

Research and management of a study population of New Zealand Falcons in managed habitats in Marlborough: The Marlborough Falcon Conservation Programme.

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1. Introduction.

The Marlborough Falcon Conservation Programme is now in its fifth year and is focussed on the New Zealand Falcon *Falco novaeseelandiae* or 'Falcon'. Started as the 'Falcons for Grapes Project' in 2006, it currently funded by the Emirates Falconers' Club and by International Wildlife Consultants (UK) Ltd and now has a broader approach to Falcon conservation than being a pest control programme to benefit the wine industry. The charitable Marlborough Falcon Conservation Trust (MFCT) has now been set up and the plan is for this to raise funding for the programme to develop, probably in a modified form, into the future.

This plan covers the existing captive Falcons, facilities and human resources and how best to use them in order to best meet conservation, legal, humanitarian, educational and financial constraints and targets, and the wishes of the Department of Conservation.

2. Achievements of the project to date.

2.1. In the first five years of the project, about 55 Falcons have been 'manipulated' in a man-managed environment. The number is vague because we now have inter-gradation of 'manipulated' or 'translocated' falcons breeding with wild Falcons, or breeding in the hills on the margins of the Wairau Plain. We also have older birds whose radio-tags have now ceased functioning and are harder to locate and study.

These Falcons have lived free in the man-made environment of the Wairau and Awatere river plains for periods ranging from one day to five years. To some extent we have managed to follow their wanderings, dispersal, pairings and nesting attempts.

2.2. The study has proven three things so far:

- a. New Zealand Falcons can be translocated into intensively man-managed environments and will establish themselves with resident territories, and can breed there. They face a number of difficulties in breeding, in particular a lack of safe nest-sites, disturbance, and nest predators.
- b. Electrocution is a major hazard, especially for young female Falcons, to the point that it can be a limiting factor in the range of the Falcon (Fox and Wynn 2010).
- c. Falcons can significantly reduce pest bird damage to grapes, and this could become a financial incentive to support the conservation of the species (Saxton 2009, Kean 2009.)

2.3. In additions to these three proven points, we have reason to believe, but have been unable to prove, that Falcons face significant levels of human persecution. Two falcons (one wild, one translocated) were definitely shot in vineyards during this study. We have many reports of Falcons being killed because they were catching chickens or pigeons, and there is circumstantial evidence of Falcons being killed by poisons intended for other species.

3. The goal of the Marlborough Falcon Conservation Programme as a whole.

3.1. When we started the project five years ago, it was as the ‘Falcons for Grapes’ project and part funded by the Sustainable Farming Fund. Currently the project is privately funded and is under no commitment to the wine industry. It has now become a broader conservation programme for the species and has one, far-reaching conservation goal:

Our long-term conservation target is the restoration of the Falcon to its former breeding range, which was the entirety of New Zealand.

3.2. Conservation of the species. There is an inverse correlation between the distribution of Falcons in New Zealand, and the distribution of Man. Why is this? In other countries birds of prey live cheek by jowl with Man, even nesting in cities. Why not here?



Ginny, the first Falcon to breed in the vineyards.

3.2. We are not proposing to reach our conservation target by releasing Falcons all over New Zealand. Rather, we are proposing to continue identifying and researching the problems faced by Falcons in man-managed environments and to develop management techniques, legislation, education programmes or whatever else it takes, in order for the Falcon to gradually re-colonise the areas from which it is now absent. Dr Richard Seaton and Wingspan have demonstrated the ability for Falcons to colonise pine plantations and we have demonstrated that Falcons can breed in vineyards and other intensive situations. We therefore have some cause for optimism. The Falcon is much more adaptable than most of New Zealand’s indigenous birds.

3.3. As this conservation goal is a national one, we see the Marlborough efforts being part of a wider, co-operative, national effort working together with other existing raptor teams and studies.

