'Fingerprinting' the blue duck

GORDON ELL, BUSHFILMS

Blue duck populations may not always be limited to the territory where they are born, according to Dr Tania King of Massey University. DNA analysis of birds in the central North Island reveals some movement, between some rivers with too many birds, and those with spare habitat.

Just as in human paternity cases, the process of DNA 'fingerprinting' can reveal the truth about the ancestry of animals. Research at Massey University reveals that DNA can tell a lot about what New Zealand's wildlife species are doing.

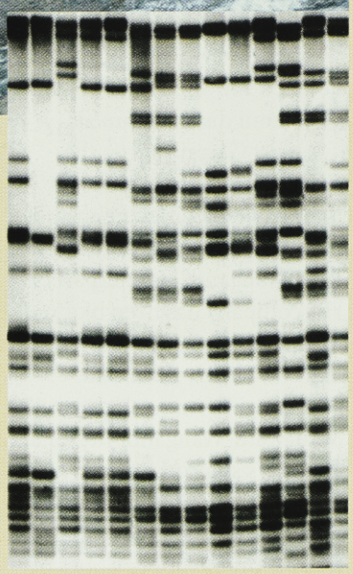
With the secretive blue duck, for example, DNA analysis can reveal which duck has mated with another, and which ducks are related to one another. This provides information from which to deduce how far individuals are moving and where they are going.

A recently completed genetic study has tried to answer some basic questions about the movement patterns of blue duck. Such questions and many others can be answered (to some degree) by looking at patterns of variation in DNA.

The blue duck is a native species which lives on fast flowing rivers. They are territorial and it is generally believed that fledglings set up new territories not far from their parents. Previous genetic studies have shown that blue ducks tend not to move between North and South islands or between river systems, but scientists don't know to what extent they are moving between geographically closer rivers.

The primary issue was to establish where new recruits to a population were coming from. Do some birds move between populations? Are some rivers acting as 'sources' and others as 'sinks'? 'Source' populations are those whose production is higher than the river can accommodate, causing birds to move further afield in search of a territory. 'Sinks' on the other hand, are unable to produce enough new fledglings to keep the population going and rely on input from elsewhere. Populations can be at either extreme of these two situations, or somewhere in between.

Individual blue duck from four different rivers in the central North Island — Manganuiateao, Whakapapa, Whanganui and Tongariro — were genetically examined in a joint effort between Massey University, ECNZ which provided funding, and the Department of Conservation which coordinated blood sampling.



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DNA 'fingerprints' of New Zealand blue ducks. Such molecular genetic analysis of blood samples can establish parentage and relationships among birds as surely as it does between humans.

Perhaps the most interesting discovery was that not all populations are behaving in the same way. Populations from the Manganuiateao, Whakapapa and Whanganui rivers (all a continuation of the same water system) were found to be genetically very similar. If two individuals from within a river were compared, their DNA revealed levels of similarity not much lower than that expected between parents and their offspring, or between brothers and sisters. From this it seems that the blue duck populations on the Whakapapa, Whanganui and Manganuiateao rivers are more likely to be self-sustaining. If there is movement into or out of those rivers, it is not happening over large distances.

The Tongariro population of blue duck is a different story, however. Individuals from this population are much more genetically variable. This suggests that the Tongariro river is likely to have recruited birds from further afield than do the Whakapapa, Whanganui and Manganuiateao rivers.

This finding is important for the management of blue duck populations. It was previously thought that there was little migration among river populations, and that birds fledged on a particular stretch of water would not move far from it. The Tongariro result, however, clearly shows that this is not the case for all populations.

The Tongariro population is probably acting as a 'sink', relying on birds from elsewhere to sustain its population. While scientists cannot say how productive the Tongariro population is, it seems likely that because birds are moving onto the Tongariro river from further afield, such 'immigrants' may well be an important factor in the long-term viability of the population. For this reason, authorities must be aware that the success of one river population could depend upon the success of a number of other populations, and that no single population can be considered in isolation.

A wide range of molecular genetic techniques are being used in the Molecular Ecology laboratory at Massey University to study many aspects of bird populations. These include genetic sexing of both living and extinct birds (using for example, kakapo eggs and museum skins, or moa bones), and the mating patterns among takahe and hihi (stitchbird). — *Tania King*