

Supplemental Documents to BIISC Target Species Prioritization Process

Aloha. Welcome and thank you for checking out our target prioritization project. We are still in the development phase, so we'd love folks to try this out and give us some feedback on species you are considering controlling or eradicating, on a small, large, or island-wide scale.

Pardon the informality here—no time to build a website. There are a series of links and documents attached here. Please email me at skaye@hawaii.edu for separate, fillable worksheets and guidelines if you'd like to try this out on a few species yourself.

LINKS TO EXTERNAL DOCUMENTS

1. Learn more about the Hawaii Pacific Weed Risk Assessment Project:
 - a. Weed Risk Assessment Home Page: <https://sites.google.com/site/weedriskassessment/home>
 - b. HPWRA in nursery risk assessment: <https://plantpono.org/plant-assessments/>
2. Learn more about the Victoria Supplemental Weed Risk Assessment Process:
 - a. Early Invaders 3: Managing Weeds Assess the Risk Guide:
https://www.environment.vic.gov.au/data/assets/pdf_file/0028/49177/WESI-Guide-2ndEd-03_assess-the-risk_PRINT.pdf
 - b. Worksheet is found on page 27 of the document.

DOCUMENTS INCLUDED HERE (Just keep scrolling down)

1. Conference Abstract and Poster
2. Results: Outcomes for 12 species re-evaluated using this process
3. BIISC Standard Operating Procedure 008: Target Prioritization (This is the how-to guide. Note: some tasks will be very specific to BIISC staff/procedures, and should be adapted to be useful to your organization).
4. Example: Completed Supplemental Assessment
5. Example: Effort Assessment Calculator
6. Example: Completed Weed Status Report

In simplified terms, the procedure is to:

1. Identify the species
2. Assess the risk of the species becoming invasive in Hawaii, based on the literature. Use the HPWRA Score.
3. When the assessment is uncertain, e.g. the literature is sparse, supplement the risk assessment with a formal assessment of local performance. This requires time in the field. Use WESI Supplemental Risk Assessment Worksheet.
4. Evaluate the feasibility of control, i.e. How many hours of work will it take to control during Year 1 and Lifetime of Project? Requires mapping and a reasonable estimate of your program's rates of work on similar terrain and targets. Use the Effort Estimate Worksheet.
5. Draft a report including a range of management options in context of available resources (staff, partners, funding).
6. Bring all the information to a panel of experts (in our case, the BIISC steering committee)
7. Panel assigns a level of management to pursue (i.e. island-wide eradication, containment, local control, monitor, outreach only, or no action).
8. Publish a report so that partners understand the actions being taken and reasoning.

1. Abstract and Poster (Hawaii Conservation Conference 2021)

Island-scale eradication of newly detected invasive plants contributes to cost-effective, long-term protection of native biodiversity—when it can be accomplished. A scarcity of resources requires a triage approach that evaluates both the importance and feasibility of attempting an island-scale eradication. Risk assessment tools previously developed in Hawai'i have primarily relied on a species' global track record, i.e. the literature, and have contributed to at least thirty successful island-scale eradications of invasive plants. In recent years, however, high-impact pests have arrived without a history of invasion elsewhere, and sometimes without identification! Decision makers need documented, transparent selection procedures, accountability, and a sober assessment of costs—even and especially when they exceed available funding.

Our proposed process supplements the familiar Hawai'i Weed Risk Assessment tool with a quantitative assessment of local performance developed by the Weeds in the Early Stages of Development project of Victoria, Australia. We added a calculator to estimate the effort required to eradicate the population, and steps to consider available staff time, document the decision-making process and explicitly state the management goal. We evaluated twelve previously detected species and compared results to previous management decisions, which sometimes diverged. The process requires more investment at the assessment stage, but it may increase the success rate of attempted eradications while boosting transparency and accountability. Similar modifications could be made to the evaluation of other taxa, expanding the scope of risk-assessment tools that rely exclusively on the global track record.

An Updated Invasive Species Target Selection Procedure for Hawai'i



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BACKGROUND

A scarcity of resources requires a triage approach that considers both the importance and feasibility of attempting an island-scale eradication. This process can be challenging when little is known about a new species.

BIISC's new process supplements the Hawai'i Weed Risk Assessment, which relies on invasion history elsewhere, with a secondary assessment of local invasiveness and impact developed in Australia, and a cost calculator to measure feasibility. We consider available staff time, funding, and stakeholder impacts, explicitly define a management goal, and publish the decision making process to maintain accountability.

METHOD

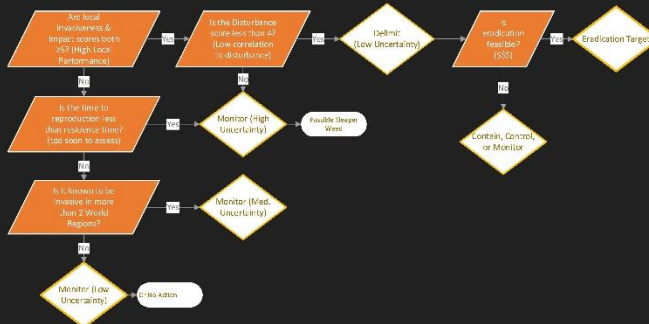
BIISC re-evaluated twelve previously detected species and compared results to previous management decisions. All species with HWRA scores higher than zero underwent secondary assessment.

RESULTS

Four of 12 species were elevated to control or eradication, and 3 were downgraded to monitoring or no-action. Local evidence of invasiveness and impact were key to escalating or downgrading the response.

Though "feasible" with typical funding levels, recent cuts to state funding will mean only one of these species can be addressed.

Considering local performance can improve invasive species risk assessment and target selection. Costs matter.



Process adapted from the Victoria Weed Risk Assessment Guide



Take a picture to download the procedure.

Think About:

- Species with little history of invasiveness in the literature can be easily passed over, even when local performance is alarming.
- Decision makers need documented, transparent selection procedures, accountability, and a sober assessment of costs—even and especially when they exceed available funding.
- Better assessment takes time and money, but will avoid future costs.
- Explicitly including stakeholder impacts in the assessment phase may further improve outcomes.
- Feedback welcome!

Springer Kaye, James Parker, Jonathan Price, Charles Chimera, Robert Parsons, Joel Brunger, Kris Meehan



2. Results: Outcomes for 12 species re-evaluated using this process

BIISC ran 12 species through the new protocol. Each of these species, except for the newly detected *Chromolaena odorata*, had been detected several to many years previously. Nine were placed on the back-burner, monitored periodically or ignored. One had been scheduled for delimiting surveys, in preparation for a possible eradication effort, and two had been immediately selected for eradication upon detection, due to the very small apparent population in the case of Foxglove, and the very high certainty of impacts associated with *Chromolaena*.

After applying our new protocol, using the Victorian Supplemental Assessment as written, the committee was left unsatisfied. According to the protocol, only three species, with scores falling between 0-6 (Evaluate) received the supplemental assessment. We felt we needed more information on local performance of five species with lower-end “High Risk” ratings on the HPWRA, i.e those with scores between 7-12. These are species whose global track record are not terribly alarming, but still pose a documented risk for invasiveness in Hawaii. We also had lingering questions about feasibility, particularly the human dimension. Were there any stakeholder issues that might impact the ability to take on these species effectively?

We adapted our procedure to run each species through the Supplemental Assessment, even if it had a high-risk rating on the HPWRA. This provided evidence of site-specific performance (reproduction, dispersal, association with disturbance, and time since arrival) right here in Hawaii. This more time-intensive step was completed for all but two species—one that had adequate information to reach a No Action determination, and one that is awaiting completion.

We also added a public outreach consultation step, examining the presence of the species in the horticultural trade, and use of the plant by other stakeholders, to determine whether significant barriers might be found to public acceptance of the eradication program.