4. Specific objectives for the Marlborough Falcon Conservation Programme.

4.1. Following on from the four points that we have identified in section 2.2 and 2.3, we are ready now to take some actions:

4.2. **Ecology.** Issues concerning breeding, dispersal, hunting, mortality need further study and will be discussed in more detail later in this document. Our study has been able to follow the lives of Falcons through detailed radio-tracking. We have been able to study the problems they face during nesting, such as lack of safe nest sites, and introduced predators such as cats and mustelids, and we have been able to discover what they die of. 90% of 21 recorded deaths were unnatural. 47% were through electrocution and this is the subject of a separate paper (Fox and Wynn 2010). Shooting is still a major issue for Falcons, yet hard to prove. A radio tag thrown into the river Wairau from the bridge may be the only evidence left of a shot Falcon. The public attitude in Marlborough is that if an animal or plant of any sort causes any inconvenience, then kill it, poison it, spray it. It is hard to encourage a more tolerant attitude and this is why we need to expand our public relations efforts.

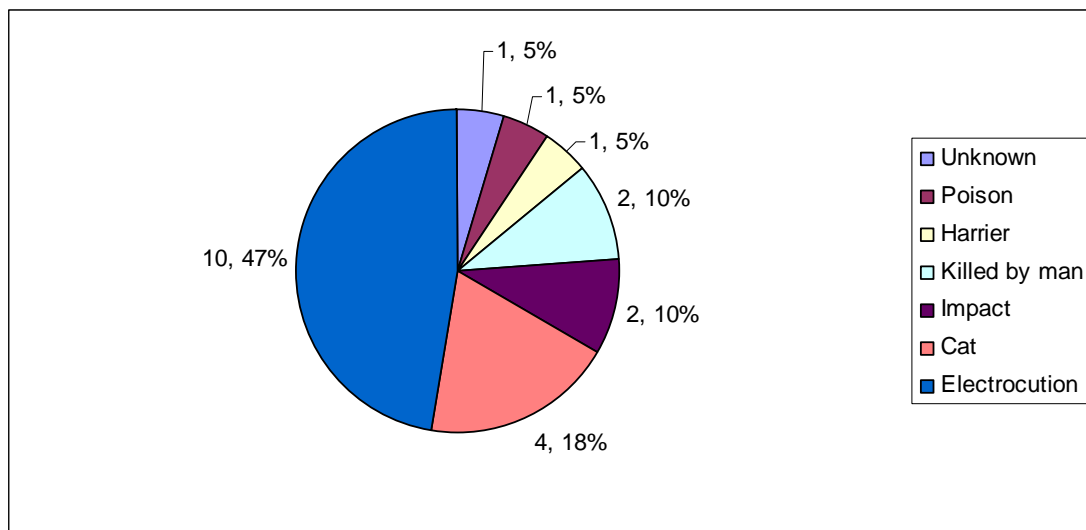


Figure 1. Causes of death in 21 Falcons from the project.

4.3. **Electrocution.** We have now proven the significant impact of electrocution and produced a dossier on this. We will now prepare this for a peer-reviewed journal and are in contact with other interested parties on electrocution issues. We hope that a consensus will be reached on the next steps towards mitigating the problem. This could entail ministerial/political involvement, legal injunctions, media involvement and public awareness, local meetings, international inputs and so on. The next steps of action on this issue are beyond the scope of this document.

4.4. Pest control. Although the ability of Falcons to reduce grape damage has been proven, the involvement of the grape growers has been poor (Kean 2009). We would like to increase community involvement and there is pressure from the Marlborough District Council to reduce anti-social bird control methods, as well as financial pressures to reduce the costs of pest control. We propose to investigate ways of producing more targeted pest control (both in time and in space) and developing systems that would be cost-effective both for vineyard owners and for the suppliers of the service. The proposed study area includes major areas of vineyards, as well as arable crops and is thus ideal for further research on pest control.

4.5. Human persecution. Given the difficulties of enforcement, it is agreed with DOC that the best way to reduce human persecution is through education and public awareness.

4.6. Education and Public Awareness. Most New Zealand citizens cannot tell the difference between a Harrier and a Falcon, and few have ever seen a wild Falcon. Many would kill either bird if it threatened their livestock in any way and the Government has just passed a law enabling Swamp Harriers *Circus approximans* to be killed. Few people realise that the Falcon is our only surviving indigenous bird of prey.

We thus start from a very low starting point, a lower starting point than for any country in which I have worked. It is a pretty dismal state of affairs.

