

Management Plan for captive black stilts

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Cover illustration: Captive adult black stilt and chick.
Photo: Christine Reed, Department of Conservation.

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1. Introduction

The wild black stilt population presently stands at approximately 80 pure black adults. Introduced predators, loss of habitat and hybridisation with the pied stilt (*Himantopus himantopus leucocephalus*), have contributed to their decline. The Recovery Plan contains detailed historical and geographical information on this species.

The long-term conservation goal of the approved recovery plan (Reed *et al.* 1993) is to establish at least one self-supporting population of black stilts to ensure their survival without a continuing need for intervention. The short-term goal of the plan is to avert extinction.

The main effort to achieve the short-term goal is conducted within the present range of the surviving population - the Mackenzie Basin, South Canterbury. Protection of eggs and chicks from predators through artificial incubation of eggs, predator exclosures and trapping are methods currently employed.

The captive breeding programme will be an integral part of management of the wild population. Eggs laid by captive pairs will either be fostered to wild birds, hand-reared or reared by their parents to 9 months of age when the juveniles will be released.

1.1 GOALS OF THE MANAGEMENT PLAN FOR CAPTIVE BLACK STILTS

The primary goal contained within the black stilt recovery plan for management of captive black stilts is to provide young birds for release into the wild population. A secondary aim is for the captive population to become self-sustaining.

These goals will be met in 2 ways. Firstly, captive pairs will be held primarily as insurance against loss of the wild population. Avicultural techniques will continue to be developed so that productivity from these pairs is maximised and their offspring are released into the wild. Secondly, eggs from captive pairs and some from the wild will be hand-reared for release.

The overall outcome for the captive programme will be maintenance of a healthy captive population, capable of being self-sustaining (productivity > mortality), which contributes to recruitment of black stilts in the wild.

2. History of the captive population

In October 1979, 8 eggs were removed from 3 nests in the Mackenzie basin and were transferred for artificial incubation and hand-rearing at the National Wildlife Centre (NWC) at Mount Bruce in the Wairarapa. All 8 birds (3 males, 5 females) were reared successfully and at 18 months of age were housed as pairs (based on sexing results from hormonal analysis of faeces).

Between 1983 and 1987, eggs from 16 clutches produced by one breeding pair were fostered by wild pied, hybrid or black stilts, but only 4 young are believed to have survived. Thirteen juveniles from final clutches were reared at the NWC and retained in captivity.

Eight birds hatched from the eggs of wild pairs were hand-reared at the NWC in 1980/81 and released in the Mackenzie Basin at 1 year of age. Only 1 of these birds survived for even a month. At least 2 were killed by harriers before release. All were very tame. Pierce (1982) recommended that no further liberations take place until the "habitat in captive pens can be made to resemble that in the wild more closely and precautions taken to ensure that the birds are predator-wary".

As a result of these findings and following a four year study of captive birds held at the NWC, Reed (1986) suggested transfer of the breeding programme to the Mackenzie Basin to allow black stilts to be reared within their "natural range".

In late 1986 staff accommodation was established on 15 ha of ECNZ-owned land adjacent to the lower Ohau river. An aviculturalist was employed from January 1987 and construction of a 45 x 14 x 6 m aviary was completed in late May. A second aviary of similar dimensions was completed in May 1988 and a third aviary was constructed in December 1991.

Facilities now include staff accommodation (1994) and a management facility (1993) containing an incubator room, brooder room and outdoor aviaries, food preparation area, laboratory, insect-rearing and store rooms.

From June 1987 to May 1992, breeding pairs and their juveniles were transferred from the NWC and Queenstown to Twizel. Once at Twizel, pairs were allowed to rear their own or fostered chicks and most juveniles were released at about 9 months of age. Appendix 1 shows the number of juveniles released from the Twizel facility during that period. Seven of these birds bred in the wild in the 1996/97 season, and their eggs were protected through artificial incubation.

Productivity from one pair at the National Wildlife Centre between 1983 and 1987 was high. Fifty fertile eggs were produced in total (mean = 10 per annum). Productivity from captive pairs at Twizel from 1987 until 1994 was much lower. Fifteen fertile eggs were produced during that period (when between 1 and 4 pairs were held annually).

