but banding of these birds has not been possible.
- Individual birds have proven to be very mobile, while the Otira Valley pairs have been stable.
- Whio readily eat fruit and seeds from riparian shrubs and grasses.
- Overall distribution of Whio within Arthur's Pass National Park appears to have declined since the 1970's.

Discussion:

The project has yielded some interesting results since birds were colour banded, particularly the observations of fruit feeding and the movement of a banded bird across the main divide. Both rivers with banded birds are relatively accessible. A lot of data has also been collected on distribution within Arthur's Pass. This is held on a data base and it is hoped to have this ready for publication shortly. It is timely to look critically at the

Arthur's Pass work in relation to the national objectives:

- Should we concentrate on thoroughly monitoring birds in a small area or should the emphasis be on banding birds over a wider area with less comprehensive monitoring? (What rivers should be included if it is to be extended).
- How effective have public sightings been and should these continue to be an integral part of the monitoring?
- How important is the continued collection of data and monitoring of Whoio distribution in the region and what emphasis should that receive in relation to the monitoring of banded birds?
- How much emphasis should be put on monitoring habitat?
- Is it worth continuing to collect behavioural/habitat use data?
- What type of research would be most beneficial to this project?
- What resources are available to continue or extend the project?

Meeting Comment: The Arthur's Pass study has yielded excellent results and is worthy of expansion (see new proposals), especially to consider trans-alpine movement.

No report on the Mt Peel population. This was viewed with concern as it is an isolate and as such has potential for rehabilitation. Agreed that greater investigation of this population was warranted.

Action: John Andrew

11. OTAGO (compiled by Bruce McKinlay)

Activities have centred on survey in the Makarora field centre. Rivers surveyed were the Blue, the Leven, the Ore, Siberia Stream and the north branch of the Young River.

One pair were recorded on the Young and the Blue. Previously birds had been seen on the Siberia.

Comments from local people were that blue ducks were always to be found at the same place on the Blue River. The balance of the Blue River appears to have good blue duck habitat but no birds. This raises questions about dispersal and recruitment in South Island valleys.

The Conservation Corp surveyed the Catlins River for blue ducks but no birds were seen.

Records continue to be collected for addition to the database.

A series of talks were given to local groups in Dunedin to make people aware of the fact that the department was actively seeking blue duck records.

Meeting Comment:

Given the apparent lack of birds in the conservancy and the remoteness of those few remaining pairs, monitoring should be disregarded. Instead effort should be directed to sites for possible introductions and to sources of birds. A release and monitoring plan needs preparation.

12. SOUTHLAND (compiled by Nick Torr)

PUBLIC AWARENESS COLLECTION OF DATA ON DISTRIBUTION

A "return post" recording card system was implemented from this office in the last quarter of last year.

Cards were printed and a simple hand out sheet giving background information on blue duck and the information required was produced for distribution with the cards. A small colour poster suitable for display in huts, camp grounds etc was also produced. Several Conservation groups, tramping clubs and outdoor sports groups have been talked to and supplied with cards and other material. Effort is also made mainly through the Fiordland National Park Visitor Centre to contact parties travelling to more remote parts of Fiordland and requesting them to make note of any blue duck they see. An article backgrounding the blue duck and their predicament and requesting information on sightings was run in the local newspaper with quite a good response.

Overall the response has been good with over 180 new records being added to the data base which has more than doubled the number of records for this area. There is still a constant number of cards drifting in and we are steadily getting a much better picture of general duck distribution in Fiordland.

POPULATION MONITORING

Progress on selecting sites for population monitoring has been slow due mainly to difficulty of access to most of our rivers, general lack of data on distribution of blue duck through much of Fiordland and inexperience of staff in monitoring techniques.

Monitoring of blue duck in the Clinton and Arthur rivers was carried out by hut wardens stationed there over the summer season. It appears that there are only three pairs and one lone male in the Clinton. No successful breeding was observed there but it appeared likely that at least one pair attempted to breed. Interestingly a memorandum by senior field officer W C Condon on an old Wildlife Service File noted that 27 blue duck were counted on the Clinton river in August 1952. In the Arthur valley at least six pairs were seen although only some sections of the river were covered. One pair produced a clutch of four chicks near Dumpling hut of which two fledged.

ANTICIPATED ACTIVITIES FOR THE NEXT 12 MONTHS

- Continue publicity and collection of data on distribution.
- Survey rivers to ascertain numbers of blue duck present as opportunities arise. Some of this type of work may be able to be in conjunction with other work being done in this area.
- Select sites to start monitoring population to determined trends. It will be difficult to find three sites that fit all three categories set out in the conservation strategy however we will aim for ones which appear to give a fair representation of populations in the area.

Meeting Comment: A key area for blue duck. Difficulty of access to much of the National Park is recognised. To improve the base of information about distribution, both negative and positive returns from all catchments should be sought, especially those seldom visited.

Convenor's summary of conservation reports (Murray Williams)

There is considerable regional variability in the extent to which survey and monitoring has been embraced.

Areas containing major concentrations of blue ducks have proceeded faster and further than those with small numbers.

It is apparent that the "monitoring" task is receiving less and less support, possibly because it is not viewed as a priority by senior managers. Furthermore, there appears to be a need for more active and "output"-oriented activities (see later for elaboration of this).

RESEARCH REPORTS

1. Blue duck radio-telemetry (Murray Douglas).

Investigation summary:

A pilot study developing new radio telemetry techniques for automatically monitoring blue duck nocturnal and diurnal activities, Manganui-a-te-ao River.

Objectives:

To design a technique for automatic remote monitoring of blue duck nocturnal behaviour using radio telemetry. It is important that the technique should show whether nocturnal feeding activity occurs. To commence a one year pilot study starting January 1990, using these techniques.

Methods:

Design and build three activity sensitive transmitters with harnesses. Fit to a captive bird at Mt Bruce for 3 months then to one pair in the Manganui-a-te-ao study area from January. Design, test, then use at the field site an automatic radio telemetry data logging and recovery system. Run monthly field research trips. Develop software to summarise and display activity data recovered.

Interim Results:

Three, back-mounted, 3-position, tilt sensitive, transmitters were designed and built. Tests of a prototype transmitter on blue duck at Mt Bruce and at the study site were highly successful. The study pair showed no adverse effects from being tagged and were observed during the day to behave normally. Several distinct behavioural patterns can be identified from the telemetry data using comparisons from direct observations and simultaneous video/telemetry monitoring. Data was recorded from January to May 1990 before the female was killed by a predator (presumably a cat), and the male was missing, the transmitter located downstream.

Interim Conclusions:

The development of remote automatic activity monitoring is an important step for conservation research. Preliminary analysis of the first four months of one pair of blue duck field data indicates significant periods of nocturnal activity from both birds including feeding. A research study with a medium sized sample conducted over a longer period is required to establish more fully blue duck nocturnal activity patterns.

2. Food and feeding of blue duck (Kevin Collier)

INVESTIGATION SUMMARY:

Information on the diet of Blue Duck is important in understanding mechanisms behind the historical decline of the species, and in assessing the suitability of new sites for possible re-introductions of birds in the future. Analyses of potential food availability, diet and feeding behaviour of Blue Duck have been carried out in several rivers throughout New Zealand, partly in conjunction with Massey University, DSIR Nuclear Sciences Institute and Sally Morallee of the British Royal Society for the Protection of Birds. Field work began in December 1988 and was completed in January 1990.

OBJECTIVES:

- 1) To determine the diet of Blue Duck in number of rivers.
- 2) To investigate spatial and temporal variations in diet and food availability.
- 3) To elucidate mechanisms affecting food availability on Manganuiateao River.
- 4) To investigate relationships between Blue Duck diet, feeding behaviour and food availability.
- 5) To assess potential food availability and habitat of Blue Duck in a wide range of New Zealand rivers, and relate this where possible to Blue Duck density.

METHODS:

1) Spatial variations in potential food availability and diet of Blue Duck were assessed on one visit to several sites on Manganui-a-te-ao River, Wanganui Region, and a number of rivers in the East Cape region in 1988. Benthic invertebrate samples were collected by the kick method, and diet was assessed by stable carbon isotope analysis of feathers (Manganui-a-te-ao River only) and faecal analyses (both regions).

2) A more intensive, seasonal study was carried out on Manganuiateao River in conjunction with Massey University to look at temporal changes in food availability (DOC), diet and feeding behaviour (Massey). This involved 6 bimonthly field trips in which faecal samples and feeding behaviour data were collected from birds in two territories, concurrently with the collection of benthic invertebrates (stone samples) and the measurement of habitat variables.

3) A survey of physical habitat variables and invertebrate faunas was conducted in a wide range of New Zealand rivers where densities of Blue Duck were known. Where possible, observations on feeding behaviour were also made.

INTERIM RESULTS:

Faecal analyses showed that, at most East Cape sites, Blue Duck had been eating mainly larvae of the cased caddisflies *Heliopsyche* and *Pycnocentroides* (78% of total invertebrates in faeces). At the Manganui-a-te-ao sites in 1988, faeces were comprised largely (40% of total invertebrates in faeces) of larvae of cased caddisflies in the family Conoesucidae (most were probably *Beraeoptera* larvae), and lower proportions of stonefly and chironomid larvae (12-13%). However, there was considerable variation in the composition of the faeces within the same river system, and this is thought to reflect variability in the availability of food supplies. Stable carbon isotope values (range -25.0 to -16.4 parts per thousand) confirmed that Blue Duck were assimilating carbon primarily from benthic invertebrates, and that diet could be highly variable along the same river.

Analyses of faeces collected on three of the six bimonthly field trips to Manganui-a-te-ao River (December 1988-October 1989) by workers from Massey University indicated that Blue Duck faeces can also contain large proportions of larvae of uncased hydrobiosid caddisflies and mayflies. There was considerable variation in diet between trips, and this appears to reflect temporal changes the availability of food supplies on stones.

Feeding behaviour data and faecal data for the other three sampling occasions at Manganui-a-te-ao River are not presently available. Data on the composition and density of aquatic invertebrate faunas on stones from all trips has been loaded onto computer and awaits analysis. Samples of invertebrates collected from the survey of Blue Duck rivers are currently being sorted and identified.

INTERIM CONCLUSIONS:

Blue Duck consume a wide range of aquatic invertebrates. Diet can vary between sites on the same river and between dates at the same site. The variable flow regime of Manganui-a-te-ao River appears to be an important factor regulating the density and of Blue Duck food supplies.

Conclusions about preferences of Blue Duck for any aquatic invertebrate taxon can not be made until all the faecal data have been analysed. Analyses need to take into account the availability of invertebrates on stone surfaces that are accessible (upper surfaces) and inaccessible (lower) to Blue Duck.

Future analyses of Manganui-a-te-ao samples should consider biomass, size-frequency distributions and relative food values of key invertebrate taxa to determine their role in Blue duck nutrition.

