FIELD NOTE

The Case of the Pink Dolphin

Trent University's wildlife DNA lab equips conservationists with new forensic tools

BY DAVID HAYES

TWELVE YEARS AGO, John Wang, who had just received his Ph.D. in biology, identified a tiny pod of fewer than 100 pink dolphins living in the shallow waters along Taiwan's heavily industrialized west coast. The habitat for this rare Indo-Pacific humpback population stretches 100 kilometres down the coast, but the Taiwan pod spends most of its time in the warm waters two kilometres offshore, where boat traffic and pollutants have risen significantly over the past decade or two. Petrochemical and manufacturing projects, as well as shoreline reclamation, are encroaching on the dolphins' habitat, so much so that Wang, along with a number of international conservation groups, believes they could suffer the same fate as the Baiji (or Yangtze River) dolphin; in 2006, searches failed to turn up a single specimen.

Still, Taiwan has been slow to protect the pink dolphins. Wang knew that a more persuasive argument could be made if he could prove that the Taiwan pod was genetically distinct from the Indo-Pacific humpbacks found off the coast of Hong Kong and in other Chinese waters. So he began documenting the dolphins' skin pigmentation and sending the data halfway around the world to Ontario cottage

country, where his mentor, Brad White, runs Trent University's state-of-the-art Wildlife Forensic DNA Laboratory just outside Peterborough.

White's team spent six months analyzing the results, and the data confirmed Wang's hypothesis: the isolated Taiwan population was a genetically distinct species. In 2008, on the strength of White's research, the International Union for Conservation of Nature designated the pink dolphins of the Eastern Taiwan Strait as critically endangered on its Red List of Threatened Species.

Genetic research to support conservation efforts began a couple of decades ago, and as techniques have become more sophisticated and the results more precise its value has grown. White and his lab team are global pioneers in the field. In the early '90s, while he was still teaching at McMaster University in Hamilton, Ontario, the molecular biologist produced the first evidence of a wildlife-related crime to be accepted into a North American court. "Our work brings to conservation the scientific rigour of DNA forensics," he says. "DNA is the first and most important information technology."

Already at the forefront of its field, the laboratory received a major boost in 2006 from the Ontario Ministry of Natural Resources, which regularly collaborates with the facility to investigate provincial wildlife and aquatic research and conservation projects. Partnering with several other agencies, MNR contributed to $20 million for advanced equipment and other resources.

White's interests are many, and the lab's projects reflect this: his team has also used genetic fingerprinting to track the decline of the North Atlantic right whale and the spread of rabies in raccoons. It continues to produce DNA evidence for court cases involving poaching (deer, moose, wild birds); the illegal harvesting of bear claws and gall bladders (in South Korea, China, and Japan, the claws are considered a delicacy and the bile forms the basis of medicines); and determining whether bone or hair used in jewellery and works of art came from endangered species. Convictions have resulted in fines ranging from a few hundred dollars to $40,000, as well as prison terms. As White says, "We're advocates acting on behalf of justice for wildlife."

Another recent project involves studying purebred Saanen dairy goats, a fertile animal that routinely produces twins, triplets, and even quadruplets. White wants to isolate the genes responsible for higher milk production and birth rates, in the hope that the discovery will benefit farmers in developing countries. "Instead of paying Air Canada a quarter million dollars to ship goats by the herd," he says, "hundreds of embryos can be sent in liquid nitrogen for the price of a seat."

Throughout our planet's history, changes in DNA have been driven by evolution, a gradual process that can no longer keep pace with the changes to habitat wrought by industrial development, climate change, and other forces. Genetic profiling provides some of the strongest evidence international conservation agencies can marshal to put pressure on countries that fail to protect native species.

When the lab's research helped to establish the pink dolphins' critically endangered status, it also helped secure funding for other agencies to study the mammals, and drummed up support for local Taiwanese environmental groups, such as the Wild at Heart Legal Defense Association and the FormosaCetus Research and Conservation Group, which finally managed to block a huge petrochemical project in 2011. "The Taiwanese government is sensitive to international attention," says White. "DNA profiling is a tool to provide information, but that data can be used to produce change."