

OF MEN, GOATS & GUAVA — PROBLEMS CAUSED BY INTRODUCED SPECIES IN THE GALAPAGOS

by

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A symposium was held in Quito on 10-11 March 1982 on the problems of introduced organisms in the Galapagos. A total of 26 participants, representing various government bodies, the Galapagos National Park Service, CDF Council members and CDRS resident scientists, discussed aspects of the effects of introduced animals and plants, as well as the feasibility of reintroducing native animals to certain islands. This article is a summary of the discussions and conclusions.

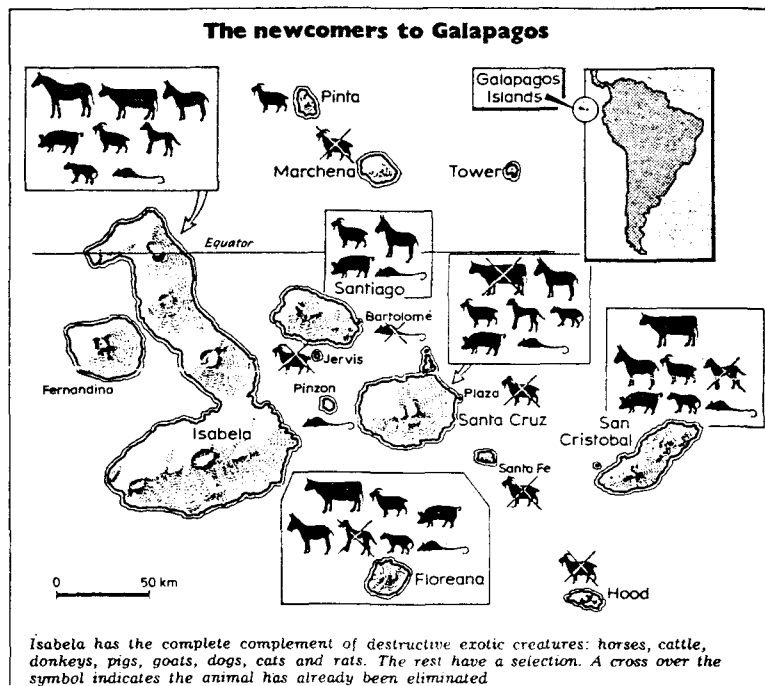
The rather complex subject was divided into (1) introduced mammals, (2) introduced plants, (3) other introduced organisms, (4) reintroduction of native animals into areas presently under management and (5) reintroductions in deteriorated areas.

1. Introduced mammals.

On Santiago (James Island) the population dynamics and ecology of the goats had been under study since 1974. The goat population was estimated at between 80,000 and 100,000, together with 20,000 pigs. It was thought that such numbers could only be eliminated if a major programme of eradication could count on sufficient funds and manpower right from its inception and throughout the entire project. The possibility of requesting assistance from the Ecuadorean armed forces was considered; it was agreed that in any event the National Park Service should be the body responsible for laying down the rules and maintaining control over the hunting campaign.

Although no exact date was set to start the programme, it was generally thought that studies should be completed in 1982 (goats) and 1983 (pigs), and that goats and pigs should be eradicated jointly, starting not later than 1985. Trained dogs could be used at certain stages of the campaign.

Studies of the protected vegetation plots on Santiago should be continued but no further fenced quadrats should be constructed in the highlands in view of the imminence of the hunting campaign, one of the first stages of which would be the driving of goats away from the humid highlands.



Map by Nigel Sitwell.

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Resolution 1

That the Director of the CDRS, the Superintendent of the National Park and the Resident Scientist in charge of mammal control should form a plan for the eradication of goats and pigs on Santiago, by means of a large scale hunting campaign.

Priorities were established in the control programmes of mammals on other islands; e.g. eradication of goats on Pinta and the Alcedo volcano on Isabela.

The dog control programmes on Isabela and Santa Cruz should be continued, and agreement with the local authorities in the settled areas should be sought in order to come to some understanding on the control of stray dogs.

The rat control programme at Cerro Pajas on Floreana should be continued and should serve as a pilot study for future programmes to control rats on Pinzon (Duncan Island), Eden, and parts of the highlands of Santa Cruz (area of *Media Luna*). Finally, it was thought of critical importance that the National Park Service should be able to count on more funds for conservation in 1983.

2. Introduced Plants

The most serious threats to the native vegetation by introduced plants are those caused by guava, cinchona, various grasses and, on some islands, *Lantana camara*.

On Isabela only studies of the dispersion and expansion rates of guava have so far been undertaken, whereas on Santa Cruz guava and cinchona have been eliminated with some success in parts of highlands. There was a feeling that closer co-operation was needed between the botanists of the CDRS and the park wardens in charge of plant eradication.

Since many introduced plants are dispersed from the farming zones into the National Park, a close co-operation is needed with the agricultural organisations and the local authorities. The dispersion of guava seeds is to a large extent due to free-roaming cattle. Cattle farming should be restricted to the availability of grazing grounds within the settlements and, in order to avoid free-ranging animals wandering into the Park, a policy should be developed to impel all farms to have properly fenced-in areas.

Resolution 2.

That eradication programmes of introduced plants on Santa Cruz should have priority.

3. Other introduced organisms

Various questions were asked: What would be appropriate methods to prevent further introduction of arthropods and other organisms, and to reduce to a minimum the inter-island transport of these organisms? What methods should be used to exterminate the fire ants (*Wasmannia auropunctata*) on the inhabited islands? What regulations should be made to control the import of insecticides, fungicides, and other chemicals used to control pests?