Problems relating to low breeding success at Twizel have been addressed in this plan through a more frequent intake of eggs for use as breeding stock, and the release of unpaired individuals too subordinate for pairing. The programme also

became more streamlined by transferring the role of flock-mating from the NWC to Twizel, reducing stress and the risks of injury and disease transfer.

Over the period from 1979 until 1994, adult mortality per year was approximately 10%.

Reed (1998) contains a full summary of captive black stilt management data from 1981 to 1995.

3. Current status of the captive population

3.1 POPULATION SIZE

At 31 March 1998, there were 48 birds in captivity: 44 at Twizel and 2 each at Queenstown Kiwi and Birdlife Park, and Wellington Zoo. Peacock Springs in Christchurch have completed an aviary for black stilts and await the transfer of two pairs from Twizel (scheduled for April 1998.). Of the 48 birds in captivity, 13 were males, 11 were females, and 24 were juveniles of unknown sex (13.11.24), including 9 breeding pairs (Appendix 2).

3.2 POPULATION AGE, STRUCTURE, AND PARENTAGE

The ages and history of each captive bird are shown in Appendix 3. The origins of the adult and sub-adult captive stock are listed in Appendix 4, excluding the juveniles which will be released to the wild.

4. Current aviaries

Five categories of aviary for housing black stilts are recognised. Holders of captive stilts will have each of their black stilt aviaries graded. An aviary may be authorised under one or more of the following categories:

1. Public viewing - to house individuals on display only, i.e., not part of the breeding programme. These may be old or injured, too subordinate for flock-mating or sexually malimprinted birds.
 2. Holding aviaries - to temporarily house non breeding birds, e.g., juveniles, until they are ready for flock-mating or release.
 - (a) with public contact
 - (b) without public contact
 3. Pairing aviaries - for flock-mating up to 4 birds.
 4. Breeding aviaries - housing pairs for egg-laying, incubation, chick-rearing.
 - (a) with public contact
 - (b) without public contact
 5. Special purpose - e.g., Twizel aviaries for hand-rearing juveniles up to fledging age. (See husbandry manual section 4 for recommended aviary sizes.)
- Appendix 5 shows the number of each aviary type presently available.

5. Objectives for management of the captive population

Figure 1 outlines the key objectives of the management plan for captive black stilts, with tasks to achieve these objectives.

5.1. ESTABLISH A CAPTIVE POPULATION CAPABLE OF BEING SELF-SUSTAINING'

A captive population capable of being self-sustaining (i.e., productivity > mortality) will act as insurance against loss of all wild black stilts. The captive population will be held at more than one location.

5.1.1 Increase numbers held in captivity at Twizel

Increase the number of black stilts held in captivity at Twizel until a maximum of 6 pairs are held.

Twizel will hold up to 6 breeding pairs, and release juveniles or retain them in captivity for future brood stock. Twizel pairs will generally hatch and rear their own chicks in each breeding season unless this is contrary to needs of wild population management. Inexperienced pairs are to be encouraged to lay only one clutch, then rear their own chicks. If successful, they may be multiple clutched in following years as required. Older pairs may lay up to 3 clutches. The resulting chicks will either be hand or parent-reared and will be released as juveniles.

The recovery plan specifies that Twizel will be the focus for housing of the most productive breeding pairs. Once 6 pairs are established at Twizel, new pairs will be held at the National Wildlife Centre or Queenstown. Unpaired stock would be "flock-mated at other facilities each winter ... resulting breeding pairs will be housed at the NWC or Queenstown and then whole families moved to Twizel".

The management regime recommended in this plan is contrary to that recommended in the Recovery Plan but has been recommended by the Black Stilt Recovery Group subsequent to the publication of that plan. The NWC has also withdrawn as a participant in the programme (at least temporarily). The management regime of the captive management plan is based on the principles contained within Stockdale *et al.* (1993). The Twizel aviaries are considered a priority 1 disease management area, generally allowing bird movements out of but not back into this facility. There may be some exceptions to this rule, and these are outlined in the transfer protocol of the husbandry manual.