Our educational programme, broadly, has two main aspects: The first is to enable people to see and experience Falcons. Obviously we cannot cart all the people off into the back country. Therefore we are using advocacy birds, to enable people to see the Falcons up close and to see them flying freely in the sky. The Falcons sell themselves; they are their own best PR agents. The success of this has been shown admirably by Wingspan at Rotorua, and when Ministers have visited both Wingspan and the Marlborough project, they have been captivated by the Falcons. We have to teach people to value their own wildlife. A solitary Falcon sitting in a cage in a wildlife park is a sad image which does not inspire.

The second aspect is our target audience. We are primarily targeting the young. Their minds are more open, and they will be the decision-makers of the future. Our school programme has been a major success, limited only by our own resources. The DOC team in Renwick has made tremendous strides in this. We need more skilled advocates, and more suitable Falcons, to expand the programme. But classroom visits have their limits. We also need free-flying demonstrations to enable the children and their parents to see Falcons as they should be seen – flying free and showing their aerial skills.



Phil Bradfield from DOC teaching school children about Falcons.



Colin Wynn introduces a male Falcon called Wilson. Wilson is also used for pest control demonstrations (notice his back pack transmitter) and has successfully bred in captivity.

4.7. A study population. Given the progress we have made so far, and the action in progress on electrocution and on education, we are still left with a number of unanswered questions:

- What factors are affecting the productivity of the Falcons?
- What factors affect the distribution, density and movements of the Falcons?
- What other factors affect the mortality of fledged Falcons?
- How and why do these factors compare between man-managed habitats and high-country or bush 'unmanaged' habitats where Falcons live now?
- What can realistically be done to mitigate limiting factors faced by the Falcons in order for them to prosper in man-managed areas?

To do all this, we need to maintain a free-living population in a man-made environment, with all Falcons radio-tagged and capable of intensive study. To be statistically valid, and yet within our resource capability, we need a population of about 20-30 radio-tagged individuals. Currently we have around 25 birds, but not all with active tags and not all staying in a man-managed environment.

4.8. Human resources. To establish and maintain this study population will require a management team of people with hands-on skills and local commitment. Further people will be needed to study and document the Falcons in detail. To a great extent, management and research dovetail together and feed off each other. We propose to develop an overall study plan in order for students to participate in a co-ordinated manner.

5. A Study Area.

5.1. Location. Although we started on the Wairau Plain, the electrocution risk is too high there to maintain a population of breeding Falcons.

5.2. Surviving with power poles. Having investigated the electrocution factor, we face two choices: either make all power poles safe for Falcons, or minimize the contact between Falcons and power poles. The first option is not viable on our timescale so we are taking the second option. Thus, we are no longer releasing Falcons on the Wairau Plain but have started to create a population on the Awatere plain which has a lower human density and less power poles.

5.3. Location. The Awatere plain offers a useful mix of man-made habitats. High country pastoral land gives way to rolling grassy plains, which in turn give way to vineyards and arable cropping land. There are also significant areas of riverbed and less intensively managed land. The topography lends itself to radiotracking and it has a good road network. There are a number of interested land-owners there, and we already have some of our study falcons there. We have not defined boundaries to the study area yet: to a large extent this will depend on where the falcons themselves are. Following discussions with Barry Feickert, we are undertaking preliminary trials towards establishing an automated triangulation radio-tracking system that would allow all the tagged falcons to be monitored in detail for long periods. Apart from reducing the fieldwork load, this would raise the quality of data and value of the study immeasurably.



The Awatere Plain, Marlborough.

5.4. Facilities. In order to accommodate people working on the programme, we would need to establish a new base for up to about 10 people, and provide resources for them to work.

5.5. Comparative studies. In order to put the results into a national context and perspective, we need comparative studies. In particular we would like to participate in an intensive study of a parallel tagged population (maybe 10 or so contiguous pairs) in the Marlborough hills. This would enable useful comparisons to be made in the ways Falcons use the two types of environments (high country pastoral and low country man-managed). This would be in line with DOC's own long-term goals. We have trial tagged three young Falcons at Mt Olympus this year and tracking in these hills seems feasible. In addition to our own efforts in Marlborough, information from the study in Kaingaroa pine forestry habitat offers a very useful comparison and we would like to maintain and reinforce co-operation between the studies, including exchanges of personnel.

