

Axis Deer in Hawai'i

Summary prepared by Christy Martin, CGAPS, May 25, 2011

- Axis deer (*Axis axis*) are native to India and Nepal, first introduced to Moloka'i in 1868 as a gift to King Kamehameha V. They were purposefully moved for recreational hunting and food to Oahu that same year, to Lāna'i in 1920, and Maui in 1959, with repeat introductions at various locations on these islands. It is believed that a combination of hunting pressure and management actions led to the local extirpation of axis deer on Oahu in the mid-1960s.
- Axis deer were not known to be present on Hawai'i Island, although there have been sightings and rumors to the contrary over the past few years. One recent, credible sighting by a rancher in Ka'u led the Big Island Invasive Species Committee to set up camera traps in the area. On April 29, 2011, a photograph of an axis deer was captured in Ka'u. An informal working group has been meeting to discuss survey plans to determine how widespread the problem is, discuss legal needs to close what appears to be loopholes in the law prohibiting the introduction or movement of species, and related issues.
- While the axis deer is valued for its meat and as a valuable game species, earning private hunting companies thousands of dollars in hunter fees, the presence of axis deer costs millions of dollars per year in impacts to agriculture, public health and safety, and natural resources, resulting in higher costs to society.

Rising Axis Deer Populations

- Populations of axis deer in Hawai'i exhibit annual population growth rates of 20-30% due to the following:
 - The lack natural predators and natural environmental controls such as extreme weather or population-culling diseases;
 - their adaptability to different environments allows them to live and forage from sea level to 7,000 ft. or higher, in forests, scrublands and grasslands;
 - their variability in diet, which includes more than 75 species of plants, and their adaptability in eating plant leaves, stems, fruits, seeds, seedlings, flowers and bark;
 - their ability to breed year round, with more than 90% of mature females producing fawns annually when forage is good. The Maui axis deer population grew from an estimated 2,000 animals in 2001, to an estimated 12,000 animals today;
 - their elusive and semi-nocturnal habits allow them added protection from hunting and official control measures;
 - in some areas in Hawai'i, there is a lack of hunting or official control measures;
 - in hunted areas there may be a bias towards taking bucks, which does not reduce reproduction.

Damage to Agriculture & Landscaping

- Axis deer have had devastating impacts on Maui, Moloka'i and Lāna'i agricultural industry, and impacts this past year were heightened due to the deer's response to drought conditions.
- At Haleakala Ranch, axis deer aggregated into herds of 500-700+ and they slowed their movements from browsing to grazing on forage grass that could otherwise have sustained

cattle operations through November 2010 and the beginning of the rainy season. This competition for forage grass cost the ranch six figures worth of supplemental feed, destocking, death loss, and premature sales

- Tedeschi Vineyards, Ltd. lost 6 productive acres of wine grapes totaling 6 tons of grapes at a retail value of \$150,000, not including damage to trellises, the loss of next year's bud wood, and other long term damage to the plants
- On Maui, HC&S reported extensive crop damage to germinating cane in 2011, damage at Hali'imaile Pineapple Company is in the tens of thousands of dollars, and many smaller farms and producers have lost acres of vegetable, fruit and other crops.
- Built environments such as golf courses and landscaping are also affected. Herds of deer on the Championship Blue Course at Wailea Golf Club on Maui damaged trees, devoured turf, and made deep divots in the greens, costing thousands of dollars in labor alone.

Threats to Health and Human Safety

- Axis deer carry common parasites including *leptospirosis*, *cryptosporidiosis*, and strains of *E. coli*, which can harm public health. In watersheds, droppings and urine enter streams and can contaminate our drinking water.
- In their native India, axis deer have also been shown to carry and transmit bovine tuberculosis and several other diseases that can affect humans. East Moloka'i has a history of recurrent bovine tuberculosis which can also impact and be carried by domestic and wild cattle, goats, and pigs. Although Moloka'i was declared free of bovine tuberculosis in 1993, a reservoir of potential infection still exists in wild animals, and a quarantine is in place to restrict the movement of axis deer and other animals from East Maui. The possible movement of diseased animals must be investigated
- Deer grazing on crops spread fecal matter and urine on crops, creating a major food safety issue
- In 2006, the National Highway Traffic Safety Administration reported an average of 1.5 million deer-vehicle collisions each year in the U.S.
- Maui Police Department records show that between 1997 and 2000 there were 21 accident reports involving deer-vehicle collisions on Maui, and incidents are on the rise with the increase in deer populations
- The Insurance Institute for Highway Safety reports that deer-vehicle collisions cause about 200 fatalities each year in the U.S.
- In 2010, State Farm reported the average property damage cost of deer-vehicle incidents at \$3,103, and a total of \$3.8 billion of insurance claims and driver costs across the U.S.
- As the risk of deer-vehicle accidents rises, drivers can expect to pay higher monthly premiums. Although deer are present on some islands, a 2010 State Farm projection of the likelihood of a driver colliding with deer in the next year is 1 in 13,01128, and that Hawai'i is currently the least likely state for driver-deer collisions.

