Return to previous file: TSOP05.pdf

TWIZEL FENCES

LOCATION: Twizel.

TARGET ANIMALS: Cats, mustelids, rats.

BRIEF DESCRIPTION: 1.3 m high electrified post and chain-link netting fence.

CONTRIBUTOR: Dave Murray.

We have two types of fence in operation, but I will only describe the more recent design, which is lower, cheaper to build, easier to maintain and just as effective as the original design.

Our fences are designed to keep out rats, mustelids (ferrets and stoats) and feral cats. With this range of predators our fences have to be effective against animals which will climb to gain entry and animals which can jump. Because rabbits are common in this area, the fence netting also has to go underground to prevent burrowing.

1. Design and construction

Wooden fence posts are driven at approximately 5-m intervals, about 1.3 m height above the ground. High-tensile 8- or 12-gauge wire is strained tight near the top of the posts, and a second wire is placed 900 mm lower. 13-mm wire netting is attached to these wires. The netting we use is 900 mm wide, and we join two rolls together, which allows for 500 mm to be dug into the ground. The netting is clipped to the high-tensile wires with Gerrard Rings.

Two sets of electric wires are attached to the outside of the fence on fibreglass insulating rods, using spring wire clips which can be moved on the rods to give the desired spacing. The lower set is placed just below the netting to join and has two hot wires. The inside wire must be close enough to the netting to prevent predators climbing up. The top rod is set at an angle to prevent cats jumping onto the top of the fence and into the enclosure.

Two hot wires are used, with an earth wire between them. Posts which are too high must be cut off so that the top is below the level of the highest wire.

We have used both mains powered and battery powered (solar panel charged) electric fence controllers. Mains powered is more effective and reliable. The electric fence controller should have fast pulse setting, as the rate usually used for domestic stock is too slow for small, fast-moving animals.

2. Problems

- A constant high level of maintenance is necessary to keep the fence in effective working conditions.
- Vegetation growth can short out the lower hot wires.
- Wind-blown debris can short out wires.
- In time, wires will stretch and the netting will sag, resulting in shorts.
- Access gates are weak points.
- Inflowing and outflowing streams are problem areas. Concrete walls with pipes placed below water level are the best option.
- Occasional failures are inevitable, even with the best maintained fence; periodic trapping or poisoning is recommended.

NATIONAL PROVIDENT FUND FENCE &
PLATEAU CREEK ENCLOSURE FENCE - MT BRUCE

LOCATION: National Wildlife Centre, Mt Bruce.

TARGET ANIMALS: Mustelids, possums, rats.

BRIEF DESCRIPTION: 1910 mm chain link; 1800 mm electrified chain link.

CONTRIBUTOR: Shaun O'Connor.

No birds that we know of have been directly lost to predators in these enclosures. Although the fence hasn't excluded all potential predators, it has excluded most and kept predator numbers reasonably low inside enclosures. The hardest animals to keep out are probably possums. We have caught stoats outside enclosures, but never inside.

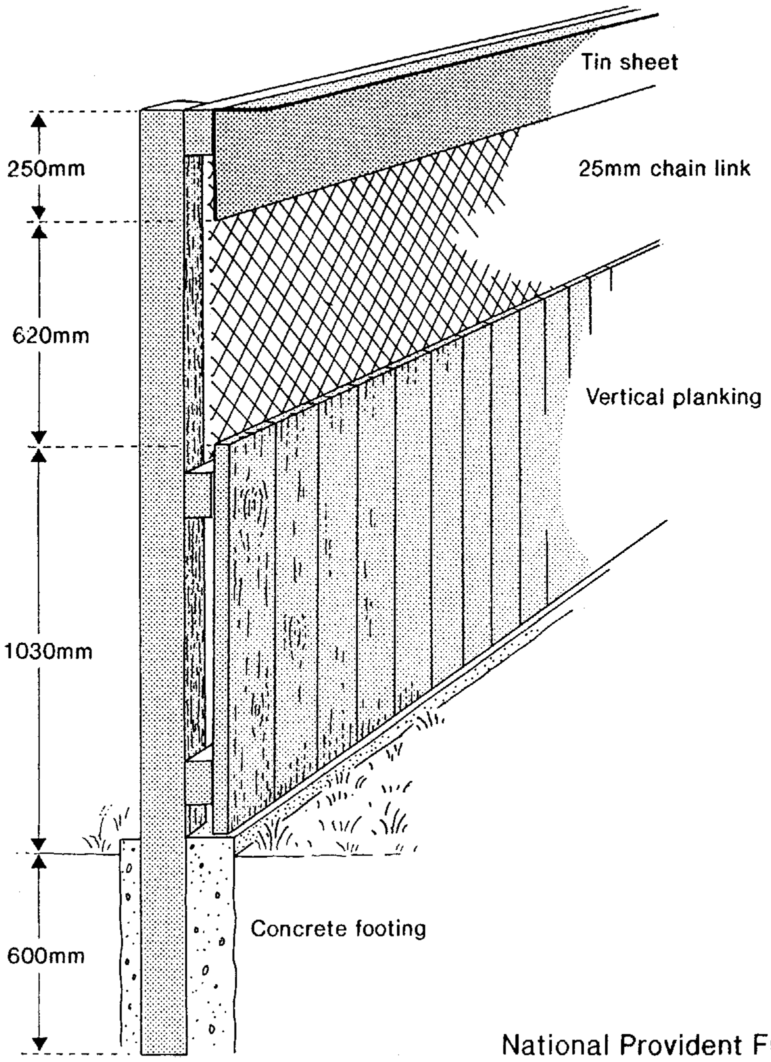
Some points to note:

National Provident Fund Fence: Current trapping programme using Timms, Fenn, rat snap, cage traps and poison bait stations has revealed (about three weeks into the programme)

