WR Committee

From: Chris Brosius <brosius@westmauiwatershed.org>
Sent: Tuesday, March 20, 2018 10:05 AM
To: Kimberly Thayer
Cc: WR Committee; Jill LaBram
Subject: Re: WR-5, Watershed Management and Protection
Attachments: DWS_Watershed_Protection_Grant_Application_FY2019_FINAL.pdf; WMMWP DWS15 Qtr Reports.pdf; WMMWP Testimony_Maui County Council WRC_20180320.pdf

Aloha Water Resources Committee staff,

Here attached is our response to your request. Also attached, as referenced in our response letter, is our DWS FY19 proposal and quarterly reports for our FY15 DWS grant. Due to file size, we will send the quarterly reports for our FY16 and FY17 DWS grants by separate email.

Mahalo nui,
Chris

---------- Forwarded message ---------
From: WR Committee <WR.Committee@mauicounty.us>
Date: Fri, Mar 16, 2018, 8:41 AM
Subject: WR-5, Watershed Management and Protection
To: brosius@westmauiwatershed.org <brosius@westmauiwatershed.org>
Cc: WR Committee <WR.Committee@mauicounty.us>

Mr. Brosius,
Please review attached correspondence for response to the Maui County Council's Water Resources Committee. The hard copy is being mailed to you as well.
Thank You,
Water Resources Committee staff

--
Chris Brosius
Program Manager
West Maui Mountains Watershed Partnership
PO Box 13240
Lahaina HI. 96761
Office Hrs: Mon.-Thurs.: 7am - 5:30pm
Phone: 808-661-6600
Fax: 808-661-6604
brosius@westmauiwatershed.org
www.westmauiwatershed.org

West Maui Mountains Watershed Partnership

West Maui Mountains
Watershed Partnership
P.O. Box 13240
Lahaina, Hawai'i
96761
Phone (808) 661-6600
Fax: (808) 661-6604

Watershed Partners

County of Maui

Dept. of Land & Natural Resources

Kahoma Land Holdings. LLC

Ka'anapali Land Company, LLC

Kahoma Land, LLC

Kamehameha Schools

Makila Land Co., LLC

Maui County Department of Water Supply

Maui Land & Pineapple Company Inc

Wailuku Water Co. LLC

The Nature Conservancy

March 19th, 2018

Chair Alika Atay
Water Resources Committee
County of Maui
200 S. High Street
Wailuku, Maui, HI. 96793

SUBJECT: Responses to information requested in letters dated March 9th and 15th.

RE:WATERSHED MANAGEMENT AND PROTECTION (WR-5)

Dear Chair Atay,

On behalf of the West Maui Mountains Watershed Partnership I wish to thank you for the County's ongoing support of our program and welcome the opportunity to respond to your many important questions. I hope you find the responses satisfactory. I look forward to testifying on March 20th as requested and responding to further questions as necessary. The following information is presented in the order upon which it was requested.

<u>Per the March 9th letter:</u>

1. *Number of years that WMMWP has been a grant recipient of OED and DWS funds.*

WMMWP has been a recipient of OED funds in the past from FY07/08 through FY11/12. DWS funding has been received from FY98 to present.

2. The Amounts Requested in FY 19.
FY19 funds are being requested only from DWS in the amount of $569,546.62. A letter of inquiry was sent to OED seeking funds for wildfire prevention efforts but was not deemed appropriate for the Environmental Protection Fund.

3. A*n itemized account of costs being requested in FY19*
Please refer to our DWS FY19 Proposal provided electronically.

Per the March 15th letter:

Copies of our Quarterly Reports for the past three years have been provided electronically.

1. List of your funding sources, including monies received from the county or the state, for invasive species eradication.

Funds received by source in last year;

Maui County Department of Water Supply FY18: $430,000
State of Hawaii, DLNR, Watershed Partnership Program FY18 $293,500
State of Hawaii, DLNR, Hawaii Invasive Species Council FY18 $3,894
State of Hawaii DLNR CIP Fencing Grants $60,000
The Nature Conservancy of Hawaii FY18, $155,954
NOAA/DLNR Department of Aquatic Resources FY18, $32,262
US Fish & Wildlife Service Partners for Fish & Wildlife Program FY18 $34,907
Atherton Family Foundation $25,000

2. For each invasive species addressed by your program, indicate the amount your watershed partnership has allocated and spent towards eradication for the past three years.

WMMWP performs work on various levels to prevent and control the spread of invasive species. We do this through many programs including fence construction and maintenance, ungulate management and control, invasive weed control, monitoring of watershed threats and resources, outreach and education, and wildfire prevention. We do not track the expenditure of funds per species since many of our activities are integrated and the species encountered may be numerous or area based. We can however provide an estimate of cost for each of our programs which again act cohesively to prevent the spread of invasive species.

Year	Fencing	Ungulate Control	Weed Control	Monitoring	Outreach	Wildfire	Total
FY15	$ 240,342	$ 330,852	$ 127,370	$ 133,094	$ 31,717	$ 4,938	$ 868,313
FY16	$ 356,911	$ 218,098	$ 132,971	$ 102,382	$ 18,995	$ 7,456	$ 836,814
FY17	$ 253,178	$ 258,597	$ 180,794	$ 110,287	$ 27,812	$ 12,185	$ 842,853

3. For the same three-year period, provide a list of organizations that received funding or compensation from your watershed partnership for invasive species eradication efforts and the amounts paid or provided for each organization.

We do not sub-contract funds to other organizations to perform our work. We do source materials, supplies, and helicopter transportation from various island-based vendors.

4. For Question No. 3, provide a brief description of the work done or services rendered.

Not applicable.

5. For the requests below, please provide a matrix summarizing your eradication efforts for the prior three years. Include in the matrix the following information:

The matrix summarizing eradication efforts for the prior three years is attached. In addition, below are narrative responses for items *a* through *g* to supplement the information in the matrix.

a. indicate the number of infestations reported to you per species.

WMMWP rarely gets information from the general public on our target species. Most communications do express a general concern for watershed protection and support our efforts. Knowledge of infestations typically stem from staff and partners with knowledge and a presence on the mountain.

b. For each infestation, indicate the date you were notified of the infestation, the location and approximate size of each infestation, and the population of the infestation and area of coverage.

WMMWP does not track this information. It is rare that we encounter a new or incipient species within our management area. In general such instances are self detected locations and data are entered into a data base or shared with another agency for follow up. WMMWP typically addresses species which have been known to the watershed and are more common. Our goal is largely to prevent further spread to core water recharge areas and prevent further degradation to the watershed.

c. For each infestation, indicate the eradication method used— that is, whether a mechanical or chemical method was used.

For most species, both mechanical (i.e. hand pulling) and chemical control are used. The method employed depends on the size of the target. We use integrated techniques which center on education, prevention, and control methods. The approach with regard to weed species is to prevent spread and control satellite individuals and small outlying populations which threaten the core of the watershed. In this way we focus on the upper elevations first and work our way lower. Our control efforts up to this point actually spend more time searching than finding and controlling to ensure the absence of weedy species in core areas. As time goes on and we work our way down the mountain, targets will be more numerous and diverse and the financial resources needed will increase.

d. Whenever mechanical methods were used, describe the method, personnel employed, hours expended, and period of treatment.

Expanding on the above statement under section c, when we do use mechanical control this is performed mainly by hand pulling of small or early stage plants. Work is performed by staff and, in certain locations, volunteers. The period of treatment would be characterized as ongoing. Typically we control the highest elevation targets and advance down slope. Areas are revisited at a rate which allows detection of new seedlings before they reach maturity and fruit. This helps limit future reestablishment. The timing for revisiting targets varies depending on accessibility and growth or reproductive rates. This work is ongoing in the sense that we need to maintain vigilance in perpetuity. However, the goal is to have far fewer plants each time we go back. Seed banks can persist for years, and new populations can be spread by birds, winds, and other vectors. Typically, we can continue to push the line down the mountain with enough available resources.

e. *Indicate the person or persons who supervised the chemical application; their certification or license with the State of Hawaii to apply pesticides or herbicides, if applicable; whether restricted pesticides or herbicides were used; and the name of the person or persons applying the chemicals.*

All work is directed by the WMMWP Manager and is informed by WMMWP partners and advised from various sources and experts within the State. All staff handling herbicides have taken the State of Hawaii Pesticide Risk Reduction Course which details safe handling, mixing and application techniques. WMMWP does not use restricted herbicides. When herbicide is used we follow the procedures described on the product label. WMMWP does not make public the personal information of employees.

f. For each infestation, indicate the date treatment began and was completed at each site. Indicate if the infestation and treatment are ongoing.

This information cannot be compiled in the time permitted.

g. For each infestation, indicate whether the infestation has been completely resolved and if so, the date it was resolved.

Due to limited resources and priorities being focused on managing the worst threat of ungulates during most of WMMWPs history, we are still in the early stages of our weed control efforts. In more recent years we have been able to do more work on invasive weeds as resources permit. Focus has been on surveying, mapping, research and planning weed control efforts. Now that we are better organized, we aim to greatly enhance the capacity of the program and garner increased funding for these efforts.

Respectfully submitted,

Chris Brosius
WMMWP Program Manager

The undersigned hereby certify that he/she has read and understands all terms, conditions and specifications pursuant to this grant application. The undersigned stipulates that he/she has the capacity and authority to submit this grant application, and to fully administer the proposed program.

Grant Applicant _____ Date _____

Print Name _____

Executive Director _____ Date _____

Print Name /Title _____

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM A) APPLICANT INFORMATION

RESET FORM

Fiscal Year 2019

Date of Application _____

Organization University of Hawaii

Mailing Address 2440 Campus Road, Box 368

City Honolulu **State** HI **Zip Code** 96822

Physical Address 2425 Campus Road, Sinclair Library Room 1

City Honolulu **State** HI **Zip Code** 96822

Field Operations Address P.O. Box 13240

City Lahaina **State** HI **Zip Code** 96761

Executive Director Ms. Yaa-Yin Fong **Phone** _____

Email yaayin@hawaii.edu

Authorized Administrator Georgette Sakumoto **Phone** (808) 956-4056

Email gsakumot@hawaii.edu

Grant Project Manager Dr. Clifford Morden **Phone** (808) 956-9636

Email cmorden@hawaii.edu

Grant Project Coodinator Dr. Clifford Morden **Phone** (808) 956-9636

Email cmorden@hawaii.edu

Fiscal Year 2018 Grant Funding Received $350,000 pledged

Fiscal Year 2018 Grant Funding Spent $0.00

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM B) REQUIRED DOCUMENTS & FORMS CHECKLIST

FISCAL YEAR 2019

Applicant/Grantee: West Maui Mountains Watershed Partnership		**ATTACHED**
DOCUMENT AND FORM		
A. Tax Clearance Certificate or Certification of Vendor Compliance (certified and dated within the last six (6) months).		☐
B. Annual Financial Statements: Current financial statements for the past three (3) years. One (1) year must be audited.		☐
C. DWS Grants General Terms and Conditions signed by the authorized grant administrator and its executive director.		☐
D. The names of other funders and grants for the proposed project with DWS, including their individual contribution amount.		☐
E. An administration and overhead (A&O) breakdown of direct and indirect cost rates not exceeding the allowable percentage of the total grant amount. The direct and indirect administrators must also be identified. [The expenditure functions for both direct and indirect A&O will be outlined in the General Terms & Conditions]		☐
F. All fillable forms included in the Watershed Protection Grants Program Application (Forms C through P)		☐

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM C) DELIVERABLES REPORTING FORM **FISCAL YEAR** 2019

Performance Period = 4 Quarters
(4 Qtrs = 100%)

RESET FORM

Applicant/Grantee: West Maui Mountains Watershed Partnership	**Included** (yes/no)	**Target Goal**	**1st Quarter** Goal Amount 1st Qtr	% 1st Qtr	**2nd Quarter** Goal Amount 2nd Qtr	% 2nd Qtr	**3rd Quarter** Goal Amount 3rd Qtr	% 3rd Qtr	**4th Quarter** Goal Amount 4th Qtr	% 4th Qtr	**Percent Completed Final Report** Total %	Target Goal Reached
UNGULATE CONTROL	● Yes ○ No											○ Yes ○ No
Fence construction (ft)	● Yes ○ No											○ Yes ○ No
Fence inspection (ft)	● Yes ○ No	139875										○ Yes ○ No
Surveyed transects (number)	● Yes ○ No	31										○ Yes ○ No
Install traps (number)	● Yes ○ No	100										○ Yes ○ No
Maintain traps (number)	● Yes ○ No	4601										○ Yes ○ No
Ungulate removal (number)	● Yes ○ No	15										○ Yes ○ No
Other (please describe) Ground Scouting/Surveys (acres)	● Yes ○ No	20										○ Yes ○ No
WEED CONTROL AND ERADICATION	● Yes ○ No											○ Yes ○ No
Survey sites (numer of acres)	○ Yes ○ No											○ Yes ○ No
Weed removal (number of acres)	○ Yes ○ No											○ Yes ○ No
Apply herbicide - HBT (number of applications or acres)	● Yes ○ No	100										○ Yes ○ No
Other (please describe) Tectococcus ovatus biocontrol sites	● Yes ○ No	4										○ Yes ○ No
INVASIVE PLANT CONTROL	● Yes ○ No											○ Yes ○ No
Ground Surveys (number of acres)	○ Yes ○ No											○ Yes ○ No
Aerial Surveys (number of acres)	● Yes ○ No	200										○ Yes ○ No
Invasive plant(s) controlled (combined acres)	● Yes ○ No	58										○ Yes ○ No
Miconia (acres)	○ Yes ○ No											○ Yes ○ No
Pampas grass (acres)	○ Yes ○ No											○ Yes ○ No
Fountain grass (acres)	○ Yes ○ No											○ Yes ○ No
Himalayan ginger (acres)	○ Yes ○ No											○ Yes ○ No
Gorse (acres)	○ Yes ○ No											○ Yes ○ No
Ivy gourd (acres)	○ Yes ○ No											○ Yes ○ No
Strawberry guava (acres)	● Yes ○ No	27										○ Yes ○ No
Other plant (please describe) Clidemia hirta	● Yes ○ No	17										○ Yes ○ No
Other (please describe) Morella faya and other Priority Species	● Yes ○ No	14										○ Yes ○ No
RESOURCE MONITORING/RESEARCH	○ Yes ○ No											○ Yes ○ No
Monitor rain gauges (number)	● Yes ○ No	1										○ Yes ○ No
Other (please describe) Photo / Veg plots and Erosion Bridges	● Yes ○ No	32										○ Yes ○ No
COMMUNITY OUTREACH (#/hrs)	○ Yes ○ No											○ Yes ○ No
Educational hikes (number)	○ Yes ○ No											○ Yes ○ No
Volunteer trips (number)	● Yes ○ No	6										○ Yes ○ No
Outreach events (number)	● Yes ○ No	5										○ Yes ○ No
Public presentations (number)	● Yes ○ No	10										○ Yes ○ No
Volunteer recruitment (number)	○ Yes ○ No											○ Yes ○ No
Volunteer outplanting (number)	○ Yes ○ No											○ Yes ○ No
Other (please desribe)	○ Yes ○ No											○ Yes ○ No
RESEARCH, GERMINATION, AND PLANTING	○ Yes ○ No											○ Yes ○ No
Collect native seeds for revegetation - attach species (lbs/kg)	○ Yes ○ No											○ Yes ○ No
Locate seed sites for planting (number in watershed)	○ Yes ○ No											○ Yes ○ No
Collect wilt resistant koa seeds (lbs/kg)	○ Yes ○ No											○ Yes ○ No
Distribute wilt resistant koa seeds (to watershed partners)	○ Yes ○ No											○ Yes ○ No
Outplanting for reforestation and management (number)	○ Yes ○ No											○ Yes ○ No
Other (please describe)	○ Yes ○ No											○ Yes ○ No

● Careful consideration should be given to your Target Goal. Reaching your Target Goal may be obtained incrementally over 4 quarters until the deliverable is 100% complete. Be sure to provide justification if you do not attain your Target Goal due to unexpected technical and personnel issues or weather related delays. Your proposal and updated quarterly reports will be used as reference, if more detail about your planned project activities to complete deliverables is needed.

*Please attach narrative justifications or additional descriptions behind this form.

Notes to Accompany Form C

Ungulate Control:

- Fence Inspection - We will be inspecting 139,875 feet of fence. This number is derived from our total fence lengths (54,862' = 10.4 miles) which will each be inspected between one and four times over the course of the year.
- Install traps – We will install new traps as necessary if an ungulate hotspot arises. On average, we typically install ~100 new traps per year.
- Maintain traps – We propose to maintain 4,601 traps. This number is derived from our total number of traps (2076) which will each be checked between one and four times over the course of the year.
- Ungulate removal – Over the last few years, we have averaged the removal of ~15 ungulates from managed areas in Mauna Kahalawai. Our goal is to keep managed units at or near zero ungulate activity and we continue to monitor to ensure consistent and effective absence of ungulates.
- Other – We will perform ground scouting in ungulate free areas for early detection – 20 acres.

Weed Control and Eradication:

- We put most of our information in the Invasive Plant Control Section below.
- Apply Herbicide – HBT- The HBT mission is for a follow up survey for PsiCat in the back of Iao Valley to retreat and cover any survivors. One 3-hour mission covering ~100 acres.
    - In addition, we may conduct up to an additional three HBT missions for research and development of HBT applicability for other priority species.
- Other – We will install 4 new *Tectococcus ovatus* biocontrol release sites in Kahakuloa

Invasive Plant Control:

- Ground Surveys – Our proposed acres are separated out within the species below.
- Aerial Surveys – We propose to conduct aerial surveys for priority weeds for early detection. 2 hours per quarter and surveying a total of 200 acres.
- Invasive Plants controlled
    - Strawberry guava – proposing 24 PD for ground weed control missions in the West, East and Northeast units, as well as six Volunteer Service Trips, totaling 27.4 acres.
    - Clidemia hirta – proposing 18 PD for ground weed control missions in the West and East Units, totaling 17 acres.
    - Morella faya – proposing 8 PD for ground weed control missions in the West Unit, totaling 4 acres.
    - Other Priority Species – proposing to cover 10 acres to begin controlling other Priority weed species

Resource Monitoring / Research:

- Monitor Rain gauges – 1 rain gauge will be monitored in Honolua
- Other – Monitor 22 photo/vegetation plots in the Southeast and Southwest Units
  Monitor 10 erosion bridges in the Northwest Unit

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM D) PROJECT BUDGET SUMMARY

- Applicants should exercise caution and responsibility when requesting funds. Awards are considered based on applications with clear justification concerning the costs and activities to achieve contracted deliverables.
- Awarded funds are limited. Only request amounts that you are prepared to spend in a given performance period. Plan and follow project eligibility requirements under number one of Part VI, Eligible Projects, in the RFP.
- See Budget Instructions (Section 1.5), Grant Performace Period (Section 2.3), Gen. T&C's (Section 3.0), and Request for Reimbursements (Section 4.2.7) for guidance, limitations, and restrictions that may prohibit the reimbursement for your expenses.
- Grantees should ensure that totals for each expense categories are reconciled accordingly. Requesting budget changes after the submission of your Project Budget Summary can result is long delays in reimbursement.
- Grantees should not attempt to spend down remaining funds close to their project closeout date that alters your initial Scope of Work under Payments of the T&C without ample justification.
- Vehicles, equipment, supplies, and materials are for project-based work only and personal or recreational use is strictly prohibited.
- Please provide narratives for large unspent amounts if they were included in your initial grant proposal.

RESET FORM

FISCAL YEAR: 2019 GRANT NUMBER: NTP Start Date: NTP End Date:

PROJECT BUDGET SUMMARY - APPLICANT/GRANTEE West Maui Mountains Watershed Partnership	Requested Budget Amount	Matching Funds	Award Amount	1st Qtr Drawdown Amount	2nd Qtr Drawdown Amount	3rd Qtr Drawdown Amount	4th Qtr Drawdown Amount	Grant Award Remaining Balance
EXPENSES								
A. Personnel (payroll taxes & fringes)	$333,442.68	0	0	0	0	0	0	0
B. Transportation (e.g. fuel, etc)	0	0	0	0	0	0	0	0
C. Contractual (e.g. helicopter, consultant, contractor, etc)	$46,735.44	0	0	0	0	0	0	0
D. Facility Rental	0	0	0	0	0	0	0	0
E. Utilities (e.g. telephone, mobile, water, electricity)	$6,769.00	0	0	0	0	0	0	0
F. Travel	$11,600.00	0	0	0	0	0	0	0
G. Field Crew (e.g. equipment, training)	$59,324.00	0	0	0	0	0	0	0
H. Supplies & Materials	$38,361.00	0	0	0	0	0	0	0
I. Administrative & Overhead	$51,748.50	0	0	0	0	0	0	0
J. Other Expenses	$21,566.00	0	0	0	0	0	0	0
TOTALS	**$ 569,546.62**	**$ 0.00**	**$ 0.00**	**$ 0.00**	**$ 0.00**	**$ 0.00**	**$ 0.00**	**$ 0.00**

*Comments/Notes Section Below

PLEASE ATTACH BUDGET NARRATIVE/JUSTIFICATIONS BEHIND THIS FORM IF NECESSARY

The budget and scope of work for 2019 is designed to help WMMWP meet its most pressing priorities. Decreases in Federal Funds sources and ripple effects thereof throughout conservation are anticipated to put more financial pressure on other traditional funding sources. WMMWP can not continue to perform and sustain the same gains within core programs without added support from other traditional sources such as the County. The State is also trying to fill this need for core funding to the extent possible. Fortunately, the state is funding several fencing projects to replace aging fences and tighten up others in existing management areas. This is a huge benefit to the partnership. Fencing addressed, one of the critical reasons for increased funding requests to the County is the pressing need to control our worst invasive weeds. WMMWP must increase its ability to further address its list of up to 21 priority weed species if it is to sustain native forest cover and its water collection function. Therefore, additional funds are needed to enhance our capacity and achieve our weed control goals. The additional staff, gear and mobilization funds will help us sustain core programs and enhance the control priority weeds. This budget also reflects increases in wages, materials, fuel, and transportation. Working with the same level of funding means doing less when we need to be doing more to sustain watershed and water resources. Thank you for your support and consideration!