3. Population dynamics of blue duck on Manganui-a-te-ao River (Murray Williams)

INVESTIGATION SUMMARY:

The biology and population dynamics of Blue Ducks inhabiting the Manganui-a-te-ao River has been studied for 10 years (slightly longer than the average lifespan of a Blue Duck) so as to provide basic knowledge upon which a national conservation strategy for this threatened species can be based.

OBJECTIVES:

- (a) To study the long-term changes in the population by measuring such parameters as the number of young produced annually, survival and dispersal of juveniles, longevity of adults, and changes in breeding and population density
- (b) To determine what factors the number of birds on the river by measuring such parameters as (i) territory size and seasonal variations in the use of the territory, (ii) relating the pattern of use to the distribution and abundance of food within the river
- (c) To determine what proportion of each year's production of juveniles may be removed (to populations elsewhere) without having a long-term effect on the population.

METHODS:

All territorial pairs and their progeny are caught and banded with combinations of bands. The study is based on compiling dossiers on these individual birds, the information coming from 3-day visits to the study area

every 2nd month (January -July) and monthly visits during the breeding season. Blue Ducks are also present on a further 20km of river above the study, mostly inaccessible gorge section of the river is surveyed annually or biennially to locate banded individuals and to assess breeding output in the 9 km section immediately upriver of the study area.

INTERIM RESULTS (1989) :

- (a) 1989 was another poor breeding season, on a par with 1987 which was the 2nd worst of the decade. Perhaps it is significant that the 3 bad years (83, 87,89) all coincide with southern oscillation weather events.

Seven ducklings fledged, raised by 3 of the territorial pairs that attempted to breed. Four of these young were raised by a solo male, his female disappearing when the 4 ducklings were only about days old. Two nests were flooded (one renested), females were predated at the nest, and another nest failed as a result of a mate change while the female was incubating. An entire brood of 3 young ducklings were predated by a hungry Black-backed Gull

- (b) For the 3rd successive year, breeding by 11 pairs in the 9km section of river immediately above the study area confirms the extreme importance of the study area productivity in the overall dynamics of the river's population and provides further indications that not all of the river is prime habitat despite the presence there of a high density of pairs.
- (c) The extent of genetic relationships amongst pair within the study area was assessed using DNA fingerprinting (refer report by Sue Triggs). This confirmed all relationships deduced as a result of banding, it that in all cases the guardian adults were the ducklings' true parents, and it suggested a close relationship amongst some of the original (1980) adults whose origins and relationships were not known. The degree of genetic relationship within this population of Blue Ducks is higher than has been detected in any other population of wild birds anywhere in the world.

INTERIM CONCLUSIONS:

This study is, of necessity, long-term. Blue Ducks are long-lived (annual mortality 12.5%, mean life expectancy after obtaining a territory is 6.5 years, approx 20 % birds live longer than 10 years), and their population processes are slow . Highly erroneous conclusions would be drawn if this study was limited to less than the average life span of Blue Ducks.

The principal conclusions to date are:

- (1) Breeding is erratic. Mean annual productivity over 10 years was 1.2 fledglings per territorial breeding pair but in 6 of the years production was at or less than one duckling per pair. In other words, good and highly productive years are not frequent. This will severely limit "annual cropping" as a technique for establishing new populations.

- (2) There is considerable variation in productivity and breeding success between pairs. This appears to extend to genetic lineages (although data are not conclusive) and appears to rule out variations in territory "quality" as the principal factor influencing breeding output measured over the lifetime of an individual bird. In other words, not all Blue Ducks are created equal! Again this has implications for the specie's conservation and the management techniques that can be applied.
- (3) By comparing the genetic structure of Blue Duck populations elsewhere in New Zealand with that of birds on the Manganui-a-te-ao, Sue Triggs has been able to show that a high level of relatedness amongst neighbouring birds is a natural characteristic of Blue Ducks. In other words, inbreeding is a natural feature of the Blue Duck social system and probably a consequence of limited dispersal of juveniles. It is not a factor of major concern in the conservation of the species.

FUTURE DIRECTION OF INVESTIGATION:

This study has spawned a number of complementary investigations involving students and staff at Massey University and other S&R scientific staff. Their involvement, and likely future direction of their work is as follows:

- 1) Population Dynamics.

The decade of study is considered sufficient for the recording of details and interpretation of Blue Duck biology and population dynamics on this central North Island river. It is enough now for this population to be one of the many that are monitored nationally as part of the scheme incorporated in the "Blue Duck Conservation Strategy" and responsibility for this monitoring now shifts to the two Conservancies. The only population characteristic that needs further investigation is dispersal and survival of juveniles, especially in their first year of life. Given the nature of much of the river's topography, this aspect of the investigation will need to involve use of radiotelemetry. Plans are afoot for Duncan Cunningham and Murray Douglas to undertake this aspect of the study. Commencing in December 1990 a sample of fledglings raised in the Manganui-a-te-ao and Makatote headwaters will be fitted with transmitters and their dispersal monitored regularly over the following 12 months using a light aircraft as the initial tracking vehicle.

- 2) Territory use and food availability

Two studies of territory use have been completed; of winter territory use undertaken by two Massey Univ. students in 1985, and breeding season use studied by Clare Veltman (Massey Univ.) and MJW in 1986. A more detailed investigation of resource use in relation to its availability has involved Ian Henderson and Clare Veltman from Massey and Kevin Collier (S&R). Field data collection for this study was completed in late 1989 and the material is now being analysed and reported upon.

What Blue Ducks do at night is the remaining gap in our knowledge. Hitherto it has been thought that Blue Ducks do little or no feeding at night and that observed daytime activity represents the extent of their use of river. However feeding time and intake during daylight appears too low by comparison with other waterfowl species and some night feeding on this river is suspected. Murray Douglas has developed a radio transmitter that discriminates different sorts of activities and has this on one pair of Manganui-a-te-ao birds. Unfortunately the trial came to a premature end as the result of predation but the technique, and its automatic recording system have successfully passed the test. Results from this trial indicate night feeding may be much more extensive than previously suspected and that feeding behaviour of male and female may be very different by comparison with that seen during the day. This trial will be followed by a full field investigation, commencing in late 1990 and Murray Douglas (with Ross Pickard's assistance) will take responsibility for it.

3) Manipulation of population

No attempt has yet been made to pursue the 3rd objective of this study, viz. to determine the effect of removing birds from the population for the purpose of establishing new populations elsewhere. However this study has followed a natural removal experiment that is extremely relevant to this objective. Five years before the commencement of this study, a volcanic lahar ripped down the Mangaturuturu R. tributary devastating it and sections of the Manganui-a-te-ao. The study area and about 4km of river immediately above it were rendered uninhabitable by Blue Ducks for 2 - 3 years. Some of the then residents of the affected sections managed to survive in small and intact sidestreams but it seems that the bulk of the birds perished or abandoned ship. My 10 years of study has coincided with the recolonisation of rehabilitated habitat. In effect I have monitored the effect of removing birds from contiguous territories over 9 km of river. The pattern and speed of recovery is what one could expect if a large number of resident pairs were all removed simultaneously and transferred elsewhere. In other words, the results of this study offer a prediction of the duration over which population recovery could be expected should another removal take place. On the basis of this knowledge, removal of resident pairs rather than juveniles is the obvious trans-location option. Future work will concentrate on removing several contiguous pairs from this river and another in the central North Island and releasing them on Mt Egmont/Taranaki. The donor and released populations will be closely monitored for the next 5 or more years. This particular project is one that is central to the existing "Blue Duck Conservation Strategy" and will proceed only after approval of the Blue Duck Management Liaison Group.

PUBLICATIONS:

- Veltman, C.J., Williams, M. 1990. Diurnal use of time and space by breeding Blue Ducks. Wildfowl 41 (in press)
- Triggs, S., Williams, M., Marshall, S., Chambers, G. 1990. Genetic structure of Blue Duck populations using DNA fingerprinting. Auk (in press)
- Triggs, S., Williams, M., Marshall, S., Chambers, G. 1990. Genetic relationships within a population of Blue Ducks. Submitted to Wildfowl 42 (1991)
- Williams, M. Some social and demographic characteristics of Blue Duck. Submitted to Wildfowl 42 (1991)

4. Massey University research projects (Clare Veltman and Ian Henderson)

In our last progress report we described two field studies of blue duck diet, which commenced early 1989. Fieldwork for both projects has now been completed. Here, we summarise the data, our preliminary analyses, and our plans for future research on blue duck diet.

Project One: Seasonal changes in diet of blue ducks on the Manganui-a-te-ao River

This is a joint study with Kevin Collier (DOC) in which he measured invertebrate abundance at bimonthly intervals throughout 1989 and we collected faecal droppings and behavioural observations from two territorial pairs (Ram Paddock and Meyers Bridge) at the same time.

Each faecal sample was split into subsamples of about 200 recognisable insect fragments, and one such subsample was microscopically sorted for every dropping. We converted the number of counted fragments into estimates of the number of individual prey items so that we could look for seasonal changes in diet and relate diet to invertebrate availability as measured by Kevin Collier. Lisa Newton analysed 48 samples collected from 6 adult birds during the first four fieldtrips (January to July 1989) but we have not yet statistically analysed the remaining material or the behavioural data.

Blue ducks consumed invertebrates from 19 taxonomic (family or genus) groups. Chironomid larvae made up 60% of the diet, and caddis fly larvae amounted to 24% of the prey consumed. Caddis larvae from the Hydrobiosidae were the most frequently eaten prey in this group. Diets varied significantly from month to month, as did the composition of the invertebrate community. However, when we calculated selection indices for each taxonomic group by month we found that blue ducks consistently sought out Hydrobiosidae, stoneflies and *Aphrophila*. They consistently avoided cased caddis flies, and seemed to have a low preference for the very abundant chironomid midge larvae. The male ducks in the sample caught a broader range of prey than females but when we compared males with each other, we found no evidence of individual prey preferences.

Project Two: Impact of introduced trout on the diet of blue duck

To test the hypothesis that trout compete for food with blue ducks, we collected benthic and faecal samples from either side of trout barriers on 3 rivers, and from 2 matched pairs of rivers with and without trout. The Tauranga-Taupo River and Ohutu and Waiokatore Streams were visited in February 1989, and Flora, Riwaka, Waitaha, and Te Moana Rivers and Frasers Creek samples were collected in November 1989.

Through fitting loglinear models to the data, we found that blue ducks foraged selectively in the sites we sampled. Trout exerted a statistically significant effect on the benthos, and affected prey selection by the ducks. However, our large sampling effort may have uncovered an effect which is of only slight biological importance, so we are now scrutinising the data for effects on key taxa. When Williams looked closely at the data from the Tauranga-Taupo River and Ohutu and Waiokatore Streams for his honours project, he found that trout exerted different effects in different rivers so it will be difficult to generalize about their interaction with blue ducks.