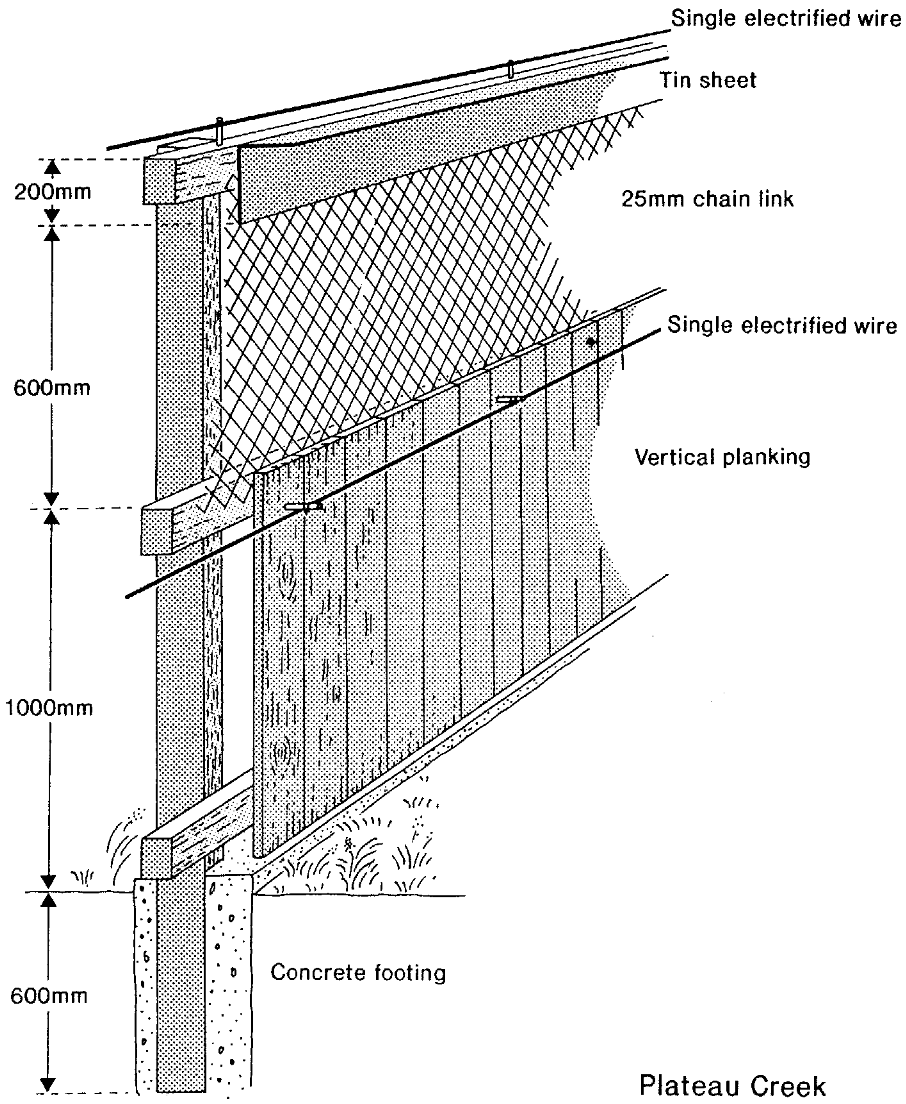
- Numerous possums: selected vegetation heavily browsed. Trapped. Also taking poison baits.
- Rats: one trapped, one poisoned (dead near station).
- Sighting of stoat (pre-trapping programme): `fairly reliable' public sighting and accurate description. Possible access through damaged door flap - now repaired.
- Surrounding vegetation well pruned before the programme.
- Possible access by swimmers (rats/stoat/etc.) around grate of water outflow, but unlikely.
- Possums undoubtedly springboarding off sign to top of fence. Suspect they are also climbing straight up and over.

Plateau Creek Enclosure: Electric fencing; overhanging vegetation not particularly well maintained over the last few years. There is another internal cage block within the Plateau Creek Enclosure, which is fully enclosed and well maintained for shore plover, and integrity of the perimeter fence has been allowed to slip. Possum sign is apparent within the enclosure, and one rat was caught in a trapping programme in mid 1993. Gnaw sticks (candles) are currently in place and are showing signs of gnawing, probably by rats.

Both fences are about to be upgraded with galvanised steel sheet up to 1100 mm above ground level and with a more effective electrical system.



National Provident Fund



Plateau Creek

EXPERIMENTAL RAT FENCE

LOCATION: Kaitaia.

TARGET ANIMALS: Rats.

BRIEF DESCRIPTION: Three electric wires supported on battens and fibre-glass rods. Bottom wire 25 mm above the ground, 25 mm between wires. Total fence height: 75 mm.

CONTRIBUTOR: Don McKenzie.

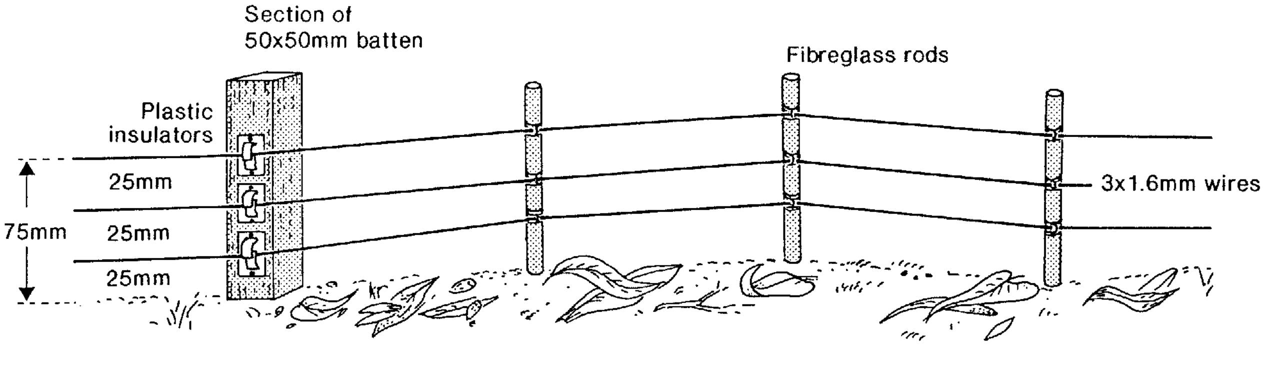
Three 16-gauge galvanised wires approximately 2.5-3 cm apart are supported above the ground using sections of tanalised fence battens and fibreglass rods. Plastic insulators are fastened to the battens and the wire tensioned by hand. Where practical, all fence supports are positioned on the inside of the wire to prevent rodents from climbing up and into the fenced area. Where the wooden battens are on the outside of the wire, and on outside corners, extra `hot' wires are placed around the outside of the batten.

