Pre-Lab: Cane Toads

1. What is meant by the biological term “alien species”? 

2. Why was the cane toad introduced to Australia?

3. What defensive mechanism does the cane toad have against predators?

4. What is one reason why the cane toad is so successful in the Australian habitat?

5. Several alien plants have been introduced into Santa Cruz County, such as Pampas grass (a grass that produces tall feather-like stalks) and French broom (a bush that produces yellow flowers). Both of these plants spread very easily and grow well in our coastal and mountain climates. What problems are these species causing locally? If you have never heard of these species, make a guess as to what problems they might be causing.
Lab: Cane Toads, the Movie

Alien species are organisms that are introduced into a new environmental area, one in which it has never existed in before. Both the alien species and its new environment must cope with this new relationship without the benefit of evolution. The results of introducing a new species are often unpredictable and may negatively affect species that are native to that environment.

The film Cane Toads is a documentary about the introduction of the cane toad into Australia. The cane toad was introduced as a biological pesticide against the cane beetle and cane grub, insect pests that were destroying Australia's sugar cane crop. The film illustrates the unforeseen consequences of introducing an alien species into new environments and the potentially harmful effects it can have on the ecosystem, even with the best of intentions.

Background
Cane toads, *Bufo marinus*, are one of the largest toad species (up to 10 inches long and 3 pounds in weight). It was introduced to Australia to control two insect pests of sugar cane, the grey backed cane beetle and the French’s cane grub. One hundred and one toads arrived in North Queensland in June 1935. Unseasonal breeding occurred almost immediately, and within 6 months over 60,000 young toads had been released.

Cane Toads can tolerate a wide range of environmental conditions. They breed in almost any body of water and spawn very large numbers of eggs several times a season. Adults live a long time. Many of the diseases and parasites that keep Cane Toad populations under control in their native countries, are absent from Australia. Cane Toads eat a very wide range of animals, including small vertebrates as well as invertebrates, and they have adapted to feeding on non-living food such as processed pet food. Cane Toads have very few predators because they are toxic to most animals that try to eat them.

The egg, tadpole and adult of the cane toad are poisonous to animals, which mouth or eat them. They secrete a highly toxic poison that can kill mammals that try to eat it. In urban areas such as Florida, the toad is attracted to standing food dishes and is hazardous to dogs. It is also dangerous to small children if it is licked or put in a child’s mouth. The adults have large (parotid) poison glands on their shoulders, which secrete a toxic milky substance. Smaller glands over the body also produce venom. They have few predators which exhilarates their spread, but a few birds such as crows kill the toads by turning them over and attacking their soft undersides. A few snake species also seem to be immune to their toxins.

Cane Toads will eat almost any small creature that they can catch, but they have few predators in Australia. The Common Freshwater Snake or Keelback (*Tropidonophis mairii*) is the only Australian animal known to be able to regularly feed on whole Cane Toads without dying as a result. Even Keelbacks occasionally succumb to poisoning from eating Cane Toads. Other native animals, such as estuarine crocodiles, water rats, crows, kookaburras and species of ibis, are believed to feed on toads or their internal organs.

There is still work to be done to understand what effects Cane Toads have on native wildlife, and just how far they will spread. In the areas where Cane Toads have been around for the longest time, their populations have declined after an initial population explosion. It is also suggested that some native animals are learning to avoid eating them.
Lab Report Questions: (Type your answers on separate paper)

Q1. How effective was the cane toad as a biological pesticide in Australia? Explain why it was or was not effective.

Q2. Describe three ways cane toads use to identify and capture potential prey? List some of their natural prey items.

Q3. What mechanisms of evasion do the cane toads use to avoid predators?

Q4. Describe at least three life style strategies that allow the cane toad to be so successful in an environment that it did not evolve in.

Q5. Why is the cane toad described in the film as such a threat to the ecology of Australia? Was that threat to the ecosystem realized according to more recent information? Why or why not?

Q6. What experiments would you recommend before introducing a new species as a biological control.

Addition to Cane Toad Lab: Your Ecological Footprint

Human overpopulation, over-urbanization, and over consumption are triggering enormous environmental impacts such as: resource depletion, habitat destruction, and unprecedented species extinction. How much is each one of us responsible? Find out by going to the URL http://www.ecofoot.org. Once you have calculated your footprint, print out the final page from the web site and attach it to your lab report.

Answer the following questions on a separate.

1. What was your ecological footprint in each of the four categories? What was your total?

2. How did your footprint compare to others in the United States? And to the rest of the world?

3. What activity of yours contributed the most to your ecological footprint? Why?

4. What activity contributed the least? Why?

5. Describe three ways that you can reduce your ecological footprint.