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM E) PAYROLL

RESET FORM

FISCAL YEAR 2019

Applicant/Grantee: West Maui Mountains Watershed Partnership	INDIVIDUAL TOTAL SALARY ($)	REQUESTED DWS SALARY CONTRIBUTION ($)	Performance Period Drawdowns NTP start date NTP end date 1st Quarter SALARY ($)	2nd Quarter SALARY ($)	3rd Quarter SALARY ($)	4th Quarter SALARY ($)	Remaining Balance ($)
POSITION NAME/TITLE AND FTE%			*** All included expense invoices must be dated within NTP start and end dates**				
Program Manager 35%	$89,453.20	$31,308.62					
Natural Resource Operations Manager 35%	$66,479.49	$23,267.82					
Natural Resource Management (NRM) Supervisor (Fencing) 35%	$59,336.17	$20,767.66					
Program Associate 35%	58170.17	$20,359.56					
NRM Technician (Animal Control) 35%	$51,450.00	$18,007.50					
NRM Specialist (Invasive Weed Control) 35%	$54,500.00	$19,075.00					
Field Assistant Level II 35%	$46,297.69	$16,204.19					
Field Assistant Level II 35%	$38,666.88	$13,533.41					
Field Assistant Level II 35%	$37,552.79	$13,143.48					
Field Assistant Level I 35%	$33,232.50	$11,631.38					
Field Assistant Level I 35%	$33,232.50	$11,631.38					
Field Assistant Level I 35%	$33,232.50	$11,631.38					
Outreach and Education Specialist 50%	$46,297.69	$23,148.85					
PCSU Specialist (5% of direct costs)		$24,657.05					
Salaries (Subtotal)	647,901.58	258,367.26					
Payroll Taxes	0.00	0.00					
Fringes and Benefits	204,697.81	75,075.42					
TOTALS	$ 852,599.39	$ 333,442.68					

*Comments/notes section below

PLEASE ATTACH PROJECT JOB DESCRIPTION BY POSITION/TITLE BEHIND THIS FORM

- The proposed costs in this category are designed to accomplish project deliverables in the scope of work. The fringe benefit rate includes medical, retirement, group life insurance, long term disability, long term care, worker's compensation, FICA and other benefits consistent with the policies set by the Research Corporation of the University of Hawaii through which WMMWP staff are hired. The benefits rate varies slightly and is based on individual's family structure. The salary costs above assume a 5% increase for FY19 above current FY18 rates. The Taxes and Fringe Benefits are increased at the same rate. The average Fringes and Benefits rates for current staff is 32% and used to calculate this cost per position. The actual salary and fringe per position may vary dependent on the staffing at the time of the award and contract period.
- This Staff structure also includes the advancement of Field Assistants from level I to level II and also included two replacements at level I to meet the ongoing needs in the scope of work.
- The Outreach and Education Specialist capacity will help us enhance related program needs while increasing the assistance of public volunteers in stewardship and management priorities.

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM F) TRANSPORTATION

RESET FORM

FISCAL YEAR 2019

Applicant/Grantee: West Maui Mountains Watershed Partnership			REQUESTED BUDGET AMOUNT ($)	PURPOSE	Performance Period Drawdowns NTP start date NTP end date 1st Quarter ACTUAL EXPENSES ($)	2nd Quarter ACTUAL EXPENSES ($)	3rd Quarter ACTUAL EXPENSES ($)	4th Quarter ACTUAL EXPENSES ($)	Remaining Balance ($)
ITEM	Vehicle	VIN #			* All included expense invoices must be dated within NTP start and end dates				
Fuel for 4 trucks and 2 UTVs	Ford F350	1FTSW31R18EC13379							
	Chevy 3500	1GBJK34KOSE264275							
	Tacoma	1GBJK34KOSE264275							
	Polaris UTV	YTBD							
	Kubota UTV	YTBD							
	PJ Trailer	3CVCE1827J2568441							
Repairs / Maintenance									
TOTALS									

*Comments/notes section below

PLEASE ATTACH ADDITIONAL NARRATIVE/BREAKDOWN BEHIND THIS FORM IF NECESSARY

Four project vehicles (one new Tacoma proposed), two UTVs and an equipment trailer are used to transport the crews and materials from our base of the WMMWP project area for projects over rugged 4x4 roads throughout the Lahaina and Wailuku Districts. Wear and tear on vehicles for this purpose would include repairs, tire replacement, registration, safety checks, etc.

- See Form "L" or Supplies, Materials and Equipment for Fuel costs.
- Repairs/Vehicle maintenance See Form "N" or Other.

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM G) CONTRACTUAL SERVICES

RESET FORM

FISCAL YEAR 2019

Applicant/Grantee: West Maui Mountains Watershed Partnership	HOURS	COST ($)	PURPOSE	Performance Period Drawdowns NTP start date NTP end date 1st Quarter ACTUAL EXPENSES ($)	2nd Quarter ACTUAL EXPENSES ($)	3rd Quarter ACTUAL EXPENSES ($)	4th Quarter ACTUAL EXPENSES ($)	Remaining Balance ($)
ITEM				* All included expense invoices must be dated within NTP start and end dates				
Helicopter Hours for general management @1229.88 / hr.	28	$34,436.64	Transportation					
Helicopter Hours for HBT @ 1229.88 / hr.	10	$12,298.80	Transportation					
Helicopter Operations				HRS: $		HRS: $		HRS: $		HRS: $		
TOTALS	38.00	$ 46,735.44						

*Comments/notes section below

PLEASE ATTACH ADDITIONAL NARRATIVE/BREAKDOWN BEHIND THIS FORM IF NECESSARY

- Helicopters are required to transport crew and materials into remote field camps and work sites. Thousands of pounds of fence materials, camp gear and tools are air lifted. Work would never be accomplished without this tool. Hiking in to such areas with the necessary equipment without helicopter support would increase costs several times or make work impossible. Use of helicopters in standard practice in resource management work in Hawaii and in similar conditions worldwide.
- Use of HBT will be for trials of new target species and ongoing follow up work of Strawberry Guava.
- Use of UAVs will help keep helicopter survey costs down where possible.

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM H) FACILITIES

RESET FORM

FISCAL YEAR 2019

Applicant/Grantee: West Maui Mountains Watershed Partnership			Performance Period Drawdowns NTP start date NTP end date				
	COST ($)	PURPOSE	1st Quarter ACTUAL EXPENSES ($)	2nd Quarter ACTUAL EXPENSES ($)	3rd Quarter ACTUAL EXPENSES ($)	4th Quarter ACTUAL EXPENSES ($)	Remaining Balance ($)
ITEM			* All included expense invoices must be dated within NTP start and end dates				
TOTALS							

*Comments/notes section below

PLEASE ATTACH ADDITIONAL NARRATIVE/BREAKDOWN BEHIND THIS FORM IF NECESSARY

- The WMMWP base yard is made of a dedicated mobile facility owned by its non-profit, Malama Kahalawai, Inc.
- The land we occupy is provided by a lease of 10$ per year by Olowalu Elua Associates.

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM I) UTILITIES

RESET FORM

FISCAL YEAR 2019

Applicant/Grantee: West Maui Mountains Watershed Partnership			Performance Period Drawdowns NTP start date NTP end date				
	COST ($)	PURPOSE	1st Quarter ACTUAL EXPENSES ($)	2nd Quarter ACTUAL EXPENSES ($)	3rd Quarter ACTUAL EXPENSES ($)	4th Quarter ACTUAL EXPENSES ($)	Remaining Balance ($)
ITEM			* All included expense invoices must be dated within NTP start and end dates				
Spectrum, Telephone (land line) plus Internet Access	$1,584.00	Communications					
Sewage Pumping Service	$1,375.00	Sewage					
MECo., Electricity for Base Yard	$3,300.00	Power					
Olowalu Water Co., Water bills	$510.00	Water					
TOTALS	$ 6,769.00						

*Comments/notes section below

PLEASE ATTACH ADDITIONAL NARRATIVE/BREAKDOWN BEHIND THIS FORM IF NECESSARY

- WMMWP is rent free. Our portable field station requires only electricity to power our office trailers, drinking water, and portable toilet service. Utilities are used to support project implementation by WMMWP staff and not University administrative support.
- Telephone and Internet service are provided to us as a business bundle package from our provider at $132 per month x 12months.
- Electricity costs an average of $275 per month x 11 months.
- Sewage pumping service is $125 per month x 11 months.
- Water service costs an average of $85 per 2-month service period.

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM J) TRAVEL

RESET FORM

FISCAL YEAR 2019

Applicant/Grantee: West Maui Mountains Watershed Partnership			Performance Period Drawdowns NTP start date NTP end date				
	COST ($)	PURPOSE	1st Quarter ACTUAL EXPENSES ($)	2nd Quarter ACTUAL EXPENSES ($)	3rd Quarter ACTUAL EXPENSES ($)	4th Quarter ACTUAL EXPENSES ($)	Remaining Balance ($)
ITEM			* All included expense invoices must be dated within NTP start and end dates				
Crew Fieldwork Per diem	$2,100.00						
Inter-Island Coordination Meeting Airfare	$1,000.00						
Conference travel, per diem and accommodations	$7,000.00						
Certification Training in Rappelling Leadership	$1,500.00						
TOTALS	$ 11,600.00						

*Comments/notes section below

PLEASE ATTACH ADDITIONAL NARRATIVE/BREAKDOWN BEHIND THIS FORM IF NECESSARY

- Per Diem is required for all overnight camping trips at a rate of 20$ per day per person. We estimate at least one 2-day camping trip per month with up to 6 to 7 staff per trip, over the 12-month grant period.
- Professional development through conference attendance (such as the Hawaii Conservation Conference) exposes them to new ideas, techniques, and methodologies and broadening of our staff experience is vital to long term retention and staff growth. Based on prior years, per person conference travel is estimated to be: $200 airfare + $120 off-island per diem + $20 ground transportation and parking + $260 lodging.
- The Program Manager is requested to attend meetings on Oahu for State functions related to the advancement of watershed protection and the Hawaii Association of Watershed Partnerships. Estimated costs include $200 airfare + $50 off-island per diem for 1 function every quarter.
- Our NRM Supervisor will need to travel to the training center to become certified as a Ropes and Rappel Leader. This will enable us to maintain staff certifications and capabilities in the field as well as safety.

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM K) FIELD CREW

RESET FORM

FISCAL YEAR 2019

Applicant/Grantee: West Maui Mountains Watershed Partnership			Performance Period Drawdowns NTP start date NTP end date				
	COST ($)	PURPOSE	1st Quarter ACTUAL EXPENSES ($)	2nd Quarter ACTUAL EXPENSES ($)	3rd Quarter ACTUAL EXPENSES ($)	4th Quarter ACTUAL EXPENSES ($)	Remaining Balance ($)
ITEM			* All included expense invoices must be dated within NTP start and end dates				
Crew Field Supplies	$6,525.00						
Crew Training	$5,250.00						
Conference Registration	$4,554.00						
Ropes Leader Certification Registration	$3,500.00						
Unmanned Aerial System Training / Registration	$3,150.00						
Toyota Tacoma Crew Cab 2019	$36,345.00						
TOTALS	$ 59,324.00						

*Comments/notes section below

PLEASE ATTACH ADDITIONAL NARRATIVE/BREAKDOWN BEHIND THIS FORM IF NECESSARY

- Field Crew Supplies includes items such as flagging tape, saw blades, rope, rappelling gear, work gloves, tools, camp gear (tents, sleeping bags, rain protection, etc.), hand held gps units (~$450 per unit), radios (~$500 per unit), power tools, packs, boots (~$250 per pair), T- shirt uniforms, etc. New staff will require all new gear and equipment.
- Field crew training includes technical training and cross training in field based observations, computer software, wilderness first aid, CPR, rappelling, helicopter safety, database use. Includes fees and travel. Fees range from $100 to $300 per person.
- NRM Supervisor Ropes Leader Certification Registration (~$3500)
- Unmanned Aerial System Training / Registration; This extensive training is required for non recreational use of UAS applications by the FAA.

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM L) SUPPLIES & MATERIALS

RESET FORM

FISCAL YEAR 2019

Applicant/Grantee: West Maui Mountains Watershed Partnership	COST ($)	PURPOSE	Performance Period Drawdowns NTP start date NTP end date 1st Quarter ACTUAL EXPENSES ($)	2nd Quarter ACTUAL EXPENSES ($)	3rd Quarter ACTUAL EXPENSES ($)	4th Quarter ACTUAL EXPENSES ($)	Remaining Balance ($)
ITEM			* All included expense invoices must be dated within NTP start and end dates				
Fence Maintenance Materials	$2,750.00						
Fence Materials for New Kahoma Fence	$5,356.00						
Office Supplies	$2,000.00						
Volunteer Supplies/hand Tools	$1,155.00						
500 Native out plantings	$2,500.00						
Fuel for Vehicles and Equipment	$3,500.00						
HBT Herbicide Capsules	$13,000.00						
Unmanned Aerial Systems	$5,000.00						
Software for UAS such as Pix 4D	$3,100.00						
TOTALS	$ 38,361.00						

*Comments/notes section below

PLEASE ATTACH ADDITIONAL NARRATIVE/BREAKDOWN BEHIND THIS FORM IF NECESSARY

- Fencing material is for maintenance and improvement of existing fences.
- New fencing addresses pig impact in Kahoma and the Lahaina Water Supply.
- Operational supplies may be items which do not neatly fit within field crew costs such as herbicide, disposables (like paper towels, trash bags), consumables (weed whacking string, chain saw bar oil) decontamination/cleaning supplies etc.
- Office supplies may include paper, toner, small machine repair, computer software, licenses, etc.
- Volunteer supplies consist of personal protective equipment. Hand tools and herbicide tools.
- The native plants are to restore areas where we removed invasive plants. Estimate $5 per plant.
- Combined fuel cost for the four project vehicles and two UTVs. Small amounts are also procured for weed trimmers, chain saws, etc.
- HBT herbicide covers manufacturing and shipping. Budget may be substituted with spray ball or other weed control related operations.
- UAS software is at an educational rate and will help us take raw imagery collected by UAS to create maps of target species

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM M) ADMINISTRATIVE & OVERHEAD

RESET FORM

FISCAL YEAR 2019

Applicant/Grantee: West Maui Mountains Watershed Partnership	COST ($)	PURPOSE	Performance Period Drawdowns NTP start date NTP end date 1st Quarter ACTUAL EXPENSES ($)	2nd Quarter ACTUAL EXPENSES ($)	3rd Quarter ACTUAL EXPENSES ($)	4th Quarter ACTUAL EXPENSES ($)	Remaining Balance ($)
ITEM			* All included expense invoices must be dated within NTP start and end dates				
UH 10% indirect charge	$51,748.50						
PCSU 5% direct charge ($24,642.14 under expense category A in Form D.)							
TOTALS	$ 51,748.50						

*Comments/notes section below

PLEASE ATTACH ADDITIONAL NARRATIVE/BREAKDOWN BEHIND THIS FORM IF NECESSARY

- WMMWP is a project of the Pacific Cooperative Studies Unit (PCSU) of the University of Hawai‘i. WMMWP staff are employees of the Research Corporation of the University of Hawai‘i (RCUH). Grants are fiscally managed by the Office of Research Services (ORS) of the University of Hawai‘i.
- The UH Indirect Cost Rate for this grant is 10%.
- The PCSU Direct Cost Rate is 5% and is assessed at $24,642.14 under expense category A in Form D, as salary.

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM N) OTHER EXPENSES

RESET FORM

FISCAL YEAR 2019

Applicant/Grantee: West Maui Mountains Watershed Partnership	COST ($)	PURPOSE	Performance Period Drawdowns NTP start date NTP end date 1st Quarter EXPENSES	2nd Quarter EXPENSES	3rd Quarter EXPENSES	4th Quarter EXPENSES	Remaining Balance
ITEM			* All included expense invoices must be dated within NTP start and end dates				
Geodatabase Maintenance	$5,350.00						
Data Entry Computers, Tablets & Software Licenses	$2,200.00						
Security Alarm Service	$666.00						
Web Site Maintenance	$1,500.00						
Printing and Publication	$1,850.00						
Vehicle Repairs and Maintenance	$5,000.00						
Facilities Repairs and Maintenance	$5,000.00						
TOTALS	$ 21,566.00						

*Comments/notes section below

PLEASE ATTACH ADDITIONAL NARRATIVE/BREAKDOWN BEHIND THIS FORM IF NECESSARY

- Ongoing maintenance of the Geodatabase is critical to streamlining the data process. WMMWP Access databases and gps units will be kept in order. Designing tablet functions, correcting data systems and maintaining database function is critical to producing reliable and reportable results.
- We have 10 computers and 1 laptop which we replace/upgrade at a rate of 1 to 2 computers per year (~$800 per unit) to keep hardware and software current. Tablets (including protection and data applications) are ~$250 per unit. GIS licenses are approximately $100 per unit per year.
- Security is essential in our area. We have been burglarized twice in the last five years. Cost is $55.50 per month for 12 months.
- Printing and Publication is often need for outreach materials and interactive displays. Water story presentations will require large format maps of water systems, which can cost up to $200 each. Our outreach displays are also dated and need to be redone to last the next 5 years. 5 boards X $300.
- Vehicle repairs, maintenance, registration, safety for three project vehicles: Toyota Tacoma ($325 registration + $40 safety), Ford F350 ($540 registration + $40 safety) , and Chevrolet flatbed ($40 safety; State registered).

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM O) EQUIPMENT & SUPPLIES INVENTORY

*Include Invoices/Receipts

FISCAL YEAR 2019

RESET FORM

Applicant/Grantee: West Maui Mountains Watershed Partnership	DATE OF PURCHASE	QUANTITY	UNIT COST ($)	TOTAL COST ($)	PURPOSE	ANTICIPATED USEFUL LIFE
ITEM						
TOTALS						

PLEASE ATTACH ADDITIONAL NARRATIVE/BREAKDOWN BEHIND THIS FORM IF NECESSARY

COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

WATERSHED PROTECTION GRANT PROGRAM

(FORM P) OTHER FUNDERS & GRANTS

FISCAL YEAR 2019

RESET FORM

Applicant/Grantee: West Maui Mountains Watershed Partnership	DELIVERABLE ACTIVITY	AMOUNT ($)
FUNDER OR GRANT		
State of Hawaii, DLNR, Watershed Partnerships Program (Anticipated based on Prior Years)	All Proposed Programs	$330,000.00
State of Hawaii, DLNR, Puu Kukui & Kapunakea Fence Construct & Replacement (Contracting)	Fencing	$250,000.00
USFWS, Partners for Fish and Wildlife (Pending)	Fencing	$25,000.00
State of Hawaii, DLNR, Hawaii Invasive Species Council, Albizia Control (Contracting)	Weed Control	$3,800.00
See below for further information...		
TOTALS		$ 608,800.00

PLEASE ATTACH ADDITIONAL NARRATIVE/BREAKDOWN BEHIND THIS FORM IF NECESSARY

Please Note: Based on past years, DLNR may fund the amount projected above for the requested programs. In FY19 DLNR/State is also funding several discrete projects in new fencing above and beyond core funds being requested in this proposal to the tune of approximately $250,000. US. Fish & Wildlife Service also has supported new fence projects above and beyond these core programs for fence repairs in Kauaula and Launiupoko areas. Private foundation funds will also be requested for specific items in support of all projects and programs which usually generates 10 to 20 thousand in additional dollars for base yard, equipment, and facilities improvements. The Nature Conservancy also supports our efforts through its contacts to WMMWP for work in Kapunakea Preserve. Lastly, Olowalu Elua Associates also provides in-kind use of nearly one acre of land for our base yard and facilities.

Quarterly Progress Report
October 1st – December 31st, 2014
West Maui Mountains Watershed Source Protection Program
FY 2015 Grant
Acct #0006801; Contract # WC-0818
to

County of Maui Department of Water Supply

By:

West Maui Mountains Watershed Partnership

County of Maui
Ka'anapali Land Management Corp.
Kahoma Land Holdings, LLC.
Kahoma Land Company, LLC
Kamehameha Schools
Makila Land Company, LLC
Maui Land & Pineapple Company, Inc.
Maui County Department of Water Supply
State of Hawaii DLNR
The Nature Conservancy
Wailuku Water Company, LLC
Tri-Isle RC&D
US Fish and Wildlife Service

&

Prepared by:

Chris Brosius – Program Manager
Jill LaBram- Natural Resource and GIS Technician
Kimberly Thayer – Program and Data Assistant
West Maui Mountains Watershed Partnership
P.O. Box 13240, Lahaina, Hawaii 96761
(808) 661-6600
brosius@westmauiwatershed.org

Quarterly Progress Report
October 1st – December 31st, 2014
West Maui Mountains Watershed Source Protection Program
FY 2015 Grant
Acct #0006801; Contract # WC-0818

1) Background

The DWS 15 contract opened on October 3, 2014. Monies spent so far include fuel and payroll for field work in Mauna Alani. The helicopter PO is in the process of being set up with Windward Aviation. We are currently finishing work on the DWS 14's original and supplemental contracts, and the DWS 15 deliverables will commence more completely next quarter.

2) Tasks Completed During this Period:

a. Regular fence maintenance

i. 270 meters of fence were inspected and are in good condition.

b. Zero tolerance control of ungulates

i. 37 animal control devices were checked, 0 animals removed and there is no ungulate activity above the fence.

ii. Aerial Shoot Protocols have been developed and approved by participating landowners, the Division of Forestry and Wildlife Branch Manager, and the official plan is now being submitted to the DOFAW administrator for state approval.

c. Watershed and Water quality monitoring

i. Two Mauna Alani transects were read this period for ungulate sign. 4 stations had fresh sign. The sign is located in an area which is currently unmanaged. Our limitation in addressing this problem continues to be the presence of dirt bike activity. We hope to renew our efforts to mitigate dirt bike activity in this area and subsequently control pig activity.

Transect	# of Stations	Date Read	Avg. % New sign	# of Stations with New Sign	Avg. % Old Sign	# of Stations with Old Sign
Mauna Alani	33	12/2/14	0	0	0	0
Mauna Alani2	69	12/2/14	0.09	4	0	0

ii. Two photo points in Mauna Alani were read this period.


The two photos above (Mauna 7/8 Internal on left and middle on right) were taken in December 2014 in comparison to the photos below, taken in 2011. Old disturbance has been mostly covered up by non-native vegetation.


d. Outreach

i. An informative and interactive WaterStory session was held with a group of seniors at the West Maui Kaunoa Senior Center on Thursday, November 13. The participants were interested and engaged in the subject matter, asking many follow-up questions during and after the session. Policy recommendations the participants developed during the role-playing portion of the session include the following, among others:

"Educate population and businesses about conservation, recycling water, using native species. Teach how it will be cost effective for all."

"Fostering native species – Tax break on [planting/landscaping with] native species"

Feedback gathered from the participant exit survey was all positive. Participants reported that they learned where their water comes from, the history of water use on Maui, who is responsible for what in water

management, that the population needs to be educated, and that there are many solutions for protecting watersheds.

3) *Budget Summary:*
   a. Monies spent so far include fuel and payroll for field work in Mauna Alani and staff time spent working on aerial shoot process and meetings.
   b. **See attached**

Quarterly Progress Report
January 1st – March 31st, 2015
West Maui Mountains Watershed Source Protection Program
FY 2015 Grant
Acct #0006801; Contract # WC-0818
to

County of Maui Department of Water Supply

By:

County of Maui
Ka'anapali Land Management Corp.
Kahoma Land Holdings, LLC
Kahoma Land Company, LLC
Kamehameha Schools
Makila Land Company, LLC
Maui Land & Pineapple Company, Inc.
Maui County Department of Water Supply
State of Hawaii DLNR
The Nature Conservancy
Wailuku Water Company, LLC
Tri-Isle RC&D
US Fish and Wildlife Service

&

Prepared by:
Chris Brosius – Program Manager
Jill LaBram – Natural Resource and GIS Technician
Kimberly Thayer – Program and Data Assistant
West Maui Mountains Watershed Partnership
P.O. Box 13240, Lahaina, Hawaii 96761
(808) 661-6600
brosius@westmauiwatershed.org

Quarterly Progress Report
January 1st – March 31st, 2015
West Maui Mountains Watershed Source Protection Program
FY 2015 Grant
Acct #0006801; Contract # WC-0818

1) Background

The DWS 15 contract opened on October 3, 2014. We have completed the work on the DWS 14's original contract and are currently finishing the supplemental contract; therefore we have now started on the DWS 15 deliverables more completely this quarter.

