MAUI INVASIVE SPECIES COMMITTEE
Friday, October 28, 2011
MEETING MINUTES

ATTENDANCE MORNING SESSION: Fern Duvall, Pat Bily, Kim Starr, Forest Starr, Bob Hobdy, Randy Bartlett, Chuck Chimera, Lloyd Loope, Rob Hauff, Keanu Valle, Roman DeShons, Adam Radford, Lissa Fox, Teya Penniman, Mike Ade, Elizabeth Anderson

- The meeting was called to order by Pat Bily, TNC/MISC Chair, at 10:15am
- Introductions were made around the table.
- Minutes from the August 12, 2011 meeting were approved. They will be posted on the website.

GENERAL UPDATES

- Adam: the new fountain grass site in Pukalani is the largest fountain grass find on Maui to date. Access has been a bit of an issue and we had to negotiate with the landowner. It is in a highly manicured yard. We are guessing that it was planted in 2007. We controlled the front yard earlier this week and we filled a full-size shop vacuum three times just with seeds. I have never seen so many seeds. Carl Martin procured a variety of native plants to restore the yard. The owner was so impressed with our work that he has agreed to let us do the back side of the property as well. Re-landscaping someone's yard is not our normal procedure, but in this instance we felt we really needed to get on it and this was the only way to get the owner to agree to control. Dennis is the one who found the population. We have surveyed around the site and haven't found anything. There is a gulch nearby that belongs to MECO where we still need to survey. It has taken awhile to get permission from MECO. They required a right of entry permit and insurance certificate.

- Mike: we recently discovered that we are not allowed to use Garlon on residential sites. HDOA alerted us to the issue and Dow Chemical confirmed it. Garlon can't be used anywhere that children might be present before it is dry. I did some research and found that Pathfinder should meet our needs. It has 14% active ingredient and is already premixed with oil. It was not labeled for use in Hawaii. We went through the process to get it labeled for residential sites in Hawaii. It is now available for use in Hawaii.

VERTEBRATES

Coqui Frog

- Adam: we have presented vertebrate updates at other recent meetings. Today I want to focus on key points for our targets and solicit input from the committee. For coqui, a large portion of our effort is going into Maliko Gulch. Citric acid is our biggest limiting factor. We can use 2,000-4,000 gallons a night. It adds up quickly. I figure there are 140-150 working nights per year. Citric costs $1/lb and we mix a pound to a gallon. We are trying to go back to smaller diameter hoses and nozzles and trying to be as efficient as possible. On the Big Island, there are up to 20,000 frogs per acre. This is double the density in their native range. We still get outlier frogs and we still have three recalcitrants. Most of the outlier activity is in the middle section on the Hana side of the road. We haven't done control in that area yet.

- Adam: we had researchers here studying the frogs and the results of our efforts this summer. They made several recommendations: 1) keep them in the gulch, 2) continue rapid response, and 3) follow up on new reports and treat other sites. We are looking at putting up a barrier near our third recalcitrant. We hope it will slow down or stop them and keep them in the gulch. This spring we will start from the top and move all the way down the gulch with a goal of not hearing anything before moving on. We will stay in an area until it is done and then move on. This is a change in strategy from this year where we had to stay on schedule because of the researchers. We have put in a lot of infrastructure – we have a gravity-fed pipe system running through much of the gulch, large-volume storage tanks on the rim, and several fill stations on the edge. We are trying to figure out how to maximize efficiency. We hope to procure a tractor that would help us pump out of the ditches, move citric, do habitat work, etc. We are looking at different ways to free up crew time. Teya: I want to acknowledge Adam for putting together proposals for the tractor. The vertebrate crew is very dedicated.

- Adam: to be truly successful we would need to double the crew and have 300,000 lbs of citric on hand. We are still waiting for the Environmental Assessment to go through in order to be able to use the Fish & Wildlife Service funding we received this past year. We don't know if we will have to go through the public process with the EA. The FWS grant was for $400,000 and $200,000 of it will go to citric acid. We have four dedicated crewmembers on the coqui crew now. We would need at least $250,000 additional to double the crew size. We did a big picture cost estimate awhile back and came up with one million per year for initial suppression.

- Adam: outside of Maliko we have two residential sites that are almost done. At one site there have been no frogs in months and the other site has had no more than five frogs in the last six months. Both sites are in the Wailea/Makena area. We have three nursery sites that are continuing to suffer from off island reintroductions. We either need a biosecurity plan or they need to change their business practices. We still get random reports popping up here and there. Teya: Lissa and I got to see a hot water treatment facility while we were in Hilo earlier this week. The water is heated by propane and they roll the plants through. The treatment is 113 degrees for five minutes. It is very effective. Hot water treatment should be required for interisland transport. Adam: I did a presentation at the Landscape Industry Council of Hawaii conference on Oahu earlier in the month. They seemed very receptive. There are easily 20 or more introductions per year statewide, not counting the Big Island.