5.6. Action priorities. These are ambitious and long-term objectives, and we cannot wait until we have all the answers. There is an element of 'manipulate and see what happens'. Some aspects, such as electrocution issues and human persecution/educational efforts, have already become clear and can be acted upon. Other aspects are much more subtle and will take dedication and perseverance to untangle.

5.7. Department of Conservation permits. Because the programme has a number of inter-related strands, rather than applying for a long list of permits for each activity and location, following discussion with DOC, our plan is designed as a holistic one and there would be an umbrella permit for it. Dr Nick Fox at IWC would continue to be the permit holder, and names and contact details of those involved in specific activities requiring a permit would be given to DOC by the umbrella permit holder and updated on a six monthly basis.

6. Objectives for keeping Falcons in captivity.

We would like to reduce our need to translocate birds from the wild and develop captive breeding capacity to enable the project, and our study population, to be self-sustaining. There are a number of objectives with conservation benefits in keeping some Falcons in captivity:

- a. For breeding for release to the wild in the Marlborough conservation programme.
- b. For breeding as a source of captive Falcons for other conservation programmes.
- c. For advocacy by taking Falcons to schools, events, media opportunities and films to reach the wider public.
- d. For advocacy by flying Falcons in vineyards and crops to demonstrate bio-control.
- e. For foster-rearing cohorts of baby Falcons from the Marlborough conservation programme.
- f. For rehabilitation.
- g. To remove problem Falcons from the wild and provide a non-lethal alternative to killing them.
- h. To train people in management techniques.
- i. To research the captive breeding of NZ Falcons under local conditions in comparison to wild pairs and overseas programmes.

7. Captive Stock

7.1. Falcons held on 25th February 2010 are shown in Table 1.

Captive Falcons in Marlborough Falcon Conservation programme							
Name	Sex	Hatch date	Ring No.	Source	Reason for captivity	Purpose	Location
Wilson	M	12/07	H34471	Puipui	Breeding, field trials and education	Breeder	Renwick
Delphine	F	12/07	S81223	Aotea	Breeding, field trials and education	Breeder	Renwick
Arty	M	2008?	H23480	Local unknown	Smashed beak, found in cherry farm net	Breeding	Renwick
Ella	F	2008	S44826	Cable Bay	Killing chickens	Breeding - 2 eggs	Renwick
Napoleon	M	12/2009	H23479	Murchison	Blind in one eye	Breeding/advocacy	Renwick
Doris	F	2007?	S44832	Takaka	Killing chickens	Breeding/advocacy	Renwick
Wink	M	30/11/08	H34477	Mt Carmel	One blind eye	Breeder	Wingspan

The breeding stock consists of three unrelated pairs. The original pair, also used for advocacy and field trials, produced their first chick this year. She was released to the wild but electrocuted. Two other females came into captivity because they were killing chickens and two handicapped males are paired with them. One of these pairs laid 2 eggs this year. A further part blind male was sent to Wingspan for breeding.

7.2. Chicken killers. We constantly receive reports of Falcons being killed for harassing chickens or pigeons, but seldom have sufficient evidence to prove it. It is better to provide people with a management alternative of taking the offending Falcons into a breeding programme rather than killing them.

7.3. Captive Falcons tend to have a much longer lifespan and greater productivity than wild ones. This is because they are sheltered from the risks faced by wild Falcons, and because they have health care provided. Captive Falcons usually reach ages of 10-14 years. Most of our wild Falcons' deaths occurred in the first six months of age, mainly due to electrocution and cat predation.

