



Laukahi: The Hawai'i Plant Conservation Network

Priority	Research Topic	Genus/Species and comments
1	Threat Control: Alien Invasive Plants	Too many to list easily here, but it seems to me that the most problematic invasive plants are: Psidium cattleianum Clidemia hirta, Morella faya, invasive grasses, Casuarinaceae equisetifolia, Leucaena leucocephala
1		In my limited observations, most natural area managers are struggling most with threats (including all others listed), making outplanting and genetic banking attempts secondary until effective prevention and management methods are developed. Keystone species such as Meterosideros must be at a minimum protected to maintain genetic diversity.
1		Clidemia hirta, Psidium cattleianum, Hedychium gardnerianum, to name a few
1		More so developing techniques/tools for management in difficult terrain, researching invasive phenology & seed germination/dormancy and developing models that would aid in prioritization of target species within a management unit
2	Threat Control: Alien Invasive Plants	Clidemia, tibuchina, strawberry guava, christmas berry. These four species are the biggest hold up for restoration of mesic to wet mesic zones. Even after removal, they are capable of re-establishment in areas of 100% native cover.
2		We are seeing an explosion of alien plants. On East Maui pines have especially but we're also seeing Himalayan ginger populations in places we've never seen it before.
2		Biocontrol needed for Schinus terebinthifolius, promising biocontrol already being tested in Florida
3	Threat Control: Alien Invasive Plants	california grass, haole koa
3		Address control methods for field use; Biocontrol for widespread invasive plants; Do alien plants really compete with native plants for resources (water, nutrients, light, etc.)?



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3	Threat Control: Alien Invasive Plants	We once had some really great native shrubland with <i>Schiedea salicaria</i> on W. Maui. A few years ago a fire, fueled by exotic grasses, swept through this area- we have not had the chance to go back to see how many <i>Schiedea salicaria</i> plants are still there. When we first visited these populations in the late 1980's the dry shrublands were full of native species, but I am not sure what they are like now. Even a few fire breaks might have made the difference. The effects of alien grasses on native dryland communities are devastating. Fountain grass is now spreading around to the side of Diamond Head with <i>Schiedea adamantis</i> - this species could still be controlled.
4	Threat Control: Alien Invasive Plants	various depending on habitat
4		Strawberry guava etc
4		Biocontrol for <i>Clidemia hirta</i> still needed
4		like more ways to control bigger areas of ubiquitous weed species next to or within intact forest- biological control or weed suppression techniques (i.e. HBT on drones or something) that will allow native forest regeneration in a big way. For instance if there was a way to get rid of understory <i>clidemia</i> in a native dominated canopy. Maybe this is too broad?
5	Threat Control: Alien Invasive Plants	<i>Schiedea</i> .: Alien invasive plants greatly impact where native populations can survive and how well plants in restoration areas will do.
5		Controlling invasive grasses in areas with rare plant species (<i>Bidens</i> ssp., <i>Phyllostegia</i> ssp., <i>Clermontia</i> and <i>Cyanea</i> ssp.)
5		List species in priority for those species with least - to most - invasive plant management importance. Helps to determine which species and where the most action is required (a triage for species locations)



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1	Threat Control: Insects	Cyanea sp.
1	Threat Control: Insects	I have heard from managers that many outplants die from pests (insects and others such as mites) and diseases. While there is good work being done on many other threats, I do not see much work being done on pests and diseases of rare plants. I think this would be the area where most progress can be made.
2	Threat Control: Insects	It would be great to have a control method that can be used in the field for Coffee Twig Borer for <i>Fluggea</i> and other species that are harmed by it.
2		Species impacted by BTB! <i>Fluggea neowawraea</i> , <i>Alectryon macrococcus</i> . Also other insect effected taxa: <i>Hibbramok</i> seed predator?
2		<i>Alectryon</i> and <i>Fluggea</i> - we really have to try to do something about ambrosia beetles.
2		We need level 10 Bio security measures at our ports of entry.



