

IS THE NEW ZEALAND GREY DUCK

EXTINCT?

AS HUNTERS, WE FREQUENTLY HARVEST AN ASSORTMENT OF BIRDS ON THE SPECTRUM from what appear to be pure-looking mallards to pure greys and everything in between – most commonly identified through variations in head and wing plumage as well as other factors like bill and leg colour. Many of us take a keen interest in the level of hybridisation with the glorious 'green' of a Southland drake being much the envy of, say, a Nelson-based hunter, where drab and mottled head colouration is the norm rather than the exception. Yet a Southern hunting enthusiast may just be a little envious of their fellow compadres to the north and west, where 'grey-type' ducks exist in greater numbers – a bird that, as many appreciate, cuts a striking form – though in a more subtle way.

SEARCHING FOR THE PĀRERA

But does the pure native grey duck actually exist? Many think not. To investigate further, noted United States duck geneticist Philip Lavretsky from the University of Texas El Paso (UTEP) brought with him a team of three others that included UTEP graduate student Joshua Brown, Irene Englis from the University of California-Davis, and field technician Madison Mayfield, and spent two weeks in New Zealand to answer the question: is the New Zealand grey duck (pāpera) extinct?

First, Phil partnered with Jenn Sheppard from the University of Auckland to get blood samples from the North Island during banding operations. Next, Phil and his team were in New Zealand during the 2018 game bird season to carry out the research and were on hand to collect samples of greylards from all over

the country, most of them supplied by hunters via local Fish & Game offices.

Pāpera have been listed in conservation status as 'nationally critical', which has been mainly attributed to interbreeding with mallards. Yet little genetic-based research has been completed – rather presumptions based on phenotype. Thus, the key purpose of Phil's research was to genetically identify pure New Zealand grey ducks (if they existed) and to present a landscape scale genetic assessment to establish the amount of hybridisation occurring within grey/mallard ducks, then to look for environmental and landscape factors that may be acting as a barrier to hybridisation and gene flow. The end result has an aim to develop a regional map of where we have true pure grey ducks, pure mallards, and where hybridisation exists.

Finally, Phil hopes to use this

information to develop a key which Fish & Game NZ (and you, the hunter) can use in the future to determine whether birds have pure genetic lines, or if not, the level of hybridisation in the bird.

Phil and his team carried out DNA sequencing of 584 greylard samples, (239 from the North Island and 345 from the South Island), and made genetic comparisons by further analysing 56 North American wild mallards and 49 game-farm mallards.

GOOD NEWS

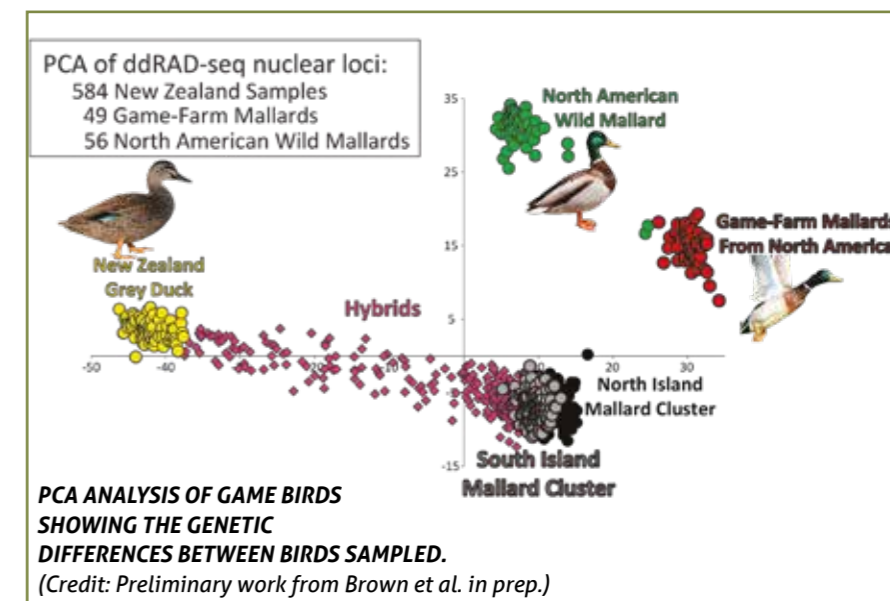
These first results from the research are in and, contrary to popular belief, the pure New Zealand grey duck still exists in New Zealand with the regional stronghold area, not surprisingly, being the West Coast of the South Island.