With the additional information, firm management recommendations could be made for each species. Management recommendations for five of the twelve species changed, with two downgraded to No Action, or Monitor, and three escalated to Eradicate or Contain (Table 1).

Understanding that it routinely takes between \$10,000 and \$50,000 to mount the first cycle of survey and control of a new eradication target, and that funding for this work typically supports 5-10 target species on any island, narrowing the range of targets to those with clear evidence of invasive potential is mission-critical. Removing those species that, despite a high risk rating are not (yet) showing evidence of invasiveness, documenting a clear monitoring plan for those species, and focusing resources on those species that are spreading aggressively, should improve the success rate of eradication programs in Hawaii.

Table 1: Management Decisions under three protocols-Risk Assessment only, Supplemental Risk Assessment (local performance measured) for uncertain species, and Supplemental Risk Assessment for ALL Species. Firm management recommendations could be made more readily for five of twelve species when local performance was included in the evaluation of “high risk” species with moderate risk scores.

Species	HPWRA 7+ =high-risk, 0-6 =evaluate	Original Decision	Round 1 Supplemental Assessment	Round 1 Management Decision	Round 2 Supplemental Assessment	Round 2 Management Decision
Stenocarpus sinuatus TREE	0	Monitor	Delimit-Low Uncertainty	Monitor--Landowner concerns need to be resolved		Monitor--Landowner concerns need to be resolved
Leea indica TREE	4	Monitor	Delimit-Low Uncertainty	Eradicate		Eradicate
Parkia timoriana TREE	5	Monitor	Monitor-Medium Uncertainty	Monitor		Monitor
Phenax hirtus SHRUB	7	Monitor	N/A	Need more information	Delimit	Contain
Bursera simaruba TREE	7	Monitor	N/A	No Action. Does not appear to be aggressively spreading given long history in Hawaii.	(ruled out)	No Action
Heteropterys brachiata VINE	7	Monitor	N/A	Need more information	(Not yet done)	(Not yet done--keep monitoring)
Norantea guianensis VINE	7	Monitor	N/A	Need more information	Monitor-Low uncertainty	Monitor
Digitalis purpurea FORBE	7.5	Eradicate	N/A	Eradicate-clearly incipient.	Delimit	Eradicate
Lonicera hildebrandiana VINE	9	Monitor	N/A	Need more information	Delimit	Eradicate
Calliandra houstoniana var. calothyrsus SHRUB	12	Monitor	N/A	Need more information	Monitor-High Uncertainty	Monitor
Elaeagnus umbellata SHRUB	13	Delimit	N/A	Monitor. Does not appear to be aggressively spreading given long history in Hawaii.	Monitor-Medium Uncertainty	Monitor
Chromolaena odorata SHRUB	28	Eradicate	N/A	Eradicate-abundant evidence	Delimit	Eradicate

Target Species Selection Procedure

Standard Operating Procedure #008

Version 1.0 (9/9/20)

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Revision History Log:

Version #	Revision Date	Author	Changes Made	Reason for Change	
1.1	5/28/21	SJK	Incorporated feedback from 4/28/21 Steering Committee Meeting.	Most changes were requests for additional or more specific information.	
1.2	6/21/21	SJK	Added detail to clarify data collected during Secondary Assessment phase	These were previously detailed in a separate document, making it difficult to follow stepwise procedure.	
Add rows as needed for each change or set of changes associated with each version.					

1. Introduction

1.1. Purpose and Scope:

This SOP provides guidelines to research, evaluate, and document the characteristics of new or newly concerning plants found on the island, prioritize potential target species in terms of risk and feasibility of control, and develop a list of impactful targets feasible to eradicate, contain, or control on a limited basis. Findings and recommendations will be documented in a Weed Status Report, which aids the BIISC Steering Committee in making the final determination. The ultimate product is the Target Species List, a prioritized list of all species BIISC is working to eradicate.

1.2. Roles and Responsibilities:

Early Detection Program Coordinator (EDPC): Responsible for making sure all potential targets are researched and assessed according to set timelines. The coordinator must document the entire process clearly and provide regular updates to the manager and committee. Responsible for directing the ED technicians in assisting the prioritization process through research and documentation of observations, training field staff on identification, and gathering feedback from experts and BIISC subcommittees.

Early Detection Technicians: Assist the ED Coordinator in effort to prioritize all potential targets.

Operations Planner/Analyst: Provide mapping and analysis needed to complete the Effort Estimate.

Field Supervisor: Provide ground survey support to complete delimiting surveys.

Manager and Steering Committee: Review completed Weed Status Reports and decide the appropriate course of action for each species assessed. Ensure all Weed Status Reports are edited appropriately and made publicly available.

Communications Director: Develop a public outreach strategy once a target species has been selected for eradication.

1.3. Training Requirements:

The ED coordinator should have a degree in Botany or a related field, be familiar with most common invasive plants, and have a working knowledge of the impacts of invasive plants. ED Technicians will receive specific training in plant systematics (use of a dichotomous key, botanical nomenclature), survey

procedures and data collection, the BIISC database and have been working in Hawaii long enough to recognize common, widespread species without much effort. All staff completing assessments must be familiar with the four publications cited at the end of this SOP, and study in detail the Victoria Weed Risk Assessment Guide.

2. Prioritization Process

The Target Species Prioritization SOP is the procedure by which potential eradication targets will be scored and evaluated, with results documented in a Weed Status Report for each species considered. The process documents all the pertinent information used to decide whether a species should be targeted for eradication or other management goals.

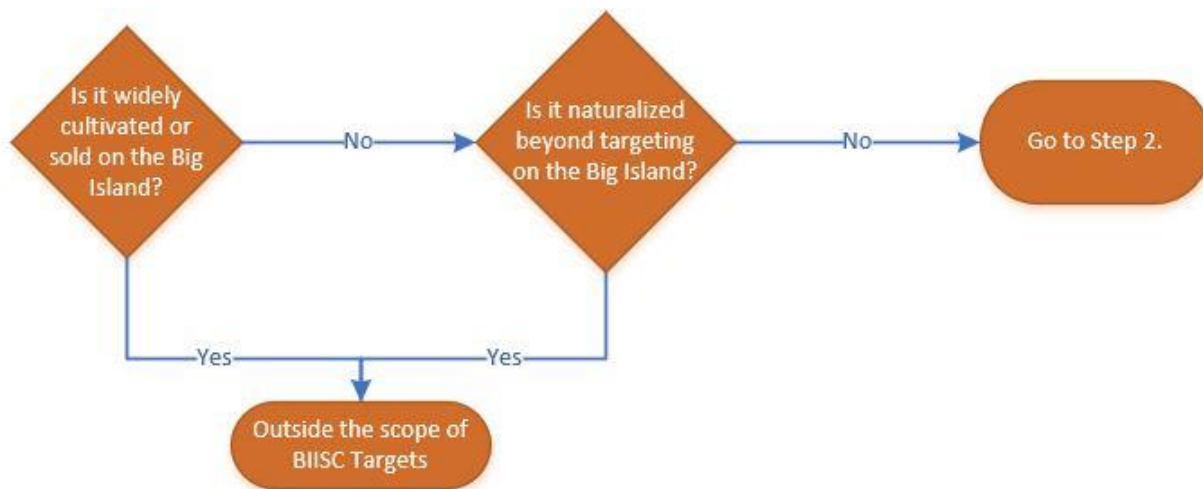
The process of evaluating a new species should begin immediately upon detection (for suspected new island records) or upon being selected for prioritization (for legacy species). Some gaps in information are to be expected, but the process is iterative in design. Once completed, the Steering Committee will review and assign a management goal at the next committee meeting.

The Weed Status Report should be considered a work in progress, to be updated and reconsidered when new information is obtained.