A portable solar reflector and 12-volt battery provides the power to the fence unit (6000 volts?), and an isolating switch on the fence allows it to be switched on and off without switching the whole solar unit off.

The bottom wire on the fence is supported just above ground level, and the whole line of the fence was cleared beforehand to obtain a smooth contour for the bottom wire to follow. In addition, overhanging vegetation and soil humps were cleared away to avoid leaving natural ramps into the fenced area.

This fence is based on a design used on a marron farm in Northland. Advice on its design and construction came from a former contract fencer from Northland, Ben Hickey. Initial trials at the Sullivans' Kiwi House and Glowworm Grotto near Kaitaia were promising and definitely reduced the invasion of rats into a habitat.

The total cost for 125 in of fence plus electrifying component was about $2000 in 1991.



Kaitaia Experimental Rat Fence

TUATARA FENCE

LOCATION: Stephens Island.

TARGET ANIMAL: Tuatara.

BRIEF DESCRIPTION: 900 mm high post and netting fence, with flashing along the top.

CONTRIBUTOR: Derek Brown.

Height of fence c. 900 mm.

Posts every 1.8 m (approx) in windy sites, but spaced farther out in sheltered forest locations, etc. Additional battens in between, or horizontal braces behind flashing and between posts can add strength if required.

Materials required:

- tanalised round posts for corners
- tanalised half-rounds
- galvanised flashing
- bird netting
- lacing wire, galvanised flathead nails, netting staples, rivets

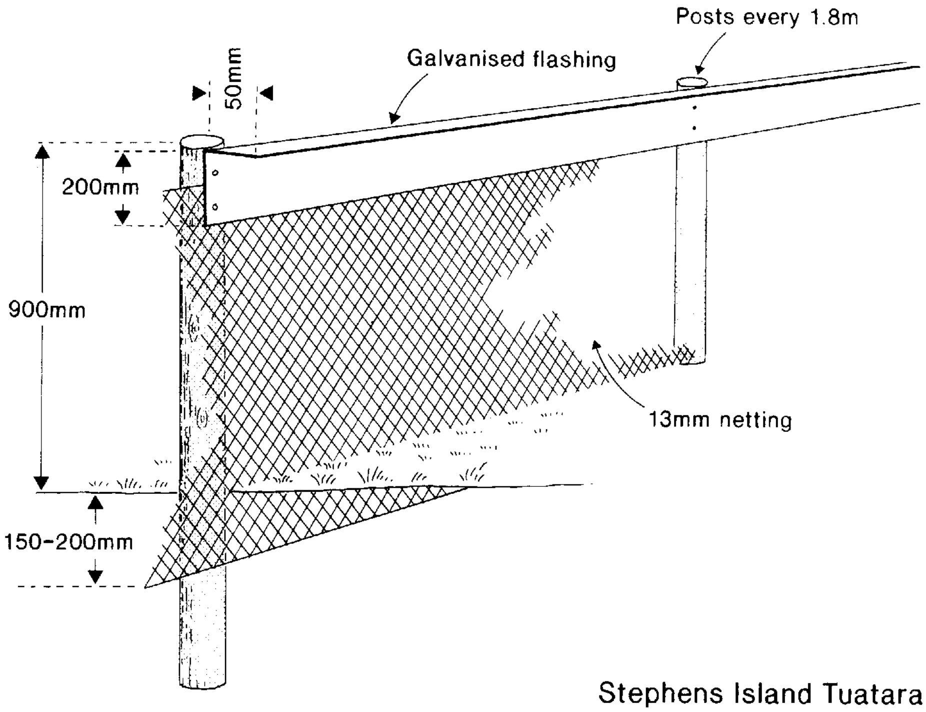
Tuatara can climb up the netting but cannot get any purchase on the flashing and do not have the agility to climb out over the overhang. The fence allows small vertebrates (frogs, lizards) in and out, and doesn't restrict invertebrate fauna movements in and out. It doesn't significantly alter wind flows as a solid fence would, so there is little effect on the microclimate.

This fence has stood up well to the strong winds on Stephens Island. The occasional stress crack can be patched with pieces of flashing riveted over the crack.

Costs:

- netting: $260 per 100 m
- flashing: $520 per 100 m
- posts: c. 50, at $8 each = $400/ 100 m
- miscellaneous: est. $50/ 100 m

Total: $1330 per 100 m



Stephens Island Tuatara Fence

FENCE LOCATION: (Proposed) Karori Wildlife Sanctuary, Wellington.

TARGET ANIMALS: Cats, dogs, mustelids, rodents, goats, deer, possums, people.