2) Tasks Completed During this Period:

a. Regular fence maintenance

i. WMMWP has inspected 8,515 meters (5.29 miles) of fence this quarter in the West, Southwest, Southeast, and East Units and are in good condition. Five meters of fence were also maintained and brushed due to a tree fall.

b. Zero tolerance control of ungulates

i. Feral ungulates have been controlled above project fences. While checking 1,565 animal control devices this period, a total of one pig was removed this period in Wai'ehu, shown in Table 1, below.

ii. Aerial Shoot rights of Entry are now being worked out with participating landowners. We anticipate submission to the state Attorney General's office for approval in the next quarter.

FY15 Q3 (January 1- March 31, 2015)

Management Unit	Secondary Unit Name	# checked	# new installations	# removed	# pigs	# cows	# deer	# goats
1.5	Eke	0	0	0	0	0	0	0
2.1	Waihe'e	0	0	0	0	0	0	0
2.3	Waiehu	59	0	3	1	0	0	0
2.4	Pu'u Kane	0	0	0	0	0	0	0
3.2	Kapilau	165	0	0	0	0	0	0
3.3	Waikapu	16	0	0	0	0	0	0
3.4	Hanaula	81	0	5	0	0	0	0
4.7	Helu	232	0	25	0	0	0	0
5.2	Pana'ewa	69	13	16	0	0	0	0
5.3	Kahoma	0	0	0	0	0	0	0
5.4	Hahakea/Wahikuli	815	0	11	0	0	0	0
5.6	Honokowai	128	0	0	0	0	0	0
TOTAL		**1565**	**13**	**57**	**1**	**0**	**0**	**0**

c. Control of Priority Weed Species

i. 542 *Clidemia hirta* plants (20 mature) were controlled during an 8.3-acre sweep in Wahikuli (Map 1, p.6). The reduction and removal of this

population, which can threaten source water recharge areas in Lahaina, is a top priority for WMMWP.

ii. One mature *Morella faya* was treated in Helu on the north ridge just above the fence line.

iii. Staff was trained on release methods for *Tectoccocus ovatus*, strawberry guava biocontrol, including how to prepare field release sites and monitoring its spread. Release in other areas is being pursued with landowners now that the agent is available.

iv. Volunteer efforts on Waihe'e Ridge trail will commence in the upcoming quarters, once the deliverables for the DWS 14 have been completed.

d. Watershed and Water quality monitoring

i. The Helu transect was read this period for ungulate sign and presence of weeds. No stations had fresh sign, but eight of the 42 stations contained old goat sign. Management has been established recently on this ridge, which allowed for the removal of one goat previously. No fresh sign has been noted since.

Transect	# of Stations	Date Read	Avg. % New sign	# of Stations with New Sign	Avg. % Old Sign	# of Stations with Old Sign
Helu	42	2/23/15	0	0	0.83	8

ii. Six photo points in Waiehu were read this period. To date, all old disturbances have been re-vegetated. Although many of these species are non-native, they still help to prevent erosion.

iii. Water quality monitoring in Honolua continued this period. Five storm samples and four base-flow samples were collected and will be sent to the UH-Hilo Analytical Lab for analysis. The game camera photos below show a storm event on March 4, 2015 in which two storm samples were collected during the high flow.

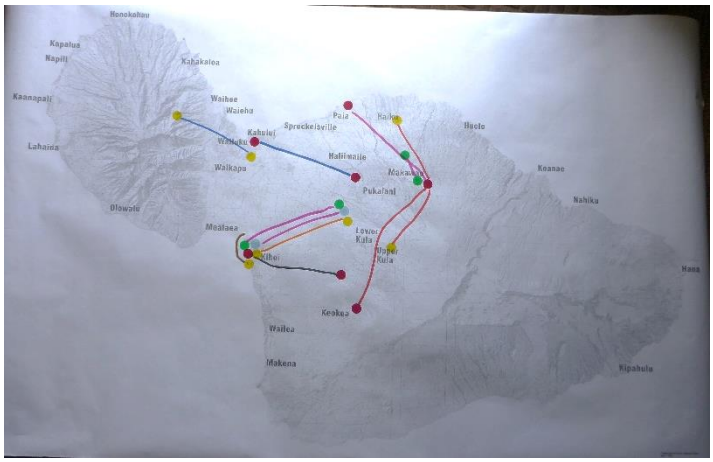
Game camera photos above show a storm event in Honolua stream on March 4, 2015. The top photo shows the high flow when the samples were collected. In the bottom photo, the stream has gone back down to near normal flow.

e. Outreach

i. A total of four informative and interactive WaterStory sessions were conducted this quarter in partnership with the Maui Economic Development Board:

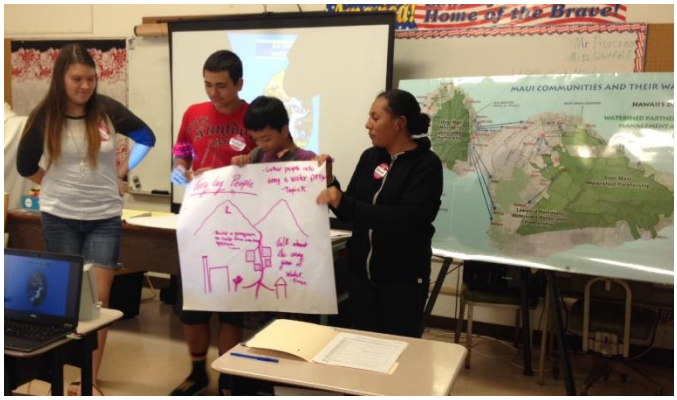
- February 19, 2015: various staff in the Fairmont Kea Lani Sustainability group
- March 16, 2015: two separate classes of 7th graders in the Kamehameha Schools Ipu Kukui Program
- March 20, 2015: various management-level staff from the Fairmont Kea Lani

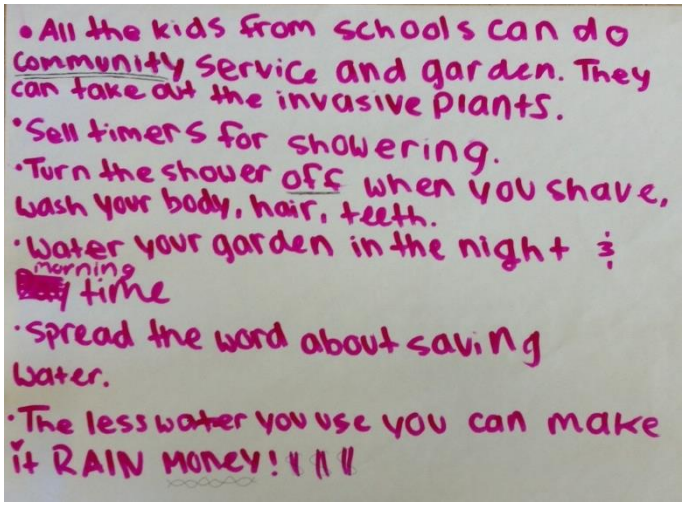
The first exercise in the WaterStory session is for each participant to plot two points on a map of Maui—one where their house is, the second where they think their water comes from—and to draw a line to connect the two points. While a few know the source of their water, it is apparent from facial expressions that many have *never* thought about it. As shown in the map to the left, many South Maui residents guess their water source to be upslope on Haleakala. Similarly, residents of Central Maui and the North Shore waver between a source on Haleakala or in the West Maui Mountains. Regardless of where they live, many participants are surprised to learn that water from the West Maui Mountains supplies all of West Maui, Central Maui (to Paia), and South Maui.



At left: Water Source Map completed by Fairmont Kea Lani staff on February 19, 2015.

The bulk of WaterStory is a two-part policy making exercise in which participants take on roles of County Council members, business owners, and everyday members of the public. In part 1, each group develops a series of policies for advancing watershed protection. In part 2, the groups are mixed, thus forcing each role (Council, business, and public) to advocate for their interests and achieve compromise in shaping policies for watershed protection. Moreover, the groups must identify a way to fund each policy. Policy recommendations the participants developed during the role-playing portion of the session include the following, among others:



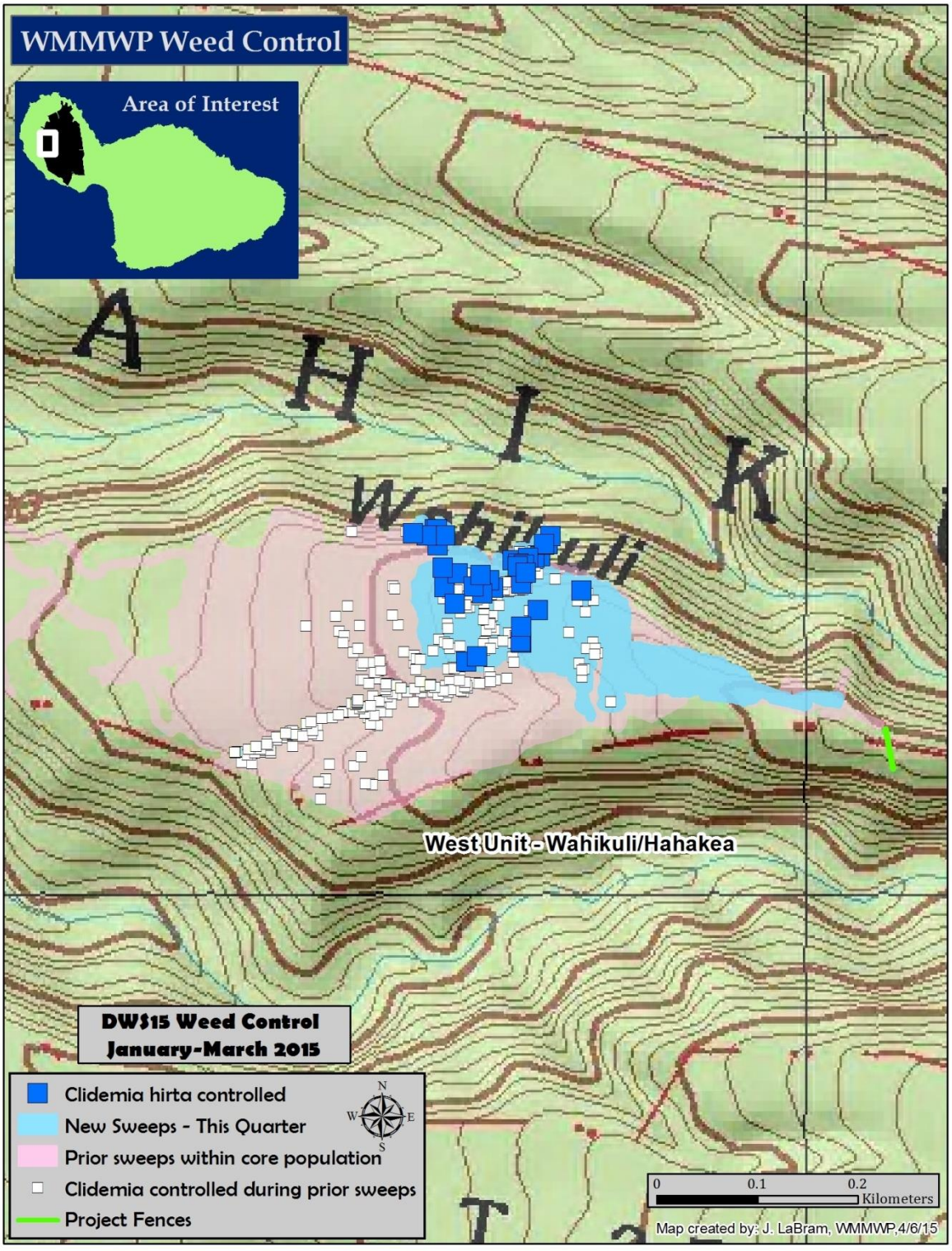


Above: Ipu Kukui students representing everyday residents present their policy recommendation in picture form. To the right of them is a WaterStory map that depicts the actual water sources around the island with an overlay of the watershed partnership management areas.
Right: Policy recommendations from Ipu Kukui students representing everyday residents.

Feedback gathered from the participant exit survey was all positive, with nearly all participants reporting that WaterStory was enjoyable and worthwhile. When asked what they learned from the session, lessons included the following:
"The impact we all as residents have on the water supply and the dangers to the environment" (Kea Lani staff 2/19/2015)
"Water is very important it is the source of life. If it's gone a lot will be gone" (Ipu Kukui student 3/16/2015)

In terms of project deliverables, five out of eight WaterStory sessions have been conducted since the Notice To Proceed. One more session is scheduled in early April, and the last two have yet to be scheduled.

3) *Budget Summary:*
   - **a.** Monies spent this quarter include staff payroll for fieldwork, coordination, and outreach; helicopter services to Mauna Alani (from December 2014) and Keahialoa and Puu Kane in February 2015; utilities (electricity, security, and water/sewer); field tools and office supplies; UH overhead; and other costs (vehicle maintenance, printing of WaterStory maps).
   - **b.** See budget summary attached**.**



Map 1. Clidemia Weed Control. 542 Clidemia plants (blue squares) were controlled in Wahikuli during an 8.3-acre sweep (blue polygon) this reporting period. Twenty of these plants were mature. Also shown are previous sweeps and control points within the core population area. The reduction and removal of this population is a top priority for WMMWP.

Quarterly Progress Report
April 1st – June 30th, 2015
West Maui Mountains Watershed Source Protection Program
FY 2015 Grant
Acct #0006801; Contract # WC-0818
to

County of Maui Department of Water Supply

By:

County of Maui
Ka'anapali Land Management Corp.
Kahoma Land Holdings, LLC
Kahoma Land Company, LLC
Kamehameha Schools
Makila Land Company, LLC
Maui Land & Pineapple Company, Inc.
Maui County Department of Water Supply
State of Hawaii DLNR
The Nature Conservancy
Wailuku Water Company, LLC
Tri-Isle RC&D
US Fish and Wildlife Service

&

Prepared by:
Chris Brosius – Program Manager
Jill LaBram – Natural Resource and GIS Technician
Kimberly Thayer – Program and Data Assistant
West Maui Mountains Watershed Partnership
P.O. Box 13240, Lahaina, Hawaii 96761
(808) 661-6600
brosius@westmauiwatershed.org

Quarterly Progress Report
April 1st – June 30th, 2015
West Maui Mountains Watershed Source Protection Program
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1) Background

The DWS 15 contract opened on October 3, 2014. The DWS 15 deliverables are on track to be completed by October 3, 2015. Tasks completed this period are shown below.

2) Tasks Completed During this Period:

a. Regular fence maintenance

Tasks Completed

- WMMWP has inspected 10,632 meters (6.61 miles) of fence this quarter in the West, Southwest, Southeast, Southwest, East, and Northeast Units. All are in good condition. Only two meters of fence needed to be maintained. Two trees—that had not yet compromised the fence—were cut off the fence line within the West Unit.

b. Zero tolerance control of ungulates

Tasks Completed

- Feral ungulates have been controlled above project fences. While checking 1,314 animal control devices this period, a total of two pigs were removed in Pana'ewa, shown in Table 1, below. Pana'ewa has continued to be a hotspot, but captures and sign have reduced significantly in the last several months due to fence maintenance, a fence extension, and our newly constructed North Kanaha boundary fence which was funded by the DWS 14 supplemental award.
- No aerial shoot activity this period.

FY15 Q4 (April 1- June 30, 2015)

Management Unit	Secondary Unit Name	# checked	# new installations	# removed	# pigs	# cows	# deer	# goats
1.5	Eke	69	0	0	0	0	0	0
2.1	Waihe'e	113	0	0	0	0	0	0
2.2	Mauna Alani	40	0	0	0	0	0	0
2.3	Waiehu	0	0	0	0	0	0	0
2.4	Pu'u Kane	0	0	0	0	0	0	0
3.2	Kapilau	0	0	0	0	0	0	0
3.3	Waikapu	0	0	0	0	0	0	0
3.4	Hanaula	36	0	0	0	0	0	0
4.7	Helu	0	0	0	0	0	0	0
5.2	Pana'ewa	122	49	6	2	0	0	0
5.3	Kahoma	0	0	0	0	0	0	0
5.4	Hahakea/Wahikuli	870	0	3	0	0	0	0
5.6	Honokowai	64	21	0	0	0	0	0
TOTAL		**1314**	**70**	**9**	**2**	**0**	**0**	**0**

c. Control of Priority Weed Species

Psidium cattleianum

Task 1: Weed Maintenance Area

- Seven incidental juvenile P. *cattleianum* were treated on the Waihe'e Valley plateau during an annual monitoring trip.
- Also on the Waihe'e plateau, two HBT points were ground-truthed and assessment showed defoliation of the plants.

Task 2: Expanded Weed Control Area

- A trip for weed control in our expanded area has been scheduled for next quarter

Task 3: Biological Control Dispersal Training

- WMMWP staff has continued to monitor the *Tectococcus ovatus* release sites in the West Unit and recorded the spread of infection to multiple plants (photo at right). Release in other areas is being pursued with landowners now that the agent is available.

Photo depicting the spread of T. ovatus to a neighbor plant

- WMMWP Program Manager oriented Tracy Johnson (USDA Forest Service) and Graduate Research Assistant, Gerald Crank, to potential West Maui *Tibouchina* biocontrol release sites, and current *P. cattleianum* biocontrol release sites.

Task 4: Furthering Volunteer Weed Control

- Three strawberry guava volunteer weed control trips on the Waihe'e Ridge trail occurred this period. A total of 1,732 strawberry guavas were controlled during 91 volunteer hours.
    - 5/16/15 – 13 employees and family/friends of Monsanto (40 volunteer hours) controlled 1,529 strawberry guavas.
    - 5/17/15 – 6 Kumu and family of Punana Leo o Maui Preschool (33 hours) treated 164 strawberry guavas (79 were plants that needed re-treatment).
    - 6/6/15 – 4 volunteers from the public for National Trails Day (18 hours) treated 39 strawberry guavas. Twenty-eight of these were large mature plants that needed re-treatment and eleven were mature trees along the trail that were treated and cut down.


Photos above: Kumu and family of Punana Leo volunteer trip controlling a strawberry guava (left) and enjoying the view of Waihe'e Valley (right)


Photos above: Program Manager, Chris Brosius (left), educating volunteers about the importance of the watershed and the issues it faces. Monsanto employees and family/friends enjoying the day treating strawberry guava on the right.

Clidemia hirta

Task 1: Lahaina Clidemia Control

- 246 Clidemia keiki were pulled during an animal control check on Wahikuli ridge. 5.81 acres were scouted.
- The reduction and removal of this population, which can threaten source water recharge areas in Lahaina, is a top priority for WMMWP.

Task 2: Iao Valley Clidemia Control

- 326 Clidemia were controlled in Iao Valley along the trail of Transect 1 during a scout of 7.33 acres. 3 plants were mature.
- 1 mature Clidemia was found and treated in the back of Iao Valley while reading Transects 2 and 3 (9.84 acres).

Other Weed Objectives

- One known mature Mule's foot fern (*Angiopteris evecta*) was treated on the Waihe'e Valley plateau while performing an animal control check.
- One incidental mature *Grevillea robusta* (silky oak) was treated during an animal control check and Clidemia scout on Wahikuli ridge.

- The removal of these outlier weed species within the native forest helps to maintain the structure and function of the watershed. These weeds can be habitat-modifying and can compromise the integrity of the native forest, affecting its ability to collect rain and cloud moisture to its fullest potential.

d. Watershed and Water quality monitoring

Task 1: Ungulate Monitoring Transects

- Four transects were read for ungulate sign this period: Keahikauo, Iao1, Iao2, and Iao3. No fresh or old sign was recorded.
- The Lihau transect was established (34 stations) and no ungulate sign was found.

Task 2: Invasive Weed Monitoring Transects

- The four transects read this period were not on the weed monitoring cycle this year. However, *Clidemia hirta* was found and controlled on the Iao 1 and Iao 2 transects and was reported in the above section.
- The presence of weeds were recorded on the new Lihau transect. No strawberry guava was found and only one Tibouchina was recorded. The most prevalent weeds were *Rubus rosifolius* (thimble berry), *Hypochaeris radicata* (hairy cat's ear), and *Andropogon virginicus* (broomsedge). These records will be used as a baseline for future transect readings.

Task 3: Water Quality Monitoring in Honolua

- The sonde and the rain gauge were checked to download data and to install new batteries on 4/30/15 and 5/26/15
- One storm sample was collected on 4/28/15 and will be sent to UH Hilo Analytical Lab for nutrient and TSS analysis.
- One additional storm sample was collected on 5/4/15, however due to inclement weather leading to the inability to collect the sample within 48 hours, only TSS will be analyzed.

Task 4: Forest Health Observations and Monitoring

- We are educating our staff about Rapid Ohia Death for early detection and response. This is an alarming disease established on the Big Island.
- During the course of other work, we continue to monitor populations of *Erythrina sandwicensis* (Wiliwili) which are still showing sign of recovery.

Task 5: Photo / Vegetation Plot Monitoring

- Eight of the ten photo / vegetation plots were monitored in Kahakuloa. To date, all disturbance has since been covered up with vegetation. The remaining two were unable to be checked due to inclement weather.
- The four plots were revisited on the Waihe'e plateau. Although many of the dominant species are non-native, specifically *Clidemia hirta*, they still play a role in preventing erosion.

Task 6: Aerial Surveys

- No aerial surveys were conducted this period.

e. Outreach

- In terms of project deliverables, six out of eight WaterStory sessions have been conducted since the Notice To Proceed.

- During this quarter, one session was held on April 7, 2015 with 10 members of the 2015 class of Ka Ipu Kukui Fellows.
- Looking ahead, one more session is scheduled for August 20th with a local hula halau, and the last one has yet to be scheduled.

Photo left: A mixed group of County Council, business, and residents discusses their policy recommendations. Seen in the center background is a layered map showing basic water source and supply infrastructure set in relation to Watershed Partnership management areas.

3) <u>Budget Summary:</u>

a. Monies spent this quarter include staff payroll for fieldwork, coordination, and outreach; utilities (electricity, security, and water/sewer); field tools and office supplies; and UH overhead.

b. See budget summary attached**.**

Final Report
October 3rd 2014 – October 3rd, 2015
West Maui Mountains Watershed Source Protection Program
FY 2015 Grant
Acct #0006801; Contract # WC-0818
to

County of Maui Department of Water Supply

By:

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Final Report
October 3rd, 2014 – October 3rd, 2015
West Maui Mountains Watershed Source Protection Program
FY 2015 Grant
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BACKGROUND

Complete a description of how your program achieved the goals, objectives and scheduled action steps outlined in grant proposal.

The West Maui Mountains Watershed Partnership (WMMWP) was created in 1998, making it the second-oldest Watershed Partnership in the State. The mission of WMMWP is to protect and preserve our island's water supply through collaborative forest management. Native Hawaiian forests compose a giant living sponge that soaks up rainwater and lets it percolate through the vegetation and soils. This process in turn recharges our aquifers and streams while preventing runoff, erosion, and flashfloods that muddy our island's aquatic systems from mauka to makai. With the support of our Partners, our 10 crew members and 2 AmeriCorps interns, we serve as stewards of our native forests to minimize the impacts of priority threats. With limited funding we aim to make the most positive impact toward watershed protection and prioritize based on what actions achieve the most good.