2.1. Species Determination and Initial Assessment

The correct identification of a new species is generally required to properly assess its weed history and impact around the world. All steps detailed in SOP 007 to obtain a species determination should proceed immediately upon first detection, and specialists should be actively pursued whenever a plant ID proves illusive. If you cannot confirm the ID within 60 days, continue on with the field assessment portions of this SOP while continuing to pursue species determination.

The initial assessment can be summed with a couple of important questions about the plant’s current status on the Big Island. Both questions must be answered “No” if the species is to be considered a potential target. If it is ruled outside the scope, complete the Weed Status Report with notes supporting the finding (i.e. widespread in forest reserves in three districts, found in 40% of nursery surveys, etc) and a recommendation of “No Action.” It is not necessary to complete the assessment tables in that case.



2.2. Obtain a Hawaii Weed Risk Assessment Score

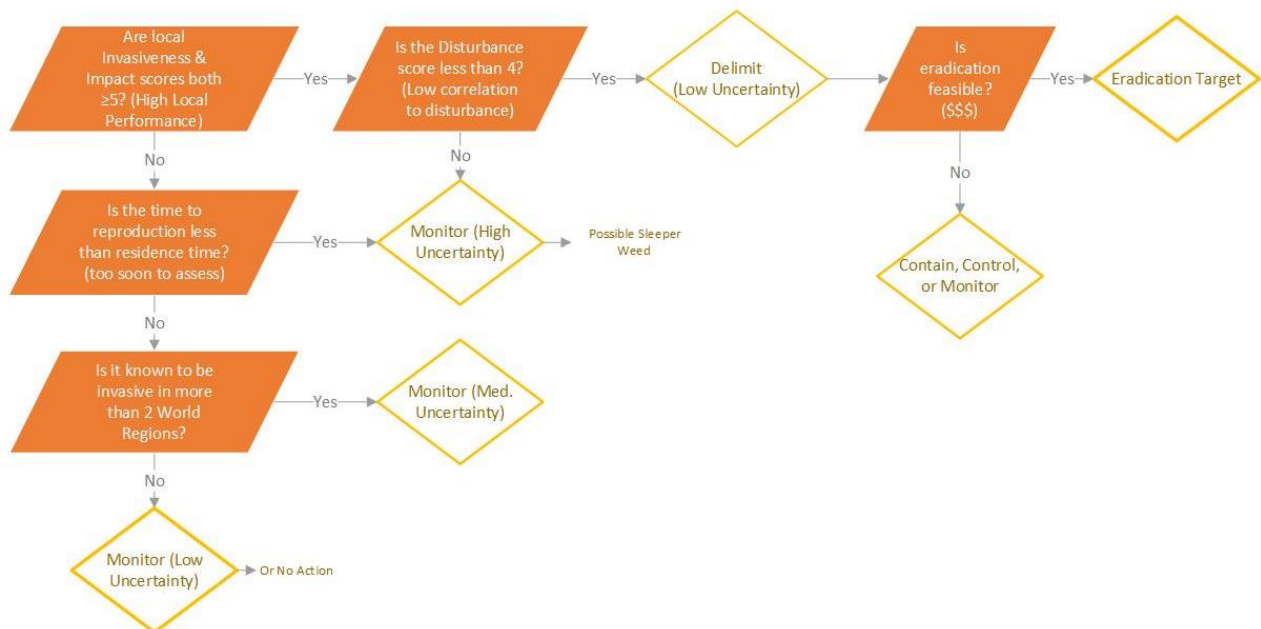
Check the HPWRA website at <https://sites.google.com/site/weedriskassessment/home> to see if the species has been assessed. If not, email Chuck Chimera at hpwra@hawaii.edu and request an assessment for your species. Provide field observations collected during the survey (e.g. fruiting/flowering, pollinators, density, plant count and size classes...). Chuck will develop and return the WRA score and post it on the HPWRA website.

The Weed Risk Assessment score is categorical, rather than a grade. A “Low-Risk” categorical rating is given to plants that score 0 or less. At this time the lowest number for low risk is -14. An “Evaluate” score is given to plants scoring between 1-6, and generally means we need more published information to obtain a clear rating. Seven or greater means the plant is likely to invade Hawai‘i’s landscapes (or already has). The highest score recorded is 32, for Lantana. Enter the WRA score on the worksheet.

- If the WRA score is 1 or greater it has an “Evaluate” or “High-Risk” rating: Proceed to Prioritization Step 3, Secondary Assessment. Note: Depending on BIISC workload, we may limit further assessment to scores of 12 or higher per Brock & Daehler, 2020.
- If the score is less than Zero and has been given a “Low-Risk” rating, complete an abbreviated Weed Status Report with a recommendation of “No Action.”

2.3. Step 3: Supplemental Risk Assessment

This process is adapted from the Victoria Early Invader Manual (Blood, et al., 2019) and in many sections is quoted directly from the manual. When a plant lacks enough information to complete an assessment, or has yet to be identified to species, we can rely on local performance observations to determine invasive potential. The overall process is summarized as follows:



As of 2021, the BIISC Steering Committee has recommended that we complete the Supplemental Risk Assessment for ALL potential target species prior to bringing them before the committee for prioritization, ensuring that adequate field observations are available to understand the plant's local performance. This process guides the decision on whether to spend the necessary funds to delimit and possibly control the population, or to monitor its performance and reassess at determined intervals.

There is a worksheet associated with this step (WESI_SupplementalRiskAssessment.pdf). The worksheet can be found as Appendix A. The questions on the worksheet contain prompts that explain how to score this section, and brief explanations regarding the questions can be found below. For more information, refer to the original document at <https://www.google.com/search?client=firefox-b-1-d&q=victoria+early+invader>manual>.

Weed History

Refer to the Global Compendium of Weeds (GCW) by Rod Randall for an answer to this question. A full version of the 2012 document can be found in the SOP_008 folder on the server. Quickly scan the document to find the scientific name of the species being assessed. At the bottom of the paragraph dedicated to the species, there is a list of regions preceded by a reference number and letter; for example "1262-E – Australia". The letter "E" refers to Environmental Weed, which is the only letter that counts for this question. Count how many regions are preceded by an E and record that number on the worksheet.

Local Performance

The primary consideration here is whether local field observations indicate the species could have adverse effects on the native forest—invasiveness and impact. Those values are then subjected to two filters: How long the species is considered to have been present (i.e. time-related filters, or uncertainty); and whether it occurs only in areas affected by disturbance (i.e. disturbance filter).

Measures

M1 – Invasiveness

This component requires you to determine whether the plant has spread vegetatively, by seed or via both mechanisms. You are asked to make simple measurements in relation to these possibilities. It may be difficult to identify seedlings when these are isolated, but it should be possible to get some idea of seedling identity, based upon the fact that most seedlings will appear close to parent plants. Should seedlings be detected, information on the pre-reproductive period (i.e. juvenile period) of the plant will give some idea of potential rates of spread—plants with shorter life cycles will spread more quickly than those with longer life cycles, all other things being equal.

Propagules are structures that can grow into new plants. These are commonly seeds, but also include detachable vegetative structures such as stem segments, bulbils, and aerial tubers. Vegetative reproduction can occur via such detachable structures, but more commonly occurs via joined vegetative structures, such as roots, rhizomes, stolons or creeping stems. The latter contribute to local spread, whereas seeds and detachable vegetative structures can be dispersed more easily, thereby contributing to spread over larger areas.

Take the data necessary to answer the following questions in the field:

- A. Has the plant reproduced in place by joined vegetative structures (e.g. local spread via roots, rhizomes, stolons or creeping stems)? Record the number of juveniles observed.
- B. Has the plant reproduced by seeds or detachable vegetative structures (e.g. stem segments, bulbils, and aerial tubers)? Record the number of juveniles observed.