Future research on blue duck diet at Massey University

Dale Towers (MSc. Waikato) has been awarded a DOC scholarship to study the impact of trout on blue ducks. He will sample more frequently to investigate seasonal effects, and may experiment with trout removal in a field trial. This research will commence in 1991 under supervision from Clare Veltman and Ian Henderson.

5. National Distribution Survey on blue duck (Duncan Cunningham)

Summary:

In 1976 Fordyce published the final results of a survey of blue ducks in the South Island. The results showed a patchy distribution closely associated with hilly country and inversely related to alluvium deposits. He concluded that blue ducks were restricted by their habitat, a degraded (non-aggregated) stream.

The bird atlas published by the OSNZ in 1985 showed a similar pattern of distribution for both islands but lacked coverage and the precision needed to assess the present-day status of blue duck.

Objectives for 1989-90:

- 1) Map, describe and publish present-day (1980-1990 incl.) distribution
- 2) Restructure database to align with DOC standards and maintain for ongoing management and research use
- 3) Co-ordinate national recording by making local sub-sets of the national database available to conservancies
- 4) Conduct feasibility study on juvenile dispersal

Methods:

Information on sightings continues to be solicited from outdoor recreation groups, mainly trampers, climbers and hunters. Since the blue duck seminar held at Mt Bruce in April 1988 the bulk of the information comes via staff.

All records are translated into map-based information and entered onto a database held on a Science and Research Division personal computer using DBASE III+. Data are available for manual and computer plotting of national and local distribution, gradient analysis, and likely dispersal patterns.

The National Blue Duck Database was re-structured May 1990 to include metric map references and a conservancy code. All grid references in the database are full eight-digit (Imperial grid) and 10 digit (Metric grid) to conform with DOC standards and increase the plotting and mapping power of the database. The conservancy code allows for rapid access to records within the area of interest of a particular conservancy.

Some conservancies are now using local sub-sets of the national database for their own use and entry of local data. Subsequent interchange of files via posted floppy disks allows for mutual, regular up-dating of the national and local databases.

Interim results:

- 1) The database now holds over 2,600 records (1980-1990 incl), 1100 for the North Island and 1,500; for the South Island. Many records are repeat sightings from popular tramping routes and hunting areas.
- 2) Blue duck are much more widespread than previously published information suggests. This survey has revealed small, peripheral, and inter-population groups which were not previously recorded.
- 3) Most records are clumped around high ground comprising, in most cases, more than one catchment. I am now treating these as whole populations based around one or more watersheds.
- 4) Sightings of single birds occur most frequently in the period January - April. Many are at locations up to a hundred kilometres away from the nearest population.
- 5) Conservancy sub-sets of the National Database are being slowly updated as conservancies send in their old copies.
- 6) A re-drafted manuscript is well advanced and should be ready for publication by end of September 1990.

Conclusions:

- 1) The discontinuous distribution shown by Fordyce in 1976 for the South Island is still generally true in the 1980s and is also true for the North Island.
- 2) New records show that a few populations previously thought to be separate are in fact single, zoo-geographically contiguous groups.
- 3) Populations usually occupy watersheds with two or more catchments rather than single catchments (although the latter may be true for small, remnant populations).
- 4) Blue duck appear to have a much greater overland dispersal ability than previously thought.

Comments:

- 1) The database is proving to be a desirable and useful management and research tool. Conservancy staff who have used a local sub-set of the national database appreciate its availability and value.
- 2) This survey highlights the need for more research work to improve our understanding of:
 - a) dispersal between and within populations -the subject of a new study in the central North Island.
 - b) the importance and viability of small groups, particularly those between populations.
 - c) habitat requirements, including river gradient.
the origins and subsequent expansion of newly founded populations such as the recently established birds in the Tararua Range and on Mt Taranaki.

Meeting Comment: It was agreed that

- a) A centralised database on blue duck should be maintained.
- b) The role of the central co-ordinator (presently Duncan Cunningham) should be that of a 'minder'. Active soliciting of reports etc should be devolved to conservancies.
- c) Conservancies are recommended to establish their own local databases (using sub-sets of the existing national database). They are responsible for sending an updated copy of this annually to the central co-ordinator who, in turn, updates the central database.
- d) Copies of sub-sets of the existing central database are to be supplied to conservancies.

Action: Duncan Cunningham

SPOT-PLOTTED DISTRIBUTION OF BLUE DUCK (1980-1990 INCL)

NORTH ISLAND



SOUTH ISLAND



TABLE 1: Catchments and principal waterways within populations of blue duck, 1980-1990 inclusive.

1. Principal waterways are those on which blue ducks have bred or from which there are two or more records of more than one pair.

POPULATION AND CATCHMENTS	PRINCIPAL WATERWAYS (b) = breeding)	POPULATION AND CATCHMENTS	PRINCIPAL WATERWAYS (b) = breeding)	POPULATION AND CATCHMENTS	PRINCIPAL WATERWAYS (b) = breeding)
NORTH ISLAND					
EASTERN:					
Motu R	Motu R (b) Huaoro Stm Kahaka Stm Mangakiri R (b) Mangamate Stm (b) Mangatane Stm Mangahuta Stm (b) Manukū Stm Nga Upoko Tangata Stm Takaupahi R (b) Te Kahika Stm Whikau Stm (b) Horomanga R (b) Kakanui Stm Mangamāho Stm Mangawhero Stm (b) Mingihū Stm (b) Taumutu Stm Whitiki R (b)	Mohaka R	Wāhi Stm Wāikare R (b) Waimara R Hautapu R (b) Kaipo R Makino R Mangahouanga R (b) Mangatahika R Mangawhio Stm Matakuhā Stm Mohaka R Mokomokoma Stm Momonarui Stm Oamaru R (b) Ōkeke Stm Omaroa Stm Paewai Stm Ripa R Te Hoe R (b) Tompapa Stm Un-named Stm Wabunga R Ngawapunga Stm Ngaruroro R Omarukokere Stm Tauranga Taupo B Cascade Stm Kakapo Stm Tauranga Taupo R (b)	WAIMARU: Wanganui R	Makatote R Manganui a te ao R (b) Mangatururu R Chuzala Stm Orautoha Stm Papanui Stm (b) Ratouka R (b) Taringamotu R (b) Te Pahi Stm Waione Stm (b) Wanganui R (b) Whakapapa R (b) Whakapapa Stm (b) Whakapapanui Stm L. Rotokuru Mangawhero R Mangatahi Stm Taunui Stm
Rangitiki R	Whikau Stm (b) Horomanga R (b) Kakanui Stm Mangamāho Stm Mangawhero Stm (b) Mingihū Stm (b) Taumutu Stm Whitiki R (b)			Whangarei R	L. Rotokuru Mangawhero R Mangatahi Stm Taunui Stm
Otara R	Pakihī R Te Wahi Stm				
Raukokere R	Raukokere R (b)			RUAHINE: Manawatu R	Oroua R Pohangina R (b) Apia Ck (b)
Waipatu R	Mangamāho Stm Wangāhika Stm	Ngaruroro R		Ngaruroro R	Kawera Stm (b) Kawhata R Mangatahi R Meropa R Ōhuru Stm Fourangaki R Rangitiki R (b) Waikamaka R (b) Waikōtore Stm Whakamātau R Makaroro R (b)
Waioeka R	Kahunui Stm (b) Koranga R Makakōere Stm Manganuku Stm (b) Moanui Stm (b) Opato Stm Tataweka Stm Waioeka R Kakapara R Wakohu R Wharekopae R (b)	Waikato R		Rangitiki R	
Waipaoa R	Waiwaka R Kakapara R Wakohu R Wharekopae R (b)	MAMAKU: Kakama R Waioeka R (Bay of Plenty)	Mangorewa R Ōpūkahi R (b) Ngāwhaka Stm	Tukuki R	
Waioa R (Cavies Bay)	Anini Stm (b) Hanganui R (b) Bumeka Stm (b) Mangakāhika Stm (b) Manganuihōu Stm Mangaone Stm Mangawhārewa Stm Moeranui Stm (b) Ōkaura Stm (b) Porui Stm (b) Raukiri R (b) Te Kahakaha Stm Te Kai Stm Te Totara Stm (b) Te Waiotukapō Stm Waiou R Wāhi Stm Waipaoa Stm Whangatawhia Stm I. Waikaremoana Aniwaniwa Stm (b) Boulder Ck (b) Hapurahine R (b) Kaipo Stm Mokau Stm Ōrangitūāhutu Stm Te Punaotahou Stm Apti Stm (b) Kahama Stm Manahou Stm Mangakākaho Stm Mangatoatoa Stm (b) Mouhouri Stm (b) Ōtane Stm Tauranga R (b)	RANGITOTO: Waikato R	Kakama Stm Ōkahukura Stm Turawaea Stm (b) Waimarino R		TARANAKI: Rumahanga R
		KAMAHAWA: Rangitiki R	Ecology Stm Rangitiki R (b) Ōhinengao Stm Tongaroro R (b) Waikato Stm Waipa Stm Waipakahi R (b)		SOUTH ISLAND
		Waikato R		Karamea: Aorere R	Aorere R (b) Burgoo Stm Faragan Ck (b) Spey R Cave Dk (b) Shiner Dk Gunner R Heaphy R Beautiful R Crom R (b) Cull St Kakapo R Karamea R (b) Roaring Lion R (b) Taylor Stm Ugly R (b) Verus Ck
		TARANAKI: Ōrui Stm Waioeka R	L. Dive Manganui R (b)	Big R Heaphy R Karamea R	Little Wanganui R Mokihini R Mokihini R (N B) Mountain Ck Balon R Kwi Stm Motueka R Motueka R (L B) (b)
		MATEMATRONIA: Waioata R	Omaru R (b) Waimata R		
		HAUANGAROA: Waikato R	Wāhaka R Kakaho Stm Mangatu Stm (b) Waihaha R (b) Wahora Stm (b) Ōngare R (b) Marimatahi R Ōkauka R (b)	Little Wanganui R Mokihini R	
Whakatane R	Apti Stm (b) Kahama Stm Manahou Stm Mangakākaho Stm Mangatoatoa Stm (b) Mouhouri Stm (b) Ōtane Stm Tauranga R (b)	Wanganui R		Motueka R	