This is news that is unashamedly welcomed, as Fish & Game (as successor to the former Acclimatisation Societies) have come under increasing fire for the 'near extinction' of the endemic pāpera due to historical liberations of around 25,000 North American game-farm mallards between 1940 and 1960 which have extensively hybridised with the pāpera.

There's no denying that extensive hybridisation has taken place, and it'll be of no surprise to the reader that the majority of samples (53%) were found to comprise of hybrid swarm backcrosses (mallard dominated hybrids); however, genetically pure grey ducks (8%) were found across the landscape in both the North and South islands. Though this figure may appear to some to be relatively low, many will be heartened by this revelation, because, as mentioned, it was the belief of most that the true pāpera was from a bygone era.

PREFERRED HABITAT

Clearly, the Southern Alps form a geographical barrier to gene flow, which is what the study concludes as the reason why the West Coast is a grey-duck stronghold. Added to this, the pāpera's preferred native-forest-cover landscape, bush ponds and mountain habitat are areas mallards, by nature, have little interest in venturing into, being more of an agricultural bird. Though the northern half of the West Coast has been identified as a key regional habitat of



the pāpera, there are sure to be other important stronghold areas outside of the sampled areas of this study – places like Northland and Fiordland, for example.

On the other hand, while it's clear why pure greys persist in the South Island, there was little pattern to the distribution of pure greys in the North Island, and perhaps if more samples were obtained encompassing a greater area, particularly in Northland and around the higher altitudes of the central area, a pattern may be more apparent.

GENETIC DIVERSITY

Principle component analysis (PCA) is an analysis that looks at the difference at each gene we analyse and, in the case, groups individual samples based on similarity. So individuals that are most similar group

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ABOVE: PURE LOOKING GREYS ARE OFTEN FOUND IN SOME OF NEW ZEALAND'S FINEST LANDSCAPES. Photo: Geoff Irvine

TOP: FIELD TECHNICIAN, MADISON MAYFIELD, PREPARES A BIRD FOR DNA ANALYSIS.

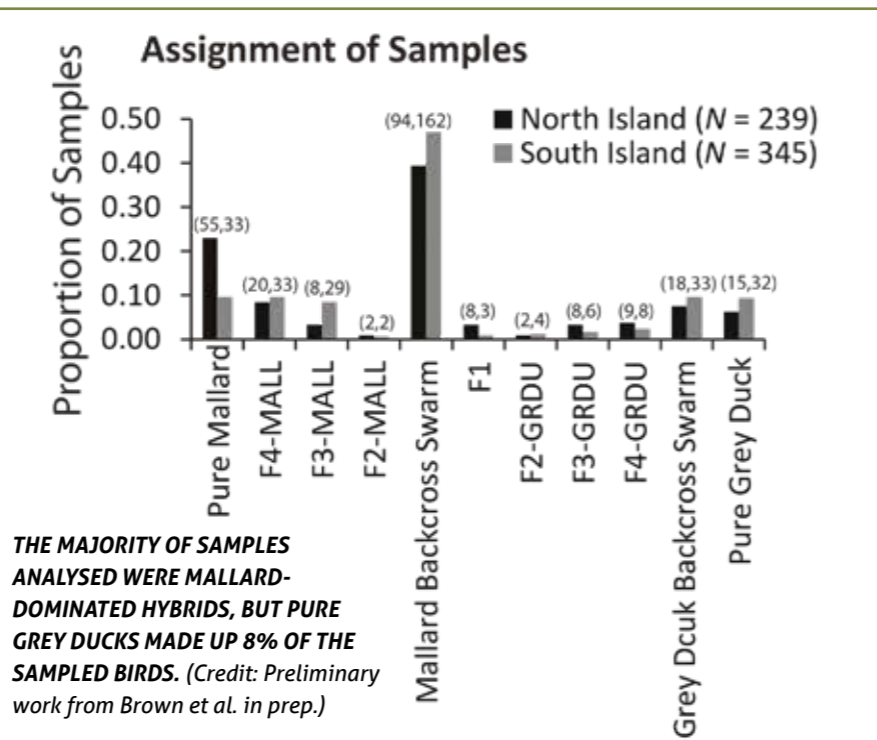
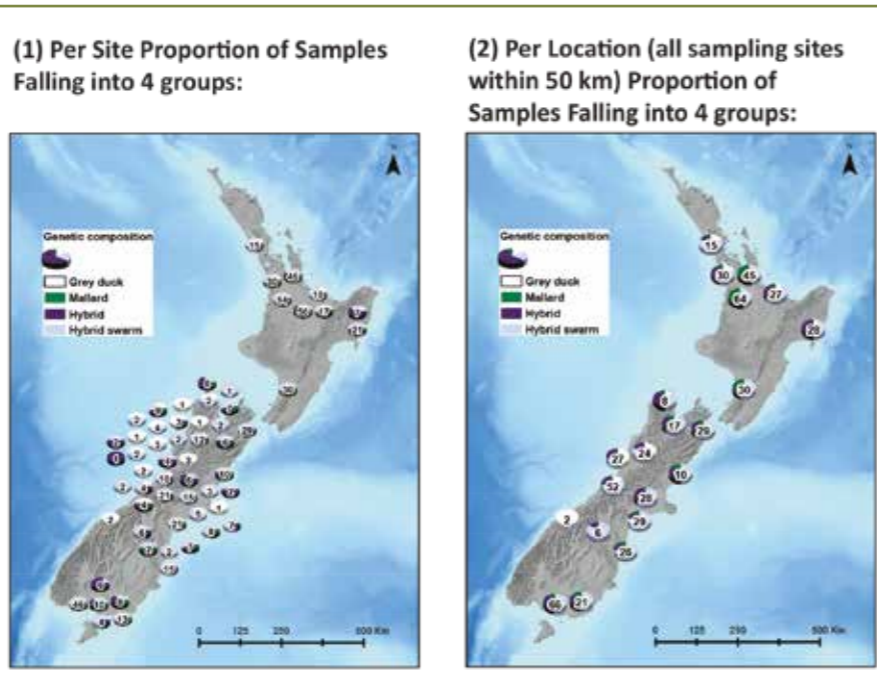
RIGHT: PURE GREY DUCKS WERE FOUND PREDOMINANTLY ON THE WEST COAST OF THE SOUTH ISLAND. (Credit: Preliminary work from Brown et al. in prep.)