- C1. How long does it take for a new individual to produce seeds or other propagules? (Less than 1 Year, 1-2 Years, or more than 2 years). This can be assumed from growth form, lacking other information. Most annuals will be less than one year, herbaceous perennials in less than 2, and the default for shrubs and trees is more than 2 years.
- C2. Distance that the plant has spread. Walk approximately 100 m in at least 2 different directions away from the presumed parent plant, and record when the last seedling or young plant is detected.

M2 – Impact

The impact on biodiversity values is a function of plant cover and total biomass. Because total biomass can be difficult to measure, the cover of a plant is commonly used because it is closely associated with impact. ***Here, the assessment of cover is intended to capture plants that "sound an alarm bell" for the observer, indicating that a plant is on the way to becoming dominant, at least locally.***

- A. Could species potentially alter community structure? Record local observations related to growth form and evidence of dominating or altering the community structure on site.

Consider the growth form of the species and the vegetation structure of the community concerned. Common transformations of community structure are conversion of grasslands to woodlands, degradation of forests by climbing plants that overtop trees, and domination of the ground layer by creepers that develop monocultures.

To answer this question, consider all the community types that exist on the island—where the plant occurs now may not be where it could have the greatest effect should it spread. Assistance in answering this question may be found through internet searches based upon the species name as well as through examination of a range of websites and databases (see list of databases and websites in Appendix 9). [NOTE: a detailed protocol is in development for this specifically tied to climate suitability maps. For now, use best judgement and document your reasoning].

Score the answer to this question as 'yes' or 'no', where:

Yes = score 5

No = score 0

- B. Has the plant attained a high level of cover?

For species reproducing vegetatively and joined to parent plants, including those that may also reproduce by seed, record the percent cover over a 2 X 2 m area.

For species reproducing by seed or other propagules and not joined to parent, record the percent cover over a 5 X 5 m area.

If the cover is 50% or greater, the answer is "Yes."

Filters

F1 – Time-related Filtering

Answering the questions in this section will help disclose uncertainty if the invasiveness or impact score total is less than 5 and the decision is to monitor. High uncertainty would suggest more frequent monitoring is called for than low uncertainty.

- A. How long has it been since first detection of the plant? Record the number of years.
- B. How long does it take the plant to produce seed or other propagules for the first time? (Less than 1 year, 1-2 years, or more than 2 years, same as above).
- C. Is the number for F1-A greater than the number for F1-B?
If Yes, the uncertainty is Medium
If No, the uncertainty is High

F2 – Disturbance Filtering

This section will determine how likely it is that the invasive characteristics your species is exhibiting pertain only to areas where disturbance is a recent or regular occurrence. Roadsides, construction sites, burn scars, flooding, pig rooting, and tillage are all examples of relevant disturbance. The higher the score, the more disturbance-related the plant is.

- A. Does the plant occur **only** in areas that have been recently (i.e. within the past few years) subjected to disturbance or are adjacent to an edge between natural vegetation and another land use? (Yes/No).
- B. What is the maximum distance that the plant (including seedlings) occurs from an edge? Only consider edges between natural vegetation and other land uses (e.g. roads, trails, ag land). Measure the distance **into** the natural vegetation, to at least 20 m.
 - Less than 10 m = score 3 (disturbance related)
 - 10-20 m = score 2
 - More than 20 m = score 1 (not disturbance related, can invade natural areas)
- C. Is the plant associated with other species that are commonly considered indicators of disturbance? Examples are annuals and early colonizers. Record 3-4 examples if observed.

Back at the office, enter the scores corresponding to all the data you collected in the WESI Supplemental Assessment Worksheet (Appendix A). Provide supplemental data in appropriate sections of the Weed Status Report.

Decision Making

When scores for either invasiveness or impact are less than critical values (5) and the disturbance score is more than 4, there is insufficient evidence for the realization of a threat to biodiversity values. This is because the plant occurs only under conditions of disturbance, with no evidence (yet) for its ability to establish and spread in intact vegetation.

An invasiveness score of 5 or less corresponds to situations where a plant has a long juvenile phase and seedlings, if present, are less than 10 m from a parent plant. An impact score of less than five suggests a species may have **the potential** to alter community structure owing to its growth form, but there is no evidence that it has produced sufficient cover to begin to realize this potential. A disturbance-filter score of greater than 4 corresponds to the situation where the plant occurs only in areas that are disturbance-affected, perhaps with other disturbance-adapted species, and/or only within 10 m of an edge.

The time-related filters (residence time and growth form) are combined to provide an estimate of uncertainty associated with the Local Performance evidence, where high uncertainty places a greater importance on regular monitoring to learn more about the species performance in Hawaii.

This process brings you to one of two possible courses of action: delimit or monitor.

- If delimit, it's a weed we ARE worried about. Proceed to Step 2.4: Feasibility Analysis.
- If monitor, it's a weed we are not so worried about, at least not yet. Proceed to Section 3: Weed Status Report. Describe in the management recommendations how often and by what method the species should be monitored.

2.4. Step 4: Feasibility Analysis (Only for “Delimit” species).

2.4.1. Public Opinion/User Assessment

Public opinion and current uses of a plant species can greatly influence the feasibility of undertaking an eradication or control program. At BIISC, we use two internal consultation steps, below, to complete this section, taking the time to formally assess the impact of targeting this species on stakeholders. A similar consideration might be whether the species could qualify for the noxious weeds list, or other regulatory or advisory lists.

1. Submit the information gathered up to this point to the Plant Pono Specialist (BIISC@hawaii.edu), who will research how commonly the plant is found in trade or utilized in Hawaii and the U.S. and determine whether the species qualifies for the Plant Pono No-Grow Plants List.
2. Schedule a consultation with the BIISC Communications Director to flag any public opinion concerns, identify key stakeholders, determine if a formal public opinion vetting process is needed, and begin framing an outreach plan if the species is likely to be adopted.

2.4.2. Determine an Initial Search Area

The process for delimiting surveys begins with creating an initial search area, i.e. buffering the points initially collected from reports or surveys. An initial 200 m buffer is acceptable for ALL species (although eventual search radius may be expanded to 500 m based on plant biology). NOTE: If the initial search area is greater than 500 acres, or expected to take more than 400 staff hours, Manager approval is required before proceeding.

2.4.3. Expand Roadside Surveys

Once the points are buffered, ED team will conduct a follow-up survey along all public roads within 1 Km of each known location of the species.

2.4.4. UAV Feasibility Assessment

During this survey, the ED team will assess the detectability of the new species at different altitudes above ground level. If the species is detectable at a safe flying height for the subject area, and the area is suitable for flying, then the ED Team will complete most or all the delimiting surveys by UAV. If not, the Plant Control team will take over planning the delimiting surveys. (Note, the initial UAV visibility assessment can be done during the secondary assessment, and may be used in determining cover).

2.4.5. Delimiting Surveys

Delimiting surveys should be a quick and dirty process to map the population extent, including the distance into forested areas, that the plant has spread. If visible by air, ED team will make flight plans and fly the buffer with the UAV. If by ground, the Field Supervisor (FS) will create transects within the buffers and schedule time for the plant crew and early detection staff to survey together. The FS will oversee getting permission to survey on foot on public and private parcels.

Delimiting surveys resemble most other BIISC ground surveys, except the crew will not be treating any plants with herbicide. The transects are spaced farther apart to decrease time spent per survey. They are meant to *quickly* survey an area and determine roughly how far the plant has spread.

2.4.6. Effort Estimate

After survey points are entered in the database, the Operations Planner/Analyst (OPS) and Field Supervisor will work together to complete the Effort Estimate Worksheet (Appendix B), i.e. how many staff hours it will take to survey and treat the updated search area. They will create a polygon (200 meters buffer; 500m in some scenarios) around all mapped plants and provide the total acreage and number of TMKs that fall within the search area. OPS will work with the Field Supervisor and Coordinator to select the other measures in the effort estimate, such as difficulty of terrain and rate of survey, revisit schedule, difficulty of control, driving time, etc.