- Teya: there is existing technology. On the Big Island, they are using it only for mainland transport. The unit has to be moved from place to place as opposed to having a facility where people bring their stuff. Fern: in the past we talked about the possibility of getting the County of Maui to do some sort of county-centric requirement. Kuhea was going to ask Corporate Council if that was within the purview of the county. Teya: we have a very receptive County Council. At the state level HDOA doesn't feel they can protect us both from stuff coming into the state and protect interisland transport. They said it would be a Legislative issue because they don't have resources to do enforcement and there are already regulations on the books. Pat: what about a letter of support from the Maui Realtors Association? Depreciation of property values is a huge issue. Bob: we need to address the problem on this side here at home. There are so many frogs on the Big Island that people are getting more used to them and don't feel they should be economically penalized. We need to get it from this side. Forest: how much would it cost?

- Teya: we need to do some fact finding first – how much movement is there between the islands, what it would cost, who the stakeholders are, etc. How do we make it happen? Elizabeth: we should just form our own working group on Maui and address it locally. If it works, others will follow. Teya: we have a County Council and Mayor that thrive on the idea of Maui being independent. Arnold Hara has a nice chart showing the temperature at which different things will be controlled and how the different plants are impacted. They are looking at surfactants that may help to control ants at a lower temperature. We should develop a list of stakeholders. Who should be invited? Fern: ants will be different. We should keep the focus on coqui for now and then once we know it will work for coqui, we can look into what more would be needed for other species. Teya: I don't think we want to limit it.

Veiled Chameleon

- Adam: we have a search scheduled for the week of November 14 in the core and hotspots. We are going to limit the number of properties we do and do them really thoroughly. We are trying to rope in good searchers from the past like Russell Suzuki and Jay Penniman. We have had no new reports since 2008.

Mitred Conure

- Adam: We have spent some time surveying and figuring out where to go. On the Waipio side we consistently see 16-18 birds. They are very habitual in what they are doing. They loaf in pandanus in the bay from 4:30-6:30pm. They are nesting /roosting on the cliff. We just got access to the ridge where they are loafing. Hopefully, that will be more productive. We could use help from additional people. On the Huelo Point side there are ~30 birds and we have not done any work there yet. We lost two full breeding seasons so the numbers are back up. Fern: a couple of years ago I was asking for the birds and I did stomach analysis and grew out the seeds. It was surprising the number of ficus that came up. They are viable seeds.

Other Birds / Vertebrates

- Fern: there have been peach-faced lovebirds in two locations on Maui for a long time. There is an area in Nahiku and at least two groups in Maui Meadows. Roughly 50% of the people love them and 50% don't. I am bringing this issue back to MISC because I have people asking for a wildlife control permit to control them. Adam: we have interviewed people in the neighborhood. We started getting reports from Maui Meadows in 2005. There are at least 60 birds. There is an aviary in the area that is in various states of repair. In one area where the birds are there is a retirement home. The residents feed the birds and love them. Fern: would they object to having them caught and put into a large aviary? Lethal control is not going to work in that area. Adam: should this be a priority?

- Fern: it would be good to get HDOA back into this discussion. This is an urban setting which is really their domain. I don't think they know about it. Lloyd: the Farm Bureau would be an appropriate venue. Fern: Monsanto could be impacted seriously. They could range pretty far, but if they have everything they need they won't likely range. In Maui Meadows, one property wants control and the others are receptive to capture and removal. They could be sold/given away as pets. Elizabeth: they don't make good pets if they aren't hand-raised. Teya: if the committee thinks this is important, we should go through our full evaluation process. We can do the assessment at our next meeting. Lloyd: we should take care of the conures before we take on another bird. We have had the conures on our radar for a long time. Pat: I agree with Lloyd. These are urban birds now. This could put conures under more scrutiny and could jeopardize that project.

GENERAL UPDATES

Funding

- Teya: the House Finance Committee is coming to Maui next week and we are hosting them at a Hana miconia helicopter operation next week. We will ship them out to Hana on Blue Hawaiian Helicopters and then Windward will tour them around. Jeremy and Pete will be the tour guides and let them see the core and the spray operation. This is a great opportunity to highlight the work we do. Lori, Lissa, and Teya will greet and orient them.