together. Distance between groups gives an idea of just how different genetically those groups are. Any individual that has genetics from two different groups (hybrids) will fall in between. As the PCA results graph suggests, pure pāpera and New Zealand mallards are clearly distinguishable from one another and from North American wild and game-farm mallards with the majority of hybrid backcrossing occurring in the mallard population. And, as would be predicted, New Zealand mallards are more closely related to game-farm mallards due to historical liberations. There's also clear genetic variation between North and South Island mallards which suggests there's little transfer between the islands, though this does take place occasionally as revealed by North Island banding programmes.

To break the results down further, of the samples obtained, approximately 6% of the North Island birds and 9% of birds from the South Island were pure greys; yet it must be noted that there are some geographical 'holes' in the area where bird samples were obtained with no birds originating from large areas of Otago, Fiordland, Central North Island, and Northland. Not surprisingly, pure mallards are also fairly light on the ground at around 15% of the sample, and most pure-looking mallards have at least some grey genetic influence. The study also revealed that hybrid birds are breeding with other hybrids or mallards, but not so much pure grey ducks, which is news that will be well received.

WHERE TO NEXT?

Final genetic analyses will be concluded by UTEP PhD student Joshua Brown, including additional work to look at overall genetic diversity between islands, and between pure pāpera, hybrids and mallards, as well as building habitat maps based on genetic diversity. Additionally, the study will now analyse over 500 crops from all birds obtained to look at dietary differences between mallards, hybrids and pāpera. Then, if some funding is found, a 'field key' could be developed for Kiwi hunters and Fish & Game staff. The field key will allow rapid field-based assessment of a harvested bird's genetic purity, which



THE MAJORITY OF SAMPLES ANALYSED WERE MALLARD-DOMINATED HYBRIDS, BUT PURE GREY DUCKS MADE UP 8% OF THE SAMPLED BIRDS. (Credit: Preliminary work from Brown et al. in prep.)

is made simple using a scoring system based on key physical attributes of the bird such as the head, rump, bill and legs. This way, it may be possible that 'citizen science' will lead us to an even better understanding of geographical distribution of pure pāpera, pure mallards, and hybrid birds.

The immediate priority, though, is to undertake habitat modelling for pāpera and mallards to identify where they're most prolific and what attributes typically define their preferred habitat areas. If we're to conserve the pure

lines of the native pāpera, then the identification and protection of these areas is a critical step forward. After all, the continued hybridisation and genetic swamping is still a major threat to the pure pāpera lines. That way, future conservation efforts can be made by Fish & Game (and land managers) to protect the key areas we currently have, design habitat that will be tailored to benefit pāpera, and potentially adjust game-harvest regulations to ensure the pure genetics of this important endemic bird are forever conserved.

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