If plants are found throughout the initial delimiting survey area, OPS, FS, EDPC, and Manager must discuss whether to expand the delimiting surveys to reach the population extent or accept that the plant is already too widely naturalized to control. This will depend on the relative size of the initial population compared to what is found in surveys, and on available staff and resources. If a decision is made not to continue, note the mapped minimum area in acres in the Weed Status Report and note that the population extent was not reached.

If a containment goal seems like a more feasible approach, the Effort Estimate must be re-run to determine the effort, in hours, associated with the containment approach (i.e. less survey acreage). Results for both eradication and containment goals should be presented to the committee.

3. Weed Status Report.

The final product of the prioritization process is a Weed Status Report that documents all the pertinent information used by the Manager and Steering Committee to evaluate the adoption or rejection of the proposed eradication target. It is a living document and includes a revision history table to document any the reasoning behind any updates to the report.

Follow the Table of Contents below to produce the weed status report and use the examples in the Weed Status Report folder for guidance.

- I. Overview
 - a. General description of the plant and its impacts
 - b. Global status
 - c. Overview of its situation in Hawaii, including the number of sites and number of plants observed in each size class/reproductive stage.
 - d. Regulatory Status
- II. Summary Table
- III. Taxonomy
 - a. Family
 - b. Latin Name
 - c. Synonyms
 - d. Common Name
 - e. Taxonomic notes
 - f. Nomenclature
 - g. Related Species in Hawaii
- IV. Description
- V. Biology & Ecology
 - a. Cultivation
 - b. Invasiveness

- c. Pollination – If any pollinators are known, note whether they are present in Hawai`i.
- d. Propagation
- e. Dispersal
- f. Pests & Diseases – if mentioned, note whether present in Hawai`i.
- VI. Distribution
 - a. Native Range
 - b. Global Distribution
 - c. State of Hawaii Distribution
 - d. Island of Hawaii Distribution
 - e. Presence/Frequency in Trade
 - f. Climate Match (GBIF/KEW) --protocol in progress.
- VII. Survey Methods
 - a. General survey considerations
 - b. Visible by UAV?
 - c. Good candidate for helicopter or remote sensing?
- VIII. Control Methods
 - a. Physical Control
 - b. Chemical Control
 - c. Biological Control
 - d. Cultural Control
- IX. Other Considerations affecting the probability of success or severity of impact (i.e. stakeholders, safety considerations, endangered resources, unusual species interactions, etc.)
- X. Management Recommendations
 - a. Summary Table
 - b. Brief summary of management options or recommendations
- XI. Final Decision of Steering Committee (leave blank until a decision is made).
- XII. Attachments
 - a. Photos
 - b. Worksheets
 - c. Research and field notes (These will be provided to steering committee but removed prior to publication)

In the Weed Status Report, include photos suitable for publications and staff training, and place copies on the server. (Z:\Projects\Target Prioritization) A minimum of six photos should include the growth habit, close-up of leaves, leaf arrangement, flowers, fruit, and citations for the copyright owner. If not a BIISC or Starr photo, or a photo otherwise marked as “commons,” we need explicit permission, in writing, to use the image for media purposes.

When complete, this document should document all the information used to make an educated decision on whether or not to adopt a species as an eradication target. The last section of the report will be updated after decision making.

Summary Table (EXAMPLE)	
Name	<i>Phenax hirtus</i>

HWRA Rating (Low Risk, Evaluate, High Risk)	6 (Evaluate)
Supplementary Assessment Findings (if needed): GCW, Invasiveness, Impact, Disturbance, and Recommendation + Uncertainty: e.g. Delimit (Low Uncertainty)	Delimit (low uncertainty)
Minimum Estimated Area (Acres)	879
Hours to control	Year 1: 2,405 Total: 9,049
Minimum Years to control	4 revisits

4. Selection and Prioritization

The Manager and BIISC Steering Committee will review all Weed Status Reports completed each quarter and consider the recommendations made, including those recommended for monitoring or No Action.

Species approved by the committee will be added to a Target Species List, which can be found on the server (Z:\Projects\Target Prioritization).

Once the decision is made, update the last section of the Weed Status Report, select a subtitle (Eradication Target, Containment Target, Subject of Monitoring or Unmanaged Invasive Species) and pass it on to the Outreach Team to upload to the website.

References

- Timmins, S.M., Owen, S.J. (1999) Eradicate this weed or not: Decision making for weed-led control programmes. DOC Science Poster No. 21. Department of Conservation, Wellington.
- Blood, K., James, R., Panetta, F. D., Sheehan, M., Adair, R., and Gold, B. (2019) Early invader manual: managing early invader environmental weeds in Victoria. Department of SBN 978-1-76077-317-5 (Print); ISBN 978-1-76077-318-2 (pdf/online/MS word).
- Brock K.C., Daehler C.C. (2020) Applying an invasion and risk framework to track non-native island floras: a case study of challenges and solutions in Hawai'i. In: Wilson JR, Bacher S, Daehler CC, Groom QJ, Kumschick S, Lockwood JL, Robinson TB, Zengeya TA, Richardson DM (Eds) Frameworks used in Invasion Science. *NeoBiota* 62: 55–79. <https://doi.org/10.3897/neobiota.62.52764>
- Daehler, C. C., J. S. Denslow, S. Ansari, and H. Kuo. 2004. A risk assessment system for screening out invasive pest plants from Hawai'i and other Pacific Islands. *Conservation Biology* 18:360-368.

Appendix 2 - Environmental weed risk screen score sheet template

Note: Use is optional and only required if a risk rating is not available in either the Advisory list of environmental weeds in Victoria, or in the Victorian Weed Risk Assessments (if you can't find it, double check that it is not under an old or a newer botanical name for the same weed).

Purpose: To assess the risk posed by a weed to biodiversity. The plant may have been either newly detected, or has been known to be present for some time but not assessed previously.

Output: Recommendation to either delimit (determine the full extent in the field) or monitor. A risk rating score is not given. **Scale:** Local scale such as, for example, a park, forest or reserve. **Where to find them:** The screen process is described in the "Managing weeds: assess the risk guide", and the completed screens are stored on the Spatial, Temporal, Activity Recorder (STAR) attached to site/species related records. **Note:** The scoring system may be also used for new detections of **native** species, for instance native plants that have been introduced from Australian regions in which they are indigenous.

Completing the screen: There is both a desk-top component and a field component to completing this screen. You will need to view the weed in the field.

Species:	Screen completed by:
Species location:	Date of assessment:

Weed History

Record the number of world regions (*A Global Compendium of Weeds* by Rod Randall is recommended) in which the species of concern has been recorded as an *environmental* weed (i.e. 'E' references only).

Refer to Table 1 (Page 6) in the *Compendium* and locate the relevant reference and location per reference - use this to determine the number of world regions the species of concern has been recorded (e.g. Africa, Australasia (i.e. Australia and New Zealand), Caribbean, Europe, North America, Pacific, South America and Subantarctic).

- There are 60 pages of references in the *Compendium*, so for ease of use it may be worthwhile printing off the reference pages (as double-sided copy) if many assessments are to be undertaken.
- Check to see if the weed occurs under more than one name (i.e. under synonyms).
- Ignore references linked with 'global' locations or lists of 'potential weeds', unless the original source can be checked to determine whether these lists include any actual records of occurrence.

Randall, R. P. (2017) *A Global Compendium of Weeds* (3rd edn). Perth, Western Australia.

<https://www.cabi.org/isc/FullTextPDF/2017/20173071957.pdf> or

https://www.dpaw.wa.gov.au/images/documents/plants-animals/plants/weeds/Compendium_3rd_Edition_2017.pdf or

<https://nla.gov.au/nla.obj-512788350/view>

Additional references used can be added at the end of this sheet.