Only first generation captive stock will be used for breeding (unless there is catastrophic loss of the wild population). All second generation stock will be released into the wild. This will ensure that the captive breeding stock are as genetically diverse as possible, given management limitations. New captive

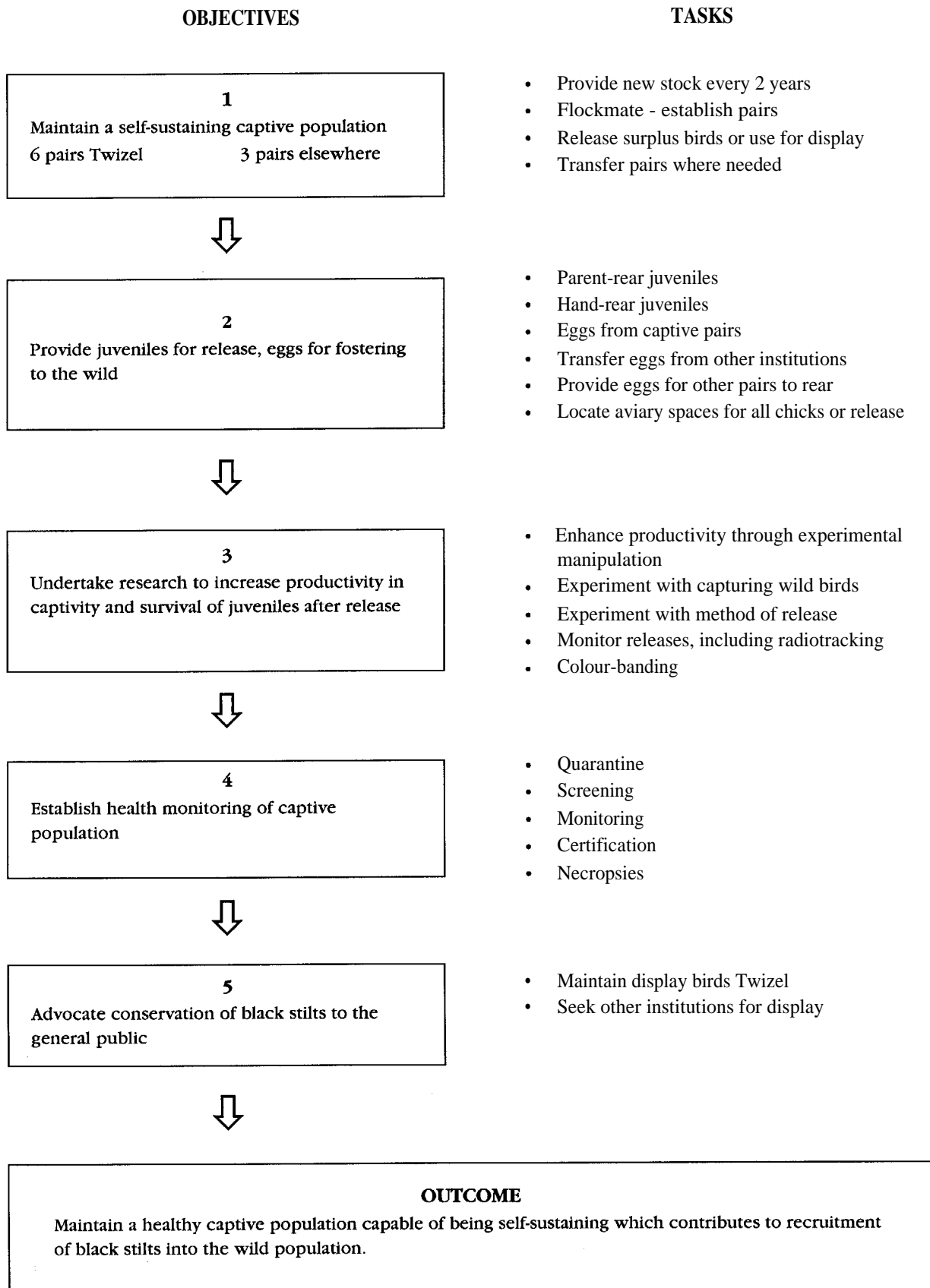


FIGURE 1. OBJECTIVES FOR CAPTIVE MANAGEMENT OF BLACK STILTS.

breeding stock will be taken as eggs or adults from the wild as required, as outlined in section 6.1. It may be necessary to retain an occasional captive-bred bird if it is unsuitable for release or is no longer represented in the founder captive population. As many individuals as possible from the present wild population must be genetically represented in captivity now to ensure against total loss of the wild population.