The priority actions undertaken by this grant have helped to protect more land by fencing off the challenging terrain from the digging, browsing and rooting of feral ungulates. The fences in turn give us an opportunity to remove ungulates and create zero tolerance zones which allow the forest and its species to recover and function as a water collection system. Once an area has been fenced and stabilized from impacts of ungulates, invasive weeds have to be removed to maintain the biodiversity of the system and the watershed's sponge like structure. Allowing the spread of ecosystem modifying species can reduce its water collection effectiveness. For instance, Strawberry guava, a priority target of this grant, has been found by Dr. Giambelluca at U.H. Manoa to consume 53% more water in drought periods and 27% more water in wet periods as compared to the native forest canopy. With guava ranging over most of WMMWP lands and completely covering 10% of its area, this species poses a serious threat and must be stopped from further spread. In this regard we have enlisted the support of volunteers, developed support by collaborative researches, implemented novel control techniques such as Herbicide Ballistic Technology (HBT) and conducted control efforts in strategically important areas with staff efforts. All of our efforts are geared toward providing a clean and sustainable water supply for our island.

Thus far, WMMWP staff and Partners have completed nearly 22 miles of ungulate fence that protect 29,018 acres of watershed lands—about 61.3 percent of the West Maui Forest Reserve—from damage by feral pigs, goats, and deer. Native Hawaiian forests dominate about 33,051 acres, roughly 70 percent of the watershed, much of which has yet to be protected behind ungulate fence. At the same time, successes in weed control, integration of new technologies, and monitoring programs all further our goals of protecting the watershed and native ecosystems that sustain our water supply. In addition, our public outreach and education efforts have extended into the community to draw the link between healthy watersheds and our faucets.

To recount the importance of this work, WMMWP helps to manage 47,321 acres across Mauna Kahalawai. Pu'u Kukui, the summit of Mauna Kahalawai, is one of the wettest places on Earth, receiving around 400 inches of rain each year. As such, the West Maui watershed is a key recharge area, producing 70 million gallons of water per day (MGD) of sustainable yield. This water feeds 76 percent of DWS customers, serving the Lahaina System (over 3,350 customers) as well as the Central and South Maui systems (over 20,200 customers). To sustain the needs of these users we have addressed watershed threats though the following strategies, objectives and goals laid out in the grant proposal which has resulted in strategic actions supported by this grant.

Key Strategies:

- Control feral ungulates through fencing and removal programs to reduce erosion, vegetation loss, and rare species loss, to improve water quality, and to limit health risks.
- Control invasive, habitat modifying weeds to prevent new species establishment and prevent further spread of those present. Expand weed-free areas through control programs.
- Decrease incidents of wildfires through planning, coordination, education, fuel management and monitoring.
- Decrease destructive human activities such as illegal dirt biking and trail blazing which impact watershed functions by spreading invasive species, causing erosion, and harming native vegetation.
- Conduct public education and awareness programs and build understanding through volunteerism, stewardship, and community outreach.
- Protect rare species through landscape level watershed protection efforts and facilitate efforts to recover species by experienced collaborators.
- Monitor watershed parameters such as water quantity and quality, biological resources, and threats to inform appropriate management strategies.
- Enhance management coordination through qualified staffing, adequate infrastructure, knowledge growth, and collaborations with outside partners, agencies and funders.

GOALS / OBJECTIVES

Provide a list of the goals and objectives from your grant application.

The priority of funding is focused on DWS lands owned in Waiheʻe and furthered toward adjacent lands to protect high recharge in central Maui source water areas. Other actions prioritize protection of water recharge areas in west Maui which feed the Department's systems in Mahinahina and Lahaina. Program objectives include:

- Goal 1: Regular Fence Maintenance – maintain and inspect approximately 7.8 miles of fence that protect 23,832 acres of priority forested watersheds that contain groundwater and surface water recharge areas.
- Goal 2: Zero Tolerance Control of Ungulates – conduct regular trap checks to remove ungulates from within 23,832 fenced acres to protect watershed resources against further damage and enable re-vegetation of previously disturbed areas. Coordinate State aerial

shoots for feral goats within DWS lands in Waihe'e and for deer in water source lands in Waikapu.

- Goal 3: Control of Priority Weed Species – control infestations of priority habitat modifying weeds like strawberry guava and Clidemia that alter the natural water cycle of the watershed and halt further colonization of native forestlands. Objectives include maintaining control areas in Iao, Waihee, and Lahaina; expanding control areas in Panaewa and Kanaha; training crew for release of biological control agent, continue volunteer efforts on Waihe'e Ridge, and to opportunistically treat other priority species when encountered to prevent infestations.
- Goal 4: Watershed and Water Quality Monitoring – monitor for new activity, changes, and recovery to provide feedback on management success, inform future management strategies, and show effectiveness. This includes annual weed and ungulate transects, photo / vegetation plots, aerial surveys, water quality monitoring and incidental observations of forest health.
- Goal 5: Outreach – conduct educational sessions with various community groups to increase public awareness of the importance of watersheds for our water supply and educate community members about ways they can conserve water resources and advance watershed protections.

BENEFITS TO MAUI COUNTY

Describe how your project/program has benefited the people of Maui County in relation to the goal of the DWS (providing clean water more efficiently). Keep in mind that Maui County DWS manages approximately 36,000 services on Maui and Molokai, and that the funds provided to you are from their revenues, not the general fund (tax base for all of the residents and businesses of Maui County). Include the numbers and descriptions of people and/or businesses served (please include an excel table).

- Improved water quality and quantity through effective management of our native forests and watersheds. Our management helps limit turbidity and animal born disease in surface waters. Sediments and total suspended solids from surface water is reduced which in turn limits the maintenance of water delivery systems and treatment costs.
- By protecting key recharge areas, WMMWP ensures a sustainable source of water for businesses, agriculture, residents and visitors across West, South, and Central Maui—about 76 percent of DWS customers.
- Protection of native Hawaiian ecosystems that perpetuate cultural traditions and enrich the unique and beautiful backdrop that is cherished by residents and visitors alike.
- Our Public Involvement Program (PIP) educates residents and visitors about the relationship between healthy watersheds and our water supply and ways they can help protect our freshwater resources.
- DWS customers will realize compounded returns on their investment in watershed protection, as all of our DWS funds are matched to provide us with federal, state and private funding that enable us to protect in greater depth and across larger areas.

TASKS COMPLETED FOR FY15

1) Maintenance and Inspection of Fences:

The original goal of inspecting and maintaining 7.8 miles of fence (ranging from annual to quarterly checks) has been fulfilled. WMMWP inspected 27,677 meters (17.2 miles) of fence during this grant period in the West, Southwest, Southeast, Southwest, East, and Northeast Units. All remain in good condition, and only 20 meters of fence required maintenance this year. Two trees—that had not yet compromised the fence—were cut off the fence line within the West Unit, a stream curtain was repaired in the Southwest unit, debris was dug out of a stream grate, and a fence that had been pushed down and unclipped was re-clipped in the West Unit.

2) Ungulate Control Program:

Task 1: Feral Ungulate Management:
Feral ungulates have been controlled above project fences. While conducting 4,726 animal control checks this grant period, a total of nine pigs were removed in Pana'ewa, one in Waiehu and two goats in Helu, shown in Table 1, below. Pana'ewa has continued to be a hotspot, but captures and sign have reduced significantly in the last several months (above the original boundary fence) due to fence maintenance, a fence extension, and our newly constructed North Kanaha boundary fence which was funded by the DWS FY14 supplemental award. Six of the ten captures were in newly installed groups between this new fence and the old boundary fence (see Map 1, p. 21). The pig in Waiehu was removed in January 2015, and no fresh sign was recorded during the most recent check in September 2015. There is still goat sign in Helu and this area continues to be monitored quarterly. Additionally, two new groups were installed on Honokowai ridge. This was just a precautionary measure because fresh sign has been reported in Amalu stream (north of the ridge) and proximate to the lower boardwalk on Maui Land & Pineapple lands.

Task 2: DLNR Aerial Shoots:
Final submission of the landowner Right-of-Entry (ROE) agreements are still pending. Final details still need to be worked out and some lingering questions persist as reported last quarter. A new DLNR Planner will now be able to help facilitate this need. The aerial shoot plan and communication process with adjacent landowners has been assessed and drafted. Once the ROEs are finished, the package will be submitted to the DOFAW administrator. In the meantime, aerial shoots continue on adjacent State lands. WMMWP has provided ungulate activity information to DoFAW shooters and ATN Thermal Scopes to assist in removal efforts.

Table 1: Ungulate Control 10/3/14 – 10/3/15

Management Unit	Secondary Unit Name	# checked	# new installations	# removed	# pigs	# cows	# deer	# goats
1.5	Eke	69	0	0	0	0	0	0
2.1	Waihe'e	113	0	0	0	0	0	0
2.2	Mauna Alani	77	0	0	0	0	0	0
2.3	Waiehu	89	10	3	1	0	0	0
2.4	Pu'u Kane	5	0	0	0	0	0	0
3.2	Kapilau	331	0	0	0	0	0	0
3.3	Waikapu	32	0	3	0	0	0	0
3.4	Hanaula	342	10	23	0	0	0	0
4.7	Helu	448	0	26	0	0	0	2
5.2	Pana'ewa	558	62	27	9	0	0	0
5.3	Kahoma	0	0	0	0	0	0	0
5.4	Hahakea/Wahikuli	2466	1	42	0	0	0	0
5.6	Honokowai	233	21	0	0	0	0	0
TOTAL		**4763**	**104**	**124**	**10**	**0**	**0**	**2**

3) Control of Priority Weed Species:

Psidium cattleianum

Task 1: Weed Maintenance Area (Map 2, p. 22)

- Seven incidental juvenile P. *cattleianum* were treated on the Waihe'e Valley plateau during an annual monitoring trip in June 2015.
- Also on the Waihe'e plateau, two HBT points were ground-truthed and assessment showed defoliation of the plants.
- 790 new *P. cattleianum* (287 mature) individuals were treated in Pana'ewa during a 2.4-acre sweep. An additional 49 individuals needed re-treatment (all mature).
- During a 0.7-acre sweep along upper Wahikuli ridge, 27 immature *P. cattleianum* were controlled.
- 97 strawberry guava (16 mature) were recorded and treated during a 7.05-acre sweep in upper Hanaula.

TOTAL=970 controlled; 10.15 acres

Task 2: Expanded Weed Control Area

- In our initial proposal, we wanted to expand our weed control area to East Honokohau. After multiple weather rejections for aerial surveys, we were finally able to record strawberry guava in the area via two aerial surveys spanning from 2,000 feet to 3,500 feet elevation. We have yet to access the highest priority area above 3,500 feet in elevation. This region is a high water production area and an ecologically important bog complex. Treating targets in the area is making us reconsider our approach in order to limit our on the ground impacts. Another higher elevation aerial survey will give us more knowledge and allow us to make an informed management strategy decision.

Task 3: Biological Control Dispersal Training

- Staff was trained on release methods for *Tectoccocus ovatus*, strawberry guava biocontrol, including preparation of field release sites and monitoring spread. WMMWP staff continued to monitor the two *T. ovatus* release sites on state land in the West Unit (Map 2) and recorded the spread of infection to multiple plants (photo at right). Release in other areas is being pursued with landowners, now that the agent is available.

Photo depicting the spread of T. ovatus to a neighbor plant

- WMMWP Program Manager oriented Tracy Johnson (USDA Forest Service) and Graduate Research Assistant, Gerald Crank, to potential West Maui *Tibouchina* biocontrol release sites and to current *P. cattleianum* biocontrol release sites.

Task 4: Furthering Volunteer Weed Control

- All six proposed strawberry guava volunteer weed control trips on the Waihe'e Ridge trail were completed for this grant. A total of 3,110 individuals were controlled during 223.5 volunteer hours.
  - 5/16/15 – 13 employees and family/friends of Monsanto (40 volunteer hours) controlled 1,529 strawberry guavas.
  - 5/17/15 – 6 Kumu and family of Punana Leo o Maui Preschool (33 hours) treated 164 strawberry guavas (79 were plants that needed re-treatment).
  - 6/6/15 – 4 volunteers from the public for National Trails Day (18 hours) treated 39 strawberry guavas. Twenty-eight of these were large mature plants that needed re-treatment and eleven were mature trees along the trail that were treated and cut down.
  - 7/18/15 – 5 volunteers from Maui Roller Girls (22.5 hours) controlled 105 strawberry guavas (55 were plants that needed re-treatment). Thirty-one Christmas berry were also controlled.
  - 8/22/15 – 7 kumu and family of Punana Leo o Maui Preschool (38.5 hours) controlled 116 strawberry guavas (64 were re-treated plants). Incidental *Clidemia*, common guava, and Christmas berry were also treated.
  - 8/29/15 – 13 volunteers from the Keala Kahinano o Puna hula halau (71.5 hours) controlled 1,157 strawberry guavas. Incidental *Tibouchina* and *Clidemia* were also treated.


Photos above: Kumu and family of Punana Leo volunteer trip controlling a strawberry guava (left) and enjoying the view of Waihe'e Valley (right)


Photos above: Program Manager, Chris Brosius (left), educating volunteers about the importance of the watershed and the issues it faces. Monsanto employees and family/friends enjoying the day treating strawberry guava on the right.

Clidemia hirta

Task 1: Lahaina Clidemia Control

- 542 *Clidemia hirta* plants (20 mature) were controlled during an 8.3-acre sweep in Wahikuli on 3/3/15 (Map 3, p.23).
- 246 *C. hirta* keiki were pulled during an animal control check on Wahikuli ridge on 6/23/15. A total of 5.81 acres were scouted
- 62 immature *C. hirta* were pulled during an animal control and transect check on Wahikuli ridge on 9/16/15. A total of 5.94 acres were scouted.
- The reduction and removal of this Wahikuli population, which can threaten source water recharge areas in Lahaina, is a top priority for WMMWP.
- One keiki *C. hirta* was found and pulled on the Kahoma transect at station number 42. *C. hirta* was found on this transect in the mid 2000's, but had not been found since.

TOTAL=851 controlled; 20.05 acres

Task 2: Iao Valley Clidemia Control

- 326 *C. hirta* were controlled in Iao Valley along the trail of Transect 1 during a scout of 7.33 acres. Three plants were mature.
- One mature *C. hirta* was found and treated in the back of Iao Valley while reading Transects 2 and 3 (9.84 acres).

TOTAL=327 controlled; 17.17 acres

Other Weed Objectives (Map 2, p. 22)

- One known mature Mule's foot fern (*Angiopteris evecta*) was treated on the Waihe'e Valley plateau while performing an animal control check.
- One incidental mature *Grevillea robusta* (silky oak) was treated during an animal control check and Clidemia scout on Wahikuli ridge. One more incidental *G. robusta* was treated in Panaewa during a *P. cattleianum* sweep.
- One mature *Morella faya* was treated in Helu on the north ridge just above the fence line. During an animal control trip, seven additional *M. faya* were observed on the ridge north of Luakoi. This discovery led to aerial surveys in the area and opened our eyes to the possibility of the spread of this invasive species. This plant is very difficult to distinguish from the air, but we will continue to expand our knowledge and our search image of this species. This is an extremely widespread invader on the Big Island and in Polipoli on Haleakala.
- One mature *Cortaderia jubata* was found and treated in Hanaula and information was relayed to MISC. One immature *C. jubata* and three seedlings were pulled in Panaewa at known location during a 10.3-acre scout.
- One incidental African tulip (*Spathodea campanulata*) was found and treated in Halona gulch (Panaewa) during an animal control trip. One more was recorded higher in the gulch but unable to be treated.
- Pulled 15 incidental *Tibouchina herbacea* in Helu near the summit while checking ungulate control groups.
- The removal of these outlier weed species within the native forest helps to maintain the structure and function of the watershed. These weeds can be habitat-modifying and can compromise the integrity of the native forest, affecting its ability to collect rain and cloud moisture to its fullest potential.

4) Watershed and Water Quality Monitoring:

Task 1: Ungulate Monitoring Transects

- Thirteen existing transects were read for ungulate sign this period, shown in Table 2 below and Map 4, p. 24.
- Of these, only Mauna Alani 2 transect had fresh sign (4 stations): The sign is located in an area which is currently unmanaged. Our limitation in addressing this problem continues to be the presence of dirt bike activity. We hope to renew our efforts to mitigate dirt bike activity in this area and subsequently control pig activity.
- On the Helu transect no stations had fresh sign, but eight of the 42 stations contained old goat sign. Management has been established recently on this ridge, which allowed for the removal of two goats this period.

- One new transect, Lihau, was established (34 stations) and no ungulate sign was found.
- A trip to read the Keahialoa, Wai2 and Wai3 transects were attempted several times, but cancelled due to inclement weather and tropical storms. Aerial surveys flown over the areas showed no fresh ungulate sign.

Table 2. Ungulate Transect Results

Transect	# of Stations	Date Read	Avg. % New sign	# of Stations with New Sign	Avg. % Old Sign	# of Stations with Old Sign
Mauna Alani	33	12/2/14	0	0	0	0
Mauna Alani2	69	12/2/14	0.09	4	0	0
Helu	42	2/23/15	0	0	0.83	8
Wahikuli	54	9/16/15	0	0	0	0
Kahoma	77	8/18/15	0	0	0	0
Hanaula	63*	9/9/15	0	0	0	0
Puu Kane	42	9/30/15	0	0	0	0
Wai 1	42	9/30/15	0	0	0	0
Keahikauo	22	6/29/15	0	0	0	0
Iao1	33	6/2/15	0	0	0	0
Iao2	31	6/2/15	0	0	0	0
Iao3	28	6/2/15	0	0	0	0
Panaewa	109	8/17/15	0	0	0	0
Lihau	34	6/29/15	0	0	0	0

*The original Hanaula transect has 76 stations that go down to the makai boundary fence. This lower fence is no longer a complete natural barrier and a more secure fence has been constructed mauka at the location of Station 63. There is fresh or old sign within all 13 stations below station 63. It is our hope to reduce this ungulate pressure with the use of the aerial shoot program.

Task 2: Invasive Weed Monitoring Transects

- Weeds: Three of the existing transects (Kahoma, Wahikuli, Panaewa) were on the weed monitoring cycle this period. The presence of all weed species was recorded. In addition, although the Iao transects were not read for weeds, *Clidemia hirta* was found and controlled on the Iao 1 and Iao 2 transects and was reported in the above section.
- The presence of weeds was also recorded on the new Lihau transect. No strawberry guava was found and only one *Tibouchina* was recorded. The most prevalent weeds were *Rubus rosifolius* (thimble berry), *Hypochaeris radicata* (hairy cat's ear), and *Andropogon virginicus* (broomsedge). These records will be used as a baseline for future transect readings.

Task 3: Water Quality Monitoring in Honolua

- The sonde and the rain gauge were checked monthly to download data and to install new batteries.
- Eight base flow and 11 storm samples were collected during this grant period and have been sent to UH Hilo Analytical Lab for analysis. On six of these 11 storm samples, inclement weather led to the inability to collect the sample within 48 hours; therefore only total suspended solids (TSS) will be analyzed. For all other samples, nutrients will also be analyzed.

- The game camera photos below show a storm event on March 4, 2015 in which two storm samples were collected during the high flow.

Game camera photos above show a storm event in Honolua stream on March 4, 2015. The top photo shows the high flow when the samples were collected. In the bottom photo, the stream has gone back down to near normal flow.

- Two attempts to check the erosion bridges were made, but both were cancelled due to inclement weather and the challenge of coordinating with PKW staff. One other attempt was made, but had to be cancelled due to staff getting stuck an extra night in Waihe'e and not being able to fly out.

Task 4: Forest Health Observations and Monitoring

- We took time to educate our staff about Rapid Ohia Death for early detection and response. This is an alarming disease established on the Big Island.
- During the course of other work, we have continued to monitor populations of *Erythrina sandwicensis* (Wiliwili) which are still showing sign of recovery.
- Four new locations of the endangered *Wikstroemia villosa* were found in Kapilau (Ridge 3) with Hank Oppenheimer and Keahi Bustamante (PEPP) in December 2014. On a follow-up mission in September 2015, three ripe orange seeds were collected.
- An I'iwi was recorded (audio and visual) at 4480' while reading the Honokowai transect for ungulate sign. I'iwi are considered locally to be very rare.

Task 5: Photo / Vegetation Plot Monitoring

- Eight of the ten photo / vegetation plots were monitored in Kahakuloa. After multiple attempts, the remaining two were unable to be checked due to inclement weather.
- Two plots were monitored in Mauna Alani. The other plots in this unit are located above and below dirt bike fences that have been vandalized. The purpose of the photo/veg plots was to show recovery after the barricades were installed; however, with no fences to stop the riders there is no recovery to document.
- The four plots were revisited on the Waihe'e plateau. Although many of the dominant species are non-native, specifically *Clidemia hirta*, they still play a role in preventing erosion.
- To date, all disturbance within these plots has since been covered up with vegetation (see photos below).

Kahakuloa Internal Photo Point (top left – first established August 2006,, top right - July 2008, bottom left - July 2012, bottom right - June 2015). All initial disturbance has been covered up by vegetation. Tibouchina and Paspalum were the initial dominant non-native species, with more Clidemia coming in after a couple of years. As of 2015, on a positive note, Clidemia was the only non-native species making up more than 10% of the plot, with native uluhe covering roughly 70%.

Task 6: Aerial Surveys

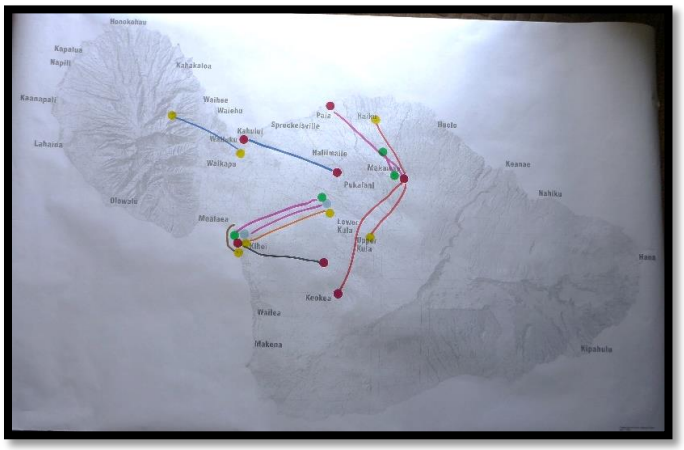
- Multiple aerial surveys to monitor weed and ungulate threats were conducted this grant period (Map 5, p. 25):
  - 9/30/15- surveyed Helu for *M. faya* and Kahakuloa for *P. cattleianum.*
  - 9/24/15- FLIR survey for ungulates in Panaewa, Helu, Lihau, Waihe'e. No animals were observed.
  - 9/24/15 – surveyed makai of Eke crater for *P. cattleianum*. Found 45 plants and 2 flowering *C. jubata*.
  - 9/23/15 – Monitored and photographed treated HBT points in Iao and N & S Waiehu valleys, recorded *Clidemia* in the back of Iao, and surveyed Waihe'e for *Angiopteris evecta*.
  - 9/17/15 – Surveyed for *M. faya* and *Sphaeropteris cooperi* (ATF) in Wahikuli (found nothing), Kauaula (found 1 ATF and many flowering *C. jubata*), Olowalu (found 3 ATF, 1 *Toona ciliata*, 2 *S. campanulata*) and Pa'u Pa'u (found nothing significant).
  - 9/14/15 - Surveyed Helu and Pau Pau looking for *M. faya, P. cattleainum* and *G. robusta*.
  - 9/9/15 – FLIR survey in Hanaula. Although extensive sign below the intact fences, no sign or animals were observed above.

