At the Trondheim Conference on Alien Species, I heard many statements to the effect that invasions by alien species are as much a threat to biodiversity as the destruction of habitat. At the same time, there were many papers devoted to discussing the spread of "accidentally" introduced species, as if such introductions were an inevitable, and largely unpreventable, part of human activity. As a result of this attitude, the industries responsible for spreading these organisms can shrug their collective shoulders and say "the invasion is not my fault".

I think our knowledge of how alien species spread is now sufficient that we can regard taking responsibility for preventing alien invasions - or of paying for the ecological and economic damage new invasions cause - as part of the cost of doing business, especially international commerce. At the present time, the cost of the damage caused by invading species, and the largely inadequate measures taken to prevent future invasions, are absorbed by the victims. In the jargon of economics, the cost of alien invasions and their prevention is "externalized" by the businesses responsible, reducing their costs but greatly increasing ours.

Two aquatic examples:

Ballast water introductions. These are usually referred to as "accidental" perhaps because it is hard to predict exactly which species of the thousands being introduced worldwide on a daily basis will actually invade. It is nonetheless inevitable that new species will invade and that they will cause major damage to the systems being invaded. The zebra mussel in the Laurentian Great Lakes is only the most egregious example. The shipping industry knows this is happening but has largely resisted doing anything about it, citing everything from safety to technological to cost issues. By and large, governments (with a few exceptions!) have rolled over in response to these arguments. Yet the shipping industry is deliberately dumping these organisms in large numbers into the estuaries of the world; an act that would not be tolerated if they were dumping toxic wastes. The least we can do, as scientists, is to stop referring to ballast water introductions as accidental, to place the blame where it belongs.
Continued from front page:

Aquarium and aquaculture escapees. The aquarium and aquaculture industries are moving hundreds of species of live fish all over the world, often rearing them in large numbers in non-native waters. Inevitably, many escape into the wild and some become established, disrupting natural systems. Despite the fact we know this is going to happen no matter how secure the containers are supposed to be, such introductions are also referred to as “accidental.” They are not accidental; we just do not know exactly when the introduction will be made or which species will invade.

I am sure the same arguments could be made for plants and seeds from the nursery trade, insects from the trade in fresh fruit and vegetables, snakes in the cargo holds of ships, and many others. We cannot prevent all introductions and invasions, but we certainly can reduce their frequency.

The problems are of cost and inconvenience. A small start to getting industries and governments to accept the responsibility for these costs and inconveniences is for us to stop referring to “accidental” introductions.

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The invasive alien weed Chromolaena odorata is widespread along the warm, moist east coast of southern Africa. It is the most serious invader weed in the Greater St Lucia Wetland Park, (KwaZulu-Natal, South Africa). The method of cutting and uprooting large plants has been favoured because it provides employment opportunities for unskilled labourers and requires simple, robust equipment. However, faced with static budgets and increasing labour costs, the Natal Parks Board recognised the need to improve the efficiency of controlling the spread of this weed in protected areas.

Results were encouraging: about 70% of the target weeds were killed by the first treatment and a second treatment was applied four months later, leading to >97% mortality in all sites. None of the indigenous woody plants or grasses were killed, except a few small seedlings. Only the sprayed portions of the branches of indigenous trees had died back. Within eight weeks of the first treatment, the Chromolaena plants had shed their leaves and the increase in growth of indigenous grasses and creepers was so dense that very few Chromolaena seedlings were able to establish under the parent plants. By contrast, the nearby manually cleared sites had hundreds of seedlings per m².

Using the principles of disturbance ecology, and knowledge of the light requirements of Chromolaena, we observed that the negative effect of cutting and uprooting was that it opened the canopy, which promoted the exposure of Chromolaena seed to light. This facilitated seed germination and created ideal sites for recolonisation by Chromolaena.

Although the initial cost of spray equipment (long-range pressurised knapsack sprayers) and herbicide was high, the experiments showed that the total cost of the two herbicide treatments was 30% less per unit area than manual/mechanical treatments. More importantly, the follow-up costs were reduced by up to 80% because the indigenous vegetation had suppressed Chromolaena regrowth. We concluded that herbicides do have important benefits in certain situations, especially where there is a need to minimise disturbance and promote increased competition from indigenous plants. Treated sites are easily rehabilitated and become unsuitable for recolonisation by alien plants. This approach should be effective for other dense, shrubby weeds and should work in a variety of habitats.