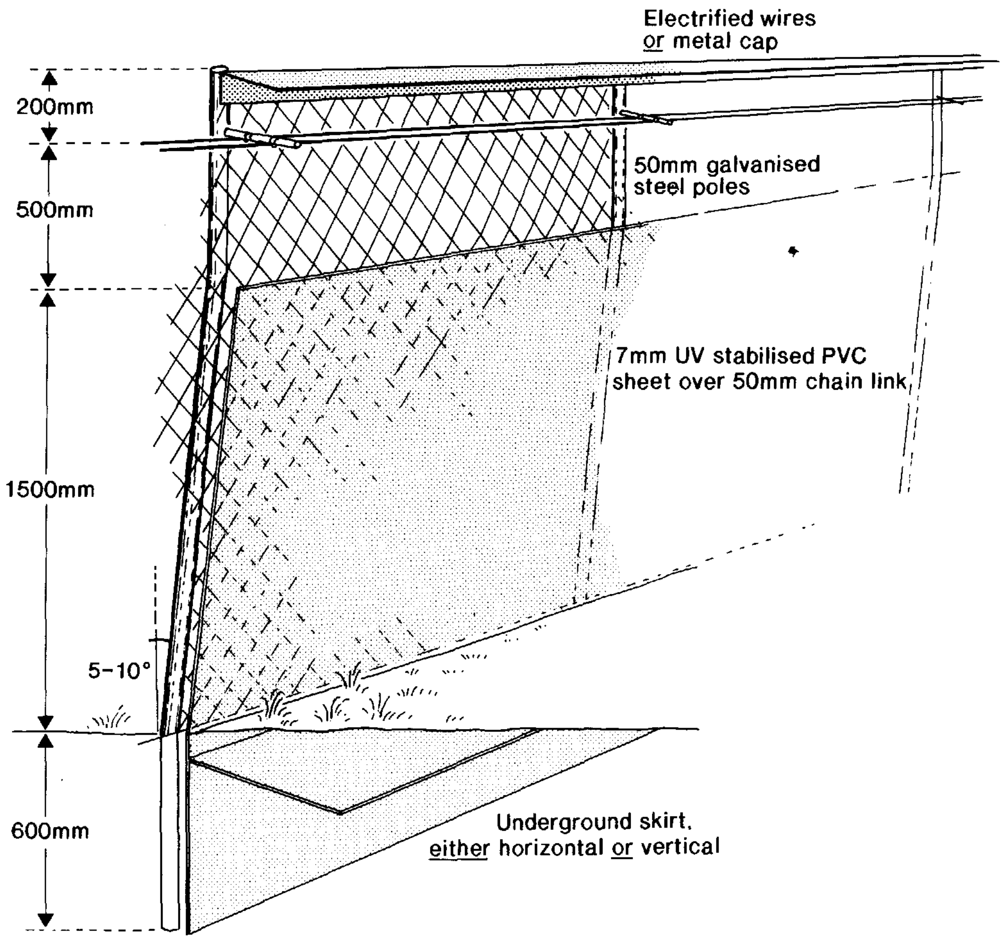
BRIEF DESCRIPTION: (Proposed) 2.2 m high barrier constructed of galvanised steel pipe with chain link netting, PVC sheet and either sheet metal cap or an electric wire top. A 5-10° `lean' is incorporated into the design.

CONTRIBUTOR: Karori Reserve Wildlife Sanctuary Steering Committee (Chair: Jim Lynch).

The illustrated fence design, which is well into the design and test stage of its development, is a result of a vision to provide a wildlife sanctuary on the mainland, only minutes from downtown Wellington, at the old Karori Reservoir Catchment Reserve.

After meetings and workshops, researchers, engineers and DoC staff have finally agreed on a design that seems to offer the possibility of controlling the access of all introduced pests to the area.

The design is being rigorously tested in a purpose-built facility against as many of the target species as possible. Indications so far are that it will do the job. It is, however, still in its raw form. The final design may be a little different from that illustrated here, to cater for any weaknesses that may be exposed in the tests.



Proposed Karori Sanctuary Fence

FEASIBILITY STUDY

LOCATION: (Proposed) Karori Wildlife Sanctuary, Wellington

TARGET ANIMALS: Cats, dogs, mustelids, rodents, goats, deer, possums, people.

BRIEF DESCRIPTION: See preceding contribution.

CONTRIBUTOR: Rod Hitchmough.

1. Introduction

A sanctuary free of introduced mammals been proposed for the Karori Reservoir Catchment near Wellington (Lynch 1993a). A feasibility study examining this proposal is now nearing completion. The sanctuary proposal is dependent on the construction of a fence which will normally exclude all pest mammal species from the reserve, and reduce the frequency of mammal re-colonisations of the reserve to rare events which can be dealt with according to contingency plans before significant populations can establish.

My project aimed to quantify jumping and scaling abilities of the small mammal species considered most likely to be able to breach fences; and to test both individual components and three complete fence designs generated by a workshop held early in the project (Lynch 1993b). Fence options referred to below are those presented by Lynch (1993b), and with minor modifications, and different numbering by Beca Carter Hollings & Ferner Ltd (1993). Option 1 of Lynch (1993b), renumbered type 3 by Beca et al. (1993), was simplified; the "fouled launch zone" has not been tested, as its maintenance is considered impractical on the scale of the proposed fence (c. 10 km), and the three materials in the original design have been replaced by a single PVC sheet at a 10' angle towards the "attack" side of the fence. Option 2 of Lynch (1993b) became type 1 of Beca et al. (1993); the solid material changed from sheet metal to PVC, and the height of the solid base section increased from 1 m to 1.2 m. Option 3 of Lynch (1993b) became type 2 of Beca et al. (1993); the only change to this design was the substitution of sheet PVC for sheet metal. Details of materials and costings for the three designs were presented by Beca et al. (1993).

This is a progress report; stoats and feral cats are still to be tested, and cats in particular may require changes to the proposed fence designs.

2. Methods

Ethical approval for the experiments was obtained from the Victoria University of Wellington Animal Ethics Committee.

A purpose-built facility was constructed for fence testing. All animals except mice (see below) were tested in this facility. Two pens, each 2.3 x 7.2 m and 2.4 m high, allowed two animals or two groups of animals to be tested simultaneously. Each pen had solid walls and a wire-netting ceiling, access doors at each end, with raised sills to reduce ease of animal escape, an observation window near the centre of one long wall, and an external window on the other long wall. Fence components to be tested were mounted across the centre of the pen.

Initially, and between tests, test animals were allowed free access to the whole pen by either mounting fence components which they could cross easily, or providing ramps to enable them to cross the fence. Water was always available to the animals. Nest boxes were provided on one side of the fence and the animals were fed on the other side, so quickly became accustomed to moving back and forth across the fence.