A base captive population of at least 18 breeding adults and such juveniles as are required for replacement stock must be maintained.

5.1.2 Establish captive holdings at other institutions

All black stilts held in captivity are part of the overall recovery programme for the species. Individual black stilts will be allocated between holders where the best possible use of that bird is recognised and in accordance with the principles of this plan. The fate of any resultant progeny (eggs or chicks) shall be decided by the black stilt project manager and captive breeding co-ordinator, in consultation with the institution.

The recovery group should make a final recommendation on all transfers for which there is a conflict between holders. New holders having satisfied the requirements outlined in "requirements for holders of black stilts" in the husbandry manual, will only receive stock with the agreement of the black stilt recovery group, the Conservator (Canterbury) and the Regional Manager (Southern). If the applicant is outside of the Canterbury conservancy, then any costs of inspection by this conservancy will have to be borne by the applicant. All permits issued to holders are to note that they are bound by the captive management plan.

The captive breeding co-ordinator will be responsible for co-ordinating all bird movements. New holders and concepts must be brought to the recovery group for a recommendation to the Department.

Pairs held outside of Twizel will have only their eggs transferred back to Twizel unless as specified in the exceptions noted in the transfer protocol of the husbandry manual. An effort will be made to ensure that these pairs rear chicks every year. The chicks may be pied stilts or 1-2 juvenile black stilts. Pied stilts will be placed at other captive facilities when space is available or released to the wild.

Black stilt juveniles will be reared and transferred to Twizel for release only when the conditions of the transfer protocol have been met. Transfer should not occur unless thorough screening takes place, they are quarantined for 45 days, they are from a health certified institution and their value to the release programme outweighs risks of disease spread. A similar evaluation needs to be made for birds which lose their mates. Unless they are critical to the breeding programme, they should not be transferred back to Twizel but be used for public display elsewhere.

A maximum of 3 (and preferably only 1-2) clutches of eggs will be taken from each pair in a season.

5.1.3 Capture wild black stilts, pair in captivity and either retain or release as pairs

Some black stilts repeatedly nest with pied stilts in the wild and are lost to the black stilt breeding population. These birds could be captured and paired with captive black stilts in a confined environment. This option for increasing captive stock has advantages in that the 3-year time delay from hatching wild eggs and rearing through to breeding age is eliminated. The pairs may be retained as breeders or released into the wild in family groups.

5.2 PROVIDE JUVENILES FOR RELEASE, AND EGGS FOR FOSTERING TO THE WILD

From 1992 to 1995, between 30 and 35 wild-laid eggs were hand-reared annually and most of the juveniles were released to the wild. In addition, up to 24 captive laid eggs were reared by captive breeding pairs and released annually. Hand rearing of wild-laid eggs will be replaced by captive-laid eggs once recommendations of the black stilt technical audit (Saunders et al. 1996) are implemented.

The juveniles will be reared with minimal human contact. The intervals between release "pulses" will be evaluated by the recovery group from year to year, depending on success of releases and status of the wild population. Should the lower Ohau River become saturated with captive-released birds, other release sites should be investigated, e.g., upper Ahuriri River, lower Cass River. The juveniles will be released at 9 months of age but trials of earlier releases (e.g., at 2 months old) should also be attempted. Adult releases are currently being trialled and should be re-evaluated after 5 years.

5.3 UNDERTAKE RESEARCH TO INCREASE PRODUCTIVITY AND SURVIVAL

Much of this research will be by management, experimenting with stimulation of breeding activity through social stimulation, provision of supplementary live food, and post flock-mating manipulations of individuals.

Experimental dosing of juveniles for tapeworms prior to release has been attempted in an effort to reduce post-release mortality. A parasitological study of captive stilts recently completed should also provide baseline information for management. Monitoring of experimental releases in alternative sites will also provide information on the success of different release strategies.