Public Relations

- Lissa: thanks to Fern and Pat for helping at the fair. The Hui project is finished. It is really cool. Go check it out if you have a chance. It should be there for 2-3 years. Nominations for the 8th annual Malam i Ka Aina award, are due November 1. PSAs are running for LFA now and will run for another two weeks around Thanksgiving. Elizabeth Speith has received a number of reports that are using the exact language as the PSAs - so we know people are seeing them.

Lunch Break

ATTENDANCE AFTERNOON SESSION: Fern Duvall, Pat Bily, Kim Starr, Forest Starr, Bob Hobdy, Randy Bartlett, Chuck Chimera, Lloyd Loope, Rob Hauff, Adam Radford, Lissa Fox, Teya Penniman, Mike Ade, Elizabeth Anderson, Jeremy Gooding, Chris Brosius, Tracy Johnson, James Leary

ATTENDING VIA TELECOM: Darcy Oishi, Neil Reimer, Mann Ko, Rene Bautista, Robert Barreto

STATUS OF BIOCONTROL RESEARCH ON *MICONIA CALVESCENS* SINCE 2009 MICONIA CONFERENCE

- Teya: we had a robust biocontrol discussion during the 2009 Miconia Conference. The recent biocontrol symposium on the Big Island focused on the various biocontrol agents under development with a lunch meeting focused on Hawaii during one day. I was intrigued by Robert Barreto's presentation on the nematode. HDOA has been working on this for a along time and they have identified some pitfalls or problems associated with it. It is possibly still a good potential candidate. I thought it was worthwhile to try to get together a conversation regarding what it would take to specifically to move forward on the nematode and the other promising agents. I am willing help find funding if that is agreed to be a limiting factor. What has happened in the last two years?

- Tracy: not enough has happened. The story is still pretty much the same as far as the agents that I see as having potential. I haven't received any new funding until just this year. I now have funding to pursue the two species of butterflies we are interested in. They are difficult to rear in captivity and we are working to figure out the details. Hopefully, we will be able to bring the butterfly to Hawaii soon. It is a Costa Rican species. The project hasn't started yet. Kenj Nishida did part of his master's thesis on the butterfly. He is one of the world experts on this butterfly. I have enough funding for Ken to work part-time for a year and a half. He will start this fall. He has been collecting butterflies and building up a population. We need to figure out the key to getting them to mate in captivity. We can ship the eggs from Costa Rica and rear them here. They are not easy to find the field and it would be better if we could generate our own population. We want to try to rear them before we go to the option of just importing. The life cycle is approximately three months. We think they will mate in the wild after they are released. They are reproducing in our university mini-miconia forest. We can use that as our nursery for importing eggs. We want to get enough eggs and try it out here. With more funds we could do both strategies at the same time. Ideally, it would be good to have more funding. Even $25,000 would help to fund some students to help out on campus.

- Tracy: the stem weevil is complicated. In tests, it has laid eggs on ohia. When there are choices, it will make a mistake. We have a burden to prove that they don't like to chew ohia bark or leaves like they do on miconia. So far, they haven't gone past first instar. We don't have the data we need. They have a tedious, long life cycle of six months. It is a lot of work to rear them. We want to preserve the females and get as much as we can. We don't want to go to a "no choice to death" test because we lose the females. We really need to get eggs that have been laid on miconia and transfer them to other plants. We are short on people for this as well. A half-time technician would be sufficient for this test. This is one I could push to an end point. We have a lot of data and just need to conclude. The Forest Service has allowed me to hire a full-time technician, Nancy Chaney. She will start in a couple of weeks.

- Tracy: the other set of insects are the ones that attack the fruit. There is a moth and a weevil. We are most interested in the weevil. In Costa Rica, we have done some partial rearing. They are very technically challenging to rear because they need to live in mature miconia plants. We are growing big miconia plants in pots. We see high populations of the weevil in Costa Rica. It goes after really small fruits before they mature and will cause the fruit to abort. For this one I would want a post-doctoral level person. With $100,000 per year for a few years, I could get stuff done.

<u>WORK ON *DITYLENCHUS GALLAEFORMANS* (NEMATODE)</u>

- Tracy: the nematode is going to be awesome for *Clidemia*, but I am not as sure about it for miconia. It is an awesome *Clidemia* agent. It is not a Melastome generalist, but is miconia tribe specific. Miconia and *Clidemia* are close. I would doubt it would do anything for *Tibouchina* or *Melastoma*. James: with these high performing agents, do we have any updated timelines as to when we might anticipate a release? Tracy: the strawberry guava experience has made me cautious about predicting timelines. What hangs me up is getting things written up in order to move forward. That is why I need a post-doc. The issue right now is not space, but rather an issue of my time and technical support. Teya: is there a good pool of people to draw from to do this work? Tracy: they are not hard to find. The issue is getting the studies done and then writing up EAs, which are a substantial job. It is a laborious process. If we had all our data on the weevil, it would still take a year to get stuff written up and out there. After that there is the approval process.