Number of world regions:

Local Performance	
Measures	Score
<p>M1 Invasiveness Propagules are structures that can grow into new plants. These are commonly seeds, but also include detachable vegetative structures such as stem segments, bulbils, and aerial tubers. Vegetative reproduction can occur via such <u>detachable</u> structures, but more commonly occurs via <u>joined</u> vegetative structures, such as roots, rhizomes, stolons or creeping stems. The latter contribute to local spread, whereas seeds and detachable vegetative structures can be more easily dispersed, thereby contributing to spread over larger areas.</p> <p>M1a Evidence of reproduction <i>M1a1 Has the plant reproduced in place i.e. locally at this site, by <u>joined</u> vegetative structures (e.g. local spread via roots, rhizomes, stolons or creeping stems)?</i></p> <p>Reproduction via detachable vegetative structures (propagules) is considered to be functionally similar to reproduction via seeds and is covered under the next question.</p> <p>Yes = score 1 No = score 0</p>	
<p><i>M1a2 Has the plant reproduced by seeds or <u>detachable</u> vegetative structures (e.g. stem segments, bulbils, and aerial tubers)?</i></p> <p>Yes = score 2 No = score 0</p>	
<p>M1b Pre-reproductive period <i>How long does it take for a new individual to produce seeds or other propagules?</i></p> <p>Less than 1 yr = score 3 1 to 2 yrs = score 2 More than 2 yrs = score 1 Default for shrubs and trees = score 1</p>	
<p>M1c Evidence of spread <i>M1c1 For vegetative spread via structures <u>joined</u> to parent plants:</i></p> <p>Spread to less than 1 m = score 0 Spread more than 1 m = score 1</p>	
<p><i>M1c2 For spread via seed or <u>detached</u> vegetative propagules:</i></p> <p>For the direction in which plants are detected at the greatest distance, score as follows, where final detection occurs at:</p> <p>Less than 10 m = score 1 10 to 50 m = score 2 More than 50 m = score 3</p>	
Total score for invasiveness	

<p>M2 Impact M2a Could species <i>potentially</i> alter community structure at this site? Score the answer to this question as 'yes' or 'no', where:</p> <p>Yes = score 5 No = score 0</p>	
<p>M2b Has the plant attained a high level of cover? Locate a dense patch of the infestation and record its cover to answer the question below. This question will be answered as 'yes' or 'no', where 'yes' corresponds to 50% cover over a 2 X 2 m area for species reproducing vegetatively (via structures <u>joined</u> to parent plants), and over a 5 X 5 m area for those reproducing by seed or other propagules. If the plant reproduces by both</p>	

<p>methods, record the cover that has been achieved through vegetative spread.</p> <p>Yes = score 10 No = score 0</p> <p>If the recommended sample areas (2 X 2 m = 4 m² or 5 X 5 m = 25 m²) are not available, slightly (e.g. 10-20%) smaller areas can be used; otherwise it will be necessary to monitor the infestation for future increases in cover.</p>	
Total score for impact	

Filters	
<p>F1 Time-related filtering <u>Only complete this section (i.e. F1a, F1b and F1c) if the invasiveness OR impact score total is less than 5.</u> The decision made will be to <i>monitor</i>, but this section assists in determining the uncertainty associated with this decision.</p>	
<p>F1a Residence time <i>How long has it been since first detection of the plant?</i></p> <p>Less than 1 yr = score 1 1 to 2 yrs = score 2 Between 2 and 5 yrs = score 3 More than 5 yrs = score 4</p> <p>Default values = 1–2 years for biennial or perennial herbaceous species (includes aquatic plants) and 2–5 years for woody plants, based on the assumption that plants will have required sufficient time to become reproductive prior to formal identification.</p>	
<p>F1b Pre-reproductive (juvenile) period <i>How long does it take the plant to produce seed or other propagules for the first time? (see answer to M1b)</i></p> <p>Less than 1 yr = score 1 1 to 2 yrs = score 2 More than 2 yrs = score 3</p>	
<p>F1c Comparing values for individual filters <i>Is the number for F1a (residence time) greater than that for F1b (juvenile period)?</i></p> <p>Yes (uncertainty = Medium) No (uncertainty = High)</p> <p>High uncertainty where residence time is less than time to reproduction reflects a lack of opportunity to become invasive and cause impact. Further monitoring will be required to assess weed risk properly for plants that reproduce <i>only</i> via seed or other propagules.</p>	
<p>Time-related uncertainty</p> <p>High <input type="checkbox"/> (Further monitoring required) Medium <input type="checkbox"/> (Continue assessment)</p>	
<p>F2 Disturbance filtering <i>F2a Does the plant occur <u>only</u> in areas that have been recently (i.e. within the past few years) subjected to disturbance or are adjacent to an edge between natural vegetation and another land use?</i></p> <p>Yes = score 1 No = score 0</p>	
<p><i>F2b What is the maximum distance that the plant (including seedlings) occurs from an edge?</i></p> <p>Less than 10 m = score 3 10 to 20 m = score 2</p>	

More than 20 m = score 1	
<p><i>F2c Is the plant associated with other species that are commonly considered indicators of disturbance?</i></p> <p>Such species will generally be annuals and other early colonisers. Common colonisers of edges, whether they occur next to agricultural land or roads and tracks, include Yorkshire Fog (<i>Holcus lanatus</i>), Perennial Veldtgrass (<i>Ehrharta calycina</i>), Large Quaking-grass (<i>Briza maxima</i>), Spear Thistle (<i>Cirsium vulgare</i>), Smooth Cat's Ear (<i>Hypochoeris glabra</i>), Cape Weed (<i>Arctotheca calendula</i>), Kikuyu (<i>Pennisetum clandestinum</i>) and Flax-leaved Broom (<i>Genista linifolia</i>). Indicators of other types of disturbance are too many and varied to be listed here. If in doubt, answer 'no'.</p> <p>Yes = score 1 No = score 0</p>	
Total score for disturbance	

Decision making	
Local Performance	Disturbance
Are invasiveness and impact scores both more than 5? Yes <input type="checkbox"/> No <input type="checkbox"/>	Is the disturbance score less than 4? Yes <input type="checkbox"/> No <input type="checkbox"/>
<p>If the answer to the Local Performance question is 'yes' and to the Disturbance question is 'yes', <i>delimitation</i> should be undertaken.</p> <p>In most other circumstances the species should be subjected to <i>monitoring</i> over time to detect possible changes in invasiveness and/or impacts.</p> <p>A possible exception to this rule is the situation where the answer to the Local Performance question is 'no', but the species is found in more than two world regions. In this case, additional information relating to potential weed risk gained from online searches may ultimately support a decision to delimit, employing a precautionary approach.</p>	
<p>Decision: Delimit <input type="checkbox"/> OR Monitor <input type="checkbox"/></p>	
<p>Where the decision is to <i>delimit</i>, the associated uncertainty is low, meaning that this decision may be taken with confidence.</p> <p>For decisions to <i>monitor</i>, if the answer to the Local Performance question is 'no', the decision is associated with low uncertainty if there is relatively low evidence of Weed History (i.e. the species is an environmental weed in two or fewer world regions). If there is a high level of Weed History evidence, however, the decision is associated with high uncertainty if the time-related filter is failed and medium uncertainty if the disturbance filter is failed. This combination (i.e. high World History and low Local Performance) captures so-called 'sleeper weeds' and is the most problematic. If practicable, monitoring at yearly intervals is recommended to detect changes in invasiveness and/or impact.</p>	

References

List all references used during this risk assessment (add references below):

- Randall, R. P. (2017) A Global Compendium of Weeds (3rd edn) Perth, Western Australia.