5.4 ESTABLISH HEALTH MONITORING OF THE CAPTIVE POPULATION

5.4.1 Instigate quarantine procedures at all facilities holding black stilt

An isolation facility has now been constructed at Twizel. The facility will be essential for future management of sick/injured stock and management of disease risk associated with any bird transfers that may need to be undertaken.

5.4.2 Conduct screening for potential pathogens

Before transfer of any black stilt between institutions, a cloacal or faecal swab will be taken to identify enteric organisms which may be moved between facilities. Two faecal samples (2 weeks apart) will also be taken to identify parasite ova. If positive, birds may be dosed for intestinal parasites prior to transfer. Enteric screens generally only look for *Salmonella*, *Yersinia*, *Campylobacter* and possibly *E. coli* and *Listeria*. They do not screen for viruses or other potential pathogens such as *Chlamydia* which require more elaborate and expensive tests.

Regular screening of captive and wild birds should also continue as a method of obtaining baseline information. A faecal or cloacal swab should be taken at least once a year from each captive bird, prior to release or while a bird is handled for other reasons. Cloacal or faecal swabs should also be taken from any wild birds that are handled. Every 6 months, 2 faecal samples (collected 2 weeks apart) should be taken from each captive bird and be tested for parasite ova.

5.4.3 Certify black stilt facilities to common husbandry and health standards

It is prohibitively expensive to screen for all potential pathogens carried by transferred birds. For this reason, it is more effective to certify all captive institutions in New Zealand to a common standard of management practise, as recently suggested by Milton Friend (US Fish and Wildlife Service, National Diseases Research Centre, Wisconsin) and contained within the draft Wildlife Health Management guidelines for the department. Certification of facilities is expected to be implemented by the year 2000.

Birds should be transferred only from high conservation value (for black stilts) to lower value facilities and not *vice versa*. Criteria for certification of all facilities housing black stilts should include all recommendations of Stockdale *et al.* (1993).

There are presently deficiencies at all facilities in regard to these recommendations: Chick rearing must be separated from food preparation areas and sick/injured birds isolated from incubation/rearing/feeding areas at all facilities. All dead birds of any species held at each institution will be sent for necropsy.

5.5 ADVOCATE CONSERVATION OF BLACK STILTS TO THE GENERAL PUBLIC

The population of captive black stilts is approximately 3 km from Twizel and 1 km from the main tourist route between Queenstown and Twizel.

With the aid of a Tourist and Publicity CAPS grant of \$112,000 plus interest, a viewing hide was placed on a terrace 50 m above a black stilt breeding aviary at Twizel. It contains a display room with information on the species and its management. An attached hide also allows a view of breeding birds and juveniles without disturbance. The hide can be approached without people being viewed by the birds. Guided tours are taken daily through the hide and it has proven a very important facility in promoting DoC's work with this species. A bird not suitable for the breeding programme is held in an adjacent display aviary.

Queenstown Kiwi and Birdlife Park and Wellington Zoo also presently play an important role in advocacy for the species, as their black stilts are on display to the public.

Once the immediate concerns over low wild population numbers have been alleviated, more birds could become available to other institutions for display. Hybrid black x pied stilts could be held in captivity to give new holders experience in their care and may also be used in public education. These institutions should be used to advocate the species through display boards or through display of hybrids.

6. Resource requirements

6.1 FUTURE BREEDING STOCK

To maximise the genetic diversity of the captive population, future breeding stock will come from eggs collected from the wild and reared at Twizel. They will be retained at this facility, flock-mated at 2 years (females) to 3 years (males) of age. Breeding pairs will either be retained at Twizel (up to a maximum of 6 pairs) or transferred to other institutions in February or March of the following summer. The juveniles will be separated from their parents and retained for release. Pairs surplus to Twizel requirements will be permanently maintained at other institutions. This change in management practise will reduce stress, injury and disease transfer risks and allow greater flexibility for mate choices.

An evaluation of stock should occur before juvenile release each year, and sufficient animals retained in captivity to replace those lost through natural attrition and to meet egg production demands. These should include unrelated individuals not already represented in the captive population where possible. Pairs will be formed from these birds and the surplus released into the wild or retained for display. Figure 2 outlines options for management of eggs and juveniles and is a general guide for future management of stock. Use of each individual in the programme may be modified according to fluctuations in mortality, availability of aviary spaces and successful pairs.

