To the User:

Element Stewardship Abstracts (ESAs) are prepared to provide The Nature Conservancy's Stewardship staff and other land managers with current management-related information on those species and communities that are most important to protect, or most important to control. The abstracts organize and summarize data from numerous sources including literature and researchers and managers actively working with the species or community.

We hope, by providing this abstract free of charge, to encourage users to contribute their information to the abstract. This sharing of information will benefit all land managers by ensuring the availability of an abstract that contains up-to-date information on management techniques and knowledgeable contacts. Contributors of information will be acknowledged within the abstract and receive updated editions. To contribute information, contact the editor whose address is listed at the end of the document.

For ease of update and retrievability, the abstracts are stored on computer at the national office of The Nature Conservancy. This abstract is a compilation of available information and is not an endorsement of particular practices or products.

Please do not remove this cover statement from the attached abstract.

Authors of this Abstract:
Tim Tunison

© THE NATURE CONSERVANCY
1815 North Lynn Street, Arlington, Virginia 22209  (703) 841 5300
The Nature Conservancy  
Element Stewardship Abstract  
For *Rubus argutus*

I. IDENTIFIERS

**Common Name:** Prickly Florida Blackberry

**General Description:**
Until the mid-1980's in Hawaii, *Rubus argutus* was misidentified as *Rubus penetrans*, also from the southeastern US. However, *Rubus penetrans* is probably a segregate of *Rubus argutus* when *R. argutus* is treated in the broad sense (Wagner et al. 1990).

Erect, arching, or trailing shrub in the Rose family (Rosaceae). Stems usually erect to arching in open areas and arching to trailing or decumbent in shaded areas. Primocanes (first year stems) are angled, 1-3 m long. Prickles hooked or straight, up to 8 mm long. Leaves palmately compound, typically with 3, sometimes 5 leaflets. Leaflets elliptic, oblong-ob lanceolate, or ovate. Terminal leaflet 8-13 cm long and 3-8 cm wide. Leaflets hairless on upper surface with soft, long hairs on lower surface. Leaflet margin coarsely toothed. Prickles and leaves on floricanes (second year stems) similar to primocanes but smaller. Flowers arranged in short racemes on pedicels 1.5-5.0 cm long. Petals white, 13-20 mm long. Fruit black when mature, adhering to receptacle.

II. STEWARDSHIP SUMMARY

Blackberry is one of the more disruptive alien plant species in Hawaii. It is a very widespread plant often found at low densities which grows best in mid-elevation, mesic to wet habitats in exposed or partly exposed sites. Disturbance of the soil stimulates seedling recruitment; disturbance of the canopy stimulates vegetative spread. It should be controlled at Kamakou because it is localized and manageable. Its distribution and rate of spread should be monitored at Waikamoi to determine if control actions are needed. Insect biocontrol agents released to date are impacting blackberry to some degree, but prospects for the release of additional insect agents are poor. An apparently host specific, virulent rust may be the most promising biocontrol candidate for blackberry, but host testing in the state has not begun. The management of blackberry is in its infancy, and no control methods or strategies have proven overwhelmingly effective. Roundup and Escort are the most effective herbicides, but additional research is needed for basal bark, cut stem, and foliar applications of more selective herbicides such as Garlon 3A.

III. NATURAL HISTORY

**Habitat:**
Prickly Florida blackberry is native to the central and eastern United States. It was introduced to Hawaii in 1894 (Neal 1965), probably for horticultural reasons (Smith 1985). It is now
naturalized on all major islands, but may be more widespread and disruptive on Hawaii, Kauai, Maui, and Oahu. It occurs in wet to mesic habitats mostly between 300 m and 2,500 m elevation (Gerrish pers. comm.). It is best developed from 1,000 m to 2,000 m elevation in mesic to moderately wet, relatively open, and disturbed habitats.

Reproduction:
Blackberry reproduces both vegetatively and by seed. Flowers and fruits are produced more abundantly in open habitats, with seed production dropping markedly in subalpine locations or in deep shade. Blackberry seeds are dispersed by alien frugivorous birds (Smith 1985), as suggested by its attractive fruits and ubiquitious nature of its seed bank.