- Darcy: HDOA did a lot of work with miconia in the 1990s and then other problems became higher priorities. Since that time we have not been doing too much with miconia. In the studies we did in the 1990s we did find a lot of natural enemies. There is a very promising flea beetle in Guatemala that we would like to pursue. Cliff Smith has been trying to arrange getting a student working on the project to overcome some of the hurdles. I am not sure why it fell through. Mann: since 2009 there has been very little progress. We have had permit problems and facility problems. The containment facility is getting old. Right now the facility is back up and running and we have the permits. We hope to get the nematode project going. We talked to Robert Barreto last month at the conference and he will be shipping us some more nematodes. There have been significant cutbacks at HDOA and I am the only one working on this now.

- Mann: first we need to multiply the weevil in large quantities for experimentation. That is the stage where we have had problems all along. Robert and Tracy have suggested that if we could culture it on *Clidemia* or some other miconia species, we could culture large quantities. Tracy: there are some host plants that it really thrives on in its native range and miconia is not one of those. There are some other species that it really takes off on. It is possible to get a single *Clidemia* plant with multiple galls and with each gall containing tons of nematodes. With miconia it deforms the plants and doesn't produce the really major galls that we get on *Clidemia*. We will try to rear it on *Clidemia*. It is really a *Clidemia* biocontrol, but there could be some nice bonuses. Mann's facility is tiny. It is the size of a walk-in closet.

- Darcy: we would test it on related plants and see if it had only miconia to eat, would it die? Mann: the life cycle is 25 days. Rob: if the facility is limiting, is there a potential for offshore testing? Darcy: yes, it is hard to get the temperature and humidity that it really thrives on. We have been discussing clearing out old equipment and replacing equipment with better humidity controls. We really need Mann to work with Barreto in Brazil to iron out the rearing problems. We need to see exactly what techniques Barreto is using to rear them and bring those techniques back to our facility. We need to be able to mass produce them. We have no budget to send him there, except the $40,000 we will receive from HISC, which basically just covers operating costs. We need to get the King Street facility in better shape. There is more than a million dollars needed in repair work over the long-term.

- Darcy: the HDOA facility on King St. is a level 3 containment/pathology facility. This is the highest level of containment in the state and requires negative air pressure and HEPA filtration. These things are required in order to bring in plant pathogens. The facility is unique in the Pacific basin, but it is small and old. We have two containment facilities – one for pathogens and one for insects. There is the actual facility and then there are associated labs. The common air handling system is the overriding problem with the facility now. Mann does everything. When Eloise retired her position was never filled and we lost our technician too. The insect facility is great. It is the pathology building that needs rehab over the long-run. Tracy: I can't do the nematodes at my lab. I don't have the level of containment. My facility is level 2. Darcy: we can keep going during the repairs because we have a dual system. We have redundancy and emergency back up. We have never had a complete failure – there has never been a breakdown in containment. We would need ~$110,000 plus fringes to replace our technicians.

- Teya: so right now it sounds like you are planning to get nematodes sent from Robert. Mann: yes. Teya: what about the idea of Mann going there? Mann: that is not possible in the current budget. Teya: what would that cost? Darcy: $20-30,000 depending on the number and duration of each trip. Mohsen is confident he can find some good insects in the Guatemala region. They may be difficult to rear, but could still be good candidates. We would like to do more exploratory work. We would like to work on the flea beetle that Mohsen found attacking miconia up to four meters tall. Tracy: one of the challenges with that one is with the larval feeding. Darcy: first we would like to get a student to figure out some of those issues and then go from there. We need at least one more entomologist and 2-3 more technicians at a cost of ~$150,000.

- James: *Colletotrichum* was released already. Is there any point in continuing to work with that agent? Is there any valuing in augmenting and doing larger releases? Mann: that might not work everywhere but in some patches. Tracy: I have reservations about that strategy because the infection is very condition dependent. It has to be at just the right time and under just the right conditions. If you could time it just right, it might work. Neil: we agree with Tracy. It would be very patchy.

Robert Barreto joined the discussion at this point and Teya gave a brief summary of what had been covered so far.

- Robert: Mann coming over would be good. The facility will be back in working mode and permitting shouldn't be a problem. It is critical to have the temperature and humidity correct. We have a technical report that summarizes the information that will be needed. It is still in Portuguese and we need to translate it. There is a lot of potential and a lot has been done already. Darcy: if we could get someone to do the translation, and then Robert could proof it, that would save time.

