

A WIDENING OF HORIZONS

CRAIG MacFARLAND, 1974-78

Craig MacFarland and his wife were familiar with the Galapagos when Craig took over the direction of the CDRS in 1974, as he had previously done four years of basic research on the giant tortoises. His published papers, in association with J. Villa and B. Toro, had provided for the first time a comprehensive account of the surviving tortoise populations and methods of preserving them. While his responsibilities were now much wider, his concern for the tortoises was undiminished and the captive-breeding programme at the Station was expanded and technically improved. Further support was received from the San Diego Zoological Society which donated a rare Española tortoise from its collection, raising the number of Española males at the breeding centre from two to three; this substantially increased the genetic variability of the stock and thus the chances of survival of the race.

In 1975 the oldest of the captive-bred youngsters of the Española and Santiago races were released on their ancestral islands, where they prospered. There was also good news from San Cristóbal where, as the farmers had exterminated the wild dogs, the island's endangered sub-species of tortoise was again breeding successfully in the wild. On the debit side there was a sudden incursion of dogs into the "strict tortoise reserve" on Santa Cruz, which led to the destruction of most of the young tortoises hatched there between 1971 and 1975: this was not one of the rarer races but the loss of four years' increment was a serious disappointment.

This upsurge of the dog population had a much more disastrous effect on the Santa Cruz land iguanas, which were very nearly wiped out. There was a similar invasion of feral dogs at Cartago Bay on Isabela, which almost annihilated the local community of land iguanas. Fortunately, Dagmar Werner, a visiting scientist who was doing research on the iguanas, realised the danger. She nobly abandoned her research project for the time being and devoted herself to the rescue of both these populations. Whether they were separate races or

species was not the immediate question: the important issue was to preserve every remaining community. Werner organized the collection of all the survivors that could be found. They were taken to the CDRS, where primitive pens were hastily built. Tortoises had been saved by captive breeding, so why not iguanas? Within four years the first land iguanas ever bred in captivity were hatched at the Darwin Station. (*Noticias de Galápagos*, Nos. 25-29).

There were plenty of problems and many setbacks as the iguanas were more difficult to keep in captivity than the tortoises. On the other hand, once the problems had been mastered, they bred much more rapidly so that eventually the pens, though extended, were suffering from overcrowding. By this time Dagmar Werner had resumed her research project and her function as advisor to the GNPS and CDRS on the rescue programme had been taken over by Howard and Heidi Snell, U.S. Peace Corps volunteers, who little suspected how many years the land iguanas were to occupy their attention. The ideal solution was to release the young iguanas in the wild as soon as they were big enough, but this could not be begun until the packs of dogs were brought under control. There was no point in rearing iguanas to feed wild dogs.

The dogs were only one part of the intractable problem of the introduced mammals - rats, cats, pigs, goats, donkeys - which came to take a more and more dominant place in the preoccupations of the CDRS and the GNPS. Before effective action to control them could be taken, a great deal of research was necessary, particularly as each island had its individual mixture of native and introduced species. Advice was sought and generously given by such bodies as the U.S. Fish and Wildlife Service, the New Zealand Wildlife Service and the Institute of Terrestrial Ecology in Scotland. The size and diversity of the problems made progress slow, particularly as interruptions in control campaigns for lack of funds gave these prolific feral animals the opportunity to recover their numbers.

While it had been accepted from the beginning that the purpose of the Darwin Foundation was, so far as possible, to preserve the entire Galapagos ecosystems, the fauna had been given the highest priority, if only because it seemed to be in the most immediate danger. The islands extraordinary flora had taken second place but had not been entirely neglected. Research by L. Calvopina and Tj. de Vries had revealed the enormous size of the goat herds on Santiago Island (estimated at 100,000) and the irreversible damage that they and thousands of pigs were inflicting on the vegetation. As resources were not available to control these pests, goat-proof enclosures were built in the hope that, by fencing in critical areas, rare endemic species of trees and plants could be saved from extinction until a solution could be found to the goat and pig problem. Henning Adersen reported that, in a mere 15 years, recently introduced goats had come near to destroying Pinta Island's unique plant community, which had taken thousands of years to become established. Progress was made throughout this period in reducing the numbers of goats, first on the smaller, then on the medium-sized islands, but on the large and rugged Santiago, resources of funds and manpower did not permit more than preliminary studies. Similarly, Deborah and David Clark, who were studying the black rats, succeeded in eliminating them on tiny Bartolomé, but it was at that time thought impracticable to attempt an extermination campaign on the larger islands with the known techniques.

The other main threat to the botanical integrity of the National Park was the steady spread of alien plants and trees from the farming settlements. The GNPS went to work to stem the invasion but by this time introduced species, such as citrus, guava, avocado and cinchona, already covered large areas and were competing with the native species. Cutting them down was almost useless; digging out the roots was a slow process and arboricides were not entirely effective. The CDRS tried to devise better methods and the GNPS wardens worked heroically, but their efforts were not adequate to turn back the tide. On some islands such as Floreana, where there had been human settlements for over a century, the spread of introduced species seemed irreversible. Meanwhile



Tree Cactus on Santa Fe Island
Photograph by Roger Perry

research went on with a view both to conservation and to the widening of knowledge of the islands' botanical resources. (*Noticias de Galápagos* Nos. 24-27). Many specialist botanical papers were written by visiting scientists and in 1971 Wiggins and Porter published their classic *Flora of the Galapagos*, which provided the tool for more ecological and management-orientated botanical research.