During tests, progressively more challenging fence components were mounted, until lack of interference with the food, or failure to return to the nest box after feeding, showed that the animals had not crossed the fence overnight. Animals were never without access to food for more than 24 hours. When maximum abilities had been established, animals were watched at night to determine how they were crossing the fence.

Initially, some animals were encouraged to cross fences by the presence of an observer in the pen. However, left to their own devices overnight, they managed to cross fences that seemed well beyond their capabilities when they were being pressured by the presence of an observer, so the latter practice was soon discontinued, which meant that only one observation could be collected each night.

3. Results

Possums: The maximum jumping height of the possums I have tested against a vertical barrier without overhangs is about 1.2 metres (Table 1). The animals normally jumped from very close to the base of the wall, held onto the top with their front paws, and pulled themselves up. At least one possum leared to use the side wall of the pen as a springboard, which enabled him to scale much higher barriers than the others (up to 1.5 m), and negated the effects of overhangs.

Overhangs were also tested above mesh panels beyond jumping height; the design in fence type 2 of Beca et al. (1993) (option 3 of Lynch 1993b) stopped all possums. This design was also tested without the 250 mm horizontal section; two possums did get past this, but only by using the wooden bracket which was supporting the end of the barrier against the side wall. Unfortunately there was no time to modify this support and test this design further, but the indications were that the overhang would be successful. The small overhang shown at 1200 mm in types 1 and 2 of Beca et al. (1993) (options 2 and 3 of Lynch 1993b), tested at the top of the fence, stopped two of the three animals, but the smaller male got past it after two nights. The top section of fence type 1 of Beca et al. (1993) (option 2 of Lynch 1993) was not effective; the most active possum simply jumped from the mesh panel to the top, although the other two possums did not get past it. A chain-link mesh overhang was also tested but was very rigid, and the possums had no difficulty in walking upside down to climb over it; it was completely ineffective, and I do not believe that an effective overhang could be made with this material.

Horizontal jumping tests were not completely conclusive, as the fence used subsequently proved to be scalable by at least one possum. They could definitely jump at least 1.5 m horizontally, but it appeared that none could jump very much more than this.

After a few attempts possums became unwilling to try to cross fence designs that had previously stopped them. However, their performance improved dramatically with experience of various fence designs, and after time to settle down in captivity.

Ship rats: Ship rats were tested against vertical metal barriers with and without a 150 mm overhang, as for possums, and against a 1.2 m PVC barrier leaning at 10° towards the attack side of the fence (Table 1). Their maximum scaling height was about 70 cm. The effect of the overhang was negated by their scaling the side wall.

One rat repeatedly jumped from the top of the window frame to cross the fence when being chased for removal from the pen, although not otherwise. This was a horizontal distance of 1.2 m, with a drop of 750 mm.

The rats were also tested for their ability to get through mesh samples supplied by Graeme Loh (DoC, Otago). When left overnight, they failed to get through 20 x 13 mm gauge chicken mesh and 25 mm welded square mesh.

Mice: Wild house mice were tested in a c. 1 m x 3 m metal-framed glass aquarium. The ends of the aquarium were covered in case the mice could climb out at the corners, but the central portions of the long sides had no cover, and the mice did not escape. the mice were tested against a 600 mm high vertical PVC barrier; they showed seemingly endless ability to get through tiny gaps at the base of this, and chewed through silicone sealer when the gaps were blocked with this, but could not get over this barrier. They failed to make any impact on the PVC, despite the fact that they were squeezing under it through very narrow gaps that they would be expected to try to enlarge. When they gnawed away the silicone sealant the PVC was again untouched. They were also left overnight in a large plastic bucket filled with sawdust to 30 cm below the rim, and did not escape from this.

The mice (both females, weighing 10.8 and 11.9 g) were also tested against the mesh samples supplied by Graeme Loh. They easily got through the 25 mm and 18 mm welded square mesh, but couldn't get through the 12 mm welded square mesh or the 20 x 13 mm chicken mesh (however, smaller juveniles certainly would).

Ferrets: Three ferrets (an adult female, a subadult female, and a subadult male) were tested against simple vertical panels only. They readily crossed 360 mm, but could not get anywhere near the top of a 560 mm panel.

Stoat: One female stoat was tested against simple vertical panels. It first crossed 1000 mm of vertical steel sheet but was unable to scale 1100.

Table 1: Jumping performances of possums and rats against solid barriers.

	POSSUMS			RATS
Height (mm)	Grey; 1 2220 g	Grey; 1 1942 g	Brown/ black; 1 2926 g	White-bellied, grey; 2 154 & 152 g
300				+
420				+
560				+
800	+	+	+	-
1100	+	+	+-	
1260	+ *	-	-	
1400	+ *	-		
1500	+-			
1660	-			
With 150 mm/ 45° overhang				
300				+
420				+
580				+
650				+
700				+
800	+	+		+ (1 only)
1100	+-	-		
With 5° overhang				
1200	+	+	+	
With 10° overhang				
1200	+ *	+-	-	-

+ = successful; - = unsuccessful; +- = failed while under observation but succeeded by morning, or failed one night and succeeded the next; * = seen to jump from or scale side wall of pen rather than the fence itself. The two ship rats tested gave identical results except at 800 mm with overhang.

Weasel: A single female weasel was tested against simple vertical panels. It failed to get past both a 560 mm panel over two nights, and a 420 mm panel which was presented for one night.

4. Conclusions

For the animals tested so far, fence types 2 and 3 as presented by Beca et al. (1993) (options 1 and 3 of Lynch 1993b) would be effective provided there are no sharp corners in the fence to allow the animals to jump from one side to the top.

Option 2 of Lynch (1993) would not be effective against all possums, as they could jump the 1 m from the ground to the mesh, and some could jump from the mesh to the top of the fence. With the base section increased in height to 1.2 m as in type 1 of Beca et al. (1993), possums would probably be excluded from reaching the mesh panel, but there is still little margin for safety in this design, and it is the least favoured of the three.