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The genus Ardisia Sw. (Myrsinaceae) contains some 250 species, of mostly tropical and warm climate distribution (excluding Africa). Members of this genus are rarer in Australia (ca. 6 species in NSW and Queensland) and naturally absent from New Zealand. However, several taxa are in common cultivation. These include A. crenata Sims and A. crispa (Thunb.) A.DC. Occasionally both are sold internationally as coral berry (a name also commonly used for Symphoricarpus orbiculata Moench (= S. vulgaris) a member of the Caprifoliaceae.

The taxonomy of Ardisia is not well understood and these two species (A. crenata, A. crispa ) are often confused. The latter (A. crispa) is usually recognised as having smooth uncrimped leaves and the former crisped or crimped leaves. However, this demarcation appears weak and further systematic work on the genus as a whole is required. A. crenata/crispa occur primarily from N.E. India to Japan where they form small undergrowth treelets or shrubs. They are most notable for their small (ca. 1 cm) actinomorphic, star shaped, white or pink flowers and profusion of long-lasting red berries.

Outside their natural range, members of the genus have become aggressive invaders. A. elliptica Thunb.(A. solanacea Roxb.), a tree from Asia, is invading Hawaii; A. humilis Vahl, a climber from the tropical Himalayas, is adventive in the Cook Islands; and A. crenatalcrispa is a vigorous weed in Mauritius and on Réunion.

A. crenatalcrispa is self-fertile and seed set is usually high. The berries are attractive to birds (including the blackbird) and are easily distributed. This plant has been cultivated in New Zealand for several years, but has only recently begun to be widely distributed through garden centres (particularly those in the north of the country). Some of the earlier plantings already seem to be reproducing naturally and seedlings have been found in the wild around Auckland (Herbarium specimens held at MPN).

Given its history elsewhere, there is an obvious potential in mild areas of New Zealand (particularly Auckland northwards) for this plant to become a major weed species. Its presence, at least in these areas, deserves to be monitored.

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Invasive trees on Seychelles islands

Following on from work on the process of invasion of introduced Melastomataceae shrubs (Memecylon caeruleum and Clidemia hirta) in Seychelles, I have been investigating invasion by a number of tree species, as previously documented in studies on habitat classification, structure and change. These have confirmed the domination of the majority of the 44 sites studied by Cinnamomum verum, Psidium cattleianum and Artocarpus heterophyllus. Local patches of Syzygium jambos and Tabebuia pallida have also been noted.

In many cases, historical data show close correlation between the age of the forests at each site (the majority being secondary habitats) and abundance of invasive species. These correlations provide an indication of the long-term dynamics of invasion processes. A full analysis of the data is being prepared, but preliminary work indicates some interesting patterns. Negative correlations were detected for Cinnamomum verum and Psidium cattleianum. Studies of short-term habitat changes contradict the analysis for C. verum, the data for which are confounded by its widespread planting in historical times, possibly masking recent increases in abundance. Removal of old plantations from the data confirms the short-term data that abundance does increase with time and that it is, therefore, a highly invasive species. The data for P. cattleianum and Artocarpus heterophyllus are more reliable and indicate that these are pioneer species in forest clearings, and in relatively healthy forest are replaced through semi-natural successional processes. The replacing species include other invasives (which are more problematic in the long term) and native, later-successional species such as the palms, Dillenia ferruginea and Northea hornei.

Currently restricted or uncommon invasive species having positive correlations with time since clearance (indicating high invasive ability) are Alstonia macrophylla, Tabebuia pallida and Hevea brasiliensis. This study suggests that these species may be important invaders in the future and should be eliminated before they become too widespread to control. In Seychelles, concern is often expressed about
the very visible invader *Paraserianthes falcatoria*. This study demonstrates a negative correlation, indicating that as with many other species it is principally a pioneer and its abundance is reduced during forest regeneration.

This study of forest composition over time confirms the invasive nature of some species but also identifies others that are currently perceived as major threats in Seychelles but which are actually declining in abundance. This has important implications for habitat restoration and management programmes, the effectiveness of which should be improved by concentration on the most significant invaders. This study also identifies introduced species which can be expected to develop into problematic invaders in the near future. It should be noted that these conclusions can only be applied directly to the current situation in Seychelles. The nature of the invasion problem in other areas is probably slightly different. Invasion is more problematic on some Seychelles islands than others and is most apparent in forests where native seedling production is low. Similar low regenerative ability is also apparent in Mauritian forests where *Psidium cattleianum* is dominant and may not be in decline due to the depletion of the seed-bank of native species. Similar studies should be undertaken in all situations where invasion is perceived as a problem and where management plans are being developed or applied.

