1.0 Introduction
Biological control, impacts awareness and education and preventative measures should all be employed as part of an integrated control programme for miconia to ensure it doesn’t spread to vulnerable new island locations.

2.0 Preventative measures
A Risk Assessment of Miconia calvescens for Hawai‘i and other Pacific islands was prepared with a resulting score of 14, meaning that it is likely to cause significant ecological or economic harm in the Pacific region. Csurhes (2008) has prepared an assessment for Australia.

3.0 Biological Control
A range of fungi, weevils, leaf-feeding beetles, nematodes, wasps, butterflies and moths have been found in South and Central America which damage miconia. In miconia’s invaded range in Hawaii, the non-native Chinese rose beetle (Adoretus sinicus) can cause up to 50% defoliation on individual leaves, but it has never been widespread and has never been observed to cause mortality (Medeiros et al. 1997). The high level of host specificity of the leaf-defoliating sawfly (Atomacera petroa) makes it a good potential control for M. calvescens (Badenes-Perez & Johnson, 2007a).

Since miconia seeds are dispersed by birds fruit- and flower-eating insects including could help manage this weed (Badenes-Perez & Johnson 2007b). A fruit-feeding gall wasp (Allorhogas sp.) and a fruit-feeding beetle (Apion sp.) were evaluated for host specificity in Brazil by Badenes-Perez and Johnson 2007b. Although Apion adults were found on leaves and inflorescences, larvae rarley infested fruits. Allorhogas larvae and
pupae did infest fruits causing them to produce 79% fewer seeds than healthy fruits (Bandes-Perez & Jonhson, 2007b).

The nematode *Ditylenchus drepanocercus* causes angular leaf spots on miconia; the best method of inoculation for this nematode is spraying plants with a suspension containing individuals of various stages on previously wounded leaves. Incubation period was determined to be 20 days (Seixas *et al.* 2004a). The fungus *Colletotrichum gloeosporioides* was tested as a possible control for *M. calvescens*; infection of miconia by *C. gloeosporioides* resulted in leaf spotting and defoliation which in turn slows its growth rate (Kilgore 1997).

Other natural enemies are currently being sought in Brazil (since 1995) (please see Seixas Barreto & Killgore 2007 for further information), Costa Rica (please see Picanço *et al.* 2005 for further information), the Dominican Republic and Ecuador. Over 60 species of arthropods were found associated with *M. calvescens* in a systematic survey at two sites in the state of Minas Gerais, Brazil. Observations in the field suggest that the following species are sufficiently damaging to *M. calvescens* to warrant further evaluation as potential biocontrol agents: a whitefly species, *Diclidophlebia* sp, Heliothrips sp.n, Ategumia sp., Druentia cf. inscita, Atomacera sp., Agrilus sp and another unidentified buprestid. Additional efforts to rear and document the life cycle of these insects and their potential as a biocontrol are needed (Picanco *et al.* 2005).

4.0 Legislation
Laws prohibiting the sale of Miconia calvescens in Queensland was passed in 1997 (Cshures 1998).

5.0 Education and Awareness
"Ho'ike o Haleakala" is an environmental education curriculum specific to Maui, produced by a partnership of school teachers, agencies, and community organisations, led by Haleakala National Park (Loope Starr & Starr 2004). The curriculum is available online (www.hear.org/hoike). A growing interest of the public on Maui in meaningful hands-on ecological restoration projects is partially related to a growing interest in the heritage of the native Hawaiian people and proliferation of potential volunteer projects (www.hear.org/volunteer/maui/). Volunteers participate in a number of restoration projects, including one involving endangered dry forest plant species on private lands (Loope Starr & Starr 2004). Campaigns to inform the public of the threat of miconia, including fliers and media coverage, were launched in the Society Islands (Meyer & Malet 1997).

6.0 Integrated management
Combining physical removal with chemical treatment has been employed to control miconia in the Society Islands. Trees greater than four to five meters were cut and herbicide was systematically applied to the exposed stumps to prevent resprouting. After several trial with different herbicides, GBnoxone (Triclopyr + 2,4-D) in diesel solution (one liter per 20 liters) applied carefully to cut stumps provided effective control with few resproutings compared with other chemicals used. 2,4-D is also said to be one of the most
acceptable chemical from an environmental point of view since it is not residual (low concentration of 2,4-D are decomposed in the soil, persisting only one to four weeks in warm and wet conditions) (Meyer & Malet 1997).

7.0 References
For references please see the GISD Species Profile for *Miconia calvescens* (References Section).