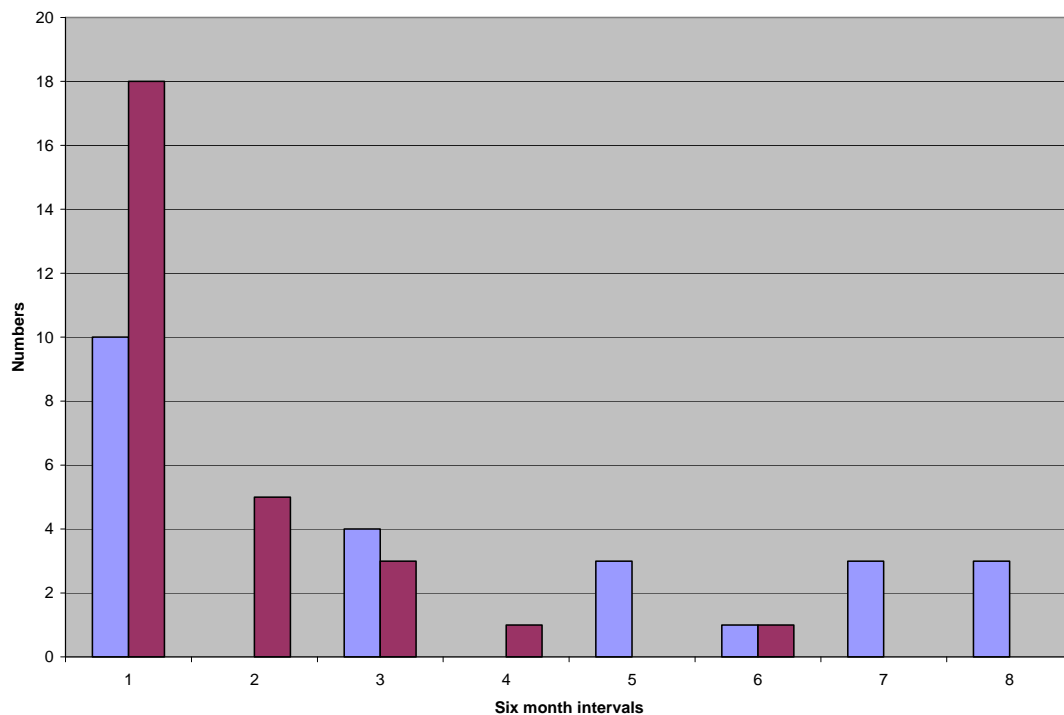


Figure 2. Age structure at six monthly intervals for live Falcons (blue) and dead Falcons (red) in the reintroduction programme as at February 2010.

8. Facilities.

8.1. IWC owns a 1760 m² commercially zoned property in Renwick which is used as a base for housing staff and a depot for equipment and vehicles. It currently has four breeding aviaries and one holding pen. The facilities are not designed or accessible for the general public and the aviaries are designed specifically for breeding Falcons and housing Falcons in a stress free environment. The aviaries comply with all DOC's

husbandry requirements for the species and the existing pairs have successfully laid eggs and reared one chick there. The aviaries have CCTV.

8.2. We are in discussion at the moment with Peter Yealands about the possibility of having an educational centre with one or more breeding pens based at his visitor centre near Seddon. Sue and Phil Binnie have also kindly offered to host a pair of Falcons at Lake Chalice Vineyard, Renwick. Montana may be able to host a pair too. Satellite pairs would come under the umbrella permit and skilled management would be provided by the Falcon team of staff. Day to day feeding etc would be done by the hosts.

8.3. Of course it is not necessary for the aviaries to be within the study area itself. The main thing is that they are close enough to manage.





IWC depot at Renwick



Interior view of an aviary.

9. Personnel.

9.1. IWC has a full-time Manager, Colin Wynn, who is responsible for the day-to-day running of the programme, including any handling of trained Falcons for advocacy purposes. The Director, Dr Nick Fox, provides specialist direction and is present throughout the breeding season. A team of volunteers helps on the project throughout the busy season. Phil Bradfield and Kate Morgan from South Marlborough DOC are assisting Colin Wynn with the advocacy work. Barbro Fox manages the accounts and cash flow, and a Board of Directors of the Marlborough Falcon Conservation Trust are developing ongoing advocacy and fund-raising. Sara Kross is currently studying aspects of the falcons for her PhD, as well as participating in advocacy, fund-raising and the MFCT.

9.2. What we really lack are skilled local personnel who are able to undertake basic procedures such as monitoring breeding pairs, incubation, rearing, fostering, hacking, trapping, harness-fitting, radio-tracking, training, advocacy handling, advocacy, record-keeping, field surveys, rehabilitation, health care, photography, web-site management and so on. Over the years, IWC has either trained New Zealanders on New Zealand Falcons at its facility in UK, or it has sent its own staff to work in New Zealand.