		Nuggety Ck (n)					
		Pearse Stm (b)					
		Wangapeka R (n)					
		Wangapeka R (N B)	Rakai R	Canyon Ck		<u>NORTH ASPEN:</u>	
Oparara R		Wangapeka R (S B)		Catie Stm (b)		Makarora R	Blue R (b)
		Nimrod Ck (n)		Leuper Stm			Burke R (b)
		Oparara R (b)		Lyeil Stm			Ngatai R
Riwaka R		Riwaka R		Marius R			Young R
		Riwaka R (S B) (b)		Mehias R (N B)		Tumbul R	Mueller R
Takaka R		Pera Stm (n)		Rakai R			
		Horseshoe Ck		Wilberforce R (b)		<u>OTAGO:</u>	
		Wainui R	Rangitoto R	Frances R		Otaio R	Otaku R
		Devil R (b)	Taramakau R	Deception R (b)			
		L Stanley		Elson Ck (b)			
		Stanley R (R B) (b)		Dunna Ck		<u>OLYMPIE:</u>	
		Waingero R		Giffin Ck		Arawata R	McIntosh Ck
Waimea R		Wairoa R		Hurts Ck (b)		Cascade R	Arctate Ck
				Kelly's Ck (b)			Cascade R
				L Meery		Cuzha R	Banc St
				Locke Stm (b)			Rock St
<u>RICHMOND:</u>				Mary Ck			Rouseburn R (n)
Pelorus R		Devils Ck		Otahake R		Hollyford R	Pyke R
		Moates Ck (b)		Otira R (b)			
		Pelorus R (b)		Pegleg Ck (n)		<u>FIORDLAND:</u>	
		Wakamarua R (b)		Taiaro R (b)		Milford Snd	Arthur R (b)
Wairau R		Crozier Stm		Taramakau R			Hamilton R
		Coulter R		Tumbledown Ck			Staircase Ck
		Timra Stm (b)		Walker Pass Tam			Tuoko R
		Top Valley Stm (b)		And Crow R		Camelot R	Camelot R
<u>PAPAHOA:</u>				Bealey R			Cocotte St (b)
Butler R				Crow R		George Snd	Edin R
Bulleck Ck		Otikarua R	Waimakariri R	Edwards R (b)		Hollyford R	Hidden Falls Ck
Fox R		Bulleck Ck (b)		Hawdon R		Irene R	Monkey Ck (b)
Grey R		Dilemma Ck (b)		Hawdon R (East)		Seaton R	Irene R
		Blackbat Ck		Minchin Stm			Kenneth St
		Camp Ck (b)		Mincha R (b)		Spey R	Seaford R (b)
		Crooked R		Pointer R			Mica St (n)
		Haupiri R		Thompson Stm		Siltwater R	Spey R (b)
		L Cristobel (n)		Waimakariri R		Sutherland Snd	Siltwater R (n)
		Moonlight Ck (b)		White R			Light R (b)
		Rough R (n)		County Stm (b)			Light R (N B) (b)
		Wahai R		Douglas Ck (b)		Wairau R	Light R (N B) (b)
Furukaki R		Punakaki R	Waikaha R	Field Ck			<u>L Manapouri:</u>
				Scamper Torrent (b)			Awe St
				Waikaha R (b)			Yis St (b)
<u>SPENCE:</u>		Blue L		Whirling Water Ck			<u>L Te Anau:</u>
Butler R		Deepdale R		Adamsom Ck (b)			Chester R
		Hopeless Ck		Smyth R			Clinton R (N B)
		L Fotoli	Wanganui R	Wanganui R (b)			Clinton R (W B)
		Lyeil Ck (n)		Barrow R			Doon R
		Marius R		Burns Ck			Erk St
		Mataitaki R		Butler R (b)			Etrick St
		Montgomery R		Perth R (b)			Galeneck R
		Sabine R		Whataroa R (n)			Henderson St (b)
		Sabine R (West)					Jennings St
		Towers R					L McKenzie
Huruni R		Huruni R	<u>MT PEEL:</u>	Fraser Stm			Lugar St
		Upper Huruni R (b)	Opiti R	Howe Hoe Te Moana R (b)			McKenzie St
Waiau R		Devilish Stm (b)		Gloney Ck (b)			Mistake Ck
		Nina R		Wahi R (b)			Nams Ck
				Andrews Stm			Nitz Ck
<u>WHITCOMBE:</u>				Orati R (b)			Plateau Ck
Arahura R		Arahura R (b)	Orati R	Lynn Stm (b)			Point St
		Newton Ck (b)		Rangitoto R (b)			Snag St
Hakika R		Crawford Ck	Rangitoto R				Wapiti R
		Cropp R					Woodrow St (b)
		Doctor Ck (b)		<u>ADIRONDACK:</u>			Castle R
		Frew Ck (b)		Cook R			Worsley Stm
		Hakika R		Architects Ck		Wairaurahi R	Hauraki St
		Kahapehā R		Copland R		Windward R	Windward R
		Kokatahi R (b)		Karangaia R			
		Minnow Ck		Omoroa R		<u>CATLINS:</u>	
		Mungo R		Waho R		Catins R	Catins R (b)
		Pollock Ck (b)					
		Styx R (b)					
		Toaroha R (b)					
		Tum Ck					
		Whitcombe R (b)					
Mikonui R		Mikonui R	<u>HUXLEY:</u>				
		Tuke R	Haast R	Landsborough R			
Poenua R		McCullough's Ck	Moeraki R	Moeraki R			
		Poenua R (b)					
		Snake Ck (b)					
		Wilberg R					

APPENDIX 1:

PRESENCE OF BLUE DUCK IN CATCHMENTS AND TRIBUTARIES
1980-1990 INCLUSIVE.

<u>NORTH ISLAND</u>	Takaputahi R Te Kahika Stm Whitikau Stm	Park R Waiohine R	Makakoere Stm Manganuku Stm Moanui Stm
KAITUNA R Kaituna R Mangorewa R	NGARURORO R Apias Ck Dead Dog Stm Ikawatea R Kiwi Ck	TONGAPORUTU R Tongaporutu R	Opato Stm Tataweka Stm Waioeka R Wairata Stm
L Rotorua: Utuhina Stm	Mangamingi Stm Ngaawapurua Strn Mangataramea Stm Ngaruroro R Omarukokere Stm	TUKITUKI R Makaroro R Middle Stm	WAIOTAHU R Ohaio Branch
KOPUAWHARA STM Kopuawhara Stm	OTARA R Te Waiti Strn Tokanui Stm	WAIAPU R Mangamauku Stm Waingakia Stm	WAIPAOA R Kokupara R Waikohu R Wharekopae R
MANAWATU R Oroua R Piriiori Stm Pohangina R	OURI STM L Dive	WAIKATO R Arataki Stm Kakaho Stm Mangatutu R Manukiore Stm Mihiana Stm Mokaihaha Stm Okahukura Stm Owawenga Stm Tunawaea Stm Waikato R Waimeharua Stm Waipa R Waipapa R Waitaia Stm Wereroa Stm	WAIROA R (Hawkes) Anini Stm Hangaroa R Hukanui Stm Ihumeke Stm Mangahopai Stm Mangakahika Stm Manganuihou Stm Mangaone Stm Mangapahi Stm Mangarewarewa Stm Mangatahae Stm Moerangi Stm Okaura Stm Owhakarotu Stm Painga Stm Parahi Stm Ponui Stm Pukakahi Stm Ruakituri R Te Kahakaha Stm Te Kei Stm Te Totara Stm Te Waiotukapiti Stm Waiou R Waihi Stm Waipaoa Stm Wairoa R Whakaretu Stm Whangatawhia Stm
MOHAKA R Coppermine Stm Hautapu R Kaipo R Makiekie Stm Makino R Mangahouanga R Mangakiokio Strn Mangatainoka R Mangawhio Stm Matakuhia Stm Mohaka R Mokomokoma Stm Mokomokonui Momonanui Stm Oamaru R Ohane Stm Okoeke Stm Omarowa Stm Otawhiri Stm Paewai Strn Pukahunui Stm Ripia R Ruatea Stm Te Hoe R Toropapa Stm Un-named Stm Waimatai Stm Waione Stm Waipunga R	PAKIHI R Orukutia Stm Pakihi R R. Arowhana Stm Horomanga R Kakanui Stm Mangamako Stm Mangawhero Stm Minginui Stm Taumutu Stm Te Weromata Stm Waihua Stm Wheao R Whirinaki R	<u>L Taupo:</u> Hinemaiaia Stm Mangaongoki Stm Whanganui Stm Waihora Stm Waimarino R Waiotaka R <u>Tauranga Taupo R:</u> Cascade Stm Kakapo Stm Tauranga Taupo R <u>Tongariro R:</u> Ohinepango Stm Oturere Stm Tongariro R Waihaha Stm Waikato Stm Waipa Stm Waipahihi Stm Waipakahi R <u>Waihaha R:</u> Mangatu Stm Waihaha R	<u>L Waikaremoana:</u> Aniwaniwa Stm Boulder Ck Hopuruahine Stm Kaipo Stm L Waikaremoana Mokau Stm Orangituaetutu Stm Taparawera Stm Te Punaotehouhi Stm Waihoroihika Stm Waiotukapuna Stm
MOTU R Huaero Stm Kahoka Stm Mangakirikiri R Mangamate Stm Mangaokura Stm Mangaotane Stm Mangatutara Stm Manuriki Stm Motu R Nga Upoko Tangata Stm	RANGITIKEI R Ecology Stm Iron Peg Ck Kawhatau R Mangatera R Maropea R Ohutu Stm Pourangaki R Rangi Ck Rangitikei R Waikamaka R Waiokotore Stm Whakarekou R RAUKOKERE R Raukokere R Un-named stream RUAMAHANGA R Mangatarere Stm	WAIOEKA R Kahunui Stm Koranga R Kotepato Stm	

