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## **A Vexing, Virulent Varmint**

■ The nonnative brushtail possum is devouring New Zealand's forests, threatening rare species and spreading disease.

By RICHARD C. PADDOCK, Times Staff Writer

TAUPO, New Zealand--This nation's biggest enemy weighs 8 pounds, stands 6 inches high and carries its young in a pouch. It is furry and cute--and has the power to devastate ancient forests.

New Zealand's nemesis is the brushtail possum, an intruder from Australia introduced here in 1837. Threatened by human encroachment in its native land, the possum has found its niche in the woods of New Zealand, where it is devouring vegetation and threatening many of the country's more than 1,000 endangered species, including the flightless kiwi bird, the national symbol.

The wily marsupials, distant relatives of the rat-like American opossum, are regularly bombed with poisoned carrots, snared in deadly traps, shot by hunters and fed toxic peanut butter. Yet the government estimates that there are still 70 million of the critters--even more than the country's ubiquitous sheep. With a population of just 3.8 million people, that works out to about 18 possums for every human.

New Zealand has no natural predator to hunt the possum, which has spread throughout 95% of the country. The only possum-free zones are small islands, protected peninsulas and a nature preserve in Wellington that is fenced off like "Jurassic Park."

Scientists hope to combat the brushtail possum by introducing yet another species into the wild--a tiny genetically engineered worm that would block the possum's ability to reproduce. While some question the wisdom of releasing a genetically altered creature, supporters say it may be the only way to bring the possum under control.

Much of the ecological management here entails correcting the mistakes of the past and combating intruder species introduced intentionally or by accident. The Department of Conservation spends so much of its resources killing possums and other unwanted creatures that it has earned the nickname "Department of Culling."

New Zealand recently slashed its defense budget, grounded its combat air force

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and cut the size of its navy by a third. But it spends more and more each year fighting what it sees as its real enemy: alien species.

A generation of New Zealanders grew up making pocket money by hunting possums for a bounty. Today, people across the country, from pot-growers in the mountains to elderly women in the suburbs, help out by trapping or poisoning the animals.

"New Zealand's clean and green image comes down to possum control," said Herb Christophers, a Department of Conservation spokesman. "People want to come here because of the pristine nature."

Most of the country is united against the pest. Conservationists loathe it because of the damage it causes to native trees and rare birds. City-dwellers hate it because it eats the plants in their backyards. And farmers detest it because it spreads tuberculosis among cattle. "The only good possum is a flat possum," farmers like to say.

Around the world today, invasion by alien plants and animals is second only to the loss of native habitat in threatening the existence of native creatures. Islands that have developed unique ecosystems are especially vulnerable.

In Tahiti, for example, an ornamental Miconia tree planted in a botanical garden in 1937 has invaded more than half the island and threatens several endemic plant species with extinction, according to a recent report on "100 of the World's Worst Invasive Alien Species" by the Swiss-based World Conservation Union.

In New Zealand, two-thirds the size of California, plant and animal life evolved during 80 million years of isolation. With two main islands and 220 smaller ones, it has thousands of species found nowhere else in the world.

It was one of the last places on Earth to be inhabited by humans when the Maoris arrived from Polynesia 1,000 years ago. They brought with them the dog and, unintentionally, the first species of rat. Before that, the only mammals to reach the islands had been three species of bat.

The newcomers found dozens of species of birds that had been living on the islands for so long without predators that they lost the ability to fly. Eventually the Maoris hunted many of them to extinction, including all 11 species of the giant moa.

When Europeans arrived 232 years ago, they recklessly began introducing a host of mammals, including cattle, sheep, goats, pigs, cats, deer mice and two more species of rat.

To build the fur industry, the settlers introduced rabbits. When the rabbits began breeding out of control, they brought in ferrets, weasels and stoats to hunt them. With the help of the rats and feral cats, these predators further ravaged the native bird population.

The Maoris and Europeans cleared most of the vast forests that once covered the country. Today, less than 10% of the ancient lowland forests still stand, but the remnants demonstrate the country's diversity—for example, the spectacular flowering pohutukawa tree and the breathtaking rimu, which is among the tallest trees in the world. Some trees are well over 1,000 years old, predating the arrival of the first humans.

New Zealanders were slow to recognize the destructive habits of the possum, and they continued importing mating pairs from Australia as late as the 1920s to boost the fur trade. Today, possums consume an estimated 7 million tons of vegetation a year, mainly the new growth of native trees.

In some areas, possums have eaten the entire forest canopy. Trees often die after two years of heavy possum noshing, which has helped the animal earn a place on the World Conservation Union's list of 100 worst alien species.

While possums were long believed to be vegetarians, scientists recently captured them on video stealing eggs and eating rare adult kokako birds in their nests.

Ian Roberts is one of many New Zealanders who have spent a lifetime killing possums. As a boy, he collected the government bounty for killing them. As a young man, he hunted them for fur. After fur coats became unpopular in the '80s, he got into the possum eradication business. Now 48, he is director of Epro, a large pest-management company in Taupo in North Island farming country.

"A lot of people underestimate the possum," he said. "It's not a wise thing to do. Possums are survivors."

Depending on the terrain, he and his workers set traps, place poison in bait stations or drop carrots laced with the poison Compound 1080.

Roberts said New Zealand began to make significant advances in controlling the possum after it obtained satellite-guided positioning technology used for dropping smart bombs during the Persian Gulf War. Now a skilled helicopter pilot can lay down a blanket of poison carrots with a margin of error of two yards or less.

On a recent mission outside Taupo, pilot Dean Matthews flew through a canyon and over power lines to drop carrot chunks laced with Compound 1080 on a steep forested hillside. "I don't want to fling it into the paddock," he said as he flew. "It will kill the sheep."

The controversial toxin is banned in the United States for nearly all uses because it can easily kill animals other than the intended target. In New Zealand, hunters oppose its use because it can kill deer that eat the bait, as well as hunting dogs that eat the carcasses of poisoned animals.

But conservation and agriculture officials argue that Compound 1080 is essential in controlling the possum population until a more effective alternative is developed. "Without the use of the poison, New Zealand's forests will collapse," said Kevin Smith, an advisor to the conservation minister.

New Zealand sees itself as a leader in protecting endangered species. But the most intensive eradication efforts are aimed at protecting beef exports, not at safeguarding forests and birds.

In rural areas, possums often live in the woods and wander through pastures, spreading tuberculosis from one herd of cattle to another. Farmers, who are heavily dependent on exports, worry that persistent bovine tuberculosis could give New Zealand beef a bad name.

Spending to eradicate possums in farming areas is expected to nearly double this year, with the aim of suppressing the disease by 2013. For the time being, this gives a boost to efforts to protect native wildlife, but government interest in wiping out possums could fade if tuberculosis is brought under control.

Conservationists' best hope may be the development of the genetically altered intestinal worm that could sterilize much of the possum population.

The nematode would be developed from a species found only in brushtail possums, said Phil Cowan, a leading scientist involved in creating the worm. It would be altered so that it would turn the possum's immune system against its reproductive system, thereby preventing conception.

Scientists hope the worm would spread among the population and reach

possums even in remote areas. But success would depend on the ability of the altered worm to beat out its natural cousins. Even if it worked, it could be years before the nematode had a noticeable effect.

The altered worm is still at least five years away from development and would have to pass rigorous public scrutiny before it would be deemed an acceptable risk.

"In the end, what we would be putting out there is a new organism," Cowan said. "People want a guarantee that it will only affect possums and it's not going to mutate. But there is no such thing as certainty in life."

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