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**A Japanese Invader in the UK**

Japanese Knotweed, *Fallopia japonica* (also known as *Reynoutria japonica* and *Polygonum cuspidatum*) is a member of the family Polygonaceae of which there are about 40 genera world-wide, containing around 800 species. It is native to large areas of Japan, China and Korea, where it occurs as a component species in the early stages of succession on lava flows. In the Japanese archipelago this knotweed tends to invade within twenty years of volcanic activity, only to be replaced by other herb species within 50 years.

This plant was imported to the UK as early as 1825, by a Dutch nurseryman, as an ornamental and fodder plant owing to its attractive flowers and rapid rate of growth. By 1886 it had escaped onto cinder tips in Wales, and its spread across the British Isles has been explosive since then. Now over half of the 10x10km grid-squares throughout the British Isles contain Japanese knotweed (data from Biological Records Office, Monkswood).

Its vegetative spread and preference for riparian habitats has led to rapid colonisation along waterways and the exclusion of almost all native plants, leading to the loss of wolf-like habitats and a decrease in biodiversity. The plant forms dense, monospecific stands on river banks causing direct damage to flood protection works as well as interfering with amenity use.

Control is difficult since the use of herbicides is restricted near waterways and many mechanical methods such as the use of flail mowers and brush cutters can lead to exacerbation of the problem if adequate measures are not taken: segments of rhizome as small as 1 centimetre in length can regenerate roots and shoots. Spraying regimes using permitted herbicides need to be repeated at least twice a year for several years before eradication can be achieved. This, coupled with access problems, makes controlling the weed a very difficult and costly venture indeed.

Although it is an offence, under the Wildlife and Countryside Act (1981), “to plant, or otherwise cause to grow” Japanese knotweed in the wild, there is no legislation in place to deal with the problem as it stands, or to prevent its spread through inappropriate management practices. Indeed one major hindrance to current control measures is the determination of land ownership, especially on derelict sites which are often considered to be ecologically valuable areas. As far as long term control is concerned it is generally agreed that the only hope lies with classical biological control since it knows no boundaries and, once established, is permanent and free.

For such a programme to be feasible it is necessary that the plant is attacked in its native range by natural enemies which are not present in the country of introduction. Preliminary field surveys have shown that high numbers of natural enemies occur on the plant in Japan compared with the UK.

The spread of *F. japonica* is being closely monitored by the International Centre Of Landscape Ecology (ICOLE) and the potential for biocontrol is being continually investigated by the staff of the International
Institute of Biological Control (IIBC) in collaboration with Professor K. Yano of Yamaguchi University, Japan. It is hoped that funding sources can be found so that a classical biological control programme can be initiated.

Japanese knotweed is likely to be an exceptional target for such an approach since the whole invasion is believed to have originated from one individual plant which has spread asexually. Such a poor genetic base and the inability to reproduce sexually in its new range would negate the common problem of variable resistance to attack by biocontrol agents. Considerable damage has been caused to plants in Japan by one potential agent, the leaf feeding beetle *Gallerucida nigromaculata* and at least one pathogen.

IIBC consider that this invasive weed would be the ideal target for the first classical biological control programme against an introduced weed in the United Kingdom and that this environmentally-sound approach would be sustainable, appropriate for all areas of invasion, and economically viable in the long term. A five year programme could be undertaken at a cost equivalent to a one year spraying regime for an area as small as the West Glamorgan region’s 50 hectare infestation.

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**Preventing rat resurgence**

The apparent ease of eradicating rats from islands has lulled many people into a false sense of security. Do we really have good methods to stop future rat invasions of food-rich islands?

Around the New Zealand coast we have now eradicated rats from more than 60 islands ranging in size from less than one to 242 hectares. Preparations are almost complete for the treatment of 1970-hectare Kapiti Island.

Our preferred method is helicopter dispersal of pollard pellets containing brodifacoum, initiated when minimal natural food is available to the rats, usually in winter, and when a period of at least three days and nights of fine weather is predicted. Observations of rat activity show that during the second night after bait application, all rats feed to excess on the newly arrived “food” and probably consume more than a lethal dose.