WAIROA (B. of Plen)	Mangatoatoa Stm	<u>SOUTH ISLAND</u>	CASCADE R
Ngamuwahine R	Motuhouhi Stm		Arcade Ck
Ngatuhua Stm	Neketuri Stm	ANATORI R	Cascade R
Opuiaiki R	Otane Stm	Anatori R	
Un-named Stm	Parahaki Stm	Webb Stm	CATLINS R
	Tauranga R		Catlins R
WAITARA R	Waihui Stm	AORERE R	
Maketawa R	Waiiti Stm	Aoreere Stm	CHARLES SND
Manganui R	Waikare R	Burgoo Stm	Irene R
	Waimana R	Flanagan Ck	Windward R
WAITOTARA R	Whakatane R	Silver Stm	
Kiwi Stm		Snow R	CLARENCE R
Omaru R	WHANGAEHU	Spey R	Clarence R
Pouri Stm	Hairemaire Stm		
Waitotara R	L Rotokura	ARAHURA R	CLEDDAU R
	Mangateitei Stm	Arahura R	Tutoko R
WAIWHAKAIHO R	Mangawhero R	Newton Ck	
Waiwhakaiho R	Taonui Stm		CLUTHA R
	Tokiahuru Stm	ARAWATA	Dart R
WANGANUI R	Un-named Stm	Jackson R	Beans Bn
Ahuahu Stm		McIntosh Ck	Bride Bn
Caves Stm			Dart R
Kaiwhakauka Stm		ARTHUR R	Rock Bn
Makara Stm		Arthur R	Routeburn R
Makatote R		Green Vly	Routeburn R (N Br)
Mangahuia Stm		Staircase Ck	
Mangaio R			L Wakatipu:
Mangakahu Stm		BIG R	Greenstone R
Manganui a te o R		Cave Bk	
Mangatepopo Stm		Shiner Bk	Makarora R:
Mangatiti Stm			Blue R
Mangaturuturu R		BULLER R	L Diana
Maramataha R		Blue L	Makarora R
Morinui Stm		D'Urville R	Wilkin R
Okauaka R		Deepdale R	Young R
Okupata Stm		Glenroy R	Young R (S Br)
Ongarue R		Hopeless Ck	
Orautoha Stm		Johnston Ck	COOK R
Papamanuka Stm		L Constance	Balfour R
Piropiro Stm		L Rotoiti	Cook R
Retaruke R		Lake R	
Ruatiti Stm		Lyell Ck	DOUBTFUL SND
Taringamotu R		Maruia R	Jacobs Ck
Te Pure Stm		Matakitaki R	Un-named R
Te Whaiiau Canal		Montgomerie R	
Un-named Stm		Ohikanui R	DOUGLAS R
Waimarino R		Owen R	Douglas R
Waimonoa Stm		Owen R (W Br)	
Waione Stm		Sabine R	DUSKY SND
(Mangatepopo Stm)		Sabine R (West)	Henry Bn
Waione Stm		Travers R	Steep-to Cove
(Ongarue R)		Waitahu R	
Wanganui R			FOX R
Whakapapa R		BULLOCK CK	Dilemma Ck
Whakapapaiti Stm		Bullock Ck	Fox R
Whakapapanui Stm			GEORGE SND
		CAMELOT R	George R
WHAKATANE R		Camelot R	Edith R
Apiti Stm		Cozette Bn	Whitewater R
Kaharoa Stm		Elaine Stm	
Kariri Stm		Tuaraki Strn	
Manaohou Stm			
Mangakakaho Stm			
Mangangaatiuhi Stm			

GREY R Blackball Ck Blue Grey R Camp Ck Crooked R Fenton Ck Garden Ck Haupiri R L Cristabel Moonlight Ck Roaring Meg Ck Rough R Trent R Waikiti R	HURUNUI R Hurunui R Upper Hurunui R	Mokihinui (N Br) Mokihinui (S Br) Mountain Ck Rough and Tumble Tate Ck	Foster Ck Mates Ck Pelorus R Wakamarina R
HAAST R Burke R Landsborough R McKenzie Ck Wills R	JUNO R Juno R	MOTUEKA R Baton R Blue Ck Granity Ck Kiwi Stm Motueka R Motueka R (L Br) Nuggety Ck Pearse Stm Prospect Ck Rainy R Wangapeka R Wangapeka R (N Br) Wangapeka R (S Br)	POERUA R Dry Ck McCulloughs Ck Poerua R Snake Ck Wilberg R
HARRISON R Harrison R	KAIPO R Kaipo R	OKARITO R L Wahapo Outlet	PUNAKAIKI R Punakaiki R
HEAPHY R Gunner R Heaphy R Ryan Ck	KARAMEA R Beautiful R Crow R Cub Stm Discovery Ck Kakapo R Karamea R Leslie R Peel Stm Roaring Lion R Taipo R Taylor Stm Ugly R Venus Ck	OKURU R Chilly Ravine Ngatau R	RAKAIA R Avoca R Cameron R Canyon Ck Cattle Stm Cronin Stm Gargarous Stm Hall Ck Jagged Stm Louper Stm Lyell Stm Mathais R Mathias R (N Br) Rakaia R Ryton R Wilberforce R
HOKITIKA R Bannatyne Ck Crawford Ck Cropp R Doctor Ck Falls Ck Frew Ck Hokitika R Kakapotahi R Kokatahi R Minnow Ck Mungo R Pollock Ck Price R Styx R Toaroa R Tom Ck Whitcombe R Wilkinson R	KARANGARUA R Architects Ck Copland R Douglas R Karangarua R Manakaiaua R Regina Ck Troyte R	OPARARA R Nimrodel Ck Oparara R Postal R	RANGITATA R Frances R Lynn Stm Rangitata R St Winifred Stm
HOLLYFORD R Barrier R Crescent Stm Gertrude Vly Hidden Falls Ck Hollyford R Monkey Ck Moraine Ck Olivine R Pyke R Trinity Stm	KATIPO Ck Katipo Ck	OPIHI R Frasers Stm Hae Hae Te Moana Kakahu R Stoney Ck Waihi R	RIWAKA R Riwaka R Riwaka R (S Br)
	LITTLE WANGANUI Little Wanganui R	ORARI R Andrews Stm Bernard Stm Mt Peel Ck Orari R Scotsburn Stm	SEAFORTH R Kenneth Bn Seaforth R
	MAITAI R Brook Stm Maitai R (S Br)	OTAIO R Otaio R	SPEY R Mica Bn Spey R Warren Bn
	MATAURA R Mimihau Stm	PARAPARA R Parapara R	STILLWATER R L Marchant Stillwater R Twin Falls Stm
	MIKONUI R Mikonui R Squatter's Ck Tuke R	PARINGA R Valley of Darkness Stm	SUTHERLAND SND Dark R L Dale Light R Light R (N Br) Un-named Ck
	MOERAKI R Moeraki R	PELORUS R Deep Ck Devils Ck Doom Ck	

TAKAKA R	WAIAMAU R (SOUTH)	Hawdon R (East)	WANGANUI R
Balloon Ck	<u>L Manapouri:</u>	L Grace	Adams R
Cobb R	Awe Bn	L Minchin	Adamson Ck
Devil R	Calm Bay	Little Crow Stm	Evans Ck
Flora Stm	Freeman Bn	Minchin Stm	Smyth R
Grecian Stm	Garnock Bn	Mingha R	Wanganui R
Gridiron Ck	Grebe R	Poulter R	
Horseshoe Ck	Oonah Bn	Punchbowl Ck	WEKAKURA CK
L Stanley	Refrigerator Ck	Rough Ck	Wekakura Ck
Lindsay Ck	<u>L Te Anau:</u>	Sudden Valley Stm	
Stanley R (R Br)	Adams Bn	Thompson Stm	WHATAROA
Sylvester Stm	Canyon Ck	Twin Stm	Barlow R
Waingaro R	Castle R	Waimakariri R	Burrows Ck
	Chester Bn	White R	Butler R
TARAMAKAU R	Chester Lake		Butler R (N Br)
Deception R	Clinton R	WAIMEA R	Butler (S Br)
Dixon Ck	Doon R	Hackett Ck	Hughes Ck
Doreen Ck	Esk Bn	Lee R	Perth R
Dunns Ck	Ettrick Bn	Wairoa R	Un-named Ck
Griffin Ck	Forster Bn	Wairoa R (L Br)	Whataroa
Hunts Ck	Glaisnock R	Wairoa R (R Br)	
Hura Ck	Henderson Bn		
Jack Ck	Jennings Bn	WAIRAU R	
Kelly's Ck	Junction Bn	Avon R	
L Florence	Kakapo Ck	Bartletts Ck	
L Julia	L Bloxham	Crozier Stm	
L Misery	L Clarke	Goulter R	
Locke Stm	L McKenzie	Lees Ck	
Mary Ck	L Orbell	Quartz Ck	
Michael Ck	L Sutherland	Timms Stm	
Otehake R	L Wapiti	Top Valley Stm	
Otehake R (W Br)	Nitz Ck	Upton Brook	
Otira R	Lugar Bn	Wairau R	
Pegleg Ck	McKenzie Bn	Ward Pass Stm	
Taipo R	Mid Bn		
Taramakau R	Mystery Bn	WAIRAURAHIRI R	
Townsend Ck	Narrows Ck	Caroline R	
Tumbledown Ck	Plateau Ck	Hauroko Bn	
Wainihinihi R	Point Bn	Russet Bn	
Walker Pass Tarn	Rugged Bn		
	Russett Bn	WAITAHA R	
TEN MILE CK	Snag Bn	County Stm	
Ten Mile Ck	South Arm	Douglas Ck	
	Taheke Ck	Glamour Ck	
TIROPAHI R	Tunnel Bn	Reid Ck	
Waggon Ck	Wapiti R	Scamper Torrent	
	Waterfall Ck	Stag Ck	
TURIMAWIWI R	Woodrow Bn	Waitaha R	
Turimawiwii R	Worslev Stm	Whirling Water Ck	
	<u>Waiua R:</u>		
TURNBULL R	Borland Bn	WAITAKI R	
Mueller R		Godley R	
	WAIHO R	<u>Hopkins R:</u>	
WAIATOTO R	Waiho R	Hopkins R	
Te Naihi R		Sth Temple Stm	
	WAIMAKARIRI R	<u>L Pukaki:</u>	
WAIAMAU R	Agility Ck	Hooker R	
(MARLBOROUGH)	Anti Crow R		
Anne R	Bealey R		
Devilskin Stm	Bridal Veil Ck		
Doubtful R	Cherrywood Ck		
Lucretia Stm	Crow R		
Nina R	Edwards R		
Waiua R	Hawdon R		

ACTIVITIES OF THE BLUE DUCK CAPTIVE BREEDING GROUP

Report to Blue Duck Liaison Group Meeting.
10 -12 July 1990.

The Blue Duck Captive Breeding met for the second time on 4 May 1990. The only change in composition has been the resignation of Ms Raewyn Empsom and the appointment of Dr David Butler TSU. The minutes of that meeting were circulated to all attendees, all breeders, DOC TSU and S&R, and are available Ducks Unlimited.

Stud Book: Over the past year the Blue Duck Stud Book has been elaborated to allow the incorporation of as much historical information about each bird as possible, in addition to the relationships of each bird. Having this in place will allow new birds to be entered into the stud book with ease, and will also speed the process of having Blue Duck entered into any overall DOC captive breeding database.

1989 Breeding Season: The 1989 breeding season was moderately successful and near complete statistics are available. These are summarised in the tables below.

A total of eleven pairs were held by eight breeders, however, only two breeders held more than one pair. These birds were supplemented by seven surplus males, one of which was released onto Mt Egmont in September 1983. Six of these were held at the National Wildlife Centre while one was held at Hilldale Zoo in Hamilton. During the year, one paired male died, and was replaced with one of the surplus males.

Table 1 summarises the breeding progress made by each pair of birds. Only two (18%) pairs successfully produced ducklings. NWC1 hatched a male and a female from their second clutch while OKH1 hatched two males from the first of their three clutches. A total of eleven clutches were laid normally. Five were first clutches, with an average size of 5.0 eggs, four were second clutches, with an average size of 4.3 eggs, while two were third clutches with an average size of 2.5 eggs.

Table 1: A summary of the breeding progress of each Blue Duck pair in captivity in 1989.