New Zealanders trained at IWC in UK

Noel Hyde
Andrew Tollan
Lex Hedley
Jamie Cooper
Colin Wynn
Lena Olley
Xavier Birch
Jeremy Kumagai
Shane MacPherson

IWC staff and volunteers working in NZ

Nick Fox
Barbro Fox
Cecilia Lindberg
Cathy Blakey
Matt Wilson
Jamie Thomas
Mia Jessen
Terrie Fisher
Mike Riley
Chris Johnson
Tomas Kunca
Paul Lintott
Lena Olley

9.3. Some of us, such as Nick and Barbro Fox, Chris Johnson and Lena Olley, have been alternating between the two programmes and covering two breeding seasons per year. We therefore have to develop a programme that encourages more New Zealand young people to develop hands-on skills. We also need to encourage professional veterinarians to develop skills with raptors. In Marlborough we do all our own veterinary work because the local vets have little experience. In UK we train veterinarians at the NZ Falcon facility.

10. Management Permit.

The programme entails several different strands. We are doing cradle to grave conservation techniques in this programme and the permit needs to reflect this. Also, although the permit is

issued under the name of Dr Nick Fox, International Wildlife Consultants, key personnel on the programme who are involved in hands-on management work are as follows:

Dr Nick Fox, Director IWC.

Colin Wynn, General Manager..

Lena Olley BSc, neonatal care, advocacy and rehabilitation.

Xavier Birch, field surveys, radiotracking, advocacy, training.

Jeremy Kumagai, field surveys, radiotracking, advocacy, training.

Dudley Lerwill, advocacy, training, biocontrol.

Falcon base is at Renwick:

19 Uxbridge Street, Renwick. Tel: 03-5728858.

11. Legal aspects and compliance with DOC Policy.

11.1. The captive breeding in Marlborough, together with the vineyard conservation programme, fulfils both the requirements of Category 1, namely *Recovery of threatened species* and *Restoration of ecosystems*. It fulfils the requirements of Category 2 on *Animal rehabilitation* and *Display of wildlife for conservation advocacy* in DOC, 2006, *Draft Technical Procedures: Captive Management of Species Absolutely Protected Under the Wildlife Act*. It also fulfils requirements of management research and human resource training which do not appear to be addressed by current DOC policy.

11.2. Apart from the captive breeding specifically, other hands-on uses of the birds also have to comply with legal requirements. These include:

- **Rehabilitation**, which can be covered by rehabilitation permits,
- **Advocacy** including school visits, flying displays and demonstrations which do not require any specific permits that we know of.
- **Pest control** using trained Falcons, which also does not require specific permits, the use of falconry techniques in New Zealand being legal. The ability of the Falcons to reduce pest bird damage has now been scientifically demonstrated (see Val Saxton in the Bibliography). However, owing to the risks of electrocution, and to the inability of wine growers to form a consortium to pay for pest control, more targeted pest control efforts need to be evaluated (see Appendix 2. Methods for using Falcons to limit bird damage in New Zealand vineyards.)
- **Radiotracking**, including catching up the birds, fitting harnesses etc.

12. Humanitarian and animal welfare issues.

IWC has a very strong animal welfare ethic and undertakes consultancies on animal welfare issues, especially at the wild/captive interface. Current clients include the UK All Party Parliamentary Middle Way Group on Hunting with Dogs, and the UK Hawk Board which provides the standards for raptor keeping recognised by DEFRA under the UK Animal Welfare Act. As well as publishing research on welfare aspects of shooting and of hunting with dogs and cats, our review paper '*Welfare aspects of killing or capturing wild vertebrates in Britain*' has been frequently used and quoted. Our Mission Statement reads: *We support the wise and sustainable use of wildlife and habitats. To this end the long-term well-being of habitats and wildlife populations are our first priority, followed by the welfare of individual animals. To achieve these aims we undertake front-*

line field research, hands-on management of habitats and wildlife, education of biologists, managers, end-users and the public, and consultancies on wildlife law and regulation.

Our standpoint is, that provided a captive Falcon has a quality of life and we have resources to care for it, we would, instead of euthanizing it, endeavour to find it a meaningful role in the programme or elsewhere.



Wild Falcon chick 'Napoleon'. Blind in one eye but still capable of breeding in captivity or for advocacy.