Blackberry can form clonal thickets by root sprouting, although aerial shoots may occasionally root when in contact with soil (Smith 1985). This species is habitat-disruptive when dense clonal thickets form. Most other native plants are excluded from these thickets when fully developed, although some, such as pilo (Coprosma spp.) and palapalai (Microlepia strigosa) tolerate or even penetrate a blackberry canopy. In marginal habitats, it does not spread much vegetatively.

Blackberry is stimulated by disturbance. Seedling establishment appears to be enhanced by soil disturbance, and vegetative spread is released by canopy removal, particularly windthrow. Blackberry is adapted to fire, although this is not an important factor in its spread in the state. The aerial portions of the plant are readily killed. However, it resprouts vigorously from the roots (Smith 1985).

Blackberry is moderately shade tolerant, and grows best in forest gaps or under a sparse canopy. It can be shaded out or severely suppressed by deep shade. Blackberry is basically deciduous in Hawaii, especially in more exposed sites, at higher elevations, and during colder winters.

IV. CONDITION

V. MANAGEMENT/MONITORING

Management Requirements:
Smith (1985) categorizes blackberry as one of the 86 most disruptive alien plant species in Hawaii. Blackberry is different from certain other disruptive plants such as clidemia (Clidemia hirta) or strawberry guava (Psidium cattleianum), low densities of which almost always predict eventual high densities. Blackberry is very widely distributed at low densities. It forms dense, monospecific thickets only in some habitats under the appropriate conditions.

Blackberry is a low to moderate threat to Kamakou Preserve. It grows in plantations at lower elevations, especially in disturbed areas such as roadsides. However, the clonal thickets are not especially dense or large. It is found in Kamakou mostly along open roadsides. It may pose a greater threat to Waikamoi Preserve, especially in upper elevation forests. Large thickets are found in this environment in nearby areas, and at least one large clonal thicket occurs in the
preserve. Its threat to the subalpine shrublands is uncertain where blackberry is widespread. However, vegetative reproduction is limited, clonal thickets are not well-developed, and production of viable seed is limited (Art Meideros, pers. comm.). This results in scattered upright canes typical of marginal habitats.

At Waikamoi Preserve, recovery of native vegetation following removal of blackberry thickets is likely due to the predominantly native character of the community, although alien grasses may also invade these sites. Recovery of native vegetation depends partly on the damage to natives sustained by herbicides intended for blackberry or the stimulation of alien plants due to soil disturbance from manual and mechanical control measures. There was little evidence of native plant recruitment in colonies treated to identify an effective herbicide at Hawaii Volcanoes. These patches were located mostly in areas under or near native trees and within an alien understory (Santos pers. comm.).

Monitoring is needed at Waikamoi Preserve to determine if blackberry poses a threat. No monitoring is underway at the preserves. Hawaii Volcanoes is assessing recovery of herbicidally treated, single species stands of blackberry in mesic forest.

Kamakou should control blackberry. Even though it may not be especially disruptive in the preserve and at present is located in disturbed sites, it is currently localized and manageable. Waikamoi should monitor blackberry as described above before initiating a control program. Controlling blackberry at Waikamoi would require a program similar in magnitude to feral pig control, and probably take many more years.

Manual removal, possibly aided by mechanical removal, may provide a control method in selected habitats in which the soil is deep and loose and large clonal thickets have not developed. Manual/mechanical control will be very time-consuming. Resprouting from roots not removed or from seeds in disturbed soil may result in recovery of blackberry. Current tests at Waikamoi may indicate if manual control is feasible in some subalpine grasslands.

Control of blackberry by cut stem application of undiluted Roundup or Rodeo may be less time consuming and more practical than manual control when canes are scattered and soil is not deep and loose. Canes should be cut as close to the soil line as possible. Lower concentrations than those used by Smith may be effective.

Foliar applications of 2% Roundup or Escort at 28 g/l are probably the most effective herbicidal means of control known. However, both of these are very damaging to non-target vegetation in foliar treatments.