Impacts to Hawaiian Ecosystems, Natural and Cultural Resources

- According to the U.S. Fish and Wildlife Service, there are 437 species listed as threatened or endangered in the State of Hawai‘i, the highest number of listed species in the nation.
- The highly endemic ecosystems of the Hawaiian Islands evolved in the absence of large land mammals and thus are vulnerable to browsing and other impacts of ungulates like axis deer.
- Axis deer consume native, endangered, and threatened plants, causing harm by feeding on plant leaves, stems, fruits, seeds, flowers and bark, and by trampling plants
- The U.S. Fish and Wildlife Service lists habitat degradation and browsing by axis deer as major threats to multiple endangered plant species, including Pauoa (*Ctenitis squamigera*), with less than 250 individual plants remaining
- Axis deer can jump or circumvent most existing ungulate fences that were built to exclude feral pigs. The presence of axis deer requires farmers, ranchers, and conservation agencies to retrofit or install taller fences (8’) to protect food crops, endangered and threatened species, sensitive natural areas, and watershed forests from deer impacts
- The Nature Conservancy of Hawai‘i reports that installed deer fences in the Kānepu‘u Preserve resulted in an increase in native tree seedlings of many species that had previously been eaten by deer. Moreover, mature trees, formerly stripped of leaves and branches to the height a deer can reach, are now re-sprouting from the base
- Protection of native ecosystems on Maui has entailed installing deer-resistant fences at \$60K/mile, and deer-proof fences at \$210K/mile. There are more than 313 miles of fence on Hawai‘i Island that would need to be retrofitted or replaced, at a minimum estimated cost of \$18.7 million.
- There is a significant impact to trees from axis bucks rubbing and polishing their antlers on the bark, which frequently results in the death of these trees
- The ‘trailing’ behavior of axis deer creates dirt pathways through the thickest of vegetation, leading to significant erosion and, in wet forest areas, increased runoff by decreasing the mossy layer available to retain water
- On Maui, there has been documented very significant damage to native sites, heiau, and old Hawaiian stone walls as deer consistently pass through in large numbers.

Legal Issues and Options for Control (This section is incomplete)

- Hawai‘i Department of Agriculture: The Hawaii Revised Statutes (HRS) Section 150A-6.2, entitled "Animal Import", states in part that the Board of Agriculture will maintain three lists of animals:
 - List of Conditionally Approved Animals - requires a permit for import into Hawaii;
 - List of Restricted Animals - requires a permit for both import into the State and **possession**; and
 - List of animals that are prohibited entry into the State.

Any animal not found on any of the lists maintained by the board would be deemed prohibited except as provided for under chapter 150A. To effectuate this authority the department of agriculture has established Hawaii Administrative Rules (HAR) chapter 4-71,

aptly entitled "Non-Domestic Animal Import Rules". The axis deer is found on the restricted list under HAR section 4-71-6.5, which would require a permit for both import into the State and **possession**.

- Axis deer are on the RESTRICTED ANIMAL LIST (PART B) §4-71-6.5 43: (3) Animals on Part B of the list of restricted animals, for the purposes described in subsection (b) (2) herein and for private and commercial use, including individual possession, zoological parks, and aquaculture production.
(c) The permittee must obtain prior site approval for animals on the list of restricted animals.
(d) Restricted list animals require a permit for both import and possession. Where a permit for a restricted list animal allows transfer or sale, the proposed transferee must first obtain a permit for possession of the animal by application to the chief, site inspection approval and satisfaction of any bond or other requirements applicable
(e) The board may establish permit conditions relating to, but not limited to, time, place, location, use, special precautions, health requirements, and safeguarding the animal from escape, unauthorized release, or theft, as well as any applicable requirements of municipal, state, or federal laws. The permittee shall comply with the requirements of this chapter, chapter 150A, Hawaii Revised Statutes, and specific permit conditions established by the board. [Eff. and comp 2/21/92; am and comp JAN 3 0 1995] (Auth: §§141-2, 150A-9) (Imp: HRS §150A-6)
- HRS Section 150A-8, which is entitled "Transporting in State", requires that flora and fauna specified by rules or regulations by the department of agriculture shall not be moved from one island to another, or from one locality to another on the same island except by **permit** issued by the department. The Hawai'i Department of Agriculture confirms that no permits have been issued
- State statutes requiring testing and permits regarding the health status of the animals transported may not have been properly tested for exotic diseases and other zoonotics, as well as not having the proper issuance of livestock certificates, which is a requirement of the Animal Industry Division
- Hawai'i Department of Land and Natural Resources: §13-123-8 Game mammals. Game mammals may be hunted with a valid hunting license and the landowner's permission on private land throughout the year, unless prohibited under §13-123-12. Game mammals shall not be hunted on State-owned or State-controlled lands except as provided in this chapter. [Eff 9/28/81; am and comp Nov 06 1999] (Auth: HRS §183D-3) (Imp: HRS §§183D-2, 183D-3)
- Authorities for control: §13-123-9 Nuisance or crop damage. (a) The board or its authorized representative, upon receipt of written notice of nuisance or damage to crops, vegetative habitat, or native plants by game mammals, shall initiate an investigation of the damage or nuisance and based on the investigation, may issue a permit or permits authorizing the destruction or control of game mammals responsible for the damage or nuisance
- §13-124-7 gives the department authority to issue permits to control game animals causing damage
- Issue for controlling/eradicating deer: §13-123-22
(f) With respect to disposition of game, the following conditions and restrictions shall apply:

(1) No person shall remove any live game from any public hunting area;
(2) Unless permitted by the department, no person shall hunt, kill or have in their possession any female deer;

- On Maui, Hawaii State tort law currently hinders the process of hunting on private land by placing too much responsibility on private landowners for any personal and/or property damage that occurs during a hunt
- In Hawai'i, the most successful control strategies for axis deer to date are fencing and shooting
- The population control of axis deer through contraceptives is not currently possible because axis deer breed year round in Hawai'i, and each deer would require an injected proper dose of contraceptives at least every two years, making the delivery of contraceptives to a suitably high percentage of reproductive does impossible

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