13. Financial constraints.

13.1. The work to date has been funded by the Sustainable Farming Fund, IWC, the Emirates Falconers' Club, the New Zealand Wine Growers, by smaller donations and a myriad of volunteers and services-in-kind. Currently IWC is providing the staff accommodation, aviaries, four vehicles, three trailers, two quad bikes, incubators, brooders, freezers, radio-tracking equipment etc. The Marlborough Falcon Conservation Trust is making efforts to raise cash funding and individuals and companies are providing support in many ways. IWC is prepared to continue to support the programme if it is viable in other areas, and to some extent it will be a question of cutting our coat according to our cloth. However, the first five years have been the hardest. We now have a much clearer idea of what needs doing, and which groups are most likely to contribute.

13.2. The long haul. For a management plan to be successful, one has to think in the long term. Our research and breeding started in 1974, when Gordon Williams ran the New Zealand Wildlife Service. Many things have changed in the intervening 36 years, and the UK breeding programme has been in operation for 26 years. Our track record demonstrates a long-term commitment.

14. Links with related programmes.

14.1. Our long-term conservation target is the restoration of the Falcon to its former breeding range, which was the entirety of New Zealand. Our effort therefore is national in scope.

14.2. We have had strong links with Wingspan since its inception. Noel Hyde trained at IWC in UK before opening it with Debbie Stewart. One of the Marlborough Falcons was sent to Wingspan and paired with an Eastern Falcon from Motueka. They have produced fertile eggs already. Offspring from this pair can be returned to Marlborough as they cannot be released in North Island.

14.3. Nick Fox founded the Raptor Association of New Zealand in 1975, and it is still active today. We have hosted two AGM weekends of RANZ in the Waihopai since 2005, enabling RANZ members to see and to become involved in the Marlborough programme.

14.4. Massey University. We have links with Prof John Holland at Massey University and have hosted his students in Marlborough. We also have links with Dr Richard Seaton and Dr Laurence Barea who are now independent consultants particularly involved with Falcons and windfarms.

14.5. We have links with Lincoln University and the University of Canterbury. Dr Val Saxton and some of her students have been working on the bird damage aspects of the programme.

14.6. We also have strong links with the IWC breeding programme in UK. Nick Fox was the first person to breed this species in captivity, in North Canterbury in 1976. IWC operated first as a partnership in 1983 and since 1987 as a limited company. It runs consultancies in 17 countries and has 14 permanent staff and 38 seasonal staff (www.falcons.co.uk). It primarily focuses on Falcon conservation, sustainable use issues, animal welfare and cultural heritage (www.mefrg.org).

IWC has 26 aviaries purpose built for New Zealand Falcons in Wales. Four of these aviaries are currently occupied by Aplomado Falcons (*Falco femoralis*) for a comparative behavioural study. This South American species is potentially the closest relative to the New Zealand Falcon. The founder stock was 6 birds imported in 1984 and 1986 from New Zealand. The programme has continued solely from this stock and fluctuates between 15-20 birds. Neonatal mortality, presumably from inbreeding, has meant that in the last ten years or so, only 2-3 chicks survive to fledging each year. The programme therefore needs new genetic material (see Appendix 1). Owing to Animal Health restrictions, the UK programme is unable to send birds back to New Zealand. The programme, both in New Zealand and in UK, has developed the current techniques for breeding the species, and has generated many research publications (see bibliography).



Part of the IWC facility in Wales.

15. Ongoing research on New Zealand Falcons by IWC

- Research and management of a study population of New Zealand Falcons in man-managed habitats in Marlborough.
- Genetic variation in wild New Zealand Falcons across its range. (University of Cardiff).
- Databases on morphometrics, female productivity, egg parameters, incubation, hatching, rearing, mortality, pedigrees and DNA in the UK New Zealand Falcon breeding programme 1984-present.
- Mitigating electrocution risk to Falcons in New Zealand.
- Refinement of techniques in the breeding of New Zealand Falcons, especially nutrition and the role of adenoviruses in neonatal mortality.
- Training of personnel in the management of captive and wild New Zealand Falcons.
- A behavioural comparison of the New Zealand Falcon *Falco novaeseelandiae* and its potentially closest relative, the Aplomado Falcon *Falco femoralis*.

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