Stoats and cats have not yet been tested. The top sections of the various designs are specifically intended to exclude cats, so should be regarded as untested at this stage.

The PVC was exposed to two rats for 23 days, two mice for 25 days, and three possums for 10 days, and showed no sign of damage at all; it appears to be an ideal fence material. No animals successfully climbed it; even along welded joins.

5. Acknowledgements

The Karori Reservoir Wildlife Sanctuary Steering Committee commissioned and financed these tests. I am grateful to Ken Wright, Lyndon Perryman, and Ron van Mierlo for obtaining animals for the tests, John Fraser and Kerry Muller for permission to trap rodents at the Karori Reservoir and the Wellington Zoo, to the Victoria University of Wellington Animal Facility for the loan of equipment, to Frank Gavin for finishing construction of the pens and building test fence components, David Jackman for providing lighting, and to Vaughan Bell, Jason Frogatt, Christa Krey, Lindsay Milne, Andrea Thom, and Tertia Thurley for voluntary assistance in the course of this work.

6. References

Lynch, J. 1993a: A native wildlife sanctuary for Wellington city - initial discussion paper. Prepared by James Lynch, Chairman, Wellington Branch, Royal Forest and Bird Protection Society, 37 p.

Lynch, J. 1993b: Report on the workshop to develop the predator/browser exclusion options for the Karori Reservoir Wildlife Sanctuary. Feasibility study - project 2, Karori Reservoir Wildlife Sanctuary Steering Committee 20 p.

Beca Carter Hollings & Ferner Ltd. 1993: Feasibility report on boundary fence and access road, Karori Reserve Native Wildlife Sanctuary. Report prepared for Karori Reservoir Wildlife Sanctuary Steering Committee, 11 p.

PERIMETER AND ENCLOSURE FENCES

LOCATION: National Wildlife Research Center, Taif, Saudi Arabia.

TARGET ANIMALS: Various - cats, foxes, dogs, large browsers, ostriches.

BRIEF DESCRIPTION: Five different designs - see below.

CONTRIBUTORS: Yolanda van Heezik, Alain Delhomme, and Stephane Ostrowski.

There are five types of fences used at the NWRC for two main purposes: (1) to exclude predators, and (2) to facilitate management of captive birds and mammals.

1. **The perimeter** of the NWRC is fenced with chainlink overlaid with chicken mesh, and topped with three electrified wires (Fig. 1). It effectively excludes domestic stock and predators such as feral cats *(Felis catus),* dogs *(Canis familiaris)* and foxes *(Vulpes vulpes*). The size of the mesh (40 x 40 x 4 mm) is small enough to prevent entry by all potentially dangerous animals (cats, foxes, large lizards). Total fence height is 3.5 m, with 1 m sunk into the ground. One upright has been placed every 3 m. This type of fencing is expensive, with costs of materials and installation at about 100 SR [$50NZ] per linear metre.

2. **The construction of the houbara (Chlamydotis undulata) breeding pens** is designed more to safely contain the houbara, which are nervous fragile birds, than to prevent other small animals from entering. Medium-sized reptiles are excluded from breeding pens containing eggs and chicks by attaching chicken mesh to chainlink fencing, and sinking it 50 cm into the ground. In larger non-breeding pens chicken mesh is used against ringlock fencing up to a height of about 2 m, but this does not exclude reptiles. Tildernet (shade-cloth) is attached to all pens as a wind break. The main problem is that the chicken mesh rusts after a few years of use, even if it is galvanised. This is also expensive, at 50 SR per square metre.

However, the primary cause of death of houbara in the pens is from physical trauma, indicating that the construction of the cages is inappropriate for their needs. There are too many solid objects: low concrete walls separating pens, exposed uprights, and the fencing material is too rigid. Ideally cages for birds such as these should be made of tildernet (shadecloth) slung from uprights positioned outside the pens, and tensioned to yield on impact. This design would be more flexible in setting up observational studies, and probably also assist in the control of pathological disease introduced into the breeding flock by contact with other species of birds (e.g., avian poxvirus from sparrows *Passer domesticus),* insects and possibly some rodents.

3. Fences enclosing large animals (oryx *Oryx leucoryx,* onagers *Equus hemionus,* ostriches *Struthio camelus,* ibex *Capra ibex nubiana)* are constructed from ringlock 13-

190-30 (Fig. 2). This has been effective, except that nodes are sometimes broken by the animals (blows by horns or legs). Ringlock fences of 1.90 m height are used for all animals except ibex: for this species a height of 2.8 m is required to prevent them from jumping over the fence. One upright is placed every 6 m, although in the case of ostriches it has been necessary to place a pipe set in concrete every 3 m.

However, ringlock fencing is not ideal for enclosing ostriches, as the mesh size is large enough that they can insert their feet through the mesh. Ostriches running alongside the fence (e.g. after darting) may become entangled. Ideally ostriches should be provided with a visual barrier of small mesh size, such as, chainlink. A further disadvantage of ringlock fencing is that its low visibility means that several species of wild birds fly into it, especially at night, resulting in broken wings. Cost is 30 SR per linear metre.