Pair	Mate	Nest	Eggs	Norm	Fert	Hatch	Rear	Multi
OKH1	1	1	1	1	1	1	1	1
OKH2	?	1	0	0	0	0	0	0
NWC1	1	1	1	1	1	1	1	1
NWC2	1	1	1	1	1	0	0	1
NWC3	?	1	1	0	0	0	0	0
Pike	?	1	1	1	0	0	0	1
Nga Manu	?	1	1	1	0	0	0	0
Munro	?	0	1	0	0	0	0	1
Hilldale	0	0	0	0	0	0	0	0
Atkinson	1	0	0	0	0	0	0	0
Johnston	1	0	0	0	0	0	0	0
TOTAL	5	7	7	5	3	2	2	5
Percentage	45%	64%	64%	45%	27%	18%	18%	45%

Seven pairs laid eggs, however, only five laid normal clutches. The two non-normal clutches were due to eggs being laid on the ground, and to three soft shell eggs. It was encouraging to record that five (45%) pairs produced multiple clutches. This augers well for the future where significant productivity could be achieved through multiclutching.

The major problem that was identified was an abundance of infertile eggs. Only three (27%) pairs produced eggs and two successfully produced ducklings. The fate of each egg laid during the season has been summarised in Table 2. A total of 55 eggs were produced by seven pairs, however, of the eggs laid normally only eleven were fertile and were distributed among four clutches. Only two (18%) clutches were 100% fertile.

The hatch rate of the fertile eggs was an acceptable 55%, while the survival rate of the ducklings was 67%. Both of the successful breeders used some degree of artificial incubation which also augers well for the future as multiclutching can be promoted by the artificial incubation of the first clutch. However, this does hold a potential trap as at least three of the fertile eggs were lost due to embryo death during incubation, possibly due to too high incubation temperatures. It is not known what caused the death of the two ducklings which hatched but were not reared.

Egg Infertility: Overcoming this problem is the most immediate concern of the Captive Breeding group. We believe that at least three factors may be having a bearing on this problem.

- a) Diet: The successful Otorohanga pair were fed a diet of high protein pellets ad libitum.. This is as close as possible to the levels of dietary protein that the birds are able to achieve in the wild. Supporting evidence for the need for this high protein level is the overseas experience of breeding Harlequin Ducks, a bird which spends its breeding season in similar habitat to Blue Duck. However, a potential problem of this captive diet is its acceptability due to its odour. Other sources of dietary protein, such as tofu, may suffer from reduced bioavailability.
- b) Socialisation: It is potentially significant that the only successful breeders were those with more than one pair of Blue Ducks. Hilldale Zoo had a surplus male, however they did not receive their breeding pair until after most other pairs had completed their breeding attempt. This current lack of social stimulation may account for the reduced number of pairs in which copulations were definitely recorded, whereas the distribution of the surplus males to breeders to act as social stimulators for the breeding pair has the potential to greatly increase fertility. Hilldale have already reported increased social interactions between their males this year. A further aspect of this may be the order in which birds are introduced into their aviary as resident birds may be dominant over their new mate, regardless of sex.
- c) Inbreeding depression: This may be the ultimate cause of infertility as all current pairs are related to one family line. Therefore, the establishment of alternative pedigrees is seen as a priority. This will be possible from next year when some pairs may be remated.

1990 Breeding Season: All existing pairs will be maintained for at least this season and one new pair will be created by mating the 1989 female to one of the 1989 males, giving a total of 12 pairs. In addition there will again be surplus males. Once a pair become fertile it is intended to keep them together for as long as possible, therefore it is advantageous to mate birds of similar ages which may also help circumvent any aggression problems. As a result, it is imperative that mates be found for the surplus males before too much longer.

The capture of wild stock will allow the breeding programme to be enlarged quickly and will make use of the available males, in addition to allowing the establishment of alternative pedigrees. This could be achieved by the capture of juveniles from last year's wild breeding, or could be achieved by the taking of wild eggs later in the year. The former option is preferred by the Captive Breeding Group as this will potentially increase productivity this year. The latter option has advantages from a field management perspective, but will have a substantial lead time before impacting the breeding programme.

Aviary availability has also increased since last year with at least five new aviaries becoming available. One of these will be used to house the new pair. However, aviary availability is a two edged sword as people are reluctant to construct a specialised aviary without some certainty that they will receive a pair of Blue Duck. We are however, confident that given several months notice we would be able to house the seven new pairs, in addition to the twelve that are already established.

Flock Mating: The Captive Breeding Group also agreed to revisit the question of flock mating and are currently carrying out a small trial. The 1989 female has been given the choice of the two 1989 males bred at Otorohanga as it is known that the young birds will live together without much aggression. If flock mating can be proven it could substantially cut the lead time between mating a pair and achieving successful breeding. This in turn will help the captive breeding to meet its objective of producing 30 birds per year for release to the wild.

Table 2: A summary of the fate of each Blue Duck egg laid during the 1989 breeding season.

Pair	Clutch	Egg	Laid Normal	Fertile	Hatched	Reared	
OKH1	1	1	1	1	1	1	
		2	1	1	1	1	
		3	1	1	1	0	
		4	1	1	0	0	
	2	5	1	1	1	0	0
		6	1	1	0	0	0
		7	1	1	0	0	0
		8	1	0	0	0	
3	9	1	?	0	0	0	
	10	1	0	0	0	0	
NWC1	1	11	1	0	0	0	
		12	1	0	0	0	
		13	1	0	0	0	
		14	1	0	0	0	
2	15	1	1	1	1	1	
	16	1	1	1	1	1	
NWC2	1	17	1	1	0	0	
		18	1	1	0	0	
		19	1	0	0	0	
		20	1	0	0	0	
		21	1	0	0	0	
2	22	1	0	0	0	0	
	23	1	0	0	0	0	
	24	1	0	0	0	0	
	25	1	0	0	0	0	
	26	1	0	0	0	0	
	27	1	0	0	0	0	
NWC3	1	28	1	0	0	0	
		29	0	0	0	0	
		30	0	0	0	0	
		31	0	0	0	0	
		32	1	0	0	0	
Pike	1	33	1	0	0	0	
		34	1	0	0	0	
		35	1	0	0	0	
		36	1	0	0	0	
		37	1	0	0	0	
		38	1	0	0	0	
		2	39	1	0	0	0
			40	1	0	0	0
41	1		0	0	0		
42	1		0	0	0		
43	1		0	0	0		
44	1		0	0	0		
3	45	1	0	0	0		
	46	1	0	0	0		
	47	1	0	0	0		
Nga Manu	1	48	1	?	0	0	
		49	1	?	0	0	
		50	1	?	0	0	
		51	1	?	0	0	
		52	1	?	0	0	
Munro	1	53	0	0	0	0	
		54	0	0	0	0	
		55	0	0	0	0	
Total		55	49	11	6	4	
Percentage		100%	89%	22%	55%	67%	

MINUTES OF THE SECOND BLUE DUCK CAPTIVE BREEDING GROUP MEETING HELD
AT THE NATIONAL WILDLIFE CENTRE ON 4 MAY 1990

Present: Neil Hayes (DU), Grant Dumbell (DU), Alan Saunders (DOC TSU), Jim Campbell (DU), Martin Bell (DOC NWC), Eric Fox (DU), Paul Roman (DU Inc)

Neil Hayes opened the meeting at 10.30am and welcomed everyone. He noted that DOC was now represented by the new Threatened Species Unit and that Raewyn Empson had resigned from the committee.

Alan Saunders outlined the changes in DOC structure over the last year and the work of the new Threatened Species Unit. David Butler will be the TSU representative in the future as he is involved with captive breeding management. TSU is now involved with all recovery planning, including Blue Duck.

Apologies: None

Confirmation Of The Minutes Dated 5-5-89: These were taken as read and correct.
Moved FOX / Seconded CAMPBELL Carried

Matters arising: Eric Fox asked about progress towards securing wild stock for the captive breeding programme. Neil Hayes suggested that the committee revisit the question of flock mating. Martin Bell said that careful consideration of this point was needed. After some discussion it was felt that Murray Williams should be consulted on wild pairing. Grant raised the issue of transfers and the need for co-ordination as some of last years transfers had not been notified to the studbook.

1989 Blue Duck Liaison Group Meeting: Grant Dumbell gave a summary on the 1989 BDLG meeting in Ohakune. He reported that Blue Duck captive breeding received the overall support of the meeting which also agreed to the capture of wild birds for captive breeding. The meeting also decided to stop single releases of birds so that the captive stock could be maintained.

1989 Breeding Season Results: Neil Hayes reported that four birds had been bred, two males at Otorohanga and a male and a female at the NWC. He also pointed out that some breeders had not returned their report forms and that a change of report date should be considered.

Eric Fox then gave a rundown on his management of the successful pair which were received six weeks before they laid their first fertile clutch. Throughout the last year the birds have been feed on a high protein diet ad lib. Discussion then considered the disease implications of feeding incorrectly and the rearing of ducklings, especially single ducklings. If possible, breeders with single ducklings should contact Neil Hayes to determine if foster parents are available as the artificial rearing of one duckling means it loses the socialisation that accompanies brood membership. Another possibility is to develop a brooder inside a Blue Duck aviary for use by single ducklings.

Neil Hayes highlighted this summer's botulism outbreaks as a potential threat to Blue Duck breeders who must always be aware of disease.

Eric Fox reiterated the need for careful nest checks to be made to minimise disturbance.

Neil Hayes pointed out that Melvin Pike's birds had had two infertile clutches before his male died. Grant raised the possibility of comparing successful and unsuccessful breeding aviaries to try and determine the suitability of the aviary guidelines.

1989 Breeding Season Lessons: A long settling in period does not appear to be necessary, a high protein diet does appear necessary at all times of the year, artificial incubation of the first clutch readily induces the bird's to multiclutch, hand rearing of ducklings is successful except where only one duckling is hatched when mal-imprinting is likely.

Blue Duck Stud Book: Grant Dumbell clarified the current holdings of Blue Duck and presented a standard format for recording pedigrees. The stud book now has all available information entered into it. However, there needs to be a more rigorous reporting system for the stud book as a transfer had been made in the last year without the stud book being consulted.

The meeting agreed that all current pairings should be maintained for at least one more season. Repairings will then be considered at next year's meeting of the Captive Breeding Group.

From the birds that have been bred in the last year, only one pair can be made, as only one female was produced. It was agreed that the female bred at Mt Bruce would be best mated to one of the Otorohanga bred males to produce a pair of the same age without promoting inbreeding. Therefore, it was decided to use this as a small flock mating trial where the female would be placed with the two Otorohanga males to try and determine the feasibility of larger scale flock mating for the future. This will be carried out in Neil Hayes aviary. Once mated, the female and her mate will be consigned to Ron Munro in Invercargill who has already provided a second Blue Duck aviary.

Recommendations to Blue Duck Liaison Group: The complete stock of captive Blue Duck now totals 31 birds, up 7% from 29 at the same time last year, despite one death and one male released to the wild. There will be 12 pairs for the 1990 breeding season, up 9% from the 11 last year, however, only three (25%) of these will have a successful breeding history. This still leaves seven males who cannot be paired, due to a shortage of females, and is unchanged from last year.