5) Outreach Program:

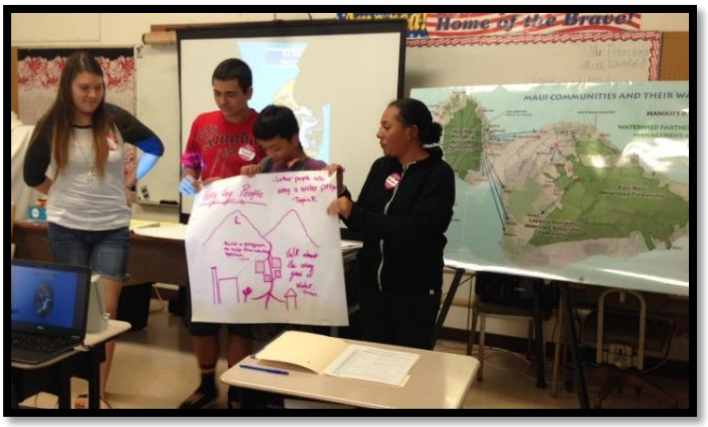
Task 1: Community Outreach Sessions

- Seven of the eight proposed informative and interactive WaterStory sessions were completed in partnership with the Maui Economic Development Board:
  - November 13, 2014: eight seniors at the West Maui Kaunoa Senior Center
  - February 19, 2015: thirteen staff in the Fairmont Kea Lani Sustainability group
  - March 16, 2015: two separate classes of 7th graders in the Kamehameha Schools Ipu Kukui Program (25 students total)
  - March 20, 2015: eight staff of various management levels from the Fairmont Kea Lani
  - April 7, 2015: ten members of the 2015 class of Ka Ipu Kukui Fellows
  - August 20, 2015: nine members of Keala Kahinano o Puna, a local hula halau. This group also came out on the Waihe'e Volunteer service trip after the WaterStory session, so it was great to show them the connection and get actual hands-on experience in the watershed.
- To substitute for the remaining WaterStory Session, a GIS (Geographic Information Systems) presentation was given to the Maui College GIS class. Twenty-four students learned what we do at WMMWP and how we use GIS to record our data, guide management decisions, and accomplish our goals.
- All eight outreach watershed presentations were accomplished and 97 community members were reached.

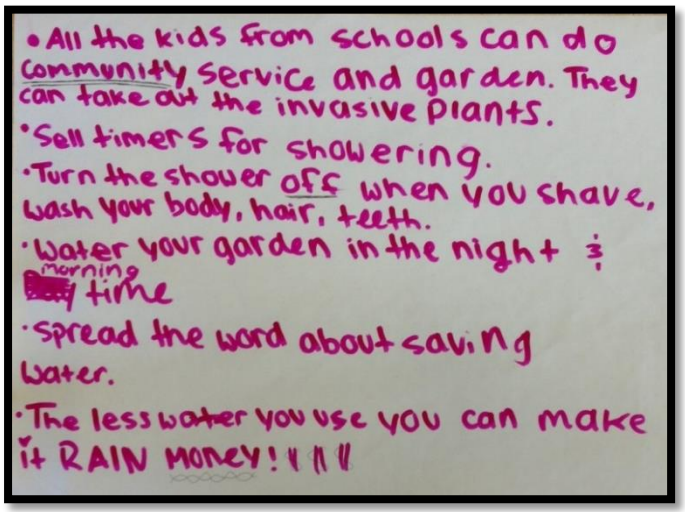
The first exercise in the WaterStory session is for each participant to plot two points on a map of Maui—one where their house is, the second where they think their water comes from—and to draw a line to connect the two points. While a few know the source of their water, it is apparent from facial expressions that many have *never* thought about it. As shown in the map to the left, many South Maui residents guess their water source to be upslope on Haleakala. Similarly, residents of Central Maui and the North Shore waver between a source on Haleakala or in the West Maui Mountains. Regardless of where they live, many participants are surprised to learn that water from the West Maui Mountains supplies all of West Maui, Central Maui (to Paia), and South Maui.



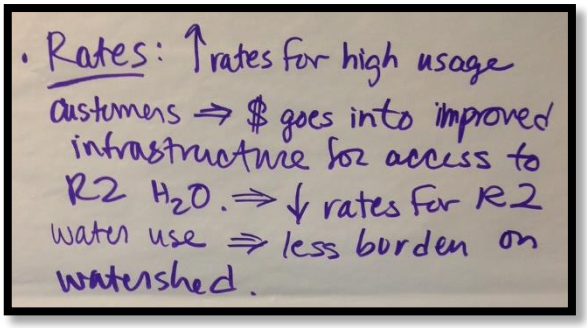
The bulk of WaterStory is a two-part policy making exercise in which participants take on roles of County Council members, business owners, and everyday members of the public. In part 1, each group develops a series of policies for advancing watershed protection. In part 2, the groups are mixed, thus forcing each role (Council, business, and public) to advocate for their interests and achieve compromise in shaping policies for watershed protection. Moreover, the groups must identify a way to fund each policy. Policy recommendations the participantsdeveloped during the role-playing portion of the sessions include the following, among others:

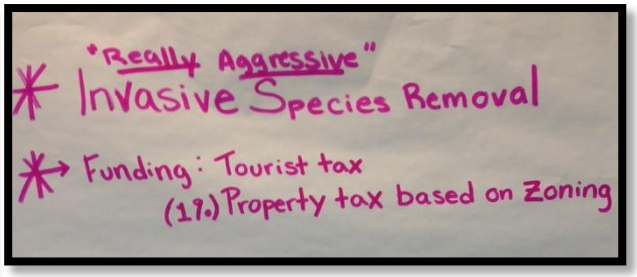


Left: Ipu Kukui students representing everyday residents present their policy recommendation in picture form. To the right of them is a WaterStory map that depicts the actual water sources around the island with an overlay of the watershed partnership management areas.



Above: Policy recommendations from Ipu Kukui students representing everyday residents.
Right: A mixed group of County Council, business, and residents discusses their policy recommendations.
Below: Policy recommendations from mixed groups.





"Educate population and businesses about conservation, recycling water, using native species. Teach how it will be cost effective for all." "Fostering native species – Tax break on [planting/landscaping with] native species" (West Maui Kaunoa Seniors).

Feedback gathered from the participant exit surveys were all positive, with nearly all participants reporting that WaterStory was enjoyable and worthwhile. They learned where their water comes from, the history of water use on Maui, who is responsible for what in water management, that the population needs to be educated, and that there are many solutions for protecting watersheds. When asked what they learned from the session, lessons included the following:

"The impact we all as residents have on the water supply and the dangers to the environment" (Kea Lani staff 2/19/2015)
"Water is very important it is the source of life. If it's gone a lot will be gone" (Ipu Kukui student 3/16/2015)
"Great discussion about balancing water supply & demand as well as environmental concerns & the issues impacting our freshwater supply. Eye-opening to see where our water comes

from & how our perception of water has changed over time." (Ka Ipu Kukui Fellow 4/7/2015)

STAFF EMPLOYED

Include the number of Full Time Employees (FTEs) as paid by these grant funds; total number of hours worked during the fiscal year, and total amount of grant funds spent in salary (including benefits and fringe).

DWS has funded an average of 3.8 FTEs out of WMMWP's 10 person staff for a total of 7,904 hours of staff time

Program staff job titles (# of positions):

- Program Manager (1 FTE)
- Program & Data Assistant (1 FTE)
- Natural Resource & Data Technician (1 FTE)
- Field Crew Supervisor (1 FTE)
- Field Crew Leader (1 FTE)
- Field and Data Technician (1 FTE)
- Field Assistants (3.5 FTE)
- Americorps Intern (1 Intern for 11 months/year)

The total amount of grant funds spent on staff payroll was $236,868.74, which included $173,045.94 in salary, $52,822.80 in fringe benefits, and $11,000.00 toward the AmeriCorps Intern.

INVENTORY OF EQUIPMENT(costing individually $500 or more acquired with DWS grant)

Equipment Item (name and brand)	Value when purchased	How used	When acquired
Not Applicable			

We did not acquire any equipment with an individual cost of $500 or more.

AMOUNT OF FUNDING LEVERAGED

Please include an excel table that identified the amount of funding you received from DWS, amount received from other sources. Please identify all sources by name, and state/federal/county government and or private, nonprofit entity.

Name of Partner	**Type of Entity (government/ private/ nonprofit)**	**Amount of Funds Leveraged**	
		Cash	**In-Kind**
Ka'anapali Land Management Corp.	private	$ -	$ 8,400.00
State of Hawaii, DLNR Watershed Partnerships Program FY15	government	$ 280,000.00	$ -

The Nature Conservancy	nonprofit	$ 118, 245.00	$ -
Skyline Eco Adventures	private	$ 5,000.00	

FUNDING NEEDED AND WHAT YOU COULD DO IF THERE WAS MORE FUNDING

Provide an explanation of how you would spend additional grant funds if you had them. Please include whether or not new initiatives could be started, if these would include additional outreach opportunities, new equipment to be purchased and or if you had additional revenues whether it may impact amount of potential revenues to be leveraged.

Additional funding could be leveraged to further implement our five-year Watershed Management Plan, the guiding document for WMMWP management programs. The Plan calls for **$2.7 million** each year to support comprehensive management of the entire West Maui watershed. While 61.3 percent of the watershed is under active watershed management, 38.7 percent of watershed lands remain unfenced and undermanaged for priority threat control. With additional funding and additional positions, WMMWP could implement some of the following programs to broaden our management reach:

- Achieve a level of zero ungulates within an additional ~19,525 acres via quarterly or more frequent management checks.
- Retrofit 10.9 miles of boundary fence to increase fence heights from 4 feet to 8 feet to exclude expanding deer populations.
- Construct over 14 miles of fence across Forest Reserve boundaries and strategic fence segments. Construct dirt bike prevention barricades and fencing in Waiheʻe.
- Prioritize the 15,000-acre watershed interior (i.e. areas above the 2,800 foot elevation) by further eliminating habitat modifying invasive plants from within this management zone.
- Promote and enhance wildfire preparedness and planning and implement the Western Maui Community Wildfire Protection Plan to protect watershed resources.
- Enhance WMMWP's capacity to integrate and manage volunteer assistance in meaningful, informative, and rewarding resource management projects.
- Continue to integrate AmeriCorps, Hawaii Youth Conservation Corps, University of Hawaii, and Kupu volunteer programs with WMMWP projects.
- Establish relationships with nearby communities and developments to educate and prevent introductions of invasive species, minimize human impacts, and solicit support for watershed values and protection.
- Facilitate the access of credible and fully permitted visiting researchers, biologists and botanists attempting to answer key questions relating to the long term survival and recovery of species.
- Continue to support the collection of water quality and quantity data throughout the watershed.
- Support Partner agency efforts to collect stream flow, rainfall, and water quality data from existing stations and support additional water quality and quantity monitoring.
- Coordinate monitoring efforts with lead agencies such as DOH, NOAA, Army Corps of Engineers and EPA to support mauka to makai efforts in watershed protection.
- Further implement and maintain monitoring data sufficient to measure success, inform adaptive management, and educate funders and policy makers.

CONSEQUENCES OF A DECREASE IN FUNDING

*If, during the course of budget, there was to be a decrease **in** funding available for watershed programs- how would this impact your program/project? Please describe and if possible provide documentation as to whether you would lose staff, amount of time previously spent on specific activities would have what type of detrimental effect? How would a decrease **in** funding impact any leveraging activities (funds and or resources from other sources)?*

High value watershed lands would revert to a degrading trend, succumbing to uncontrolled threats from ungulates and invasive species. With decreased funding, positions would be lost and leveraged funds would be reduced to further compound the problem. Knowledgeable personnel take years to cultivate in this highly specific discipline, such that extensive training, time, and resources would be required to make up for any loss in veteran staff. No further gains in protection would be achieved as it would be a stretch to maintain status quo if at all possible. Populations of feral ungulates and weeds would rebound and previous public investment in managed areas would be lost due to lack of maintenance. Two to three times the funding would be required to recover from budget reductions and regain previous levels of management success. The bottom line is that losses in management capabilities would translate to diminished water recharge as ungulates and invasive species colonize unprotected watershed lands. The sustainability of the island's water supply would be compromised if forest degradation by invasive species is permitted to go unchecked.

PARTNERS

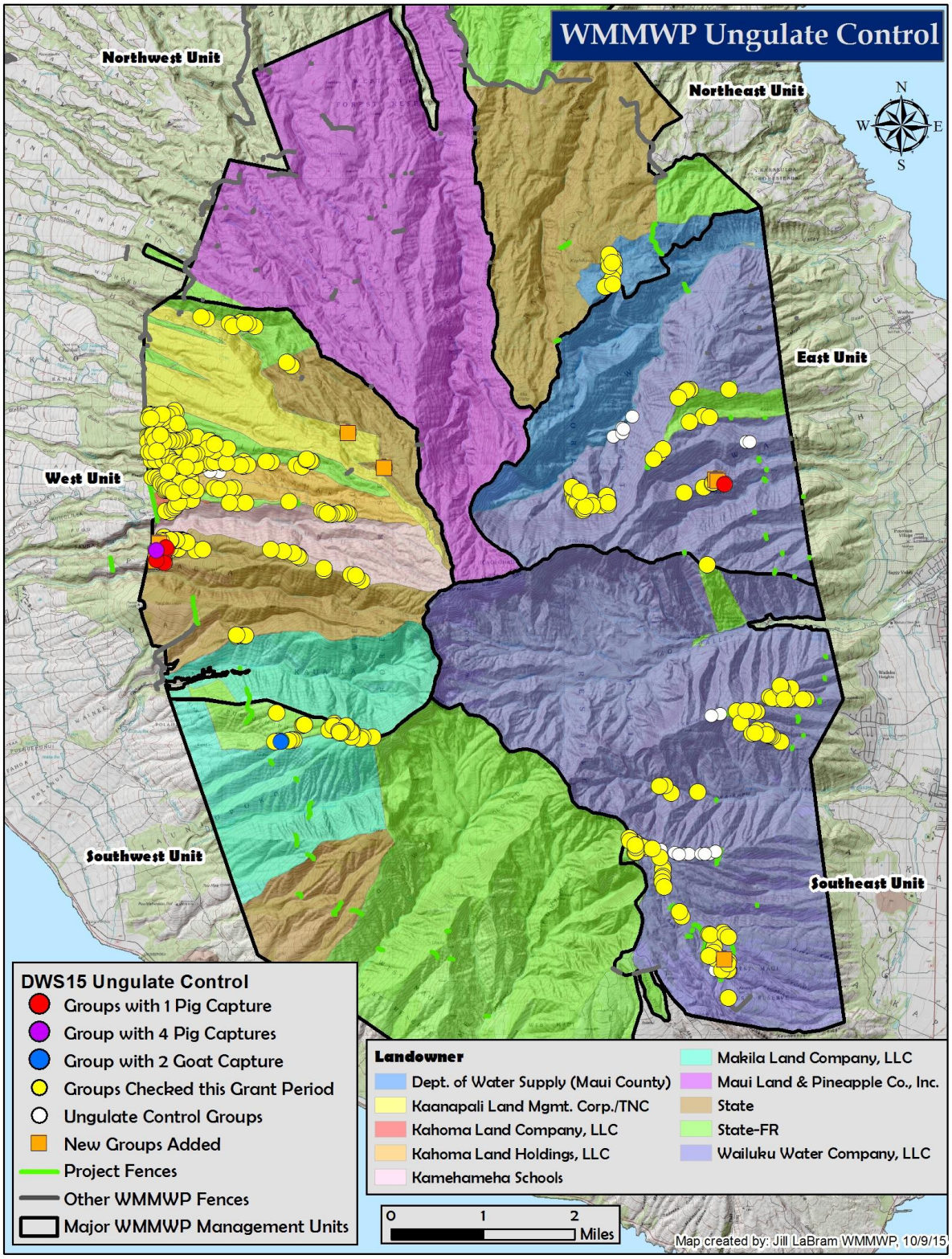
"Watershed Program Partners"

Name of Partner	Type of Entity (government/ private/ nonprofit)	Contact Person	Contact Information	Amount of Funds Leveraged	
				Cash	In-Kind
County of Maui	government	Rob Parsons	Email: Robert.Parsons@co.maui.hi.us	$ -	$ -
Kaanapali Land Management Corp.	private	Jeff Rebugio	Email: Jeff@Kaanapaliland.com	$ -	$ 8,400.00
Kahoma Land Company, LLC	private	Kimo Falconer	Email: jkimof@msn.com	$ -	$ -
Kahoma Land Holdings, LLC	private	Tom Brzozowski	Email: tombmaui@msn.com	$ -	$ -
Kamehameha Schools	private	Mililani Browning	Email: rebrowni@ksbe.edu	$ -	$ -
Makila Land Company, LLC	private	Rory Frampton	Email: rory@westmauiland.com	$ -	$ -
Maui Land & Pineapple Company, Inc.	private	Pomaika'i Kaniaupio-Crozier	Email: pcrozier@mlpmaui.com	$ -	$ -
Maui County Department of Water Supply	government	Edna Manzano	Email: Edna.Manzano@co.maui.hi.us	$ 252,250.00	$ -
State of Hawaii, Department of Land & Natural Resources	government	Scott Fretz	Email: Scott.Fretz@hawaii.gov	$ 280,000.00	$ -
The Nature Conservancy	nonprofit	Mark White	Email: mwhite@tnc.org	$ 118,245.00	$ -
Wailuku Water Company, LLC	private	Avery Chumbley	Email: abc@aloha.net	$ -	$ -
Tri-Isle Resource Conservation & Development	nonprofit	John A. Hau'oli Tomoso	Phone: 808-871-1010 Email: tomoso@tri-isle.org	$ -	$ -
U.S. Fish & Wildlife Service	government	Jennifer Higashino	Email: jennifer_higashino@fws.gov	$ -	$ -

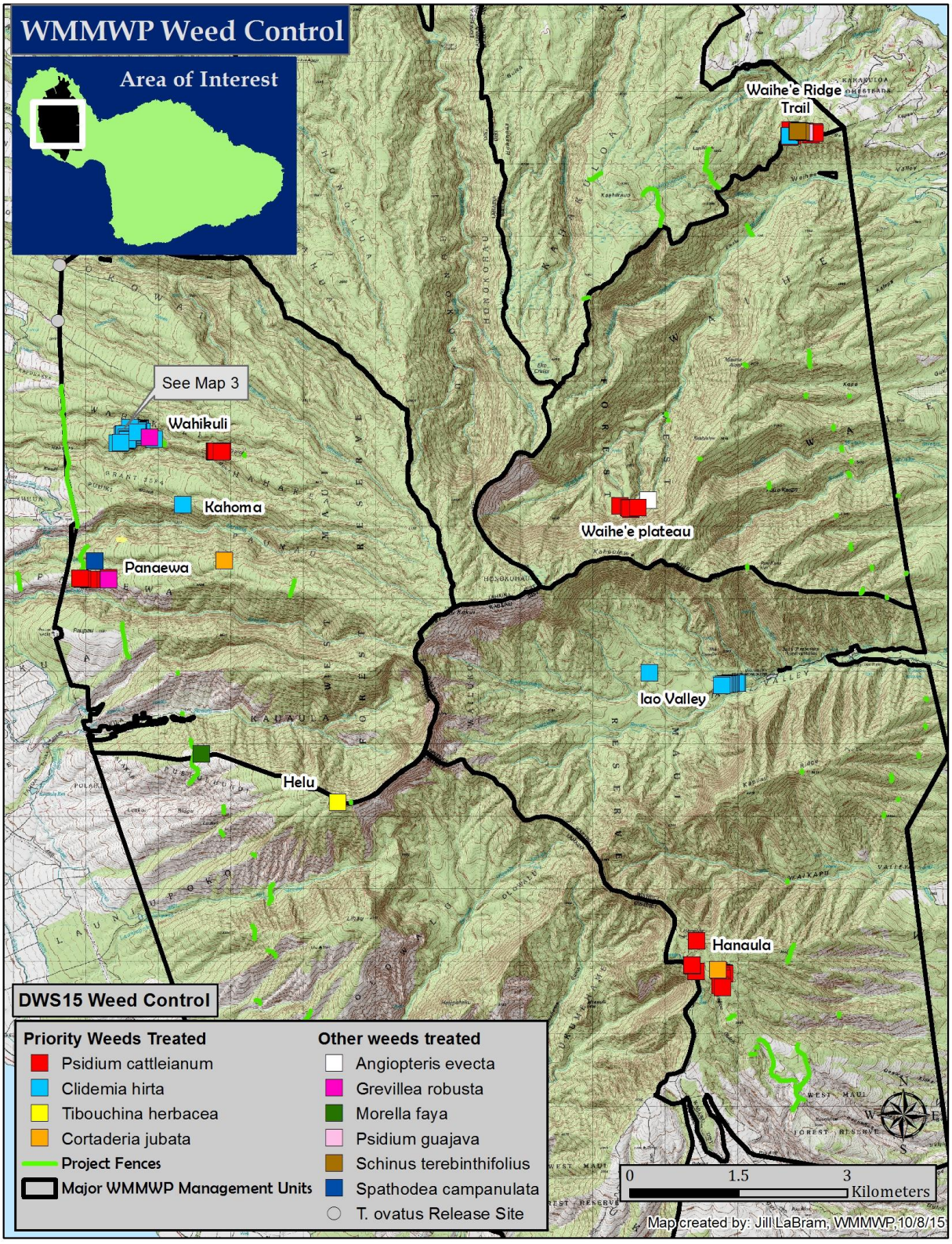
Please note: Significant in-kind services are provided in terms of professional services and time from many partners which has not been quantified.