The results of rat eradication are spectacular, and a very worthwhile reward for the efforts put into the lengthy operation planning. In the spring after eradication, seedlings will sprout where they have not been seen before, life will reproduce in abundance, and lizard species will suddenly become noticeable. As summer proceeds the insect population will increase, chicks will survive in abundance and trees will bear seed where it has not been seen before.

But how do we stop a new rat invasion?

Exclusion of humans and all that they carry with them is quite effective - but a few will break the law - and the shipwreck will occur. We must assume that a rat is likely to get ashore at some time. So we put out bait stations near all possible landing spots. Will the newly arrived rat like our bait? Will the newly arrived rat enter the bait station? At present the answer is probably “no”.

Our trials show that rats really do not like entering enclosed spaces, but prefer an open wire mesh; however this does not protect the bait from the weather. The preferred bait will not last more than a few weeks in good condition and is still not as tasty as abundant natural food: bait which is suitable for leaving in a bait station is not that preferred by rats.

For some toxins there are data on how much is needed to kill 50% of the sample - expressed as the LD50 - but we have no idea how much is required to kill every rat, and for some species and some toxins we have no idea of the LD50. The quantity of toxin in a bait seems determined by commercial expediency rather than efficient rat destruction. We need to know how much toxin can be put in a bait before bait shyness begins to occur.

After the many centuries of rat killing by humans these statements may seem out of order. But the rat killer of the past has been happy to note that the rat bait is being eaten and that the rats go away for a while. The rat-bait supplies sufficient food to attract the rats away from other food sources and the rats “go away” (die) from many areas each winter. However, the problem returns. Rats as invaders still have the upper hand. I am working to change this and improve our ability to protect islands. If you have a thought on the subject, please communicate by any means available to you.

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Aquatic Aliens Symposium

A symposium on **Marine/Aquatic Introduced Species in the Pacific** will be held during the VIII Pacific Science Inter-Congress, **July 13-19, 1997, Suva, Fiji.**

Papers on the ecology, biology, biogeography, environmental and human impacts, and management of introduced species are welcome, as are papers documenting new invasions, transport mechanisms (such as ballast water), and intentional releases. The symposium is being co-sponsored by the CSIRO Centre for Research on Marine Pests (CRIMP) and the Pacific Science Association (PSA); and Ronald Thresher (CRIMP) and L.G. Eldredge (PSA) will co-chair the session. James T. Carlton will be the keynote speaker. For further information, or if you would like to present a contributed paper, contact L.G. Eldredge [psa@bishop.bishop.hawaii.org]. Participants intending to present a paper are required to submit an abstract to the Inter-Congress Secretariat by January 31, 1997.

To obtain the Inter-Congress Second Circular which includes a general program of the Inter-Congress, along with information on paper submission, accommodation, excursions, etc. contact:

**VIII Pacific Science Inter-Congress Secretariat**

c/o School of Pure & Applied Sciences

P.O. Box 1168

The University of the South Pacific, Suva, Fiji

Fax: +679-314007  E-mail: psa@usp.ac.fj

Bailing dogs for pig control

Political pressure from Animal Rights groups are forcing Hawaiian conservation agencies to look to New Zealand for less controversial methods of pig control. American Animal Rights groups have previously attacked snaring as a means of pig control in Hawaii, and now have the main alternative, bailing dogs, firmly in their sights.

In a rare show of unity (and desperation), conservation agencies throughout Hawaii recently despatched a representative to New Zealand for an evaluation of bailing dogs for pig control. What the representative saw clearly impressed him and a proposal for funding, if successful, could see a major import of New Zealand bailing dogs to Hawaii and other states of America.

Animal Rights groups are not only concerned about the injury caused to pigs by Hawaii’s grabbing dogs, but conversely the injury suffered by dogs as a result of pig attacks. They are lobbying effectively in the US Congress for change and would likely support the importation of New Zealand bailing dogs.

Another reason for the need for dogs that have no physical contact with the pig can be found in pseudo-rabies in Hawaiian pigs. This disease tends to be concentrated in the pig’s head and is a cause for significant mortality in grabbing dogs.