Effort Estimate

Date of assessment:

Species:	Screen completed by:
-----------------	-----------------------------

Parameter	Value
1.1 Vegetation and terrain: [Hours/acre: residential/pasture = 0.3, open lava flow/shrubland/sparse woodland = 0.6, dense forest = 1.6, extremely difficult (extremely dense vegetation, gulch crossing, difficult approach) = 2.9].	
1.2 Number of revisits (Scale: 2 = minimum to 10 = many)	
1.3 Difficulty of control (Scale: easy = 1, moderately difficult = 1.6, very difficult = 2.8)	
1.4 Amount of time driving per day is entered as a multiplication factor: 1 hour, enter 1.14; 2 hours, enter 1.33, 3 hours enter 1.60, 4 hours enter 2.0.	
1.5 Number of acres in the buffer	
Multipliers Sub-Total	
2.1 Private parcels: enter 1 for every parcel, including buffer areas around known populations.	
2.2 New Herbicide Trial (add 400)	
Total Staff Hours	

- Choose the Hours/acre designation that corresponds to the site where the potential target is located.
- Number of revisits depends on both generation time and seed longevity. When seed longevity is long, but generation time is short, many visits will be needed to exhaust the seed bank while preventing new seeds from being added. Minimum is 2; maximum may be very large.
- Difficulty of control may be caused by any number of factors, such as difficulty to detect, population density, or possessing other features that may slow down treatment (e.g. thorns). This a characteristic of the species itself and is separate from the influence of vegetation and terrain.
- Distance from the baseyard increases cost with distance. This is calculated as the fraction of a given workday taken up by travel time. Calculate round-trip travel time.
- Assuming it takes 1 hour to secure permission for a private parcel, this is added on top of the total effort, and is independent of the total area.
- New herbicide trials take about 40 staff hours, which is a one-time add-on above total costs

Effort Estimate – Justification for Scores

1.1	
1.2	
1.3	
1.4	
1.5	
2.1	
2.2	

Phenax hirtus (Phenax)
Management Goal: Containment

Revision History:

Revision Date	Author	Changes Made	Reason for Change	New Version #
12/1/2020	SJK	Updated goal from “evaluate” to “containment.” Removed internal notes to prepare for publication.	Steering Committee adopts as a containment target species.	2
Add rows as needed for each change or set of changes associated with each version.				

I. Overview

Phenax hirtus (Phenax) is a tropical shrub in the Urticaceae (Nettle) family. It is a plant that thrives in disturbed, moist, shady environments. In its native region of Central and South America, *Phenax hirtus* (Phenax) is commonly found above 1000 meters in elevation. Flourishing in tropical climates, Phenax fruit is easily dispersed by wind and water (1).

Phenax was collected in 2017 as naturalized above Kona in the Makaula-Ooma State Forest Reserve adjacent to Kaloko Mauka where it has formed dense thickets up to 15 ft in height. It may have been introduced as early as 1995 (Lyman Perry, personal communication). As of 2020 the estimated search area is a minimum of 935 acres, along trails, roadsides, and 600 meters into the forest reserve. The infested area is an unmanaged, lower priority conservation area for the primary land owner, however plants have been found near endangered plant species.

The BIISC Steering Committee has adopted Phenax as a containment target, with a 2021 goal to contain the species to its current site in Kona while more is learned about managing this plant.

Summary Table	
Name	<i>Phenax hirtus</i>
HWRA Rating (Low Risk, Evaluate, High Risk)	7 (High Risk, raised after Supp Assess). <i>[At time of assessment: 6 (Evaluate). Little is known about this species. It has not previously been documented as an invasive plant anywhere in the world.]</i>
Supplementary Assessment. Considers Gobal Weed Status (GCW), Invasiveness, Impact, Disturbance, and Uncertainty	Delimit (low uncertainty). This determination means that the species exhibits enough local or global evidence of disturbance-independent invasiveness that we should delimit the population and seriously consider controlling it. The uncertainty associated with risk is low for this species (i.e. we are fairly certain it’s bad). This determination was based primarily on local performance.
Minimum Estimated Search Area (Acres)	935 acres at a single site
Hours to control	2,404 hours in Year 1. 9,622 hours total.
Minimum Years to control	4 revisits, 4-8 years

II. Taxonomy

- a. Family: Urticaceae
- b. Latin: *Phenax hirtus* (Determination received in July, 2020).
- c. Synonyms: *Boehmeria hirta*, *Phenax hirtus* var. *minor*, *Phenax hirtus* var. *petiolaris*, *Phenax laevigatus* var. *serratus*, *Phenax pentlandianus*, *Phenax petiolaris*, *Phenax rugosus* var. *mandonii*, *Phenax rugosus* var. *minor*, *Phenax urticifolius*, *Procris hirta*, *Urtica hirta* (2)
- d. Common Names: Phenax
- e. Taxonomic Notes: Specimens currently under review by Warren Wagner (Smithsonian) and description will be produced for the HBS Occasional Papers (as of Oct 2020).
- f. Nomenclature: *Phenax* – Imposter ; *Hirtus* – Hairy
- g. Related Species In Hawaii: Several native plants are in the Urticaceae family including *Pipturus albidus* (Mamaki). *Cecropia obtusifolia* (Cecropia) is also in the Urticaceae and is a widespread weed in Hawaii.

III. Description

Awaiting full detailed description from Warren Wagner at Smithsonian Museum.

Sprawling shrub growing up to 15 ft tall. Highly variable leaf size, 1-5” based on amount of sunlight. Alternate leaf arrangement with “leaf-within-a-leaf” venation pattern. Inflorescences grow at leaf nodes, tiny seeds produced with hook-like appendage for dispersal.

IV. Biology and Ecology

- a. Cultivation: *Phenax hirtus* (Phenax) is an obscure species with very little data on cultivation.
- b. Invasiveness: WRA – 6 (evaluate) *Phenax hirtus* demonstrates environmental versatility, thrives in tropical climates, and having a fruit which can easily spread by animals, wind, and water (1).
- c. Pollination: Most Urticaceae are wind pollinated (1).
- d. Propagation: NA
- e. Dispersal: Dispersal is done by either wind, water, animals, or people.
- f. Pests and Diseases: NA

V. Distribution

- a. Native Range: *Phenax hirtus* (Phenax) native range is Mexico, Central America, and South America (2).
- b. Global Distribution: *Phenax hirtus* (Phenax) has been documented throughout Central and South America along with French Guiana, and Myanmar (2).
- c. State of Hawaii Distribution: *Phenax hirtus* (Phenax) has only been collected as naturalized on Hawaii Island.
- d. Island of Hawaii Distribution: *Phenax hirtus* (Phenax) was collected in 2017 as naturalized above Kona in the Makaula-Ooma Forest reserve adjacent to Kaloko mauka. As of October 2020, this is the only known location of it on Hawaii Island.

VI. Control Methods

- a. Physical Control: Pulling up small plants is possible. Plants in the nettle family often send up shoots from the roots, so periodic cutting alone is unlikely to be effective.
- b. Chemical Control: No information available. Likely treated by foliar application of non-selective, systemic herbicide. A foliar and a drizzle application of triclopyr were applied in herbicide trials launched on November 2020.
- c. Biological Control: NA
- d. Cultural Control: Seeds are likely to be spread via muddy shoes, bike tires, pets and tools. Maintaining trail corridors will be important to prevent further spread.
- e. Regulatory Status: *Phenax hirtus* (Phenax) does not appear on any noxious weed lists.