APPENDIX B

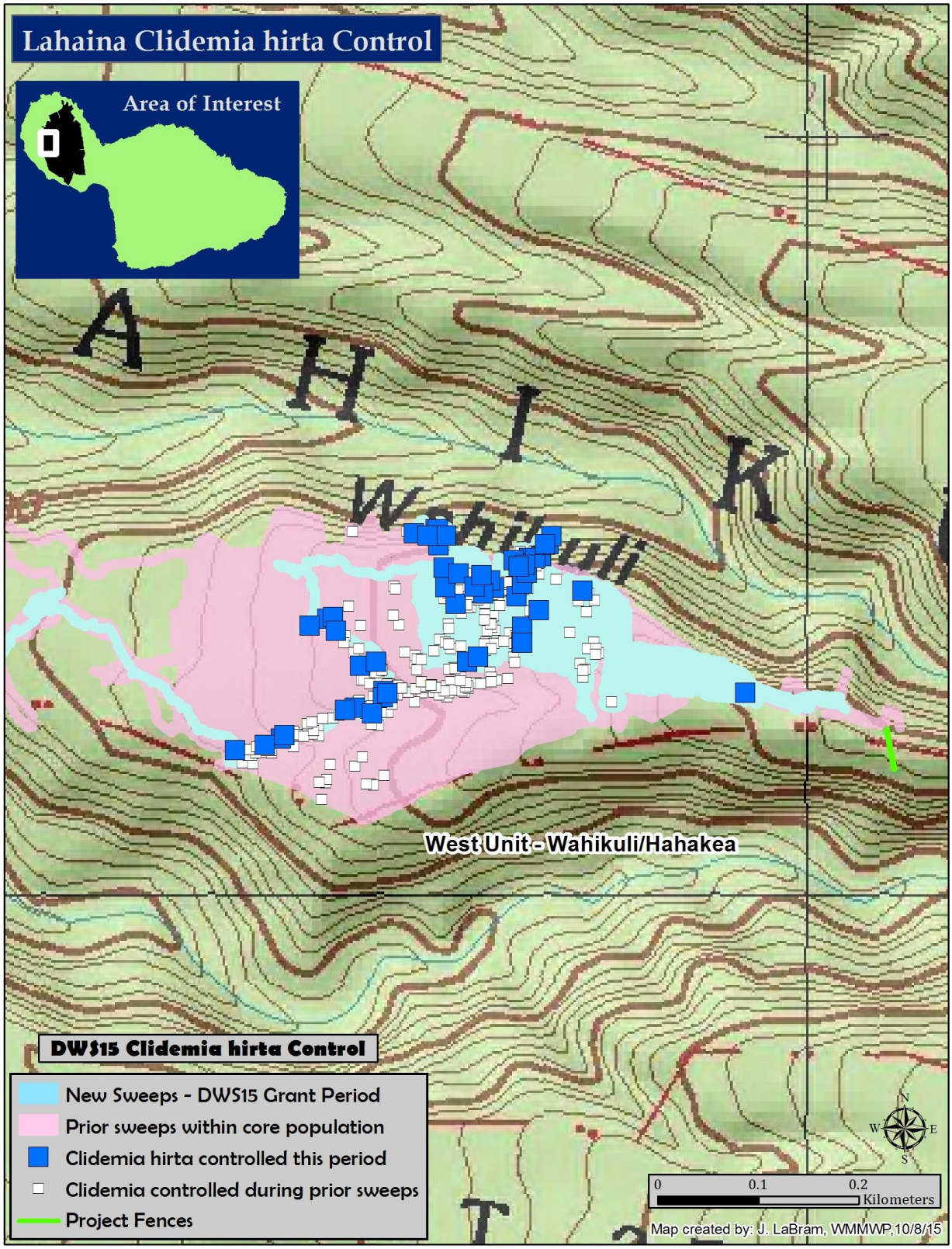
See Attached Excel File



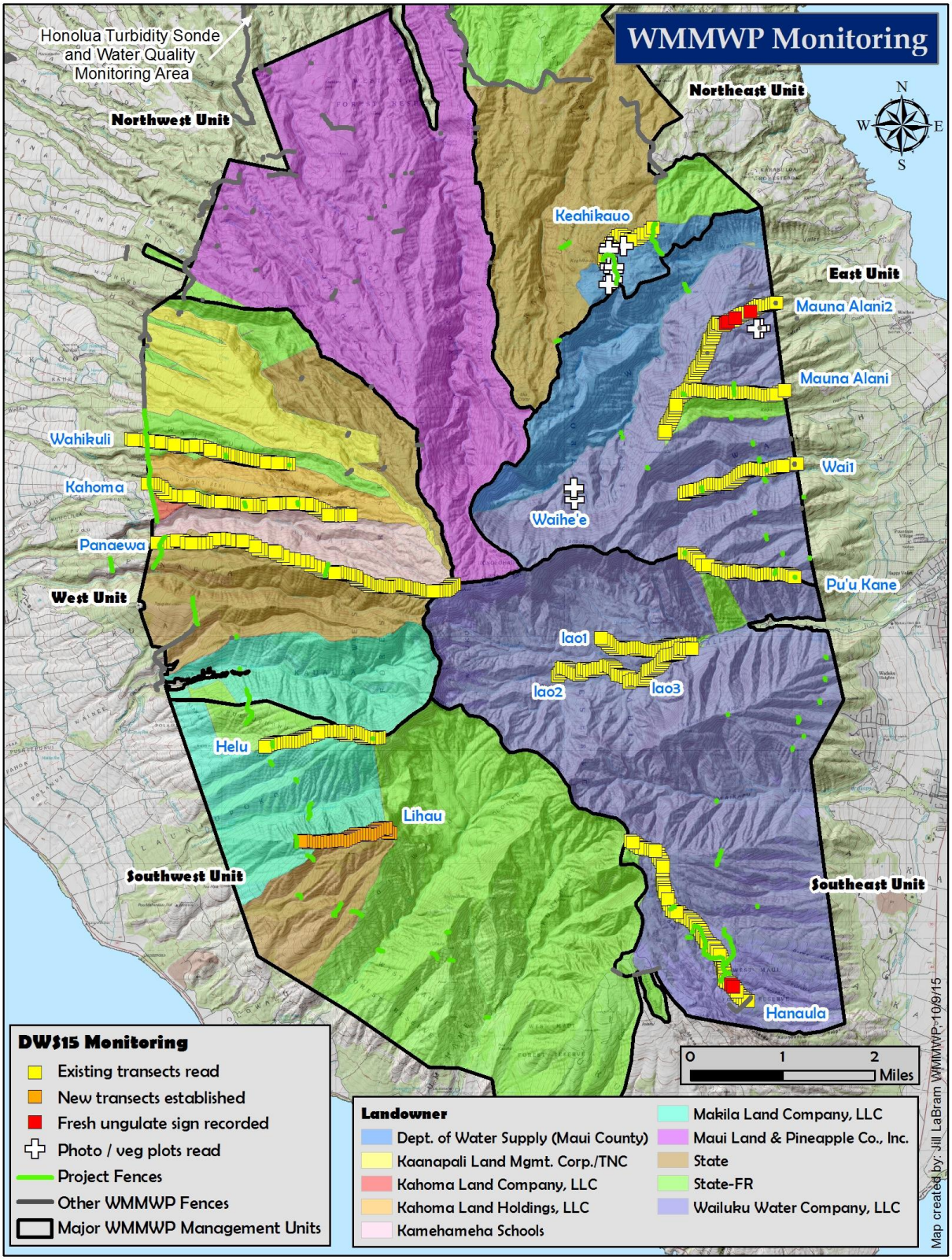
Map 1: DWS15 Ungulate Control. Map showing animal management and control activities across fenced regions of the WMMWP project area. Depending on the magnitude of ungulate infestations, managed areas are monitored and maintained between one and four times per year. A total of ten pigs and two goats were captured.



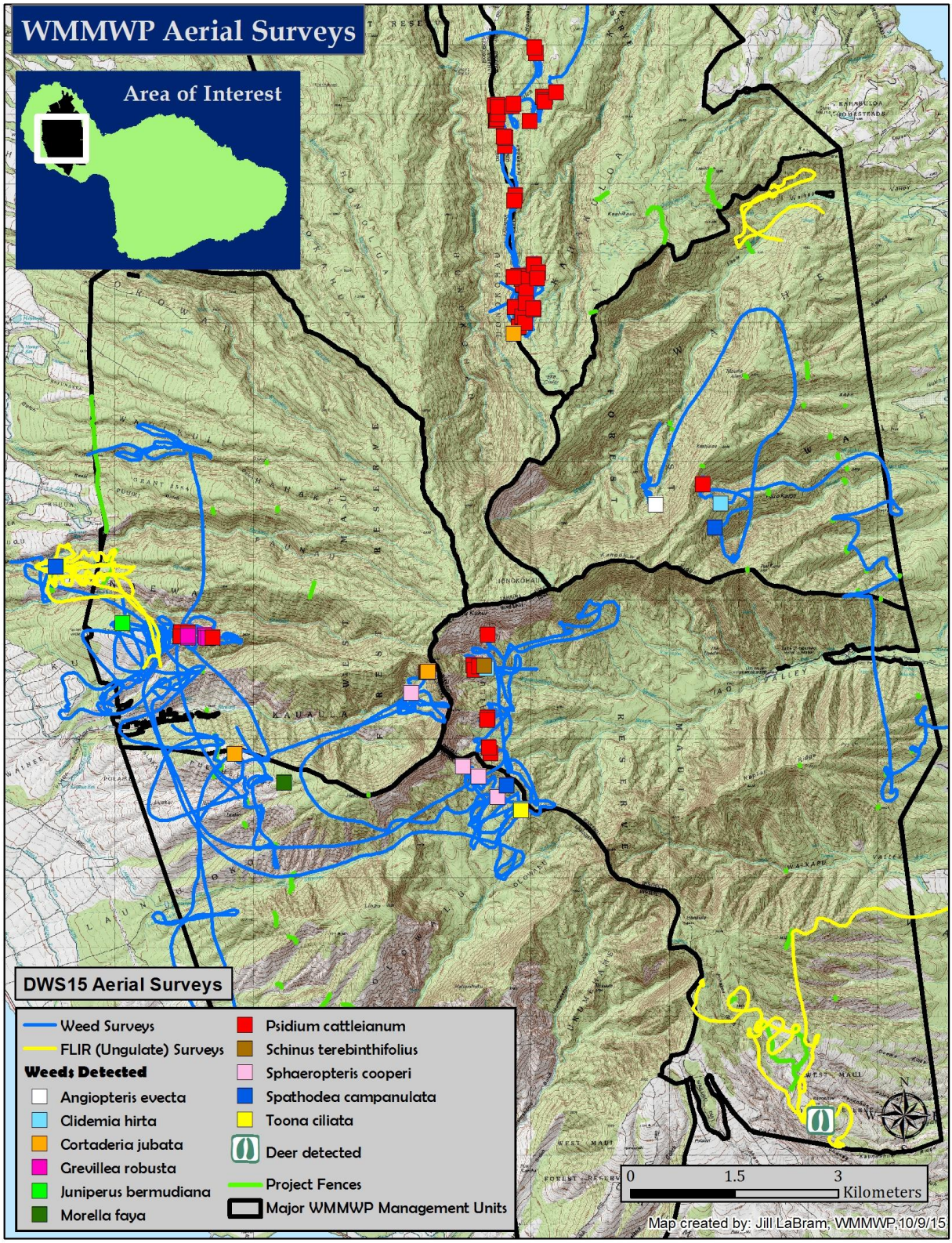
Map 2. Priority Weed Control. All priority and incidental weed control points are shown watershed wide. See Map 3 for a closer look at the Wahikuli Clidemia weed control. The Tectococcus ovatus (biocontrol for P. cattleianum) release sites are also depicted on this map.



Map 3. Lahaina Clidemia Control; Task 1. The reduction and removal of this Wahikuli population, which can threaten source water recharge areas in Lahaina, is a top priority for WMMWP. During this DWS15 period, 851 C. hirta were controlled within sweeps of 20.05 acres.



Map 4: DWS15 Monitoring. Map depicting monitoring transects and photo points/vegetation plots completed. Thirteen existing transects and fourteen photo/vegetation plots were read. Fresh ungulate sign on the Hanaula and Mauna Alani transects are shown in red. The Lihau transect was established this period and is shown in orange.



Map 5: DWS15 Aerial Surveys. Map depicting weed and ungulate aerial surveys. Five weed surveys and two ungulate (FLIR) surveys were conducted during this grant period. Weeds are shown in various colors and ungulates were only found in Hanaula (deer detected), but below our intact fences.

WR Committee

From: Kimberly Thayer <thayer@westmauiwatershed.org>
Sent: Monday, March 19, 2018 6:32 PM
To: WR Committee
Cc: Chris Brosius; Jill LaBram
Subject: Re: WR-5, Watershed Management and Protection
Attachments: WMMWP DWS17 Qtr Reports.pdf; WMMWP DWS16 Qtr Reports.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Aloha,

Per our last email, our quarterly reports for our FY16 and FY17 DWS grants are attached.

Mahalo,
Kim

Kimberly (Skog) Thayer
Program Associate

Office Hours:
* Monday - Friday : 8:30am - 5:00pm *

West Maui Mountains Watershed Partnership
Post Office Box 13240
Lahaina, Hawaii 96761
Office: 808-661-6600
Cell: 808-281-4917
Fax: 808-661-6604
thayer@westmauiwatershed.org
www.westmauiwatershed.org

On Mon, Mar 19, 2018 at 6:29 PM, Kimberly Thayer <thayer@westmauiwatershed.org> wrote:

Aloha Water Resources Committee staff,

Here attached is our response to your request. Also attached, as referenced in our response letter, is our DWS FY19 proposal and quarterly reports for our FY15 DWS grant. Due to file size, we will send the quarterly reports for our FY16 and FY17 DWS grants by separate email.

Mahalo nui,
Kim

Kimberly (Skog) Thayer
Program Associate

Office Hours:
* Monday - Friday : 8:30am - 5:00pm *

West Maui Mountains Watershed Partnership
Post Office Box 13240

Lahaina, Hawaii 96761
Office: 808-661-6600
Cell: 808-281-4917
Fax: 808-661-6604
thayer@westmauiwatershed.org
www.westmauiwatershed.org

---------- Forwarded message ---------
From: WR Committee <WR.Committee@mauicounty.us>
Date: Fri, Mar 16, 2018, 8:41 AM
Subject: WR-5, Watershed Management and Protection
To: brosius@westmauiwatershed.org <brosius@westmauiwatershed.org>
Cc: WR Committee <WR.Committee@mauicounty.us>

Mr. Brosius,

Please review attached correspondence for response to the Maui County Council's Water Resources Committee. The hard copy is being mailed to you as well.

Thank You,

Water Resources Committee staff

Quarterly Progress Report
Quarter 1
West Maui Mountains Watershed Source Protection Program
FY 2017 Grant
Acct #4502991; Contract # WC-0907
to

County of Maui Department of Water Supply

By:

County of Maui
Ka'anapali Land Management Corp.
Kahoma Land Holdings, LLC
Kahoma Land Company, LLC
Kamehameha Schools
Makila Land Company, LLC
Maui Land & Pineapple Company, Inc.
Maui County Department of Water Supply
State of Hawaii DLNR
The Nature Conservancy
Wailuku Water Company, LLC
Tri-Isle RC&D
US Fish and Wildlife Service

&

Prepared by:
Chris Brosius – Program Manager
Jill LaBram – Natural Resource and GIS Technician
Kimberly Thayer – Program and Data Assistant
West Maui Mountains Watershed Partnership
P.O. Box 13240, Lahaina, Hawaii 96761
(808) 661-6600
brosius@westmauiwatershed.org

Quarterly Progress Report
Quarter 1
West Maui Mountains Watershed Source Protection Program
FY 2017 Grant
Acct #4502991; Contract # WC-0907

1) Background

The mission of the West Maui Mountains Watershed Partnership (WMMWP) is to protect and preserve Maui's water supply and prevent further degradation through collaborative forest management – because a healthy forest yields abundant fresh water. With the support of DWS and other Partners, our staff of local residents works full time as stewards of our native forests. The West Maui watershed is a key recharge area, producing 70 million gallons of water per day (MGD) of sustainable yield – over 25 billion gallons each year according to the State Commission of Water Resources Management. Water from WMMWP lands in Mauna Kahalawai feeds around 76% of DWS customers. The program activities that we address in this DWS17 contract include fence maintenance and inspections, ungulate control, control of priority weed species, watershed monitoring, and public education and awareness. Since FY16, we have increased our scope of work within fence inspections and ungulate control. All of these activities will further the mutual goal of protecting source water resources and ensure a sustainable drinking water supply for the people of Maui. We are off to a strong start with implementing the deliverables, and the tasks completed in Quarter 1 are described below.

2) Tasks Completed During this Period:

a. GOAL 1: Maintenance and inspection of fences

Tasks Completed

- WMMWP inspected 1,250 meters of fence this period in the West Unit. This area is critical to the Lahaina water supply, and all fences inspected remained in good condition. Further permanent repairs for the Sept 13-14 storm are still needed.

b. GOAL 2: Ungulate control

Tasks Completed

- Ungulate control efforts this period were focused in the West Unit within the Pana'ewa and Hahakea/Wahikuli secondary units. Staff checked 363 ungulate traps and no pigs were captured nor fresh ungulate sign found. Sixty-four traps were removed in Wahikuli due to lack of sign and to increase efficiency during the subsequent checks.
- Two attempts were made to fly in to Puu Kane where fresh ungulate sign was found previously. These were unsuccessful due to high winds and inclement weather. Trips are scheduled for next quarter.

Table 1. Ungulate Control DWS17 Quarter 1

Management Unit	Secondary Unit Name	# checked	# new installations	# removed	# pigs	# cows	# deer	# goats
1.5	Eke	0	0	0	0	0	0	0
2.1	Waihe'e	0	0	0	0	0	0	0

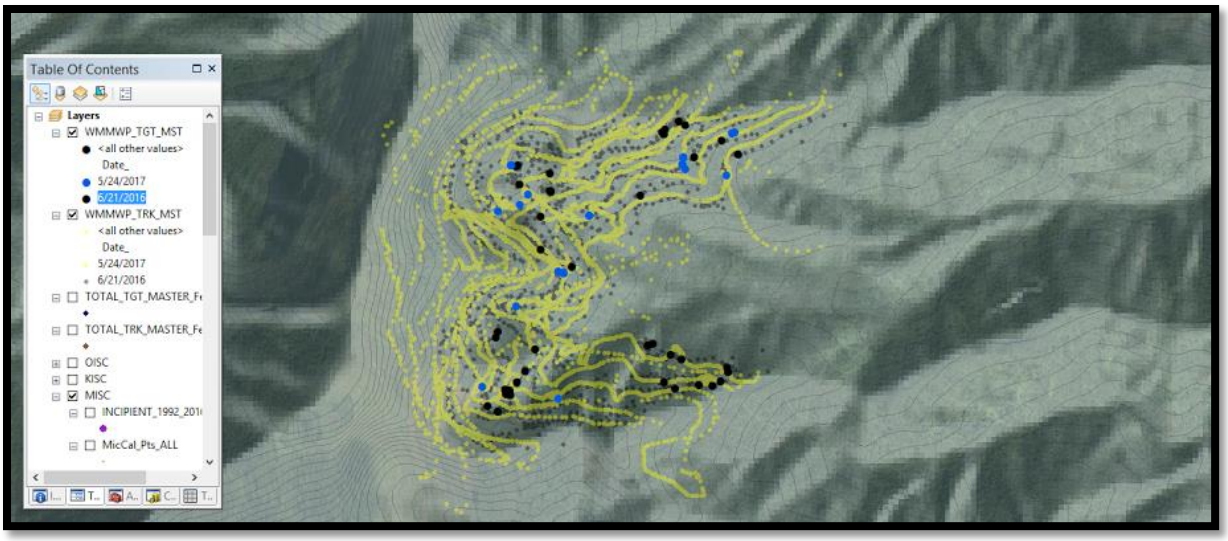
2.2	Mauna Alani	0	0	0	0	0	0	0
2.3	Waiehu	0	0	0	0	0	0	0
2.4	Pu'u Kane	0	0	0	0	0	0	0
3.2	Kapilau	0	0	0	0	0	0	0
3.3	Waikapu	0	0	0	0	0	0	0
3.4	Hanaula	0	0	0	0	0	0	0
4.7	Helu	0	0	0	0	0	0	0
5.2	Pana'ewa	30	0	0	0	0	0	0
5.4	Hahakea/Wahikuli	333	0	64	0	0	0	0
TOTAL		**363**	**0**	**64**	**0**	**0**	**0**	**0**

c. GOAL 3: Control of Priority Weed Species

Psidium cattleianum

Task 1: Weed Maintenance Area

- Follow up HBT Treatments
    - In combination with some HBT resources from Dr. James Leary, we flew a subsection of a previously covered area in the back of Iao Valley to compare the number of trees found previously (337 days from previous mission). Twenty-seven targets were treated during this quarter's mission (Image below, blue dots). Seven of these were survivors with a height of 1-2'. Shoots were sprouting at the base. The mean dose was 4.91 gae (grams acid equivalents) of the active ingredient, Triclopyr. Each projectile is estimated to contain 0.1994 gae (~5 projectiles per gram) for an average dose estimate of 24.6 projectiles per target, a 46% reduction from last year, indicative of treating smaller recruits. Further analysis will be explored with Dr. Leary for the final report.



- Ground Control Efforts
    - Two ground control efforts occurred on Kahoma ridge, totaling 10 acres. A total of 461 strawberry guavas were controlled, with the highest points documented ~3200'. To our knowledge, with the

exception of a patch of ~20 mature trees, all guavas have been treated on Kahoma ridge down to our animal control loop at ~2900'. These trees will be controlled during our next weed control mission.

- In Kauaula (Panaewa subunit 5.2), one *P. cattleianum* was found (~2900') and controlled during an ungulate control check. No others have been found on this ridge and any outliers will continue to be removed.

Task 2: Biological Control Dispersal

- No new *Tectococcus ovatus* release sites were created this period.

Task 3: Furthering Volunteer Weed Control

- No Waihe'e volunteer service trips were conducted this period. Future trips have been scheduled for the upcoming quarter.

<u>*Clidemia hirta*</u>

Task 1: Lahaina Clidemia Control

- In Wahikuli, 80 keiki were pulled incidentally in the gulch during the quarterly ungulate control check. Last FY, an extensive survey occurred to control and assess the Wahikuli Clidemia population. A follow up mission is scheduled in this core within the upcoming quarters.
- As reported in the DWS16 report, a new Clidemia population was found on Kahoma ridge while controlling *P. cattleianum*. During this quarter's surveys (noted above for both species), 769 *C. hirta* were controlled (80 of these were mature). This included a new patch found ~ 50 mauka of the W3 fence (next to the highest *P. cattleianum* patch noted above) with 43 mature plants. There were additional plants left untreated. A follow up mission will allow for the treatment of these as well as a possible ground and aerial assessment of plants that may be off the edge and not be reachable by foot. With our knowledge to date, this population has only been documented on the Kahoma ridge between ~2950' – 3200'.
- The reduction and removal of both of these populations, which can threaten source water recharge areas in Lahaina, is a top priority for WMMWP.

Task 2: Iao Valley Clidemia Control

- No trips were conducted this quarter.

<u>Other Weed Species</u>

- In Helu, WMMWP staff found and controlled two immature *Morella faya* during a 3.9 acre survey. Efforts to control any known plants continue to be a priority, as this is the only area on Mauna Kahalawai where *M. faya* has been found.

<u>Weed Management Specialist</u>

- This new position will be opened and posted on the RCUH website in the upcoming quarter.

d. GOAL 4: Watershed monitoring

Task 1: Ungulate Monitoring Transects

- The Lihau transect was read this quarter. No ungulate sign was recorded.

Task 2: Invasive Weed Monitoring Transects

- The Lihau transect was also read for weeds this period. No *P. cattleianum* was observed at previous locations near the summit nor other priority species found. The most dominant weed species were *Andropogon virginicus* (15 of the 34 stations) and *Hypochoeris radicata* (14 stations).