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Invasive alien species were declared a global problem at the Norway/UN Conference on Alien Species, held in Trondheim, 1-5 July 1996. The Conference, one in a series of Trondheim Conferences on Biodiversity initiated in 1993, brought together over 100 of the world’s leading experts from developed and developing countries to discuss the scientific, management and policy issues raised by aliens and their impacts on biological diversity. Thirty lectures were organised around 8 themes: (1) human dimensions of the problem; (2) ecology and impact of invasions; (3) aquatic aliens; (4) agriculture and forestry invasives; (5) vectors; (6) oceanic island impacts; (7) management measures; and (8) future issues and follow-up. The conference was especially important for highlighting invasive alien species introductions as a problem with global ramifications for environment and development in developed and developing countries alike. All countries share common constraints in control and eradication from the growing onslaught of intentional and unintentional introductions, primarily due to expanded global trade, and a lack of scientific, institutional and financial capacity. A number of salient points were made during the week-long event. Perhaps the most astounding was that, as the primary driving force behind unintentional introductions, global trade is putting the continents back together while the economic costs (estimated at over US$100 billion dollars in the United States alone) are largely externalised. The resulting human-induced breakdown of biogeographical barriers has initiated what some at the conference were calling the "Homogocene" - a new biological epoch - characterised by the homogenisation of the world’s regions and the consequent loss of biodiversity especially at lower genetic, species, and ecosystem levels. In fact, a number of times, speakers predicted that early in the next century, alien invasions would eclipse habitat loss as the leading threat to biodiversity. While even the lawyers felt compelled to contribute their own alien species horror stories to those of the scientists, the conference was not all gloom and doom. Success stories in South Africa, Mauritius, New Zealand and Australia showcased low-tech solutions premised on varying combinations of common and successful ingredients, such as public education and awareness, linkage of management measures with economic development, high level political will, and local community involvement, as well as a combination of development financing, incentive measures and legal and institutional frameworks. Biocides, trapping and manual labour all figured prominently as well.

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An alien scale insect *Orthezia insignis* was threatening the last remaining stands of St Helena’s national tree, the gumwood *Commidendrum robustum*. This endemic tree once formed much of the extensive woodland that used to cover the higher regions of the island but is now restricted to two stands of around 2000 trees. It is a typical example of the remarkable indigenous flora on the tiny island (322 km²), situated in the South Atlantic, some 2000 km from Angola.

Not only does St Helena boast 10 endemic genera and 50 endemic species of plant, but many specialist insect herbivore species rely on threatened endemic plants for their continued survival. The gumwoods became infested with *Orthezia* in 1991 and since then an increasing number of trees have died each year, with at least 400 lost by 1993.

*O. insignis* originates from South America but is now widely distributed throughout tropical countries and is even a pest in temperate glasshouses. It is thought to have been introduced in the 1970s/80s on contaminated plant material and was allowed to persist on *Lantana camara* (a well-known weed). It damages its host primarily through phloem feeding but the colonisation of the resultant honeydew by sooty moulds has a secondary effect through the restriction of photosynthesis.

This scale is a typical example of a pest that has become a problem after being freed from its natural enemies, and fortunately is no stranger to biological control. One agent that has been used with some success in the past is the specialist coccinellid, *Hyperaspis pantherina* which has proved effective against this pest in Hawaii, Tanzania, Uganda and Peru. This predator is thought to be specific to the scale and in the laboratory lays 93% of its eggs on the surface of the prey and the other 7% in their vicinity. Indeed, when fed on honey agar for 6 days, no eggs were laid, and after exposure to prey material one female was observed ovipositing within 30 seconds of exposure to prey material.

It was decided that biological control was the only long term solution for the control of *Orthezia* on St Helena, not least because chemical control was impossible owing to the steep terrain and inclement weather. Therefore, the International Institute of Biological Control (IIBC) was asked to rear the agent in their UK quarantine facility to ensure a clean culture for shipment to the British Dependency for mass-rearing and release. Once a mass-rearing unit had been established on the island it was not long before a sustained release programme was underway, owing to the almost unlimited supply of prey organisms. The specialist predator was released on the island during 1993 and 1994 and rapidly established and spread. This year the new facility had to close owing to a lack of prey on the island!

Although it is fair to say that this biocontrol programme has saved the gumwoods of St Helena, the island is not out of the woods yet, since it has a fair number of other weed problems including gorse, wild mango, whitewood, and *Buddleia*, as well as arthropod pests such as cutworms, Mediterranean fruit fly, citrus whitefly and false codling moth. It is hoped that these, and other pests will become the targets of an integrated pest management programme in the near future before the unique biodiversity of this island is further threatened by alien invaders.

