PEER REVIEW

The Editor,

I read with interest your article "Problems with Colour Bands?" published in the September 1997 edition of your newsletter.

Shortly I will be writing a review of colour banding difficulties we have experienced in the New Zealand Shore Plover recovery programme. I thought perhaps that your readers might appreciate a quick summary of the problems and a look at the solutions we intend to trial.

The Shore Plover *Thinornis novaeseelandiae* is one of the world's rarest wader species. It survives in one self-sustaining population on Rangatira, a large island reserve in the Chathams group, 800 km east of New Zealand. This last wild population numbers around 140 individuals. The birds forage and breed in a harsh volcanic habitat which is far removed from the sandy, muddy estuaries they preferred in their original New Zealand-wide distribution.

The Rangatira population has been metal and colour-banded since 1970. The colour bands fitted originally were 0.5 mm-thickness PVC Darvic spiral bands, or "wrap-arounds" as we call them here. The ends of these bands did not overlap, so that for at least half a band's circumference, only one thickness of plastic was exposed to the elements. By the late 1970s, the outer end of each band was being glued with araldite.

In the 1980s, serious numbers of Shore Plover were being observed as hobblers or amputees. As many of these as possible were recaptured for removal of colour bands. The bands were found to be worn down to razor-sharpness on the bottom edge, and the plastic itself had become dangerously brittle. Bands, including those glued with araldite, had slipped down over the feet and toes, causing inflammation, infection and loss of limbs. We have no idea how many birds died as a result of the injuries to feet and tarsi.

In the 1992/93 summer, almost the entire population of birds was recaptured and rebanded. Stainless steel bands were fitted to tibia, so that the metal did not share space with the plastic bands, accelerating their wear-and-tear.

In the absence of demonstrated safe alternatives, but needing urgently to preserve a capacity to monitor, the NZSP Recovery Group elected to replace the old colours with split bands. These were 0.5 mm-thickness Darvic PVC bands supplied by A. C. Hughes Ltd in the UK, the only suppliers we could find.

The choice to fit split bands did not meet the requirements for greater thickness to mitigate against wear, nor had they been trialled on an analogous species (for the simple reason that no such species inhabited a comparably brutal environment). Ultimately, the decision was taken to fit the bands as an interim measure only, to win time to develop safer alternatives, and in the belief that the bands would fall off harmlessly if they failed. The ends of the bands were sealed closed with the tip of a butane-powered soldering iron.

Unfortunately, the choice of bands proved to be a fatal one. Within a year — and despite evidence that the bands would indeed pull off in some cases, as birds foraged in weedy tidal pools — the first indication appeared that the new bands were crippling birds. On inspection, the PVC was found to have become extremely brittle, in just two years, so that when a band was dragged down off the tarsus, it lacked the flexibility to pass over the foot. We found also that colours were fading alarmingly fast, a problem we brought to the attention of A. C. Hughes Ltd.

News of the injuries dismayed recovery group members. Renewed inquiries after colour band alternatives were made internationally but all respondents assured us that they were experiencing few if any problems, largely because their waders were living in soft, muddy habitats. We were disquieted to find that we were at the bleeding edge with this problem, literally and figuratively.

Since 1993, the Recovery Group has looked long and hard for safe, durable colour bands. It has discarded anodised alloy or powder-coated stainless steel options, both of which proved to be insufficiently durable when tested on Chatham Oystercatchers living in sandy habitats.

Instead, the group has pinned its hopes on a spiral band fashioned locally by the method reported by the Victorian Wader Study Group. Using 0.5 mm-thickness Darvic PVC supplied by A. C. Hughes Ltd, the bands have two full turns, making a minimum thickness of 1.0 mm.

The *most significant distinction* between the bands applied by the VWSG and the proposed replacement bands for Shore Plovers is the method of sealing the bands closed.

Although cyanoacrylate glue has been used successfully to glue the ends of bands on New Zealand Dotterels and other waders, and is apparently used without problem by Victorian banders, we have decided to seal our bands closed with a Darvic PVC *solvent.*

Trials with standard PVC solvents convinced us that these were quite inadequate for the task. In fact, any solvent available commercially for PVC drainage ware barely affected the surface of Darvic PVC. Instead, we have found tetra hydrofuran (THF) to be a very promising, though volatile, alternative.

There are some indications, however, that THF may not be the perfect solution (pun intended). First, for reasons related perhaps to the chemical combination of pigment and PVC, it is not as effective on some colours as it is on others. Second, it requires very careful application with a (glass!) syringe to avoid drenching the band. Saturation results in temporary softening of the plastic, which may affect durability. Third, the bands take up to 15 minutes to dry which means that the newly banded birds must be held longer to ensure that their bands are not deformed after release.

On the other hand, THF is more easily applied than cyanoacrylate glue, and because it does not bond instantly, it can be applied to all of the band's overlapping surfaces instead of just the ends.

So far, we have bench-tested THF. We have considered attempts to increase its viscosity. Shortly, a measurable field trial will be conducted on a small sample of Shore Plovers on Rangatira. We intend to publish the results of this trial, regardless of its outcomes.

We are interested, of course, to know if any of your members have been down this road ahead of us. Any feedback or comment would be appreciated.

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