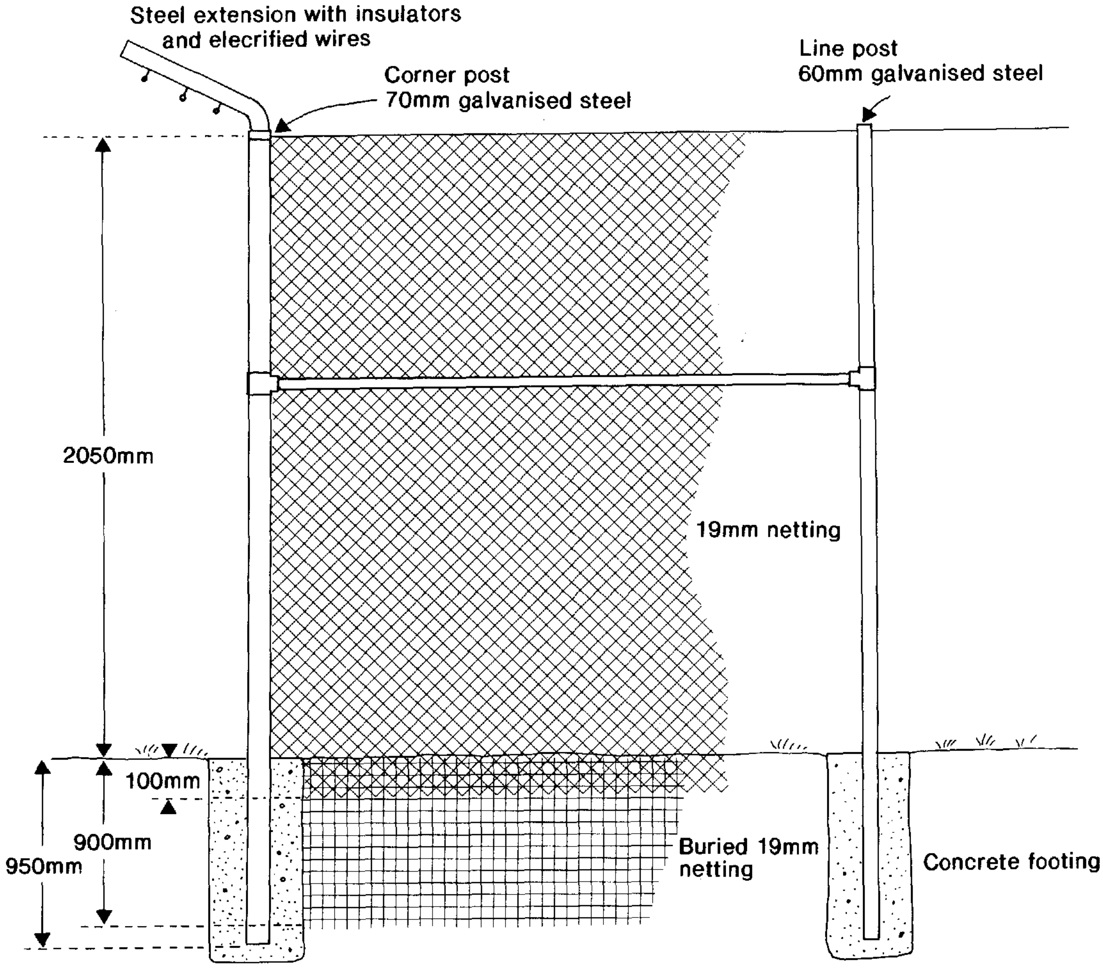
It also should be mentioned that while ringlock fencing has been successful in safely containing large ungulates at the NWRC, it is not always safe for humans. Oryx and ibex can thrust their horns through the fence, injuring staff standing close to the fence. In fact oryx regularly sharpen their horns on the fencing.

Ringlock fencing is suitable for containing animals in large enclosures, but not in small areas, such as capture pens.

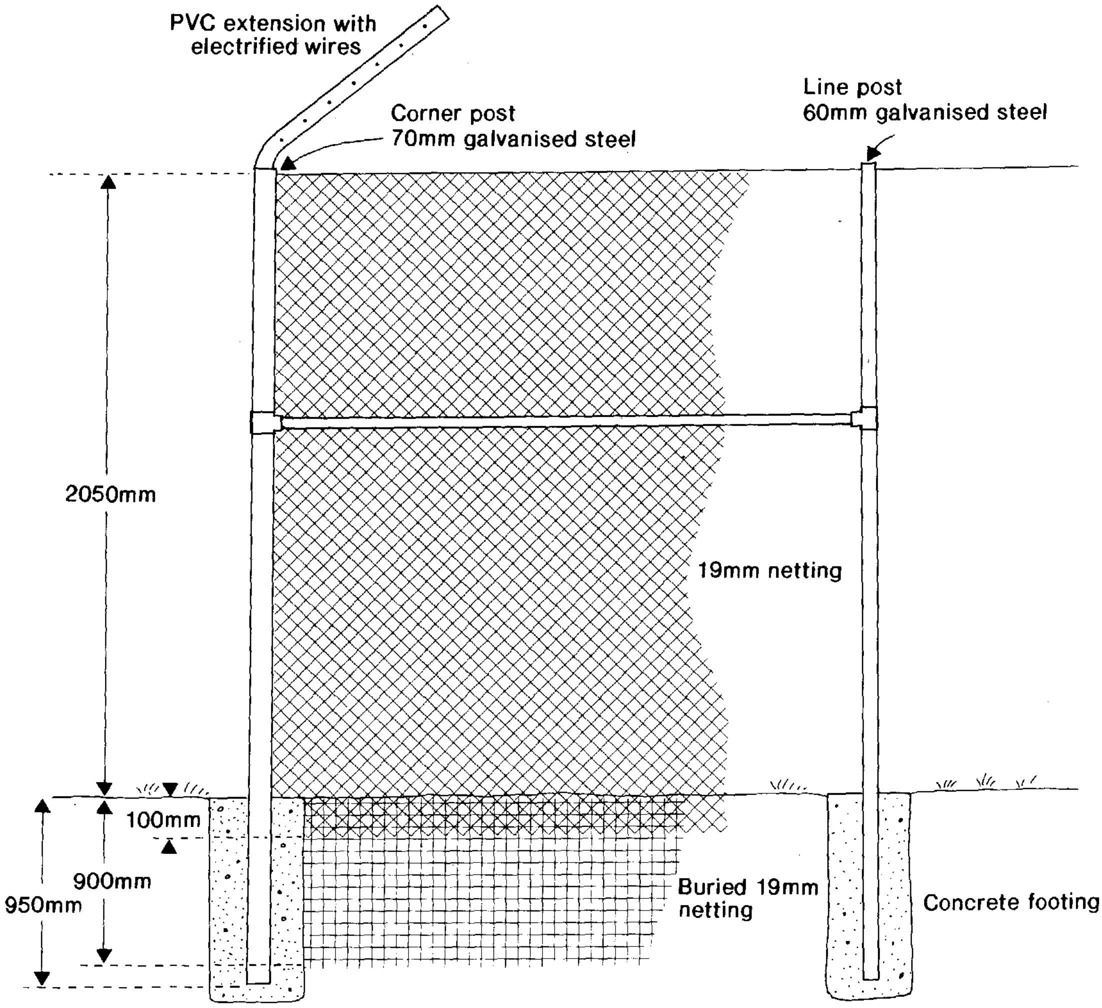
4. Capture pens, in some cases, are constructed from chainlink (mesh size 50 x 50 x 4 mm). However, this type of fencing is not suitable for ibex or gazelle *(Gazella* spp.), which may try to jump the fence and become entangled. Moreover, ibex are occasionally able to escape by making a hole with their horns. For these species it is more appropriate to use weldmesh of 3 cm.