As the volcanoes did not require a conservation programme, geology received a low priority in the CDRS's budget, though it attracted a great deal of scientific attention. The Galapagos are one of the world's most active volcanic areas and they drew repeated expeditions, often led by Tom Simkin, one of the CDF's Secretaries for the Americas. Whenever there was a major eruption on one of the islands, there was a notable exodus of staff from the Station,

anxious to get a close look at the spectacle. Recording the seismograph was part of the daily routine of the CDRS and Freddy Herrera, a local teacher who was also in charge of the Station's meteorology, looked after it for six years until he was appointed Governor of the Galapagos in 1981.

Paul Colinvaux carried out investigations on the climatic history of the islands and vegetational succession. By coring the sediments of lakes and bogs in the islands and studying the deposits of spores and pollen, Colinvaux obtained a history from time too old to be dated by the radiocarbon method. His evidence suggests that in ice-age times the Galapagos Islands were drier than now, which is of great importance to an understanding of the evolution of the unique Galapagos plants and animals.

The marine ecosystems were relatively undisturbed and seemed in little immediate danger, so not much had been done to explore the underwater resources of the archipelago, even though pioneer investigations suggested that these might prove to be at least as important as the terrestrial ecosystems. The government had still not included a marine zone in the National Park and the CDF had not found funds to build even a modest marine laboratory. It was simply a question of priorities. However, in 1974, Gerard Wellington, a U.S. Peace Corps volunteer, was assigned jointly to the CDRS and the GNPS for two years and, with the aid of the Director, Craig MacFarland, produced a massive study, *The Galapagos Marine Coastal Environments: a Resource Report to the Department of National Parks and Wildlife*. He emphasised the complex and fragile relationship between the fauna, flora and habitats of the terrestrial and the marine areas and pointed out the unexploited potential of the latter for education and tourism.

He proposed:

1. the extension of the National Park boundaries to two nautical miles from the shore.
2. the division of this marine area into zones, comparable to those proposed in the Master Plan for the land area, to facilitate the regulation of potentially disturbing activities.
3. the protection of the continuity of habitats within the National Park.

Wellington lamented the continuing lack of scientific information about the marine resources but at least he had made a brave effort to reduce that ignorance. (*Noticias de Galápagos Nos. 24 & 25*).

Two groups of scientists who undertook extensive research on the marine fauna and flora during this period were the California Academy of Sciences Ichthyological Expedition and the Smithsonian Marine Algal Program for the Galapagos. (*Noticias de Galápagos No. 27*).

In March 1978 a number of interlocking agreements were concluded between the National Institute of Fisheries, the University of Guayaquil and the Darwin Station to co-ordinate their research work and, where appropriate, to pool resources, equipment and manpower. In the absence of a legally protected marine zone, these agreements provided a substantial safeguard against harmful exploitation and promised fruitful collaboration in both conservation and scientific investigation.

In 1971 and 1972 there had been disturbing incursions into Galapagos waters by a Japanese refrigerator ship which, with the aid of local fishermen, collected some thousands of the East Pacific green turtles that breed and feed in the islands. The then CDRS Director, Peter Kramer, made representations to the government and an indefinite ban was imposed on commercial exploitation to give time for a full investigation of the population dynamics of the turtles.

Peter Pritchard, Miguel Cifuentes and Judy Webb began this study. They were followed by Derek Green who, with the support of a succession of teams of volunteers from 11 countries and with the financial aid of the National Geographic Society, devoted much of the next 8 years to the investigation. The teams spent periods of months under Spartan conditions, camping on the beaches where the turtles lay their eggs, in order to estimate hatching success. They also tagged 3,000 adults and notched 12,000 hatchlings, to provide a basis for the long term study of the turtle population. Given protection from commercial exploitation, the Galapagos turtles were not considered to be in any imminent danger. (*Noticias de Galápagos, Nos. 33, 38*).

Fritz Trillmich of the Max-Planck Institute began

a "two year" study of the Galapagos fur seals and sea lions, which he was still continuing a dozen years later with the help of a series of assistants. One by-product of his ethological research (and a most welcome surprise) was his estimate that the numbers of the endemic fur seal, once considered doomed to extinction, had risen to 40,000, roughly the same number as for the sea lion. (*Noticias de Galápagos No. 29*).

Such long term projects were unfortunately few and far between but, as the Galapagos offer exceptional opportunities for evolutionary research, over the years hundreds of visiting scientists from every continent made use of the facilities of the Darwin Research Station. Some came only once for a brief or longer period, others returned year after year. They were independently funded and were not a charge on the Darwin Foundation's budget.

Annual courses to train park wardens continued to be run jointly by the GNPS and the CDRS. In addition, courses and examinations were organised for tourist guides, as every party of visitors landing in the National Park was now obliged to be led by a certified guide. Courses for "naturalist guides" lasted four weeks, one week for "auxillary guides".

It became increasingly evident that these qualified and licensed guides were the first line of defence against potential harm by tourists. The touring companies, who actually employed the guides, were most co-operative.

In 1976 Eduardo Andrade was succeeded by Miguel Cifuentes as Superintendent of the Galapagos National Park Service. Cifuentes had previously worked for the CDRS on the marine turtles project and relations between the two bodies became, if anything, even closer. By this time the GNPS headquarters were substantially completed, with an intercom connection to the CDRS, while the gift of three patrol boats by the Frankfurt Zoological Society gave the park wardens increased mobility. With the growth of organised tourism, the pressure of visitors on the environment had become a source of anxiety, but years of scientific monitoring of "tourist impact" by M.P. Harris, Tj. de Vries, C. MacFarland, J. Gordillo, R.W. Tindle, A. Tupiza and others had concluded that, for the foreseeable future, the main threat to the ecosystems was not man himself but the alien animals and plants that he had introduced. (*Noticias de Galápagos No. 24-27*).



Land Iguana on rim of Fernandina Crater

Photograph by Roger Perry