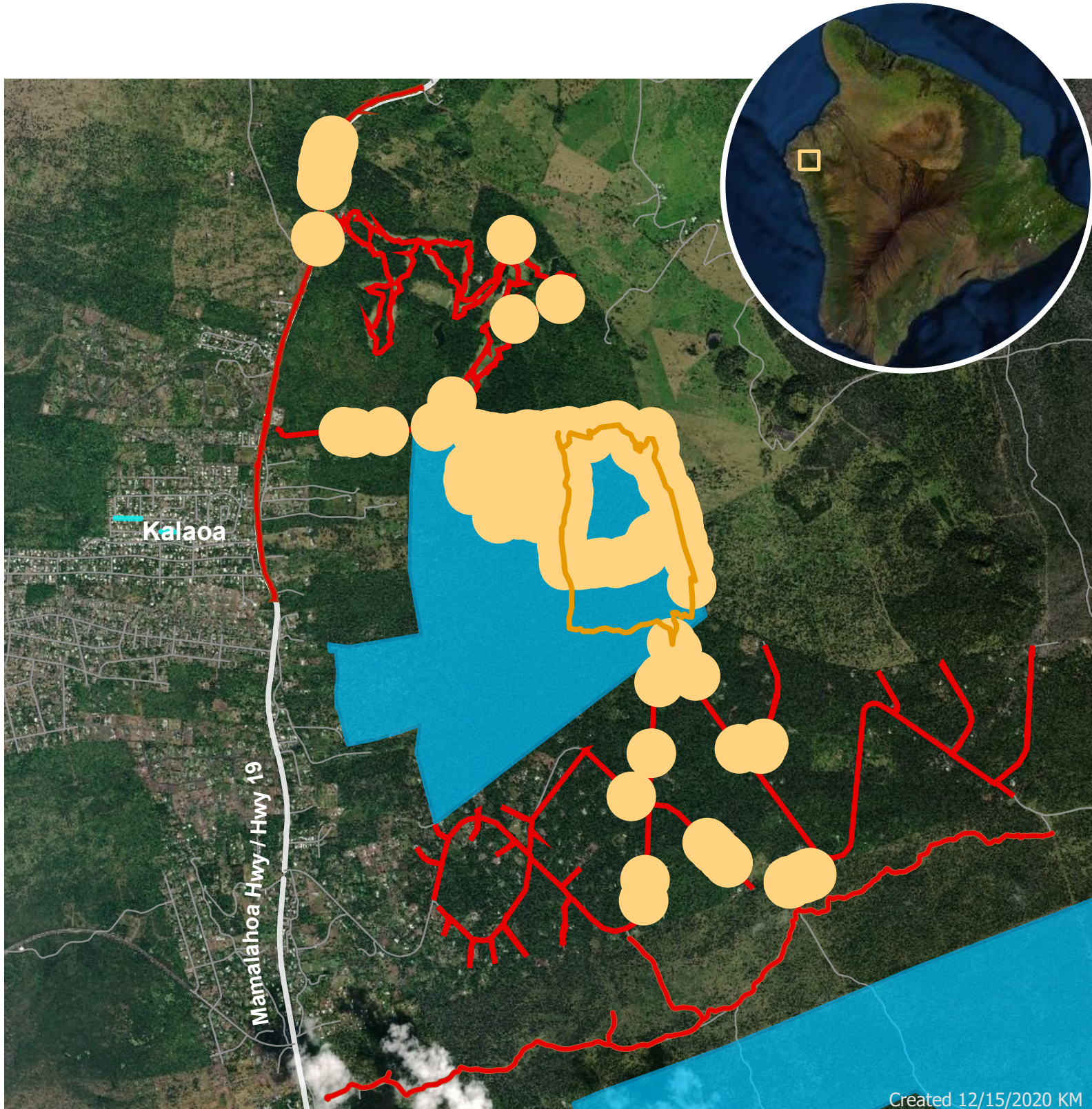
VII. Management Recommendations

While little is known about this species as a weed globally, local observations indicate it is capable of forming dense thickets extending several hundred meters into mesic forests with minimal disturbance or human assistance. With over 900 acres mapped, this species would be a stretch for any program to manage unless it proves easy to control with a short-lived seedbank (factors unknown at this time). Three possible approaches present themselves:

1. Do nothing
2. Containment: Focus a limited amount of staff time on controlling Phenax along trails and roadsides to prevent its movement to other sites. Monitor seedbank viability and assess control methods before committing to eradication. Enlist DOFAW to control plants in endangered plant habitat. Work with volunteers along trails.
3. Eradication: Commit to eradication now, starting with Containment efforts described above, endangered plant habitat, then moving swiftly to initial suppression in the forest reserve.

On December 1, 2020, the BIISC Steering Committee adopted Phenax as a containment target. While it was agreed that the species presents a high enough risk to merit eradication, current resources are insufficient to take on eradication across 900+ acres in Kona. The goal is therefore to contain the species to its current location in Kona, and in the process develop control methods, develop a plan to control the species along priority roads and trails, and engage landowners, other conservation land managers, and volunteers to assist in control efforts. DOFAW staff have already begun treatment in two sites. Also key to this effort will be developing an outreach strategy and signage where appropriate to boost weed sanitation efforts and promote reporting of new locations. This species will be reconsidered at the end of 2021 as a potential eradication target.

Phenax hirtus Detections



- Phenax Survey Lines
- Makuala O'oma Trail
- Phenax Detection Areas
- Honua'ula Forest Reserve

0 0.5 1 2 Miles

Most recent survey date: 11/20/2020



BIISC

BIG ISLAND INVASIVE SPECIES COMMITTEE

NOTES

10/6/20

- With a WRA of 6 (Evaluate) the SUPPLEMENTAL ASSESSMENT was completed, and the recommendation was to DELIMIT the population. Early Detection team did follow-up surveys in the area and plants found on those surveys were buffered 200m. Refer to map above. Further delimiting surveys still pending.
- Minimum search distance encompasses an area of 879 acres. Initial EFFORT ESTIMATE was completed for this plant based on that acreage. It was estimated that an effort to eradicate this species would require 9,049 staff hours. With “Year 1: Initial control” being complete after an effort of 2,262 staff hours. **Since updated.**
- CONFER WITH BIISC PLANT CREW SUPERVISOR AND GIS ANALYST TO ASSESS NEED TO FURTHER DELIMIT POPULATION.
- **Partner interest:** Trails maintained by volunteers and Na Ala Hele, and there may be a way to get them to take special care to treating this plant along trails (MOU with Na ala hele). Owner of large ranch in the area has committed to spray plants when they are found on his ranch land. He has given us access to survey the ranch.
- **Recommendation to committee:** This new plant pest has an extensive elevation range with the ability to grow in deep shade. It is a threat to native forest in Kona and could be moved around quite easily with its tiny seeds. At the very least, we’re looking at an impact similar to Hyptis in Kona.

10/22/20

- Met with BIISC Plant Crew supervisor and GIS Analyst to talk about delimiting surveys.
- Decided to do sweeps through a 1km squared area adjacent to the water tank road on North end of Makaula Ooma Forest Reserve.
- These sweeps will give us a picture of how far the Phenax is spreading beyond roads and trails in addition to letting us know if we need to do more delimiting surveys.
- MEET AGAIN AFTER DELIMITING SWEEPS ARE COMPLETED.

11/16/20

- Conducted delimiting surveys within Makaula Ooma Forest Reserve 11/9 – 11/10
- Swept through an area 600m x 750m. Forest was heavily invaded with silk oak and ginger, making it difficult to move quickly. Much of the survey area was heavily infested with Phenax. In my opinion, we found the Western extent of the population within the FR.
- Updated map on Weed Status Report
- Found an additional 56 acres of infestation within the FR and updated the EFFORT ESTIMATE and Summary Table.
- EMAILED STEERING COMMITTEE WITH REPORT FOR DISCUSSION AT QUARTERLY MEETING 12/1/20.



Photo by James Parker



Photo by James Parker



Photo by James Parker

References

1. Chimera, Charles (2020). Phenax hirtus Assessment Report. Published on the Internet; <http://www.plantpono.org/hpwra/phenax-hirtus/> Retrieved 11 November 2020.
2. POWO (2019). Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet; <http://www.plantsoftheworldonline.org/> Retrieved 11 November 2020.