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To subscribe to Aliens, please send an e-mail or fax to: Sarah Lowe, ISSG, at s.lowe@auckland.ac.nz or +64-9-3737-042. Include your fax number, and I will send a subscription form.

In future issues, information will be included on electronic information involving invasive species, including web sites, and discussion groups. If you would like your site included, please let us know. Until then, here are a few to whet your appetite:

Miconia in Hawaii: http://www2.hawaii.edu/~ha1esci/MiconiaInHawaii.html
Weeds database: http://ifs.plants.ox.ac.uk/wwd/wwd.htm
In the meantime, keep in touch, and start sending in the contributions for March 1997!

Sarah Lowe
Exotic Organisms on Aldabra Atoll

Aldabra, a relatively pristine atoll in the Indian Ocean, was declared a Special Reserve under the Seychelles National Parks and Nature Conservancy Act in 1981, and a UNESCO World Heritage Site a year later. I believe Aldabra is currently, or will be in the near future, facing problems with four groups of exotic organisms: feral goats (Capra hircus), feral cats (Felis catus), pantropical weed Stachytarpheta jamaicensis, and exotic birds from nearby Assumption Island.

Feral Goats

Feral goats were probably introduced to Aldabra prior to 1878, as a source of meat for passing seafarers, and for a settlement later established on Ile Picard. Goats were present on the three largest islands of the atoll - Ile Picard, Ile Malabar, and Grande Terre, but were absent from Ile Polymnie. A two-person shooting team (using bolt-action .223 rifles with 3x9 telescopic sights) was employed in an attempt to eradicate feral goats using the Judas goat technique. This technique has been successful in Hawaii Volcanoes National Park and on San Clemente Island, California, and is currently being used elsewhere in the world. On Aldabra, we used 28 Judas goats atoll-wide during the entire project.

A total of 832 goats were killed. Remaining goat populations numbering 13 on Ile Picard and 21 on Ile Malabar were eradicated. Of the 787 goats shot on Grande Terre, 263 were in the presence of Judas goats - 121 (26%) during the first season and 142 (45%) during the second. As the project progressed, Judas goats became increasingly important in locating other goats, but they also became increasingly wary since they had been used at the outset of the campaign (due to logistics) rather than only during the "clean-up" portion of the project.

Feral goats still exist on Grande Terre, albeit in low numbers: probably between 60-120 animals at 1 May 1995. Undoubtedly, goat numbers have increased since then and will continue to do so. The Seychelles Islands Foundation plans to continue goat eradication efforts on Grande Terre. As long as feral goats exist on Aldabra, its biota will be impacted. The atoll is home to the largest population of giant tortoises (Geochelone gigantea) in the world. Although goats have been shown to compete for food with giant tortoises (Geochelone elephantopus) in the Galapagos, the more important problem on Aldabra is probably reduction of shade due to goat browsing - especially in the more open Cinq Cases region, where both tortoises and goats were most abundant.

Of 206 plant species on Aldabra, 166 are indigenous and of these 20% are endemic. A year after control efforts began, signs of new vegetation growth could be seen below goat browse lines.

Feral cats

Cats were introduced to Aldabra in the 1890s in an attempt to control the introduced black rat (Rattus rattus). During goat control efforts, all feral cat sightings were noted, and cats were shot when the opportunity arose. Dead cats were examined in the field and all identifiable remains in the stomach and intestines recorded. Feral cats are present only on Grande Terre, although historically there were cats on Ile Picard. It would be nearly impossible to accurately estimate the population of cats on Grande Terre, but they are widely distributed throughout the island. Cats were most commonly seen on the coast, but that was probably due to the ease of observation and our frequent travelling along the coast at night. Although cats appeared to be most active at night, they were seen at all times of the day. Forty-two cats were sighted and 13 killed. Only two of the cats killed were females - one was lactating and the other had at least two fetuses with total body lengths of 16.5 cm.