6.2 AVIARY SPACES

To maximise the contribution of the Twizel breeding facility to the wild population, 32 aviary spaces are required for; rearing of chicks (8), holding young stock and flock-mating (5), maintenance of 6 breeding pairs (6), pre-release holding of 8 clutches of juveniles (8), isolation/ quarantine (2) and public display (1). Two aviaries should be held empty for emergencies/weed control (2). Twizel presently has a total of 26 aviaries (Appendix 5). In accordance with the black stilt technical audit (Saunders *et al.* 1996), 6 new aviaries are required at Twizel.

The number of breeding pairs held should be re-evaluated after results from pulse releases are known. Birds which fail to pair successfully after one season should be transferred elsewhere for public display or released. Birds which lose a mate but have been successful breeders should be retained and re-paired when potential mates become available (subject to the transfer protocol).

Further institutions may become involved in public display of birds surplus to breeding requirements. Depending on availability of these individuals, 1 category 1 aviary will be required per year to a maximum of 5 institutions.

Once Twizel has 6 breeding pairs, Queenstown 1, and Peacock Springs 2, any surplus pairs resulting from flock-mating can be housed at other institutions.

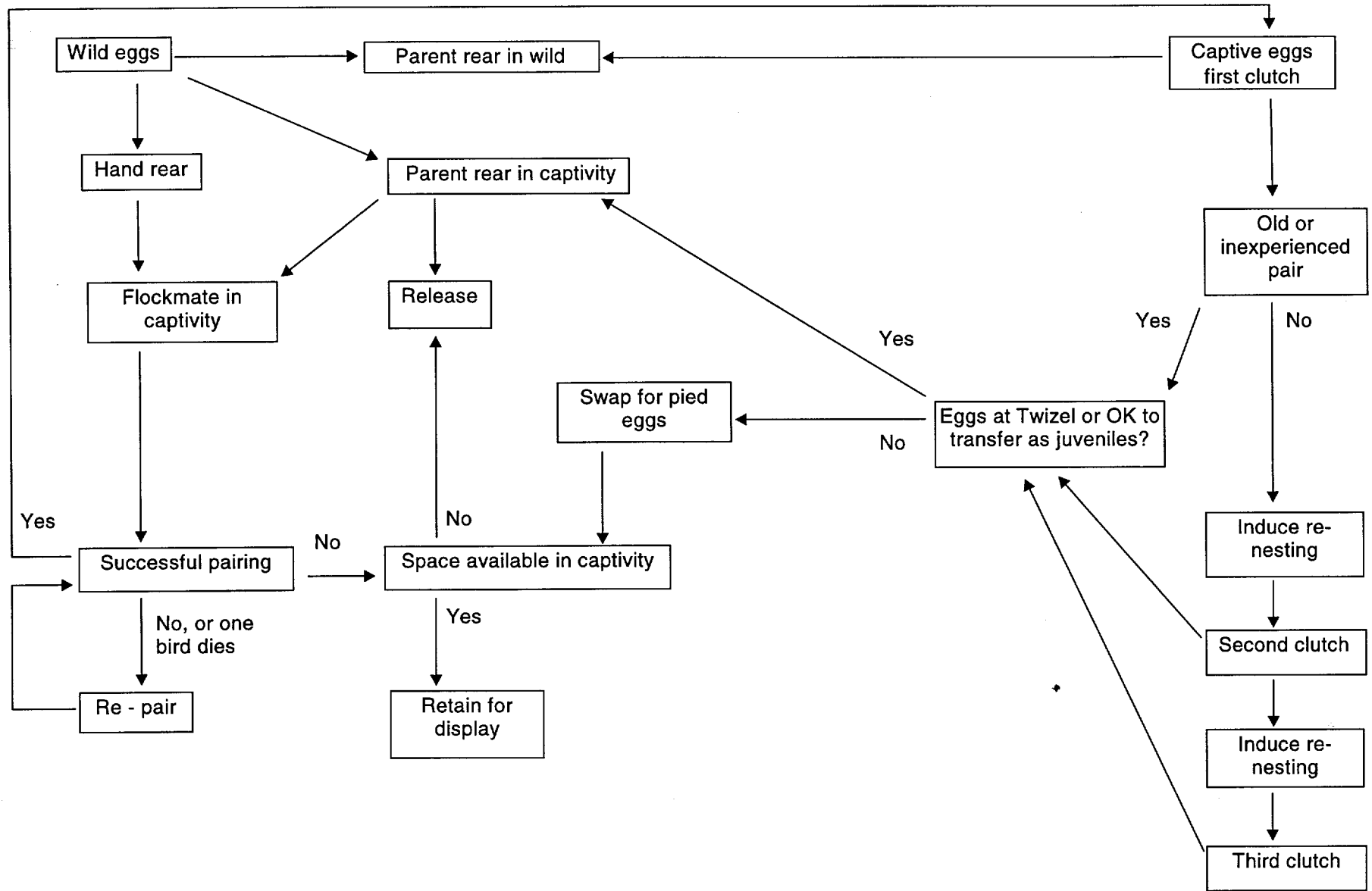


FIGURE 2. MANAGEMENT OF CAPTIVE STOCK.

The maximum number of aviaries needed will need to be re-evaluated after this plan has been operational for 5 years.

Queenstown Kiwi and Birdlife Park and Wellington Zoo both have aviaries suitable for housing a single pair. Peacock Springs in Christchurch has one aviary capable of housing 2 pairs.

7. Performance measures

The captive breeding programme will have reached its long-term (10+ years) management objectives:

- At least 15 parent-reared juveniles can be released when required with at least 75% survival 2 months after release and 40% survival to breeding age
- At least 30 juveniles can be hand-reared and released each year, with 75% survival to 2 months and 40% to breeding age