Task 3: Water Quality Monitoring in Honolua

- After being out of the field for maintenance, the sonde was re-calibrated and has been re-deployed in Honolua stream. Data will be collected next quarter.

Task 4: Forest Health Observations and Monitoring

- We continue to observe for forest health and monitor for early detection and response.
- One new *Liparis hawaiiensis* (SOC) was recorded on the upper Kahoma ridge.

Task 5: Photo / Vegetation Plot Monitoring

- Six of the Northwest photo / vegetation plots that were slated for last year (Pohakupule/Honolua) were monitored this quarter. These plots have no ungulate sign above or below the fence and all old disturbance has been covered up by vegetation.
- The only dominant native species within all plots was *Dicranopteris linearis*. The others were non-native and included *Andropogon virginicus, Oplismenus hirta, Zingiber zerumbet, Ardisia elliptica, Cinnamomum burmanii, Psidium guajava, Aleurites moluccana, Melaleuca quinquenervia,* and Bamboo species.

Task 6: Aerial Surveys

- No aerial surveys were conducted this period.

e. GOAL 5: Public Education and awareness

Task 1: Maintain Use of Media and Social Media

- Thirty Facebook posts were generated during this quarter. The reach ranged from 153 to 1,200 people per post, with an average reach of 500 people across all 30 posts. Total page likes increased from 1,029 at the start of the quarter to 1,053 at the end of the quarter.
- Our website (www.westmauiwatershed.org) saw 2,290 sessions (including 1,932 from new users) with 3,354 unique page views. A substantial

portion of visits (974) began on our hikes page (www.westmauiwatershed.org/explore/hikes). Notably, a handful of visits (8) stemmed from a link on the Maui County website. Our stewardship hikes page, which highlights upcoming volunteer weed control opportunities, received 33 hits. We seek to direct more traffic to that page over time as a means to engage and recruit new volunteers.

Task 2: WaterStory Educational Sessions

- WMMWP's Program and Data Assistant, Kim Thayer, gave three presentations this quarter:
    - Two biology honors classes at Baldwin High School (44 students).
    - Maui Mauka Conservation Awareness Training event organized by EMWP, MISC, and MFBRP. Also created an informational flyer with five watershed facts which was distributed to the attendees after the presentation.

Task 3: Outreach Events

- WMMWP participated in one community outreach event this quarter, the Hawaiian Islands Land Trust Annual Picnic at the Waihe'e Coastal Dunes and Wetlands Refuge. Staff directly interacted with 30 community members.

3) <u>Budget Summary:</u>

a. Monies spent this quarter were for staff payroll, helicopter time, vehicle maintenance, tools for the field crew, educational materials for WaterStory sessions and outreach events, and UH indirect costs.

b. See budget summary attached**.**

County of Maui
Department of Water Supply

Watershed Protection Grant Program

Fiscal Year 2017

Organization Name: WMMWP

Expense Categories	Grant Amount	Payment #1	Payment #2	Payment #3	Final Payment	Balance
A. Personnel (Payroll Taxes & Fringes)	246,768.00	58,027.75				188,740.25
B. Transportation	0.00	0.00				0.00
C. Contractual (e.g. Helicopter)	25,000.00	4,180.00				20,820.00
D. Utilities (e.g. Telephone/cell, water, electricity, etc)	5,614.00	0.00				5,614.00
E. Travel	6,700.00	0.00				6,700.00
F. Field Crew Costs	8,500.00	156.34				8,343.66
G. Supplies, Materials & Equipment	15,700.00	0.00				15,700.00
H. Administrative & Overhead Costs (not to exceed 15% of total grant amount)	31,818.00	6,250.92				25,567.08
I. Other Costs	9,900.00	145.10				9,754.90
Total:	350,000.00	68,760.11	0.00	0.00	0.00	281,239.89

Quarterly Progress Report
Quarter 2
West Maui Mountains Watershed Source Protection Program
FY 2017 Grant
Acct #4502991; Contract # WC-0907
to

County of Maui Department of Water Supply

By:

County of Maui
Ka'anapali Land Management Corp.
Kahoma Land Holdings, LLC
Kahoma Land Company, LLC
Kamehameha Schools
Makila Land Company, LLC
Maui Land & Pineapple Company, Inc.
Maui County Department of Water Supply
State of Hawaii DLNR
The Nature Conservancy
Wailuku Water Company, LLC
Tri-Isle RC&D
US Fish and Wildlife Service

&

Prepared by:
Chris Brosius – Program Manager
Jill LaBram – Natural Resource and GIS Technician
Kimberly Thayer – Program and Data Assistant
West Maui Mountains Watershed Partnership
P.O. Box 13240, Lahaina, Hawaii 96761
(808) 661-6600
brosius@westmauiwatershed.org

Quarterly Progress Report
Quarter 2
West Maui Mountains Watershed Source Protection Program
FY 2017 Grant
Acct #4502991; Contract # WC-0907

1) Background

Deliverables accomplished this period include maintenance and inspection of fences, ungulate and weed control, watershed monitoring and public education and outreach. The tasks completed in Quarter 2 are described in detail below.

2) Tasks Completed During this Period:

a. GOAL 1: Maintenance and inspection of fences

Tasks Completed

- WMMWP inspected 6,943 meters of fence this period in the East, Southeast, Southwest and West Units.
- Four meters of maintenance was performed: Trees / branches were cut off two fence lines in the West Unit. Both of these fences still remain in good condition.
- The Waikapu Valley fence (SE14) that was damaged in the Sept. 13-14, 2016 storm was also repaired this quarter. This consisted of installing 5 horse mats for a stream curtain because there was no longer a plunge pool to act as a natural barrier. A hog panel, 15 meters of double stacked fence and more T-posts were also added. The total re-construction was 20 meters.
- Further permanent repairs for other storm damaged fences are still in progress.

b. GOAL 2: Ungulate control

Tasks Completed

- Ungulate control efforts this period were focused in the East, Southeast and West Units. Staff checked 1,055 traps and no ungulates were captured nor fresh ungulate sign found. One hundred forty-three traps were removed (mostly in Kapilau and Wahikuli) due to lack of sign and to increase efficiency during the subsequent checks.
- A trip to Puu Kane was finally successful this quarter. Although fresh ungulate sign was found previously, only old sign was recorded during this field mission. Sixteen new traps were added.

Table 1. Ungulate Control DWS17 Quarter 2

Management Unit	Secondary Unit Name	# checked	# new installations	# removed	# pigs	# cows	# deer	# goats
1.5	Eke	0	0	0	0	0	0	0
2.1	Waihe'e	0	0	0	0	0	0	0
2.2	Mauna Alani	0	0	0	0	0	0	0
2.3	Waiehu	72	0	16	0	0	0	0
2.4	Pu'u Kane	7	16	0	0	0	0	0
3.2	Kapilau	122	3	71	0	0	0	0

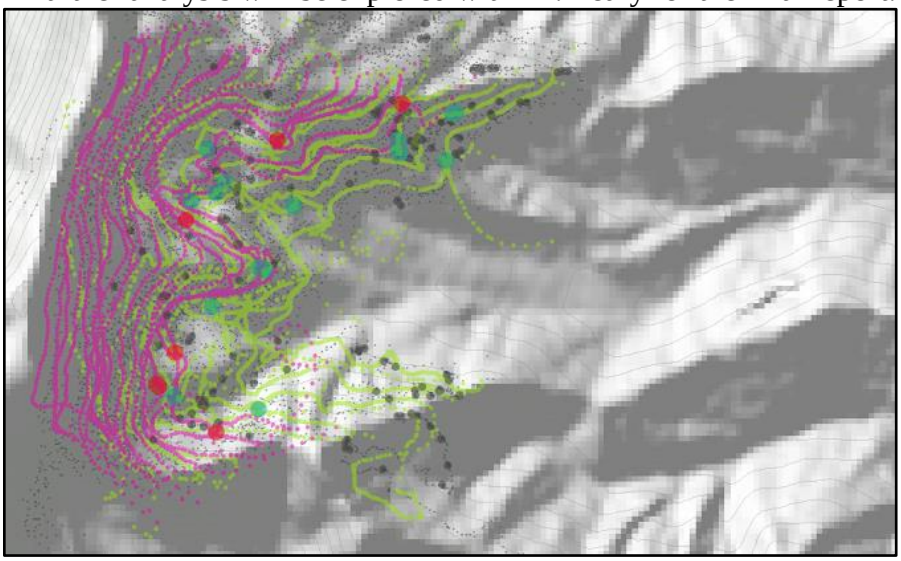
3.3	Waikapu	0	0	0	0	0	0	0
3.4	Hanaula	102	0	1	0	0	0	0
4.7	Helu	0	0	0	0	0	0	0
5.2	Pana'ewa	285	0	10	0	0	0	0
5.4	Hahakea/Wahikuli	467	0	45	0	0	0	0
TOTAL		**1055**	**19**	**143**	**0**	**0**	**0**	**0**

c. GOAL 3: Control of Priority Weed Species

Psidium cattleianum

Task 1: Weed Maintenance Area

- Follow up HBT Treatments
  - In combination with some HBT resources from Dr. James Leary, we flew a portion of the previously treated area in the back of Iao Valley. One fuel cycle was flown (shown in pink below) and ten targets were treated (red dots). The mean dose was 7.97 gae (grams acid equivalents) of the active ingredient, Triclopyr. The previous mission in May 2017 is shown in green.
  - One more fuel cycle is scheduled for the next quarter.
  - Incidental pampas grass locations were recorded and will be sent to Maui Invasive Species Committee (MISC).
  - Further analysis will be explored with Dr. Leary for the final report.



- Ground Control Efforts
  - Efforts to control the strawberry guava on Kahoma ridge were thwarted by inclement weather. Attempts will continue in the upcoming quarters.
  - On Pa'u Pa'u ridge (West unit), 51 *P. cattleianum* were controlled while monitoring the transect (three of these were retreats). These guavas were controlled within a 3.4 acre sweep down to an elevation of ~3000', reducing the extent of the previous range by ~200' in elevation.

- While reading the Pu'u Kane transect, 38 *P. cattleianum* were controlled during a 1.7 acre survey. Thirty-one of these were mature. All guavas along the ridge have been treated down to our ungulate fence at 3600' elevation.
- Additionally, while reading the Wai 1 transect, 81 incidental *P. cattleianum* (11 mature) were controlled within a 1.6 acre area.
- The total *P. cattleianum* controlled this quarter during these ground control efforts was 170 plants.

Task 2: Biological Control Dispersal

- No new *Tectococcus ovatus* release sites were created this period.
- A previously established site on Wahikuli ridge was monitored and in addition to recording more infected leaves, this was the first time we recorded galls on the fruits (photo at right).

Task 3: Furthering Volunteer Weed Control

- Two volunteer service trips were conducted on the Waihe'e Ridge Trail this period:
  - A group of 6 boys and 2 leaders from Queen Lili'uokalani's Children Center's Aha Kane joined us. A total of 388 *P. cattleianum* (222 were mature), 19 mature *Clidemia hirta*, 2 *Flindersia brayleyana* (Queensland maple) and 1 *Schefflera actinifolia* were controlled.
  - Twelve students and three teachers from Baldwin High School weeded and prepped an outplanting site on Waihe'e Ridge. Fifty native plants were put in the ground, which included 'ōhi'a, manono, uki, and naupaka.
  - NEED TO ADD HOKULEA HOMECOMING EVENT for FINAL REPORT

Clidemia hirta

Task 1: Lahaina Clidemia Control

- In Wahikuli, 39 *Clidemia hirta* were controlled during a 6.6 acre survey. Most of this survey was along the edge of the main core of the population and no mature plants were found. A follow up survey within the core is scheduled in the upcoming quarters.
- Multiple attempts were made to fly to Kahoma ridge to control the newly recorded *C. hirta* population, but missions were cancelled due to high wind and rain.
- The reduction and removal of both of these populations, which can threaten source water recharge areas in Lahaina, is a top priority for WMMWP.

Task 2: Iao Valley Clidemia Control

- No trips were conducted this quarter; however *C. hirta* was found and pulled on Kapilau ridge. These are new accounts in Kapilau and fourteen plants were removed within four different locations. None of these were mature. We will continue to monitor this area for Clidemia and control the plants we find.
- Inquiries have been made with USFS/DLNR into the development of biological controls for Clidemia. Officials have been urged to expedite the development of an agent and overcome impediments on progress.

Other Weed Species

- One keiki Australian Tree Fern (*Cyathea cooperi)* was controlled at a previously treated site in Hanaula (3200').
- In Kahoma, WMMWP staff found and controlled a *Grevillea robusta*, the highest known on the ridge ~2600'.
- On Pa'u Pa'u ridge, staff controlled 20 *Schinus terebinthifolius* and one *Grevillea robusta* while treating *P. cattleianum*.
- One *Cestrum nocturnum* (night blooming jasmine) was controlled on Kapilau Ridge 3.

Weed Management Specialist

- This new position was opened and posted on the RCUH website during Quarter 2. It will close on October 16th, and interviews and applicant selection will occur in the next month.

d. GOAL 4: Watershed monitoring

Task 1: Ungulate Monitoring Transects

- Seven transects were read this quarter: Pau Pau, Puu Kane, Wai1, Wai2, Wai3 and the lower sections of Keahialoa and Pana'ewa. Upper Pana'ewa was cancelled due to inclement weather and will be made up within the upcoming quarters.
- No new ungulate sign was recorded on any of the transects; however old sign was recorded on two of these: Puu Kane and Wai 3. On Puu Kane, seven stations had old sign. This was the same area where fresh sign was noted at the end of FY17. Scouting occurred and new ungulate groups were installed. No new sign has since been recorded. Along the Wai 3 transect, there was old sign at one station where a pig had crossed the trail.

Task 2: Invasive Weed Monitoring Transects

- None of these transects were read for weeds this period.

Task 3: Water Quality Monitoring in Honolua

- The sonde was re-deployed in Honolua stream last quarter after being out of the field for maintenance. Turbidity and stream height data has been continuously recorded this quarter and two base samples were collected. These will be sent to the UH-Hilo lab for nutrient analysis.

Task 4: Forest Health Observations and Monitoring

- We continue to observe for forest health and monitor for early detection and response.

Task 5: Photo / Vegetation Plot Monitoring

- The remaining two Northwest photo / vegetation plots that were slated for last year (Pohakupule/Honolua) were monitored this quarter. These plots have no ungulate sign above or below the fence and all old disturbance has been covered up by vegetation.
- The dominant species within the plots included the native *Dicranopteris linearis and Metrosideros polymorpha* and the non-native Mango.

Task 6: Aerial Surveys

- One aerial survey was attempted this period but cancelled due to inclement weather.

e. GOAL 5: Public Education and awareness

Task 1: Maintain Use of Media and Social Media

- Thirty-eight Facebook posts were generated during this quarter. The reach ranged from 20 to 9,003 people per post, with an average reach of 910 people across all 38 posts. Total page likes increased from 1,054 at the start of the quarter to 1,109 at the end of the quarter.
- Our website (www.westmauiwatershed.org) saw 1,653 sessions from 1.354 users with 2,802 unique page views. A substantial portion of visits (482) began on our hikes page (www.westmauiwatershed.org/explore/hikes). Notably, 18 visits came from Facebook. Our stewardship hikes page, which highlights upcoming volunteer weed control opportunities, received 30 hits. We seek to direct more traffic to that page over time as a means to engage and recruit new volunteers.

Task 2: WaterStory Educational Sessions

- WMMWP gave two presentations this quarter:
    - Twenty-one volunteers of the National Humpback Whale Marine Sanctuary. This presentation was requested by NHWMS to educate their volunteers and docents about the relationship between Maui's watersheds, water supply, and nearshore waters. In turn, the volunteers can better educate visitors to the sanctuary about Maui's water resources.
    - The Waihee Elementary School robotics club, including 8 students and 2 teachers. The students are preparing for a competition that requires them to create a robot that solves a problem relating to sourcing, storing, cleaning, or delivering fresh water. The lead teacher requested the presentation to provide students with background information about Maui's water resources and provide ideas for further research and development.

Task 3: Outreach Events

- WMMWP participated in one community outreach event this quarter, Lā ʻUlu, hosted by the Maui Nui Botanical Gardens. Staff directly interacted with 200 community members .

3) *Budget Summary:*

- Monies spent this quarter were for staff payroll, helicopter time, utilities/communication, chainsaw maintenance, tools for volunteers, field supplies, educational materials for staff, and UH indirect costs.

- Spending is on pace with allowable billing rates.

- See budget summary attached.

County of Maui
Department of Water Supply

Watershed Protection Grant Program

Fiscal Year 2017

Organization Name: WMMWP

Expense Categories	Grant Amount	Payment #1	Payment #2	Payment #3	Final Payment	Balance
A. Personnel (Payroll Taxes & Fringes)	319,495.00	58,027.75	68,860.70			192,606.55
B. Transportation	0.00	0.00	0.00			0.00
C. Contractual (e.g. Helicopter)	25,000.00	4,180.00	8,151.00			12,669.00
D. Utilities (e.g. Telephone/cell, water, electricity, etc)	5,614.00	0.00	996.49			4,617.51
E. Travel	6,700.00	0.00	0.00			6,700.00
F. Field Crew Costs	8,500.00	156.34	0.00			8,343.66
G. Supplies, Materials & Equipment	15,700.00	0.00	621.78			15,078.22
H. Administrative & Overhead Costs (not to exceed 15% of total grant amount)	39,091.00	6,250.92	7,885.11			24,954.97
I. Other Costs	9,900.00	145.10	221.12			9,533.78
Total:	430,000.00	68,760.11	86,736.20	0.00	0.00	274,503.69

Quarterly Progress Report
Quarter 3
West Maui Mountains Watershed Source Protection Program
FY 2017 Grant
Acct #4502991; Contract # WC-0907, #WC-0917
to

County of Maui Department of Water Supply

By:

County of Maui
Ka'anapali Land Management Corp.
Kahoma Land Holdings, LLC
Kahoma Land Company, LLC
Kamehameha Schools
Makila Land Company, LLC
Maui Land & Pineapple Company, Inc.
Maui County Department of Water Supply
State of Hawaii DLNR
The Nature Conservancy
Wailuku Water Company, LLC
Tri-Isle RC&D
US Fish and Wildlife Service

&

Prepared by:
Chris Brosius – Program Manager
Jill LaBram – Natural Resource and GIS Technician
Kimberly Thayer – Program and Data Assistant
West Maui Mountains Watershed Partnership
P.O. Box 13240, Lahaina, Hawaii 96761
(808) 661-6600
brosius@westmauiwatershed.org

Quarterly Progress Report
Quarter 3
West Maui Mountains Watershed Source Protection Program
FY 2017 Grant
Acct #4502991; Contract # WC-0907, #WC-0917

1) Background

Deliverables accomplished this period include maintenance and inspection of fences, ungulate and weed control, watershed monitoring and public education and outreach. The tasks completed in Quarter 3 are described in detail below.

2) Tasks Completed During this Period:

a. GOAL 1: Maintenance and inspection of fences

Tasks Completed

- WMMWP inspected 11,220 meters of fence this period in the Northeast, East, Southeast, Southwest and West Units.
- Six hundred forty-six (646) meters of maintenance was performed: With the exception of a step-over fixed on Helu/Luakoi ridge, all of the maintenance included brushing and improving the SE6 fence line in Hanaula which was becoming overgrown. Both of these fences still remain in good condition.
- **Storm Damaged Fences**: The Olowalu Valley (SW24), Ukumehame Valley (SW26), Kauaula Valley intake (W36), and the Kauaula back Valley (W35) fences that were damaged in the Sept. 13-14, 2016 storm were also repaired this quarter. This consisted of:
    - Olowalu (SW24) – decontaminating and flying in fence material and tools as well as damaged material out, replacing three horse mats for the stream curtain, adding T-posts and improving fence that was pushed down, adding plastic mesh on top of the mats. The total re-construction was 30m.
    - Ukumehame (SW26)– decontaminating and flying in fence material and tools as well as damaged material out, installing two more top and bottom panels, more T-posts and creating a new stream grate. The total reconstruction was 10m.
    - Kauaula intake (W36) – this fence was completely gone; therefore a new fence was constructed. The total re-build was 25m.
    - Kauaula back Valley (W35)– extracting and flying out all of the feasible old fence material that had been critically damaged. This required extensive effort removing accumulated debris and cutting off and pulling out fence material when necessary.
- Further permanent repairs for other storm damaged fences are still in progress.

b. GOAL 2: Ungulate control

Tasks Completed

- Ungulate control efforts this period were focused in the Northeast, East, Southeast, Southwest, and West Units. Staff checked 946 traps and no

ungulates were captured nor fresh ungulate sign found. However, while reading the East Kahakuloa transect, fresh sign was discovered (see Watershed Monitoring below) and one new group was added in the Keahikauo Management Unit.

- Goats are still noted between the future boundary and strategic fences in Helu / Luakoi ridge.

Table 1. Ungulate Control DWS17 Quarter 3

Management Unit	Secondary Unit Name	# checked	# new installations	# removed	# pigs	# cows	# deer	# goats
1.4	Keahikauo	0	5	0	0	0	0	0
1.5	Eke	67	0	2	0	0	0	0
2.1	Waihe'e	0	0	0	0	0	0	0
2.2	Mauna Alani	42	0	0	0	0	0	0
2.3	Waiehu	0	0	0	0	0	0	0
2.4	Pu'u Kane	23	0	0	0	0	0	0
3.2	Kapilau	89	0	0	0	0	0	0
3.3	Waikapu	0	0	0	0	0	0	0
3.4	Hanaula	191	1	0	0	0	0	0
4.7	Helu	29	0	0	0	0	0	0
5.2	Pana'ewa	233	1	1	0	0	0	0
5.4	Hahakea/Wahikuli	272	0	0	0	0	0	0
TOTAL		**946**	**7**	**3**	**0**	**0**	**0**	**0**

c. GOAL 3: Control of Priority Weed Species

Psidium cattleianum

Task 1: Weed Maintenance Area

- Follow up HBT Treatments
  - No HBT missions were scheduled this period.

- Ground Control Efforts
  - Efforts to control the strawberry guava on Kahoma ridge were thwarted by inclement weather. A follow-up trip has already been scheduled for Quarter 4..
  - In Hanaula (Southeast Unit), while performing ungulate checks and reading the upper transect, seven *P. cattleianum* were found and pulled. One of these was mature. These are the only known strawberry guava along the Spring trail above the reservoirs at 4000' to the Hanaula summit and then down the transect ridge to 4400' elevation.
  - While scouting and checking the Pu'u Kane ungulate control groups (East Unit), 11 mature *P. cattleianum* were controlled during a 1.5 acre survey. All guavas along the ridge have been treated down to our landing zone at 3600' elevation.
  - Additionally, while reading the East Kahakuloa transect, 12 *P. cattleianum* (10 mature) were controlled within a 3.6 acre area from the top of the transect at ~2500' down to an elevation of ~2050'.

- One re-treat occurred on Pana'ewa ridge along the mauka extent (2400' elevation) of the population that was controlled in prior years. A future follow up trip will be needed to control the remainder of the guavas makai to the 2000' elevation boundary fence.
- The total *P. cattleianum* controlled this quarter during these ground control efforts was 31 plants.