Of the 12 cat stomachs examined, ten contained the remains of native reptiles including one with the remains of four giant tortoise hatchlings. Feral cats are known to be predators of giant tortoise hatchlings in the Galapagos and are major predators of green sea turtle (Chelonia midas) hatchlings on Aldabra, however this was the first record of a feral cat preying on Aldabra giant tortoise hatchlings. Mean clutch sizes for giant tortoises on Grande Terre range between 4.0 (+/-0.6) and 6.1 (+/-0.5); and tortoises rarely lay more than one clutch annually, and most do not lay every year, so this single predation event may have accounted for an entire two-year reproductive output of a giant tortoise. Only three cats contained the remains of rats, whereas three had remains of sea turtle hatchlings, four had remains of birds, and six had eaten skinks (Cryptoblepharus boutonii) and/or geckos (Phelsuma abottii abottii and Hemidactylus mercatorius).

Feral cats have apparently also had a historic impact on the fauna of Aldabra. The flightless white-throated rail (Dryolimnas cuvieri alderbaranu), an endemic subspecies, is presently found on Ile Malabar and Ile Polymnie, but was previously reported on Ile Picard and Grande Terre. The extinction of the rail on the latter two islands has been attributed to the introduction of rats and cats. However, with the current abundance of both rats and rails on Ile Malabar, I seriously doubt rats were much of a factor in the demise of the rail. The presence of robber crabs (Birgus latro), an invertebrate equivalent (and sometimes predator) of rats, most
likely has resulted in the adaptation of the native fauna to resist the rat invasion better than most islands. Any re-introduction of the rat to Grande Terre would be ill-advised until feral cats were eradicated. Another bird that I observed having a similar distribution was the Malagasy nightjar (Camprimulgus madagascariensis aldabrensis), also an endemic subspecies. Like the rail, nightjars are ground-nesting and roosting birds which would make them highly vulnerable to cat predation. Whilst on both Ile Picard and Malabar, nightjars were seen and heard frequently, on Grande Terre they were only heard calling a few times.

Though cat control through live-trapping and shooting may be achievable, eradication is probably not possible with just those means. The greatest difficulties with regards to a cat control program on Aldabra are the terrain and dense vegetation, and the number of non-target species (e.g. tortoises and crabs).

Stachytarpheta jamaicensis
There are about 40 exotic species of plants on Aldabra introduced both intentionally and accidentally, but Stachytarpheta jamaicensis presently appears to be the most invasive. This plant is a pantropical weed native to tropical America. It seems to prefer sandy and/or open areas and is most common along the west coast of Ile Picard, and the west and south coasts of Grande Terre. Neither tortoises nor goats appear to eat it, and it is becoming a dominant cover species in areas where it is present.

In May-June 1994 much of the Stachytarpheta was pulled up by hand near the Research Station on Ile Picard. The shallow root systems made it possible to remove the entire plant without much difficulty. A year later, as long as the root system was removed, new plants were not growing in that area and its spread appeared to have been kept in check. The plants were disposed of by burning. I do not know when Stachytarpheta goes to seed, how long the seed remains viable in the soil, or if one season is better than another to perform control activities. However control does seem possible.

Exotic birds
Although there are no exotic birds on Aldabra at present, it is probably only a matter of time before one of the five introduced bird species arrives from the island of Assumption only 17 miles away. These birds include the barred ground dove (Geopelia striata), feral pigeon (Columba livia), red-whiskered bulbul (Pycnonotus jocosus), Mozambique serin (Serinus mozambicus) and Malagasy fody (Foudia madagascariensis). Ideally, a programme should be instituted to eradicate those birds on Assumption. With the number of native bird species on Aldabra, any control methods would be extremely difficult to implement when more than a few individuals are involved. This is why a control program would be ideal on Assumption - with the exception of the Souimanga sunbird (Nectarinia souimanga), all other "small" land birds are introduced and a number of control techniques could be implemented. However, at a minimum, contingency plans should be developed for the time when one of those species does arrive on Aldabra.

