Batman on a budget: affordable gadgets and gear for collecting field data

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Adam Knox - Maui Invasive

Maui Invasive Species Committee

- Project of the University of Hawai'i- Pacific Cooperative Studies Unit
- Steered by committee of voluntary partnership of government, private and non-profit organizations
- Working to prevent, control, or eliminate the most threatening invasive plant and animal species
- Protecting Maui's watersheds, ecological resources, agriculture, and community.
- Soft-funded primarily by grants from the State of Hawaii and Maui County







Yo, Hawai'i is fragile

Invasive species threaten the survival of Hawaii's unique plants and animals



MISC Targets

•25+ plant species
•Invertebrates
•Vertebrates
•Plant diseases









Plant Species



Latin Name	Common Name(s)	Control Status
Coccinia grandis	Ivy gourd	Active control
Cortaderia spp.	Pampas grass	Active control
Miconia calvescens	Miconia	Active control
Pennisetum setaceum	Fountain grass	Active control
Silybum marianum	Milk thistle	Active control
Erica lusitanica	Spanish heath	Delimit
Pittosporum undulatum	Victorian box, orange pittosporum	Delimit
Pittosporum viridiflorum	Cape pittosporum	Delimit
Enchylaena tomentosa	Ruby salt bush	Eradicated
Melastoma candidum	Malabar melastome, Indian rhododendron	Eradicated
Melastoma sanguineum	Fox-tongued melastoma, Red melastome	Eradicated
Morella faya	Fire tree	Eradicated
Parkinsonia aculeata	Jerusalem thorn	Eradicated
Acacia podalyrifolia	Queensland silver wattle	Monitor / control
Acacia retinoides	Water wattle	Monitor / control
Arundo donax	Giant reed, Spanish reed	Monitor / control
Caesalpinia decapetala	Cat's claw	Monitor / control
Cryptostegia grandiflora	Rubber vine	Monitor / control
Macaranga mappa	Bingabing	Monitor / control
Macaranga tanarius	Parasol leaf tree	Monitor / control
Maclura pomifera	Osage orange, Osage apple	Monitor / control
Morella cerifera	Wax myrtle	Monitor / control
Nassella tenuissima	Mexican feather grass	Monitor / control
Rhodomyrtus tomentosa	Downy rose myrtle	Monitor / control
Rubus ellipticus	Yellow Himalayan raspberry	Monitor / control
Verbascum thapsus	Wooly or common mullein	Monitor / control

Ivy Gourd Coccinia grandis

- Popular in Asia as food crop
- Climbing vine with tuberous roots
- Smothering growth habit
- Spreads quickly
- Difficult to control, even with herbicide





Pampas Grass

Cortaderia species

- Large tussock grass that can reach heights of 10 ft or greater
- Popular ornamental
- Wind dispersed long distances
- Very damaging to a wide range of Hawaiian habitats



Pampas Grass

Cortaderia species

- MISC has both ground and aerial operations to control pampas
- Ground control is mechanical when possible
- Other methods use foliar application of glyphosate











<u>Miconia</u>

Miconia calvescens

- Fast growing tree from South America
- Produces millions of seeds
- Bird dispersed
- Shade tolerant, can overtake moist forest habitat
- Forms monotypic stands
- Shallow roots accelerate erosion and causes landslides





<u>Miconia</u>

Miconia calvescens

- MISC originally formed to tackle miconia
- Containment project
- Dedicated miconia ground crew
- Control by pulling, or thin line basal bark with triclopyr
- Robust aerial program, using HBT





<u>Miconia</u> Miconia calvescens

- HBT= Herbicide Ballistic Technology
- Paintballs encapsulated with triclopyr
- Extremely effective and efficient for outliers in rugged terrain



I'd tell you more

But this is a presentation about field data collection tools

- MISC has utilized a multitude of data collection devices with varying sophistication
- We have broken or lost many, many expensive devices
- Currently using tablets and apps for field data collection
- Field data collection simplified; processing data more complex





Data collection & field navigation

Tablet: Samsung Galaxy Tab A Costco: \$189.99



Bluetooth GPS/GLONASS receiver: Garmin GLO Amazon: \$99.00



Chest Harness: Setwear Hands Free iPad Chest Pack Online: \$49.88



App: Locus Map Pro Google Play: \$12.99



Total cost: ~\$348

Hands-free data access



Locus Map Pro



- Low-cost app for Android
- Designed for geocaching
- Extremely customizable
- Offline capabilities
- 3rd party plug-ins
- Integrated with Dropbox, Google Drive
- Outputs many formats including GPX and KML
- Easy switching between setups
- Free version available



Locus Map Pro MISC configuration

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Pros & cons of tablets

- Pros
 - Large screen
 - Many app choices
 - Can be used for email, scheduling, zoom meetings etc.
 - Inexpensive
- Cons
 - Not ruggedized
 - Hard to operate wet
 - Large (relative)



Upload to cloud (Google drive)



Google forms for additional details

• Simple online forms

- Can be filled out in the field (requires mobile service)
- Linked on simple crew website for easy access
- Captures remaining survey or treatment data
- Stored in a queryable, simple spreadsheet
- Notifies others that data is uploaded, ready to process

Process to central database (GIS)



Create secondary guidance products







Last thoughts

- Low-cost tools are available, powerful enough to run a sophisticated program
- The easier it is to collect data, the more data you will get
- Hands free is safer and smarter
- Promote innovation & exploration

Questions?

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I would be happy to send you a copy of this presentation and additional support products if you are interested

This work would be impossible without the help and contributions from:

- Hawaii Invasive Species Council
- County of Maui
- MISC crew