Resolution 3.

That control measures should be established in harbours and airports to prevent the introduction of organisms from the mainland to Galapagos and between the various islands of the archipelago.

Resolution 4.

That entomologists and officials of the Ministry of Agriculture should work out an agreement to determine which chemical substances may be used in the archipelago.

Resolution 5.

That an active education programme should be started to draw attention to the dangers of introduced organisms.

4. Reintroductions into areas presently under management

Several programmes are aimed at reintroducing animals into areas presently under management (i.e. within the National Park).

Pinta

One of the aims of the CDF is to preserve the natural environment and the reintroduction of a large herbivore on Pinta (Abingdon Island) would coincide with this objective. The absence of any large grazer (now that the native race of tortoises has virtually become extinct and that the introduced goats are close to being eliminated) has certainly had its effects on the dominant vegetation.

In particular, the problem of the sole surviving tortoise of the Pinta race (Lonesome George) was discussed. Various possibilities were put forward:

- (1) Let George die in peace.
- (2) Let George mate with females from Wolf volcano (Isabela), the most similar race.
- (3) Introduce both males and females from Wolf in order to establish a suitable population of large herbivores on Pinta.
- (4) Artificial insemination of Wolf females using George's sperm.

After a long and lively discussion the participants agreed:

Resolution 6.

To introduce in 1984 tortoises from Volcano Wolf to Pinta once it has been finally established that no further Pinta tortoises survive on the island. (This resolution was adopted after voting; 19 in favour, one against).

Resolution 7.

To start immediately an active breeding programme using George and five or more female Wolf tortoises.

Espanola (Hood Island)

By 1982, 132 young tortoises had been released on Hood as a result of the captive breeding programme of the CDRS and SPNG. It was discussed whether the adults (3 males + 13 females, at present in the Station's pens) could now be returned to Hood and the population allowed to find its own way of surviving.

Resolution 8.

That whilst so little was known about the sex ratio of the young, which is most difficult to determine, the breeding programme of Hood tortoises should be continued at the Station.

Pinzon (Duncan Island).

The breeding programme of Duncan tortoises (which started in 1965) had been most successful and 192 young tortoises had been returned to the island. Concern was expressed as to whether temperature during incubation could be a factor influencing the sex of the animals, which could lead to rearing animals predominantly of one sex.

Resolution 9.

That the breeding and repatriation programme of Duncan tortoises should be continued and the status and survival of the young on Duncan should be thoroughly studied periodically.

Santa Fe (Barrington Island)

The introduction of tortoises on Barrington was discussed as the vegetation was recovering after the removal of all the goats ten years ago. The first question was which race should be introduced. There was a consensus that no tortoises of unknown origin (tortoises from the odds-and-ends pen of the Station) should be used and the Duncan race could well be the most suitable, particularly as natural reproduction remains a problem on Duncan so long as the rat population remains high. However, there was a possibility that the introduction of tortoises might result in their competing for food with the endemic land iguanas.

Resolution 10.

That conditions for introducing tortoises on Barrington were not yet optimum; such an introduction would have to wait several more years.

5. Reintroductions in deteriorated areas

Some proposals were discussed of introducing animals into areas which have suffered through human

interference. The rearing of young land iguanas made it urgent to find safe places for returning the animals. The captive breeding programme had been so successful that it had become a burden to house and feed so many land iguanas for indefinite periods.

For reasons not yet clear (but possibly high predation by snakes) the land iguanas on North Seymour (introduced there from Baltra in the 1930s) have a very low reproductive success but young reared from a pair presently at the Station were available for release on their ancestral island of Baltra. Before embarking on this adventure in reintroduction, a complete ecological study was needed to assess the environmental conditions on Baltra, which is not a part of the National Park. Land iguanas became extinct on Baltra in the 1940s after the establishment of a military base, almost certainly through direct killing by man and the destruction of nesting areas by covering them with concrete and asphalted roads and airstrips. In addition, rats, mice and cats have been introduced, complicating any repatriation programme of iguanas.

An even more complicated situation was noted (e.g. several predators, poor habitat) for reintroducing the Floreana Mockingbird to Floreana and for transferring Galapagos Hawks from Santiago to Santa Cruz. Not only are the hawks occasionally killed in the inhabited parts of the highlands of Santa Cruz, but their main prey (doves and native rice rats) are no longer available. The original population of some 250 pairs is now reduced to 2 or 3 pairs around Saddle-back Hill, in the north western part of Santa Cruz; the presence of this relict population is a further reason for not introducing Santiago birds.

Resolution 11.

That a plan to reintroduce land iguanas to Baltra should be carefully elaborated, based upon ecological studies of the natural conditions on Baltra.

Resolution 12.

That reintroduction of native organisms in deteriorated areas has no priority.

6. Various other problems

Control of tourism should follow along the lines of the Special Report of the Government Commission on Tourism, which was accepted by the Government in March 1982. Access to Tortuga Bay from Puerto Ayora should follow the plan of SPNG, CDRS and INGALA for visiting the beach by a nature trail not exceeding 1.20m in width. The tortoises of unknown origin at the CDRS should be used for scientific studies and for exhibition purposes by Ecuadorean institutions.

Finally, before a decree establishing a National Marine Park can be passed, carefully defined regulations are required regarding the fishing rights of the local population.