Translocation of existing biocontrol agents is not recommended. Biocontrol is only partially effective, and currently released insect agents are already widespread in Hawaii (Nagata and Markin 1986), and adversely affect native Rubus (Markin pers. comm.).

Management of blackberry in native ecosystems has only recently been attempted, and the results or too provisional for recommendations. The staff at Mt. Kaala Natural Area Reserve
on Oahu are controlling blackberry in boggy sites using undiluted Rodeo in a cut stem
application (Smith pers. comm.). However, Smith reports that this a very labor-intensive
practice (Smith pers. comm.), and progress has been slow. Hawaii Volcanoes is currently
testing foliar applications of 2% Roundup followed by cut stem treatments on resprouting
stems. Waikamoi has established small test plots for manual control.

VI. RESEARCH

Management Research Needs:
Distribution and rate of spread monitoring are needed to determine the magnitude of the threat
posed by blackberry at Waikamoi Preserve. Distribution monitoring should emphasize the
inventoring locations and sizes of large colonies in the upper forest. Rate of spread monitoring
should use on point intercept transects to determine cover changes in subalpine plant
communities with a significant blackberry component. Density plots to monitor changes in
density of canes could be used to augment cover transects.

An investigation of the ecology and life-history of blackberry would aid management state-
wide. This is an appropriate study for a University researcher, and is not needed specifically for
TNCH preserves. However, a study of blackberry demography at Waikamoi Preserve would
augment rate of spread monitoring recommended above. Also helpful to management would
be research to identify basal bark, cut stem herbicidal control methods with an herbicide more
selective than Roundup and Escort. A candidate to test is triclopyr, to which blackberry is
sensitive and grasses and many ferns are not. Research is needed to identify and test potential
biological control agents specific to blackberry and harmless to native Rubus. The use of
pathogens promises the most effective and host-specific agent (Markin pers. comm.)

Gerrish is mapping the distributions of all Rubus species in Hawaii (Gerrish, pers. comm.). No
studies of the ecology of the species are known.

Motoooka et al. (1986) found blackberry to be sensitive to triclopyr. The Research staff at
Hawaii Volcanoes National Park found that a foliar spray of 2% Roundup or Escort at 28 g/l
were relatively effective in controlling blackberry, although mortality was less than 50%
(Cuddihy pers. comm.). Smith (pers. comm.) found that undiluted Rodeo was very effective in
controlling blackberry growing at low densities when used as a cut stump treatment.

Biological control has been partly effective (Nagata and Markin 1986). Five insects were
released 1963-1969 as biocontrol agents. Three of these became established, and were causing
extensive damage by the mid-1960's (Nagata and Markin 1986). Nagata and Markin (1986)
found substantial populations of these species and concluded that they were having some effect
in controlling populations of blackberry, particularly the Schreckensteinia festaliella, a leaf
skeletonizer, and Croesia zimmermani, a leaf roller. Markin (pers. comm.) is currently
attempting to determine why released insects are not more effective, and feels that parasites on
the biocontrol insects may limit their effectiveness as biocontrol agents. There is a large
complex of insects that attack blackberry. However, new introductions are on hold because
historically released species also attack native Rubus species.
Biocontrol is currently focusing on pathogenic rust fungi because of their virulence and host-specificity (Gardner pers. comm.). Gymonconia nitens is a powerful pathogen of Rubus argutus in its native range where it produces systemic infection. Preliminary tests indicate severe inoculation of Rubus argutus, that did not affect native Rubus spp., although these tests were inconclusive due to difficulties in maintaining the native species. Gardner, National Park Service Plant Pathologist (pers. comm.) has applied for permission to bring Gymonconia nitens to Hawaii for further research, although questions about the availability of quarantine research facilities can affect the timing of the research.

VII. ADDITIONAL TOPICS

VIII. INFORMATION SOURCES

Bibliography:


IX. DOCUMENT PREPARATION & MAINTENANCE

Edition Date: 91-08-12

Contributing Author(s): Tim Tunison