The Captive Breeding Group will recommend to the Blue Duck Liaison Group that further females be removed from the wild to balance the captive sex ratio. This could be done a number of ways and could form the basis of a field trial to determine the suitability of wild manipulations to boost productivity in the field.

If clutches are removed, this may promote double clutching in wild birds. The artificial incubation of these wild clutches will then provide females for the captive programme, and a surplus of birds which could be used as a second trial release in a suitable area. Sufficient eggs will need to be removed to unrelated females to enter the captive programme with the result that the sisters of these birds would form the female component of a release. If eggs are removed, these could be incubated at two different sites, to guard against some catastrophe.

Alternatively, juvenile females could be removed from the wild, however, these would need to come from different areas as it is important that alternative family lines are

established in the captive programme. Currently all pairs will produce progeny which are related back to one pair. It would appear prudent to establish some alternative family lines as a hedge against problems in the future, and to minimise the need to remove birds from the wild in the future.

A review of aviary space both built and under construction will be completed before the BDLG meeting to ensure that sufficient space is available to the pairs that will be created when females become available.

Blue Duck Sponsorship: Alan Saunders outlined DOC's approach to sponsorship and their activities with the Forest and Bird trust. Grant then explained D.U.'s approach to sponsorship and gave a brief rundown on the formation and operation of the New Zealand Waterfowl and Wetlands Trust. It was agreed that there needed to be co-operation between DOC and DU on the subject of sponsorship and Alan Saunders agreed to discuss this with the relevant DOC people.

Other Matters: The National Wildlife Centre aviary sponsorship was outlined by Martin Bell. It was agreed that DU should instigate a Blue Duck Breeder of the Year award. Martin Bell undertook to arrange the transfer permit for the female to go to Neil Hayes, and to apply for the transfer permit for the pair to be sent to Ron Munro. Grant Dumbell will attend the Duck Liaison Group meeting at Cass in July.

The meeting closed at 2.45pm.

cc: All present
All breeders
Murray Williams
David Butler

DUCKS UNLIMITED STUD BOOK

SPECIES :
 BAND NUMBER :
 SEX :
 HATCHED :
 BRED : YES / NO

File: BLUEDUCK										Page
Report: DOC REPORT										1 June 19:
BAND No	SEX	HATCHED	MOTHER	FATHER	HELD	MATE	BRED	DIED	F	
17-92390	Male	76/77	L-17061	L- 6714	Otorohanga	L-19751	No	-	?	
L-15684	Male	89-10-05	L-18097	L-19090	N.Hayes	-	No	-	-	
L-15685	Male	89-10-05	L-18097	L-19090	N.Hayes	-	No	-	-	
L-18097	Female	-	-	-	Otorohanga	L-19090	Yes	-	?	
L-18913	Male	86-10-10	L-19064	L-18993	Nga Manu	L-18934	No	-	0	
L-18934	Female	86-11-00	Mixed	Mixed	Nga Manu	L-18913	No	-	0	
L-18936	Female	86-11-00	Mixed	Mixed	M.Pike	L-19752	No	-	0	
L-18946	Male	87-10-22	L-18097	L-17062	Mt Bruce	-	No	-	0	
L-18949	Male	88-12-00	L-19092	L-19058	Mt Bruce	L-19759	No	-	0	
L-18992	Male	83-12-28	L-18097	L-17062	Mt Bruce	L-19062	Yes	-	0	
L-18993	Male	83-11-10	L-18097	L-17062	Mt Bruce	-	Yes	-	0	
L-18994	Female	83-12-28	L-18097	L-17062	M. Atkinson	L-19057	No	-	0	
L-18995	Male	83-11-10	L-18097	L-17062	Mt Bruce	-	Yes	-	0	
L-18997	Male	Gisbn 84-11	-	-	R.Munro	L-18999	No	-	?	
L-18999	Female	84-10-01	L-18097	L-17062	R.Munro	L-18997	No	-	0	
L-19057	Male	Wgnui 84-10	WF.2	WM.2	M. Atkinson	L-18994	No	-	?	
L-19058	Male	Wgnui 84-10	WF.2	WM.2	Mt Bruce	L-19092	Yes	-	?	
L-19062	Female	Wgnui 84-11	WF.1	WM.1	Mt Bruce	L-18992	Yes	-	?	
L-19063	Male	Wgnui 84-11	WF.1	WM.1	Hilldale	L-19754	No	-	?	
L-19090	Male	Wpapa 84-10	-	-	Otorohanga	L-18097	Yes	-	?	
L-19091	Male	84-11-29	L-18097	L-17062	D. Johnson	L-19753	No	-	0	
L-19092	Female	84-11-29	L-18097	L-17062	Mt Bruce	L-19058	Yes	-	0	
L-19094	Male	84-11-29	L-18097	L-17062	Hilldale	-	No	-	0	
L-19751	Female	88-12-00	L-19092	L-19058	Otorohanga	17-92390	No	-	0	
L-19752	Male	88-10-00	L-19092	L-19058	M.Pike	L-18936	No	-	0	
L-19753	Female	88-10-00	L-19092	L-19058	D. Johnson	L-19091	No	-	0	
L-19754	Female	88-10-00	L-19092	L-19058	Hilldale	L-19063	No	-	0	
L-19755	Male	88-10-00	L-19092	L-19058	Mt Bruce	-	No	-	0	

BAND No	SEX	HATCHED	MOTHER	FATHER	HELD	MATE	BRED	DIED	F
L-19759	Female	74/76	L-17061	L- 6714	Mt Bruce	L-18949	No	-	?
L-19771	Female	89-12-03	L-19092	L-19058	Mt Bruce	-	No	-	-
L-19772	Male	89-12-03	L-19092	L-19058	Mt Bruce	-	No	-	-
L-19000	Male	84-10-01	L-18097	L-17062	-	-	No	85-01	0
L- 6714	Male	Wairoa 71-09	-	-	-	-	Yes	85-04	?
L-19071	Male	85-10-25	L-18097	L-17062	-	-	No	86-04	0
Blue	Female	85-12-25	L-18097	L-17062	-	-	No	87-03	0
L-19064	Female	Wgnui 84-11	WF.1	WM.1	-	-	Yes	87-06	?
L-19060	Male	84-10-01	L-18097	L-17062	-	-	No	87-08	0
L-17061	Female	-	-	-	-	-	Yes	88-06	?
L-17062	Male	77/78	L-17061	L- 6714	-	-	Yes	88-07	0
L-18933	Male	86-11-00	Mixed	Mixed	-	-	No	89-11	0
L-18919	Male	86-11-00	Mixed	Mixed	Released	-	-	Out	0
L-18920	Male	86-11-00	Mixed	Mixed	Released	-	-	Out	0
L-18921	Female	86-11-00	Mixed	Mixed	Released	-	-	Out	0
L-18922	Female	86-11-00	Mixed	Mixed	Released	-	-	Out	0
L-18931	Female	86-11-00	Mixed	Mixed	Released	-	-	Out	0
L-18932	Male	86-11-00	Mixed	Mixed	Released	-	-	Out	0
L-18935	Male	86-11-00	Mixed	Mixed	Released	-	No	Out	0
L-18950	Female	88-10-00	L-19092	L-19058	Released	-	No	Out	0
L-18998	Male	84-10-01	L-18097	L-17062	Arundel UK ?	-	?	Out	0
L-19093	Male	84-11-29	L-18097	L-17062	Arundel UK ?	-	?	Out	0

Meeting Comments: Captive breeding group's report received and applauded for its positive co-ordination of activities. The request for further breeding stock was discussed and it was AGREED

1. That two females be provided as soon as possible (and not later than mid-August). These birds to be taken from the wild, disrupting wild pairings if necessary. It was recommended these birds come from
 - (i) Gisborne-East Coast conservancy - possibly Takaputahi River (Action: John Galilee).
 - (ii) Tongariro/Taupo conservancy -possibly Makatote River (Action: Rob McCallum)

2. That a further 5 females be provided in late summer, these to be near-fledged juveniles. These birds could come from
 - (i) West Coast (3 females from 2 different river systems) (Action: John Lysle/Dave Barker).
 - (ii) Pureora area of Waikato conservancy (2 females) (Action: Phil Thompson/Paul Jansen).

Birds should be airfreighted or speedily road-delivered to:

Ducks Unlimited (Inc), c/- F N Hayes, 17 Wise Street, Wainuiomata, Wellington.
Tel: (04) 666189 (office), (04) 646622.

48 hours prior advice of likely arrival of birds should be given to Mr Hayes.

3. Blue Duck Liaison Group co-ordinator to
 - (i) Write to Regional Conservators making request for birds and for staff involvement.
 - (ii) Arrange necessary permits from Protected Species Policy Division.

Action: Murray Williams

FOREST AND BIRD SOCIETY CONTRIBUTION TO BLUE DUCK CONSERVATION

Mike Harding explained that Forest and Bird saw its present contribution as being

- (1) Participation in the Wanganui River Flows appeal before the Planning Tribunal.
- (2) Acting as a funds manager should commercial sponsorship of blue duck conservation activities be obtained.

Mike sought suggestions on how Forest and Bird could make a further contribution short of providing finance for projects/activities. Two suggestions were forthcoming -

- (a) "Adoption" of a blue duck project by a local Forest and Bird branch. As an example, Canterbury branch members could "adopt" the Arthur's Pass monitoring and dispersal study by providing volunteers to locate birds as and when needed, they could occasionally offer small amounts of finance to assist some aspect of the field programme and the preparation of a static display which would highlight both the project and Forest and Bird involvement with it.
- (b) An article in 'Forest and Bird' outlining the national conservation project for blue duck, and the opportunities for Forest and Bud participation. Mike Harding to prepare.

The general feeling of the group was that Forest and Bird could make a greater commitment to blue duck conservation, both active and financial.

NEW ACTIVITIES

1. Translocation Experiment

It was agreed that there was a need to expand conservation activities by attempting to establish new populations in presently unoccupied habitat. Discussion centred on the wisdom of using Mt Egmont/Taranaki as the place to trial techniques of translocation.

It was AGREED

That translocated wild buds should be onto Mt Egmont/Taranaki to supplement the captive-reared birds liberated there in early 1987 and still present on the mountain.

The source of the translocated birds should be a well-known and easily monitored population -suggested to be the mid-section of the Manganui-a-te-ao River.

The liberation should comprise 3-4 established pairs.

Detailed monitoring of the released birds was required, according to a prepared release plan.

Action: Wayne Hutchison - proposal and plan
Murray Williams - research plan

Other translocations:

Discussion ensued on transfer techniques (e.g. transferring ducklings, or fledglings, or flying juveniles, or lone adults, or established pairs), and the wisdom of trialling transfer techniques in several localities over 2-3 year simultaneously.

It was AGREED that no other translocations be attempted until the results of the Egmont experiment had been properly appraised.