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3	Threat Control: Insects	Acacia koa, Sesbania tomentosa, Mezouna kavaiensis - all affected by twig borer. We experienced a lot of mortality with Koa and 'Ohai in low elevation nursery due to this insect.
3		Controlling insects, specifically ants, in lower elevation ecosystems.
3		Little fire ants
4	Threat Control: Insects	In general, species currently identified as being substantially impacted by current non-climatic threats should be prioritized for development of threat control or mitigation as a strategy to boost resilience of populations and species to current and anticipated habitat change.
4		In dry forest more research needed on insect interactions and especially in context of climate change
4		Control methods for ants, scales, white fly, cottony cushiony scale, other scales, red spider mites, boring beetles on Neraudia ovata, Mezonueron, Isodendrion, Nothocestum. Kokia drynarioides - control of scale insects, aphid farming ants, Xylosandrus & other pests. Achyranthes splendens var. rotundata - scales and ants (5-yr rev). Two-spotted leaf hopper: - Hibiscadelphus giffardianus - more suitable control methods (Hawaii Island adden. Rec Plan), - Cyanea glabra (source Maui Island Rec Plan Adden). Black twig borer - Flueggea neowawraea, Abutilon sandwicense, Schiedea nuttallii.
4		Actually, all the threats should be lumped as they vary with site and species. I think that the threats have been identified and that funding should go to dealing with the threats and not studying them.



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4	Threat Control: Insects	Threat Control in general. I know there is a lot of research in these areas already, but continuing on with this research seems so important for preventing the decline of natural populations and protecting and ensuring the future viability of maintaining restored populations.
4		Best practices and identification of insect pests in the nursery setting would be helpful. We had discussions at workshops but to consolidate the information would be ideal.



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1	Threat Control: Mollusks	Campanulaceae, Caryophyllaceae and other mesic-wet species threatened by slugs.
2	Threat Control: Mollusks	Herbivory by alien molluscs is the limiting factor in establishment of seedlings whether from wild plants or outplanted nursery stock. Pesticides need to be developed.
3	Threat Control: Mollusks	Campanulaceae and snailicides use for conservation
4	Threat Control: Mollusks	Slugs and snails - impact on seedling survival of lobelioides, many other species • Slug experiments with <i>Cyanea</i> (if we have plenty of seeds)
4		Impact on recruitment of seedlings (<i>Cyanea</i> and <i>Clermontia</i> ssp., multi-species)
4		We have viable tools for ungulate control and a good potential for control of rodents (but we need to be able to apply this more broadly), we are currently stuck with limited and very localized tools for control of slugs in particular. This impact is likely much more widespread that we are currently aware of and can have very serious impacts on the survival potential for many plant species, both in management and restoration areas, as well as in the larger unmanaged native plant communities. Research is critically needed to identify slug control methods and how to implement their successful deployment at a landscape level.
5		Slugs and snails do so much damage to lobeliads (among others): 11. Recovery Studies: We need more concrete scientific analysis of recovery after management. For instance, removing pigs.



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1	Threat Control: Pathogens	I cannot think of anything that is a bigger threat than the possibility of unwanted plant disease on these native species. Acacia koa & Met pol for forest conservation Specie of the mixed coastal strand for supporting seabird habit
1		Eugenia spp. - I think that the rust fungus can probably be controlled by antagonist fungi. In fact, I think that endophytes should be studied more.
1		Given that genus Metrosideros dominates Hawaii's native vegetation, study of the biology of the pathogen, Ceratocystis, natural resistance within Metrosideros (possible variation among taxa), and control of the pathogen's spread should be a high priority. Such studies are taking place.
1		Rapid Ohia Death
1		Myrtaceae
2	Threat Control: Pathogens	ROD and ohia
2		I have heard from managers that many outplants die from pests (insects and others such as mites) and diseases. While there is good work being done on many other threats, I do not see much work being done on pests and diseases of rare plants. I think this would be the area where most progress can be made.
2		Maybe there is a way to inoculate susceptible species (to whatever disease) prior to infection. Like the Phyllotegia kaalensis study (this study needs to be replicated on other species and broadened to include other pathogens)....but also for other stuff like ROD?
3	Threat Control: Pathogens	Rapid Ohia Death solution!
3		Threat control and understanding threats is very important. Large ungulates are well understood (fence to exclude them and then kill them), but the effects and control of pathogens, insects, mollusks, and other small mammals deserves more attention.
3		Plantago princeps
3		Ceratocystis



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4	Threat Control: Pathogens	Accelerated rate of entry to Hawaii with increased rapid transit and lack of adequate inspection at port of entry. Rapid generational time, mutation and adaption capabilities. Ability to be generalists and/or jump from plant to plant. Can lie latent until something triggers it. ROD is a good example. Affects all life forms from land, air, sea.
4		Metrosideros and Eugenia- effective control or treatment methods to stop the spread of Ceratocystis fimbriata and Puccinia psidii.
4		All native flowering plants
5	Threat Control: Pathogens	ROD, and other potential pathogens on keystone native plants
5		Biosecurity programs for keystone species like Metrosideros
5		how do we counter Trump and his peoples