- Teya: have you done host specificity testing? Robert: yes, we will need input from the Hawaii side to complete testing. I am sure that some plants were left out. There are also some questions on the biology of nematodes that need to be addressed. The nematode needs to be tested on *Clidemia* and *Melastoma*. The student that did the bulk of the work left two years ago. Unfortunately, the work that he did on impact was not included in his report. He has the data. There has been a strike in the post office and he doesn't have Internet so I am still waiting for his data. His results were good as far as the impacts of the nematode on miconia. My hope is that because you have many Melastomes, it will build up and jump from one host to another. It will multiply on *Clidemia* and then jump. It was tested on miconia that was from Hawaii. Teya: from your perspective, what are the gaps? What is needed to move this forward? Robert: more understanding of the overall biology is needed. We are also looking at the genetics of the nematodes from different regions and the genetics of miconia.

- Tracy: do you have a sense on the status of the molecular work? Is it at a point where it is publishable? Robert: yes, he will be finalizing his publication soon. He is one of the authors on the taxonomy paper. Teya: what about the work Jaco LeRoux has done? Lloyd: that is only on the invasive populations. I don't think he did work on miconia in the native range. I am curious about what is missing from the information Robert has about the nematode and how those gaps could be filled. It is important to test the nematode against ohia. Robert: I have no native Hawaiian plants right now. I don't even have your *Clidemia*. I do still have some big miconia plants, but I don't have *Melastoma*.

- James: does the agent go systemic in the plant via the vascular system? Robert: it is an external nematode. It hides in the galls and as soon as it starts raining it starts swimming upward in the plants. It is not systemic and never goes into the tissue. It is quite unusual in this respect. You can collect them on the water from the rainfall. We are breaking new ground. No nematode has ever been used as a classical biocontrol for weeds before. There is some certainty that it won't jump to other hosts, but there are questions about how it will perform. We have no previous stories to use as examples. There is a degree of trial and error. James: is it obligate? Can it survive without the host? Robert: we think it is strictly dependent on the Melastomes. We don't think it will be able to survive without the plants. Mann: it is most likely spread by water (rain) and wind. Teya: what is missing from the biology standpoint? Robert: we know a lot already. Mann: we need to study how it will survive in the environment and how it spreads. We need to know if insects are involved. What is the mechanism of spread? Robert: it is capable of undergoing an over-wintering. It can stay on dead plant material for months.

- Robert: how is the weevil? Tracy: the hang up is it has laid a few eggs on ohia by mistake. I have to prove the larvae from those eggs can't survive on the plant. I am still optimistic, but the follow-up will be laborious. Robert: I know Tracy is not enthusiastic about the psyllid, but I think there is potential. Tracy: there is no issue of specificity on that one. The main evidence is that even when it is reared on a caged plant with no natural enemies, it never kills the plant growing tip even at very high population levels. There is some reduction, but I am afraid it is not dramatic enough.

- Teya: I've looked over Tracy's paper from the conference and will summarize notes from this meeting. We need to identify the things that are stopping us from moving forward and what it would take to move forward and send that around. What is the resource cost and what does everyone feel is the priority? MISC has been holding the line on miconia for years and our funding in uncertain. We need to move on biocontrol. I am in support of looking for added funding, supporting biocontrol in the Legislature, and even diverting funds if necessary. This needs to have a higher profile in the state. Robert: I hoped that the conference would be able to raise the profile of biocontrol in Hawaii. Manpower in Hawaii has been much reduced and this is very sad given the long story of biocontrol successes. Tracy: I think the conference set a seed of awareness in the international community that we will be able to draw on in the future. It didn't resolve our problems. More needs to be done, but it was a necessary first step.

- Robert: I think there are there are agents that could be released in a relatively short period of time with just a few more people working on them. Tracy: there is also biocontrol for hire out there in the world. There are Australian and European based groups. Robert: a half-time scientist is what would be needed to move forward from here. Around $60,000 is what we would need on our side. Darcy: our priority is the nematodes and rebuilding the pathology program to a point where it is really functional not just for miconia but for all our biocontrol agents. We need to develop a unified statewide strategy on how we will deal with not only miconia, but a number of species. When are we going to stop chemical and mechanical control? We need to make sure we aren't stepping on each other's toes. Teya: we need to look at minimum populations for a control agent to get established, etc. Darcy: we need that frame work in place. Microclimate issues play a role in miconia biocontrol as well. We need a solid strategy in place. We need to act as a more cohesive unit from now on especially with money being so tight.

Next Meeting: December 9, 2011 – Christmas Potluck