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Following a recent meeting of the Invasive Species Specialist Group, held in Trondheim 1-5 July 1996, it was decided to form a number of working groups on particular pests. I have offered to co-ordinate a small working group on the pan-tropical noxious weed Lantana camara L. (Verbenaceae). This weed is now a serious invader of a large number of island ecosystems plus many areas of natural rangeland habitat and indigenous vegetation. It is surprising to think that there are very few major weed pests that are being studied globally; Lantana camara has been studied by a number of research groups in many parts of the world, but this international research effort has never been co-ordinated in a way which could help resolve the difficult taxonomic problems both of the weed plant itself and of some of the biocontrol agents now being used to control it. The idea of the working group will be to attract like-minded people who might be willing to share their efforts towards a global approach to the control of this pestilential weed. If you are interested in joining such a group, or know of people who might be working on Lantana camara (any aspect), but who may not be recipients of Aliens newsletter, please ask them to contact me:

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CGAPS' top priority, though, has been to heighten public awareness as a foundation for stronger political support of improved pest management programs. Group members have co-authored a color brochure entitled “The Silent Invasion”, intended to convince any reader that 1) the alien pest problem affects us all, and is a major threat to our economy and quality of life, and 2) given the proper attention, there are practical solutions to many aspects of this problem. Hawaii Governor Benjamin Cayetano and Senators Inouye and Akaka have agreed to kick off the CGAPS public awareness campaign on October 22, 1996. CGAPS members intend to ride the wave of media coverage from this event to keep a steady series of relevant stories before the public. The campaign also includes development of alien species lesson plans for primary school teachers and design of a traveler awareness display program centered on Hawaii airports and funded by commercial advertising space associated with the displays. The goal is to establish a self-funded, ongoing awareness program that becomes a fundamental, positive part of Hawaii’s message to travelers.

CGAPS is chaired and administered by the Hawaii Department of Agriculture, with staff support from The Nature Conservancy of Hawaii, a non-profit conservation organization. Other members include the U.S. Department of Agriculture, U.S. Fish and Wildlife Service, U.S. Customs Service, National Park Service, U.S. Postal Service and Postal Inspection Service, U.S. Navy, Hawaii Department of Health, Hawaii Department of Land and Natural Resources, Hawaii Department of Transportation, Hawaii Visitors and Convention Bureau, and Hawaii Farm Bureau Federation. Each member organization appoints a representative and alternate, and the group holds quarterly, half-day business meetings.

In its first 18 months, CGAPS has focused on getting organized and on preventing the loss (via government cutbacks) of key programs, including preclearance inspection of outbound Guam aircraft for brown tree snakes (Boiga irregularis). CGAPS has made a priority of improving statewide ability for early detection and control of the most important pests. Contingency planning and interagency training for brown tree snake have been greatly improved, and the group has supported an intensive, statewide detection and eradication project for the weed Miconia calvescens as a pilot for this kind of work.

Hawaii launches multi-agency Alien Species Strategy

Aliens readers are well aware that the Hawaiian islands are in the grips of an invasive pest crisis that threatens the archipelago’s unique biota. For the past 18 months, a 14-member partnership of quarantine, biodiversity, agriculture, health, and commerce interests has been working to broaden public awareness of this problem and to make tangible improvements in the state’s pest prevention and control system.

The Coordinating Group on Alien Pest Species (CGAPS) was formed in January 1995 as the product of a year-long planning effort involving over 80 individuals from government, private, and non-profit organizations from agricultural inspectors to pet importers to feral pig control experts to tourism promoters. The resulting Alien Species Action Plan called for formation of a Coordinating Group that would expedite communications and problem-solving without creating new layers of bureaucracy. CGAPS is purely voluntary, driven by the idea that it helps each participating member get their own job done more efficiently. Its job is to implement and regularly update the Alien Species Action Plan. CGAPS is chaired and administered by the Hawaii Department of Agriculture, with staff support from The Nature Conservancy of Hawaii, a non-profit conservation organization. Other members include the U.S. Department of Agriculture, U.S. Fish and Wildlife Service, U.S. Customs Service, National Park Service, U.S. Postal Service and Postal Inspection Service, U.S. Navy, Hawaii Department of Health, Hawaii Department of Land and Natural Resources, Hawaii Department of Transportation, Hawaii Visitors and Convention Bureau, and Hawaii Farm Bureau Federation. Each member organization appoints a representative and alternate, and the group holds quarterly, half-day business meetings.

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Alan Holt, Deputy Director of The Nature Conservancy of Hawaii, serves as lead staff support and Conservancy representative for CGAPS. “The most striking thing about this partnership is the diversity of its membership,” Alan says. “This group is bringing our state beyond the notion that alien species are the concern only of farmers and natural area managers.” For more information on CGAPS, contact Alan at email aholt@cnc.org, ph. (808) 537-4508, or write him c/o The Nature Conservancy of Hawaii, 1116 Smith St. #201, Honolulu, HI 96817.