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1	Threat Control: Small vertebrates	All native flowering plants
2	Threat Control: Small vertebrates	I am quite interested in how small mammals (mice and rats) predate or disperse seeds of native plants - and whether this could be a major limiting factor for recruitment. Many fruiting plants could be susceptible to this
2		for rare and listed species-
2		Pritchardia, Santalum,
3	Threat Control: Small vertebrates	Impact on seed production of PEPP species including Cyanea ssp., Pittosporum ssp.
3		Cyanea, Clermontia, Delissea, Brighamia, Lobelia, Trematolobelia
3		Rats, mice, mongoose
3		While we all know that pigs, goats, sheep, cattle, etc. destroy many native plants I am not sure that we know how much damage is done from rats and mice, especially to seeds. I know Don Drake hosted a rat symposium a few years ago and some work on rat control has been done but I think this is another area that deserves attention.



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3	Threat Control: Small vertebrates	I have a sense that a large factor limiting recruitment is small vertebrates - small mammals especially. Other factors I think that may limit recruitment are slugs and snails, and insects. Understanding how these threats interact and influence demography I think will be crucial for reversing declines of rare plants.: <i>Argyroxiphium kauense</i> , <i>Asplenium peruvianum</i> var. <i>insulare</i> , <i>Bonamia menziesii</i> , <i>Chrysodracon hawaiiensis</i> , <i>Colubrina oppositifolia</i> , <i>Delissea undulata</i> , <i>Haplostachys haplostachya</i> , <i>Hibiscadelphus hualalaiensis</i> , <i>Hibiscus brackenridgei</i> ssp. <i>brackenridgei</i> , <i>Kokia drynarioides</i> , <i>Mezoneuron kawaiense</i> , <i>Neraudia ovata</i> , <i>Nothoestrum breviflorum</i> , <i>Portulaca sclerocarpa</i> , <i>Silene lanceolata</i> , <i>Solanum incompletum</i> , <i>Stenogyne augustifolia</i> , <i>Zanthoxylum dipetalum</i> var. <i>tomentosum</i> , <i>Zanthoxylum hawaiiensis</i> .
4	Threat Control: Small vertebrates	Rats, mongoose and cats, our biggest threats to endangered birds.
5	Threat Control: Small vertebrates	RATS!: <i>Pritchardia kaalae</i> , <i>Cyanea's</i> , <i>Cyrtandra dentata</i> , <i>Cyrtandra polyantha</i> , <i>cyrtandra viridiflora</i> , <i>Delissea subcordata</i> , <i>Gardenia mannii</i> , <i>Labordia cyrtandrae</i> , <i>Labordia triflora</i> , <i>Lobelia monostachya</i> , <i>Lobelia oahuensis</i> , <i>Melicope ovalis</i> , <i>Trematolobelia singularis</i>
5		More research into seed and fruit depredation by rodents and its affect on native plant recruitment.



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1	Threat Control: Ungulates	pigs in high elevation wet forest
1		Sorry I do not have a particular taxa to list. I choose this topic, threat control (all threats) as I feel it is most important to preserve the existing wild populations. In my opinion these species and populations have the greatest chance of success if we can determine and control threats in existing sites.
2	Threat Control: Ungulates	Fencing is the foundation for conservation and also the most expensive. What types of material could be used to improve longevity especially in volcanic fume conditions. In addition, techniques to improve detection, baits, control of ingress animals. It is well established that ungulates are harmful to native species so not as interested in general ungulate impacts research.
2	Threat Control: Ungulates	I have have had my priorities backwards because without controlling ungulates there will be no native Schiedea species, and no reproductive biology to worry about. Even though it is listed separately, I would also add in control of insects/pathogens- as the effects of these seem to increase each year. Twenty years ago we saw abundant recruitment from seeds of dry site species, but not for any of the mesic/wet site species. Many of these species have become weedy in our greenhouse, despite their extreme rarity in nature. Given half a chance, many rare species of Schiedea could recover. But- sometimes it only takes one pig to ruin everything.
5	Threat Control: Ungulates	pigs, axis deer, goats
5		Any species under threat by ungulates - and/or invasive plant species (I would include here).