Forward Planning

It was AGREED that forward planning for translocations and releases should commence in anticipation of the need for further trials of techniques. Guidelines for this forward planning are in "Conservation Strategy for Blue Ducks".

Action: (all conservancies), and especially Otago.

2. Arthur's Pass Monitoring and Dispersal

Steve Phillipson and Ray Smith tabled a proposal to extend the present Arthur's Pass monitoring study into a more detailed study of biology and dispersal of a mountain population (see proposal attached).

PROPOSED STUDY ON VARIOUS ASPECTS OF WHIO BREEDING AND DISPERSAL IN THE WAIMAKARIRI FIELD CENTRE 1990-91

Introduction.

The distribution of whio, or blue duck *Hymenolaimus malacorbynchos* is presently restricted to a small number of comparatively isolated rivers or river systems (Williams, 1988). Because whio usually inhabit only the headwaters of these rivers it has been assumed that mixing between groups of birds is unlikely (Williams, 1988).

The fragmentation of a population into small breeding groups can cause deleterious genetic changes to that population (Simberloff and Abele, 1982). The two main genetic problems that have been identified are inbreeding and genetic drift. The biochemical analysis of blood samples taken from whio inhabiting the isolated Manganui-a-te-ao river system indicate a high level of inbreeding in this population (Triggs, 1988). Further biochemical testing was undertaken on birds from two catchments in the Arthur's Pass area. These tests were designed to obtain data from birds living in larger, or more contiguous population. However, the results of these tests have not yet been reported.

At least three factors contribute to the level of genetic mixing within the whio population:

- a) The dispersal and recruitment of juvenile birds.
- b) The length of the adults reproductive life.
- c) The frequency with which adults re-pair during their reproductive life.

The aim of our proposed study is to investigate these factors by collecting information from banded and unbanded whio in the Arthur's Pass area.

Proposed Methods and Study Area.

Originally this study was to include birds in the Otira, Deception, Mingha, Edwards and Crow river systems. However, our shadow allocation of funds for the 1990-91

financial year will only allow us to effectively monitor birds on the Otira and Mingha rivers. Hopefully the use of volunteer labour may allow us to improve the project.

Initially we intend to ensure that most, if not all, adult birds holding territories in our study areas are colour banded before breeding commences i.e. prior to August. Most of the birds in the Otira and Mingha rivers have all ready been colour banded by Mike Harding on previous occasions, therefore, our task will be some what reduced.

After banding the birds we will commence regular fortnightly surveys of the two study river systems and collect information on the movement, identity of breeding pairs, breeding success and territory size of whio. Information collected on the birds in the Otira and Mingha rivers will be used in conjunction with that already gathered by Mike Harding over the last two years.

After breeding - but before they are evicted from their natal territory - we will attempt to colour band as many of the juveniles from our study areas as possible. We hope that some of these juveniles will be sighted in subsequent surveys of our study river systems; on surveys of other river systems in the Waimakariri field centre or in other areas e.g. in river surveys done by the West Coast Conservancy.

The Mingha river is extensively used by recreationists and we are hoping to collect additional information from this source. Based on previous experience we expect to mainly collect data on the location of banded birds (or at least location and clues to the identity of the banded birds seen).

General Discussion.

The study outlined above is the bare minimum to ensure the continued accumulation of data from the birds of the Otira and Mingha rivers. Although this information is valuable in its own right it is important that the range of the study be increased in the near future. An increase in the number of rivers or river systems used in the study would:

- a) Increase the accuracy of our observations on population dynamics and trends i.e. our results would be validated by replication. This is important if we are to accurately monitor the local whio population.
- b) Increase our rate of information accumulation on territory sizes, frequency of mate changing, reproductive output, and life expectancy.
- c) Increase the likelihood of colour banded adults or juveniles being sighted if they are moving to, or moving between, catchments. One positive sighting of an adult bird which was banded in the Otira river and subsequently seen in the Mingha river over a year later leads us to believe that this line and method of investigation is worth pursuing.

Our major concern in this field centre is that our efforts toward whio conservation are directed and will bring the most benefit for the birds. For this reason we would greatly appreciate any comments or ideas on how we could improve our intended study or perhaps redirect our resources in to a project that is of greater value to whio conservation.

S. M. Phillipson and R. Smith.
Waimakariri Field Centre.

References Cited.

- Simberloff, D. Abele, L.G. 1982. Refuge design and island biogeographic theory: effects of fragmentation. *American Naturalist* 120: pp 41-50.
- Triggs, S. 1988. Genetic Aspects of blue duck conservation. In Williams, M. (ed) 1988a. Summarised proceedings of a blue duck conservation seminar held at National Wildlife Centre, Mt Bruce on 19-20 April, 1988. DOC Science and Research Internal Report No: 13.
- Williams, M. 1988. Conservation Strategy for blue duck 1988 -1992. DOC Science and Research Internal Report No: 30.

Meeting Comment: There was very strong support for this proposal along the lines of

- a) Monitoring (about 4 times per year) marked pairs in the Otira, Mingha and Edwards Rivers.

- b) Twice annually (March/April, November) undertaking more extensive surveys of neighbouring catchments (e.g. Bealey, E. Edwards, Deception). Involvement of volunteers (e.g. local Forest and Bird) should be considered to assist this part of the study.

This study has considerable potential for expansion to provide more information on biology and dispersal of birds in montane habitats. It should be viewed as a sister study to that planned for the Styx River in Westland, and the banding and monitoring protocols should be in common.

Use of university students for small projects (e.g. foods, habitat use, time budget, telemetry) could be considered.

3. Hunter Hills/Mount Peel populations

The meeting agreed these populations deserved greater appraisal, especially as potential enhancement projects. John Andrew agreed to encourage greater monitoring of them.

Action: (John Andrew)

SPONSORSHIP:

Alan Saunders advised that the bid for Electricorp sponsorship was now dead. Janet Owen and Keith Johnson at Central Office approve all sponsorship bids and initiate approaches to potential sponsors.

There are no plans at DOC Central Office to actively promote blue duck as a species for conservation sponsorship.

It was suggested the captive breeding component of the Conservation Strategy was worthy of promotion for sponsorship. Grant was asked to prepare details of experiences associated with captive breeding and to submit them to Alan Saunders, TSU, as a potential sponsorship item.

Action: Grant Dumbell

MONITORING:

Considerable discussion centred on the inability of several conservancies to commit resources to establish and maintain blue duck monitoring. The principal reasons for this were suggested as

- a) monitoring is not seen as important (especially for a threatened as opposed to an endangered species),
- b) there are no outputs,

- c) the "conservation strategy for blue ducks" is not an "officially approved" recovery plan but instead is a 'working document' with no departmental status,
- d) monitoring protocol too demanding of time and resources.

It was AGREED that monitoring should be restricted to key sites, and that monitoring should be seen as the first step to a larger objective (population enhancement) that does have outputs, i.e. larger populations monitored should be those capable of providing birds for translocation, the smaller sites being places deserving of enhancement.

Key monitoring sites were then canvassed and listed as

North Island	Motu Catchment (Whitikau, Takaputahi, Waikohu) Whakapapa Manganui-a-te-ao plus one site in Ruahine Ranges plus one site in Pureora area
South Island	Styx River Arthur's Pass rivers Nelson (Flora, Riwaka) Fiordland - one key river

Minor sites worthy of monitoring as a precursor to enhancement were not identified. It was suggested that each conservancy representative should attempt to identify one or two such areas over next 12 months for consideration at next meeting.

1991 Meeting of Liaison Group

It was AGREED that such a meeting was desirable and necessary so as to maintain momentum for present activities. The format should alter so that

- a) all papers/reports are pre-circulated (2 weeks beforehand);
- b) the agenda is restricted to key management questions;
- c) the meeting time be shorter, and possibly combined with another species recovery meeting so as to maximise the presence of species conservation officers from all conservancies at one location;
- d) the 1991 meeting be held in Nelson conservancy in July 1991,
- e) remember to budget for attendance at 1991 meeting

Action: all conservancies

REVIEW OF PROGRESS 1988 -1990

Murray Williams reviewed progress in implementing the Blue Duck Conservation Strategy. He referred to the Timetable of Activities on pages 29 -31 of the Strategy document. He emphasised that it was only 2 years previous that the formative meeting was held at Mt Bruce.

- 1) Survey of distribution: This activity is well ahead of schedule. All key populations and probably most of the isolates are now well known. So rapid has been this progress that modification of the database can now be considered and the emphasis shift to a local rather than a national perspective. There are few, if any threatened species whose distribution is now so well known.
- 2) Population monitoring: While most suitable monitoring sites have been identified, few programmes are up and running. This is one activity that is causing problems for DOC managers but we have, at this meeting ,moved to address these
- 3) Habitat protection: As a result of increased awareness within DOC of this animal so habitat protection has followed. The species is now seen as a key animal in river protection initiatives (eg Wanagnui, Mohaka, Tongariro) which in turn has lead to a higher profile for the bird. The existence of a DOC conservation strategy for the bird has helped this advocacy.
- 4) Population enhancement/establishment: Limited so far to the Mt Egmont/Taranaki release of captive birds and their subsequent monitoring. This gives us confidence to proceed, as we have now agreed to do. Emphasis can now shift from survey to this activity somewhat ahead of schedule.
- 5) Public awareness initiatives: There has been a considerable increase at both local and national level of awareness of this bird and its status. I am aware of 8 major press articles in the past 2 years and of lectures being given by DOC staff to interest groups. Progress here has been good.
- 6) Nationally available pamphlet: Produced on schedule, a joint production of DOC Science and Research and Ducks Unlimited.
- 7) Pictorial book: Murray Williams completed the text in June 1990 and all photographs have been assembled awaiting final selection. Progress is now dependant upon the timetable and finance from sponsorship being arranged by West Coast Conservancy in whose business plan this book is listed as an output for this year.
- 8) Research topics: Considerable progress here with 6 of the 8 priority research topics having now been completed or underway.

- 9) Captive breeding: The Captive Breeding Group has made very positive progress, having completed, on time, a breeding plan, and they have monitored and recorded breeding success over the past 2 years in a way and detail that applies in no other captive breeding programme which has public involvement.

Considering (a) that the Strategy for Blue was born only 2 years ago; and (b) the institutional upheavals and budget crises within DOC over the same 2 years, progress in implementing this conservation programme has been remarkable!

DRAFT RESEARCH PAPERS TABLED:

- 1) Some social and demographic characteristics of Blue Duck (Murray Williams)
- 2) Genetic relationship within a population of Blue Duck (Sue Triggs, Murray Williams, Steve Marshall & Geoff Chambers)
- 3) Genetic structure of Blue Duck populations using DNA fingerprinting (Sue Triggs, Murray Williams, Steve Marshall and Geoff Chambers)
- 4) Diurnal use of time and space by breeding Blue Ducks (Clare Veltman and Murray Williams)