5. Hamadryas baboons *Hamadryas papio* are enclosed within a chainlink fence 2 m high, with 12 electrified wires strung along the top, but angled towards the interior (Fig. 3). This discourages baboons from trying to scale the fence during vigorous social interactions. The external fence has been made with P.V.C. tubing, and is still in good condition after six years of use.

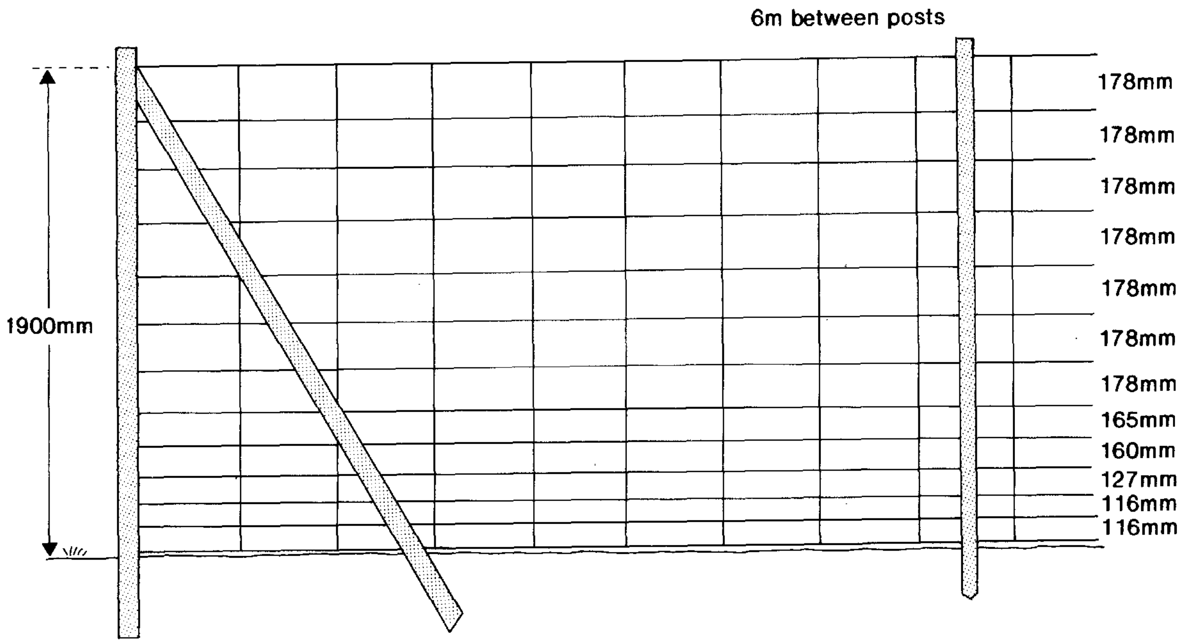
The success in enclosing baboons at the NWRC may be largely attributed to their lack of desire to escape. Experience in other countries has shown that electrified wires are often not adequate to hold some species of primates, and that a more ideal cage design would incorporate smooth walls that the animals are unable to scale.



Perimeter Fence



Baboon Enclosure



Ringlock Fence

CONTRIBUTORS ADDRESSES & PHONE NUMBERS
(March 1994)

Willie Able
Picton Field Centre
Department of Conservation
PO Box 161
Picton
(03) 573-7582

Mike Aviss
Threatened Species Unit
Department of Conservation
PO Box 10-420
Wellington
(04) 471-3236

Derek Brown
Havelock Field Centre
Department of Conservation
13 Mahakipawa Road
Havelock
(03) 574-2019

Bill Cash
Picton Field Centre
Department of Conservation
PO Box 161
Picton
(03) 573-7582

Mike Hawes
Nelson/Marlborough Conservancy
Department of Conservation
Private Bag 5
Nelson
(03) 546-9335

Rod Hitchmough
School of Biological Sciences
Victoria University
PO Box 600
Wellington
(04) 495-5207
(04) 389-8953 (h)

Simon Kelton
Waikato Conservancy
Department of Conservation
Private Bag 3072
Hamilton
(07) 838-3363

Jim Lynch
Royal Forest & Bird Protection Society
Karori Reserve Wildlife Sanctuary Steering Committee
PO Box 17-054
Wellington
(04) 476-7795

Don McKenzie
Northland Conservancy
Department of Conservation
PO Box 842
Whangarei
(09) 438-0299

Bruce McKinlay
Otago Conservancy
Department of Conservation
PO Box 5244
Dunedin
(03) 477-0677

Dave Murray
Twizel Field Centre
Department of Conservation
Private Bag
Twizel
(03) 435-0802

Shaun O'Connor
National Wildlife Centre
Mt Bruce
RD 1
Masterton
(06) 375-8004

Cam Speedy
Taupo/Tongariro Conservancy
Department of Conservation
Private Bag
Turangi
(07) 386-8607

Yolande van Heezik
National Wildlife Center
PO Box 1086
Taif, SAUDI ARABIA
Fax: xx + 745-5176

Ron von Mierlo
Burwood Bush Breeding Unit
RD 2
Te Amu
(03) 248-6193