- The number of pairs producing fertile eggs is 6 at Twizel and at least 3 at other institutions
- The number of fertile eggs produced per pair per season is at least 3
- The percentage of chicks fledged after parent-rearing of fertile eggs is at least 80%
- The percentage mortality of hand-reared chicks 0 days to fledging is less than 10%
- The percentage mortality of juveniles (fledging to release) is less than 5%
- The percentage mortality of captive adults is less than 10% per annum
- The weight attained for 95% of hand-reared chicks is 140 g by 30 days of age
- The number of cases of disease and injury per annum less than 10%.

As a mid-term measure of the progress toward these goals (and while husbandry skills are still developing), after 5 years of the programme:

- At least 10 parent-reared juveniles can be released when required to ensure at least 60% survival 2 months after release and 30% survival to breeding
- At least 16 (25 when new aviaries are constructed) juveniles can be hand-reared and released each year, with 60% survival to 2 months and 30% survival to breeding
- The number of pairs producing fertile eggs is at least 4 at Twizel, and at least 2 at other institutions
- The number of fertile eggs produced per pair per season is at least 2
- The percentage of chicks fledged after parent-rearing of fertile eggs is at least 70%
- The percentage mortality of captive chicks 0 days to fledging is less than 15%
- The percentage mortality of captive juveniles (fledging to release) is less than 5%
- The percentage mortality of captive adults is less than 15% per annum
- The weight attained for 95% of hand-reared chicks is 140 g by 30 days of age
- The number of cases of disease and injury per annum less than 15%.

8. References

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Appendix 1

Black stilt juveniles released from captivity 1987-1997

YEAR OF RELEASE	NUMBER RELEASED	NUMBER ALIVE SUMMER 1997/98	BANDS
1987	3	1*	W/W-W/Y
1988	3	1	Y-R
1989	1	0	
1990	7	1	W/Bk-
1991	4+	0	
1992	5	0	
1993	33	5	
1994	30	3	
1995	22	4	
1996	25	11	
1997	25	14	
TOTAL	158	40	

* Old band -G lost and bird re-banded.

+ Black x node F hybrids.

Appendix 2

Holdings of black stilts (31 March 1998)

INSTITUTION	HOLDINGS	MALE. FEMALE. JUVENILE
Black stilt breeding facility, Twizel	8 breeding pairs 3 unpaired males 1 unpaired females 24 unknown sex	(11.9.24) = 44
Queenstown Kiwi and Birdlife Park	1 breeding pair	(1.1.0) = 2
Wellington Zoo	1 non-breeding pair	(1.1.0) = 2
		TOTAL: (13.11.24) = 48

Appendix 3

Age of captive black stilts (March 1998)

AGE (YEARS)	MALE	FEMALE	UNKNOWN
<1	0	0	24
1	0	1	0
2	1	2	0
3	4	4	0
4	3	0	0
5	0	1	0
6	0	1	0
8	1	2	0
12	2	0	0
14	1	0	0
18	1	0	0
TOTAL	13	11	24

The founder population of 8 in 1979 consisted of 3 males and 5 females. Only 1 of these birds is still alive (-Y, i.e., banded yellow on the right leg). This male and a 1979 sibling female produced the two 12 year old birds. A wild clutch was reared by the sibling pair in 1983 and 1 of these birds (a male) is still alive as a 14 year old.

In 1989, 10 eggs from the wild were hand-reared. Three of these birds are still alive.

Eleven juveniles reared in the 1994 season were retained for breeding stock, as were 4 from the 1995 season and 1 from the 1996 season. To date, 12 of these birds have survived.

Appendix 4

Origin of captive adult and sub-adult stock

YEAR	BAND	SEX	MATE	INSTITN.	PARENT
1979	-Y (2611)	M	GY-	TWL	Wild, unknown
1983	-G	M	WW-GBK	TWL	83/2B, unb `J' x unb `J', Ahuriri R.
1985	R-	M	RW-RBk	TWL	unb (2612) x -Y (2611)
1985	G-	M	BY-	TWL	unb (2612) x -Y (2611)
1989	GY-	F	-Y	TWL	89/10A, unb `J' x unb `J', Cass R.
1989	BY-	M	G-	TWL	-RY x M-WY x unb `J', Cass R. trio
1989	RY-	M	RY-GY	CHCH	RR-Y x unb `J', Tasman R.
1991	RG-G	F	RW-BkG*	WGTN	BM-BY x WG-R, lower Ahuriri R.
1992	WW-GBk	F	-G	TWL	RB-Y x WW-W, Ahuriri R.
1993	WBk-GG	M		TWL	Y-G x YR-WW, Glentanner
1993	WBk-RR	M	RY-YR	QTN	R- x GW-Y, Coal creek
1993	WBk-YG	M	RW-GBk	TWL	R- x GW-Y, Coal creek
1994	RW-BKG	M	RG-G*	WGTN	GR-G x unb `J', Ahuriri R.
1994	RW-GBK	F	WBk-YG	TWL	R- x WG-YR, Mt Gerald
1994	RY-WY	M	RY-BkBk	TWL	-B x GW-R, Mt Hay
1994	RY-WW	M	RY-BkR	CHCH	-B x GW-R, Mt Hay
1994	RW-RBk	F	R-	TWL	-B x GW-R, Mt Hay
1994	RY-GY	F	RY-	CHCH	YY-G x WW-YG or -B x GW-R
1994	RY-YR	F	WBk-RR	QTN	YY-G x WW-YG or -B x GW-R
1994	RY-GW	M		TWL	-G, WW-GBk captive pair
1995	RY-BkG	M		TWL	WW-RW x BY-Y Ben Omar
1995	RY-BkR	F	RY-WW	CHCH	WW-RW x BY-Y Ben Omar
1995	RY-BkBk	F	RY-WY	TWL	WW-RW x BY-Y Ben Omar
1996	BkY-WR	F		TWL	RG-GG x Y-, Godley R.

* Housed together as a pair but no breeding has occurred.

Appendix 5

Current aviaries for black stilts

AVIARY	TYPE	AS AT MAY 1997
	Category 1 (public viewing)	
Black Stilt Breeding Facility, Twizel		1
Wellington Zoo, Wellington		1
	Category 2 (holding)	
Black Stilt Breeding Facility, Twizel		9
Peacock Springs, Christchurch		1
	Category 3 (breeding)	
Black Stilt Breeding Facility, Twizel		6
Queenstown Kiwi and Birdlife Park		1
Peacock Springs, Christchurch		2
	Category 4 (special purpose)	
Black Stilt Breeding Facility, Twizel		10