Task 2: Biological Control Dispersal

- No new *Tectococcus ovatus* release sites were created this period. These will be planned for next quarter.
- Three WMMWP staff members accompanied DOFAW (Dept. of Forestry and Wildlife) crew to review historically released *Clidemia hirta* biological controls for aid in identification and to assess further dispersal in needed areas.

Task 3: Furthering Volunteer Weed Control

- One volunteer service trip was conducted on the Waihe'e Ridge Trail this period:
  - A group of 14 students, teachers, and parents from the Waihe'e Elementary School's Robotics Club weeded a previous outplanting site and then weeded, prepped, and planted five *Metrosideros polymorpha* ('ōhi'a) and six *Machaerina angustifolia* ('uki) at a new site on the trail.

<u>*Clidemia hirta*</u>

Task 1: Lahaina Clidemia Control

- Again, multiple attempts were made to fly to Kahoma ridge to control the newly recorded *C. hirta* population, but missions were cancelled due to high wind and rain. A trip is scheduled for Quarter 4.
- No trips occurred on Wahikuli ridge this period. A survey within the core is scheduled for next quarter.

Task 2: Iao Valley Clidemia Control

- No trips were conducted in Iao Valley this quarter; however five more *C. hirta* were found and pulled on Kapilau ridge while reading the transect. The first accounts of Clidemia in Kapilau occurred last quarter and none of those were mature, however, this time two were fruiting. We will continue to monitor this area for Clidemia and control the plants we find.
- Inquiries have been made with USFS/DLNR into the development of biological controls for Clidemia. Officials have been urged to expedite the development of an agent and overcome impediments on progress.

<u>Other Weed Species</u>

- While monitoring ungulate control groups on Kapilau Ridge 2 (Southeast Unit), an unknown ginger was documented. After further review, it was

found to be *Hedychium gardnerianum*, Himalayan ginger, an extremely invasive weed that has spead widely in East Maui. This is the first account of this species within WMMWP and removal is a top priority. A follow up trip to assess and control occurred, resulting in the removal of 491 plants covering a 6 acre survey down the ridge. To our knowledge, there are still several clumps containing hundreds left. Another trip is scheduled in the upcoming quarter as well as an aerial survey to assess the extent of this population.

- One immature Australian Tree Fern (*Cyathea cooperi)* was controlled in Keahikauo at 2500' elevation near our helicopter landing zone. This is the first account of an ATF in this area.
- Two other ATFs were documented near Kope gulch and in Kapilau. Aerial treatment may be necessary.
- In Panaewa, WMMWP staff found and controlled a *Grevillea robusta*, the highest known on the ridge ~2400'.
- One incidental *Spathodea campanulata* on East Kahakuloa ridge and three along the Lanili fence line were controlled.
- While checking the ungulate groups in Hanaula, one incidental *Macaranga tanarius* was found and controlled at 3200' elevation.
- The highest *Schinus terebinthifolius* on Puu Kane was treated.
- One *Cestrum nocturnum* (night blooming jasmine) was controlled on PuuKane.

Weed Management Specialist

- An applicant for this new position was accepted and confirmed and will be starting on February 1.

d. GOAL 4: Watershed monitoring

Task 1: Ungulate Monitoring Transects

- Five transects were read this quarter: East Kahakuloa, Hanaula, Kapilau, Mauna Alani, and Mauna Alani 2.
- Fresh ungulate sign was found on two of the transects: within sixteen of the 69 stations on Mauna Alani 2 and three of the 49 stations on East Kahakuloa, In Mauna Alani, sign starts around 2100' elevation, in an unmanaged areas below our uppermost fence. In East Kahakuloa, a new control group was added at the spot of the fresh ungulate sign.

Task 2: Invasive Weed Monitoring Transects

- Kapilau and Hanaula transects were read for weeds this period.
    - *Clidemia hirta* was recorded on the Kapilau transect for the first time. These plants were pulled.

Task 3: Water Quality Monitoring in Honolua

- Turbidity and stream height data has been continuously recorded this quarter and two base samples and one storm sample were collected. These will be sent to the UH-Hilo lab for nutrient analysis.

Task 4: Forest Health Observations and Monitoring

- We continue to observe for forest health and monitor for early detection and response. Opportunistic Rapid Ohia Death monitoring has not lead to any detections. Protocols continue to be followed. Naio thrips was also negative for at least one site in Olowalu. *Puccinia psidii* is still present in areas but not as virulent as Oahu.

Task 5: Photo / Vegetation Plot Monitoring

- Eight of the photo / vegetation plots in Kahakuloa were monitored this quarter. These plots have no ungulate sign above or below the fence and all old disturbance has been covered up by vegetation.
- The dominant species within the plots included the native *Dicranopteris linearis* and *Machaerina angustifolia* and the non-native *Clidemia hirta*.

Task 6: Aerial Surveys

- An aerial survey was conducted to scout for ungulate sign within our East and Southeast Units (no fresh sign recorded) and to confirm two locations of Australian Tree Fern (*Cyathea cooperi*) in Kope gulch and Kapilau. These will potentially need aerial treatment due to lack of access.

e. GOAL 5: Public Education and awareness

Task 1: Maintain Use of Media and Social Media

- Forty-one Facebook posts were generated during this quarter. The reach (number of people who saw each post) ranged from 54 to 2,038 people per post, with an average reach of 525. Engagement per post (the number of people who liked, commented, or shared each post) ranged from 5 to 176 with an average of 41. Total page likes increased from 1,109 at the start of the quarter to 1,133 at the end of the quarter.
- Our website (www.westmauiwatershed.org) saw 1,452 sessions from 1,216 users with 2,558 unique page views. Notably, 14 visits came from Facebook, and two came from our newly created Instagram account (see below). Our stewardship hikes page, which highlights upcoming volunteer weed control opportunities, received 30 hits. While this was the same amount of traffic as the previous quarter, we are working to direct more traffic to this page as a means to recruit new volunteers. Our donation page received 18 hits this quarter, a substantial increase over the 8 hits received last quarter.
- To increase our social media presence and reach another demographic, we created an Instagram account (@wmmwp) in early December. Nine posts were created that month and about 100 followers were gained.

Task 2: WaterStory Educational Sessions

- WMMWP gave two presentations this quarter:

- The Baldwin High School Honors Biology Class: After the presentation was given to the previous school year's Honors Biology class in Q1 of this grant, the teacher, Ms. Ancheta, asked WMMWP to return to give a presentation to this school year's class.
- The Baldwin High School AP Biology Class: About half the students in this class received a previous presentation from WMMWP in Q1 of this grant, during the previous school year. The teacher, Ms. Ancheta, asked staff to return and deliver a more in-depth presentation about watersheds and native forest dynamics. As a result of this presentation, the class has scheduled a Waihe'e Ridge volunteer service trip for Q4 of this grant.

Task 3: Outreach Events

- WMMWP participated in two community outreach events this quarter. At the West Maui Ridge to Reef Rendezvous, staff directly interacted with 71 community members at Kahekili Beach Park. At the Arbor Day 1,000 Tree Giveaway, hosted by the Maui Nui Botanical Gardens, staff directly interacted with 68 people, with hundreds more attending the event.

3) *<u>Budget Summary:</u>*

a. Monies spent this quarter were for staff payroll, helicopter time, utilities/communication, conference travel, backcountry travel per diem, crew field supplies, crew training, volunteer supplies, operational field supplies, office supplies, native plants, vehicle repairs and maintenance, security, and UH indirect costs.

b. See budget summary attached**.**

Organization Name: WMMWP **Grant Number:** WC-0907

Expense Categories	Grant Amount	FY17 Q1 (NTP - 6/30/17) Payment #1	FY17 Q2 (7/1/17 - 9/30/17) Payment #2	FY17 Q3 (10/1/17 - 12/31/17) Payment #3	Final Payment	Total Expended	Balance
A. Personnel (Payroll Taxes & Fringes)	246,768.00	58,027.75	65,085.71	62,057.65		185,171.11	61,596.89
B. Transportation	0.00	0.00	0.00	0.00		0.00	0.00
C. Contractual (e.g. Helicopter)	25,000.00	4,180.00	8,151.00	12,017.50		24,348.50	651.50
D. Utilities (e.g. Telephone/cell, water, electricity, etc)	5,614.00	0.00	996.49	1,163.85		2,160.34	3,453.66
E. Travel	6,700.00	0.00	0.00	1,950.00		1,950.00	4,750.00
F. Field Crew Costs	8,500.00	156.34	0.00	1,369.61		1,525.95	6,974.05
G. Supplies, Materials & Equipment	15,700.00	0.00	621.78	1,753.94		2,375.72	13,324.28
H. Administrative & Overhead Costs (not to exceed 15% of total grant amount)	31,818.00	6,250.92	7,507.61	8,146.71		21,905.24	9,912.76
I. Other Costs	9,900.00	145.10	221.12	1,154.11		1,520.33	8,379.67
Total:	350,000.00	68,760.11	82,583.71	89,613.37	0.00	240,957.19	109,042.81

Organization Name: WMMWP **Grant Number:** WC-0907, Amendment 1

Expense Categories	Grant Amount	FY17 Q1 (3/21/17 - 6/30/17) Payment #1	FY17 Q2 (7/1/17 - 9/30/17) Payment #2	FY17 Q3 (10/1/17 - 12/31/17) Payment #3	Final Payment	Balance
A. Personnel (Payroll Taxes & Fringes)	72,727.00	0.00	3,774.99	16,504.58		52,447.43
B. Transportation	0.00	0.00	0.00	0.00		0.00
C. Contractual (e.g. Helicopter)	0.00	0.00	0.00	0.00		0.00
D. Utilities (e.g. Telephone/cell, water, electricity, etc)	0.00	0.00	0.00	0.00		0.00
E. Travel	0.00	0.00	0.00	0.00		0.00
F. Field Crew Costs	0.00	0.00	0.00	0.00		0.00
G. Supplies, Materials & Equipment	0.00	0.00	0.00	0.00		0.00
H. Administrative & Overhead Costs (not to exceed 15% of total grant amount)	7,273.00	0.00	377.50	1,650.46		5,245.04
I. Other Costs	0.00	0.00	0.00	0.00		0.00
Total:	80,000.00	0.00**	4,152.49	18,155.04	0.00	57,692.47

Quarterly Progress Report
Quarter 1
West Maui Mountains Watershed Source Protection Program
FY 2016 Grant
Acct #4502392; Contract # WC-0873
to

County of Maui Department of Water Supply

By:

County of Maui
Ka'anapali Land Management Corp.
Kahoma Land Holdings, LLC
Kahoma Land Company, LLC
Kamehameha Schools
Makila Land Company, LLC
Maui Land & Pineapple Company, Inc.
Maui County Department of Water Supply
State of Hawaii DLNR
The Nature Conservancy
Wailuku Water Company, LLC
Tri-Isle RC&D
US Fish and Wildlife Service

&

Prepared by:
Chris Brosius – Program Manager
Jill LaBram – Natural Resource and GIS Technician
Kimberly Thayer – Program and Data Assistant
West Maui Mountains Watershed Partnership
P.O. Box 13240, Lahaina, Hawaii 96761
(808) 661-6600
brosius@westmauiwatershed.org

Quarterly Progress Report
Quarter 1
West Maui Mountains Watershed Source Protection Program
FY 2016 Grant
Acct #4502392; Contract # WC-0873

1) Background

The DWS 16 deliverables are on track to be completed. Tasks completed this period are shown below. The mission of the West Maui Mountains Watershed Partnership (WMMWP) is to protect and preserve Maui's water supply and prevent further degradation through collaborative forest management – because a healthy forest yields abundant fresh water. The West Maui watershed is a key recharge area, producing 70 million gallons of water per day (MGD) of sustainable yield – over 25 billion gallons each year according to the State Commission of Water Resources Management. Water from WMMWP lands in Mauna Kahalawai feeds around 76% of DWS customers. The program activities that we address in this DWS16 contract include fence maintenance and inspections, ungulate control, control of priority weed species, watershed monitoring, and public education and awareness. All of these will further the mutual goal of protecting source water resources and ensure a sustainable drinking water supply for the people of Maui. We are off to a strong start with implementing the deliverables, and the tasks completed to date are described below.

2) Tasks Completed During this Period:

a. Maintenance and inspection of fences

Tasks Completed

- WMMWP inspected 8,319 meters (5.2 miles) of fence this period in the West, Southwest, and Southeast Units. The one critical situation was a breach in the Pana'ewa NAR fence W9, just above Pa'u Pa'u. Staff added a deadman and smooth wire to create an ungulate proof barrier, however pigs unfortunately had tunneled under the fence and gotten in to the preserve (noted in ungulate control section below). All other fences remained in good condition and only nine meters required maintenance. Several deadmen were installed to hold down the apron along the other Pana'ewa boundary fences and a new t-post was pounded in for a corner brace in Kauaula Valley. This area is critical to the Lahaina water supply.

b. Ungulate control

Tasks Completed

- Ungulate control efforts this period were focused in the West Unit within the Pana'ewa and Hahakea/Wahikuli secondary units. Staff checked 819 ungulate traps and 12 pigs were captured, all in Pana'ewa NAR (see Table 1, below). Five of these captures were in between the North Kanaha boundary fence (funded by the DWS FY14 supplemental award) and the old boundary fence; however, a subsequent scout found no new sign in this specific area. The other seven captures were above the old boundary fence, six of these in Halona gulch, an area that has continued to be a hotspot due

to breaches in the fence in the past. Currently, the fence remains in good condition.

- Additionally, while reading the Pana'ewa transect, fresh sign was recorded and a trail was found coming up from Kahoma Valley. An aerial survey and ground scout were conducted and new traps were added. Kamehameha Schools was contacted to discuss the installation of a new strategic fence in Kahoma Valley to cut off access. Fourteen new groups (62 traps) have been added to the transect ridge and in and around Halona gulch.
- While assessing Pa'u Pa'u for locations of *Morella faya* and *Psidium cattleianum* during an aerial survey, fresh ungulate sign was noted above the Pa'u Pa'u boundary fence (due to a breach in the fence, as stated above) in the Pana'ewa NAR. An immediate ground response was put forth the following work day to repair the fence, add new ungulate control groups, and to establish a new monitoring transect. Eight new groups containing 40 traps have now been added to this specific area.

Table 1. Ungulate Control DWS16 Quarter 1

Management Unit	Secondary Unit Name	# checked	# new installations	# removed	# pigs	# cows	# deer	# goats
1.5	Eke	0	0	0	0	0	0	0
2.1	Waihe'e	0	0	0	0	0	0	0
2.2	Mauna Alani	0	0	0	0	0	0	0
2.3	Waiehu	0	0	0	0	0	0	0
2.4	Pu'u Kane	0	0	0	0	0	0	0
3.2	Kapilau	0	0	0	0	0	0	0
3.3	Waikapu	0	0	0	0	0	0	0
3.4	Hanaula	0	0	0	0	0	0	0
4.7	Helu	0	0	0	0	0	0	0
5.2	Pana'ewa	308	102	3	12	0	0	0
5.4	Hahakea/Wahikuli	511	0	4	0	0	0	0
TOTAL		**819**	**104**	**7**	**12**	**0**	**0**	**0**

c. Control of Priority Weed Species

<u>*Psidium cattleianum*</u>

Task 1: Weed Maintenance Area

- Follow up Surveillance of HBT Strawberry guava
    - In combination with some HBT resources from Dr. James Leary, we flew a subsection of the previously covered area in the back of Iao Valley to compare the number of trees found previously. A survey area of 73.6 acres was flown and 44 targets were treated during this quarter's mission. Fewer trees were found as compared to the original 65 previously treated in the same area. This is a reduction in the number of *P. cattleianum* found, and was also a reduction in the time and resources spent searching and controlling the plants. It should be stressed that these results are preliminary and that further examination of the assessment data is in process with Dr. Leary. A

future re-assessment within the same survey area is warranted with the hopes that even fewer plants will be found.
    - When flying over the Waihe'e survey area, it was noted that plants previously treated with HBT showed various degrees of mortality.
- Ground Control Efforts
    - *P. cattlieanum* ground control efforts occurred on Pa'u Pa'u and Pana'ewa (see table below and Map 1, p.9). Trips to Keahialoa were scheduled and canceled twice due to inclement weather this period.

Species	Unit	Area	Control Type	Total # Controlled	# That Were Mature	# Acres Surveyed	Notes
PsiCat	Pa'u Pa'u	Pa'u Pa'u	Ground	13	0	1.2	Monitored PsiCat while reading transect. Controlled highest trees.
PsiCat	Panaewa	South ridge	Ground	1029	27	4	ridge south of Halona gulch. 14 were re-treats
PsiCat	Panaewa	North ridge	Ground	76	39	5.6	on Transect ridge, north of Halona gulch.
PsiCat		**TOTAL**		**1118**	**66**	**10.8**	**The totals for PsiCat control Watershed Wide**

Task 2: Biological Control Dispersal

- New *Tectococcus ovatus* release sites have been selected north and south of the Kanaha watershed in Lahaina. We are just awaiting the production of new stock for release. Previously established *T. ovatus* release sites will be monitored next quarter.

Task 3: Furthering Volunteer Weed Control

- Although no Waihe'e volunteer service trips were completed this period (one was cancelled last minute due to volunteer cancellations), we did have two volunteer trips at Olowalu Cultural Reserve to remove invasive kiawe and plant native plants for fire mitigation. If possible, these trips could be a substitution; however we will attempt to make up any shortcomings by the end of the grant period.

<u>*Clidemia hirta*</u>

Task 1: Lahaina Clidemia Control

- 326 Clidemia were controlled during a 3.3 acre sweep on Wahikuli ridge (Map 1, p.9). 25 were mature.
- The reduction and removal of this population, which can threaten source water recharge areas in Lahaina, is a top priority for WMMWP.

Task 2: Iao Valley Clidemia Control

- 279 Clidemia were controlled during a 7.5 acre survey in Iao valley along the makai transect. Nine of these plants were mature. This was the most number of plants we have seen to date, and although it is in the lower part of the valley, it is heavily traveled by hikers. This specific control trip is easily accessible and can make a difference as well as educate the public.

Other Weed Objectives

- During a survey in Hahakea valley (12.9 acres) in the west unit, two patches of *Rubus argutus* were found. One population was controlled (20 mature plants) within this period (Map 1, p.9).
- A total of 34 *Morella faya* plants were controlled during a 4.3 acre sweep in Helu. Twenty-three of these were mature. This is West Maui's only known population, therefore it was deemed necessary to control before they spread further. A few individuals remain and will require a follow up mission.

d. Watershed monitoring

Task 1: Ungulate Monitoring Transects

- Eleven transects were read for ungulate sign this period (see table below and Map 2, p.10). Of these existing transects, ungulate sign was only found on the Pana'ewa transect. New sign was recorded on thirteen and old sign on seven of the 106 stations.
- After finding ungulate sign above the fence in Pa'u Pa'u (as stated above), a new monitoring transect, measuring 25 stations long, was established. Fresh sign was recorded on eleven of the 25 stations. These transect stations will create a baseline and allow us to monitor future ungulate and weed threats in the area.
- The Olowalu transect was extended in the back valley creating a new transect called "OlowaluMauka" with 59 stations.

Transect	# of Stations	Avg. % of new sign	# of Stations with new sign	Avg. % of old sign	# of Stations with old sign
Pana'ewa	110	2.58	13	1.35	7
Kauaula Valley	53	0	0	0	0
Helu	42	0	0	0	0
Lihau	34	0	0	0	0
Olowalu	32	0	0	0	0
OlowaluMauka (new)	59	0	0	0	0
Ukumehame	52	0	0	0	0
Iao1	33	0	0	0	0
Iao2	31	0	0	0	0
Iao3	28	0	0	0	0
Keahialoa	20	0	0	0	0
Wai3	50	0	0	0	0
Pa'u Pa'u (new)	25	2.72	11	0	0

Task 2: Invasive Weed Monitoring Transects

- Of the eleven transects read this period, two were on the weed monitoring cycle this year (refer to Map 2, p.10).
- In Helu, *Tibouchina herbacea* was found as high as station 4 (at station 10 during last reading) and *Rubus rosifolius* has encroached higher up the mountain (found up to station 8 as compared to station 16 previously).
- There were no additional significant findings to report, but as always, these records are used as a baseline for future transect readings.

Task 3: Water Quality Monitoring in Honolua

- The sonde had previously been sent to YSI for maintenance. We are awaiting its return.
- Three of the ten erosion bridge sites were monitored this period. Several other attempts have been made but were cancelled due to inclement weather.

Task 4: Forest Health Observations and Monitoring

- We continue to observe for forest health and monitor for early detection and response. One staff member, Kainoa Marchello, participated in a Rapid ʻOhiʻa Death (ROD) training on Hawaiʻi island held by J.B. Friday, extension forester, and Corie Yanger, ROD outreach specialist with the University of Hawaiʻi College of Tropical Agriculture and Human Resources. Knowledge learned and identification tips were relayed to all WMMWP staff members.
- No new rare species were discovered this period. Any findings are always reported to the Plant Extinction Prevention Program (PEPP).

Task 5: Photo / Vegetation Plot Monitoring

- Three of the seven photo / vegetation plots in Helu were monitored (refer to Map 2, p.10). These were plots that were established within the burn zone of the fire in 2007. Vegetation has recovered up to 90%. With the exception of *Andropogon virginicus* and *Melinis minutiflora* (molasses grass) in one of the plots, native species such as mamane (*Sophora chrysophylla*), ʻŌhiʻa (*Metrosideros polymorpha*), aʻaliʻi (*Dodonaea viscosa*), pukiawe (*Styphelia tameiameiae*), and uluhe (*Dicranopteris linearis*) are the most dominant. The photos below show the Helu 3 plot in 2008 (top) and 2016 (bottom).

- Fifteen of the twenty photo / vegetation plots in Anakaluahine were monitored (Map 2, p.10). The remaining five plots were extremely overgrown or could not be read due to time constraints and will be discontinued. Coffee and *Clidemia hirta* dominate the understory in the valley plots (photo at right).

Task 6: Aerial Surveys

- Several aerial surveys occurred this period for weed and ungulate scouting. The findings are recorded in the table below.

Area	Purpose	Results
Pa'u pa'u	MorFay and PsiCat survey	No plants noted but found breach in fence (Pa'u pa'u) and fresh ungulate sign in Preserve. Maintenance and installation of new traps immediately followed.
Pa'u pa'u	Follow up on ungulate hotspot	No new ungulate sign. Also attempted to fly to Eke but raining and low clouds.
Helu / Ukumehame	MorFay survey / Ungulate scout	No MorFay found. No ungulate sign. Scouted for LZ in Ukumehame. Recorded a *Toona ciliata*.
Kahakuloa	PsiCat	Due to low clouds, could only get to 2000' elevation. Recorded PsiCat locations on ridges east and west of Kahakuloa valley.
Kahakuloa	PsiCat	Attempted to fly Eke but wind came in and no PsiCat points were taken. One *Grevillea robusta* recorded.
Pana'ewa	Ungulate survey	Fresh ungulate sign found. Trail coming up from Kahoma valley. Contacted Kamehameha Schools about a possible new strategic fence in the valley.

e. Public Education and awareness

Task 1: Maintain Use of Media and Social Media

- WMMWP maintains and frequently updates our website and Facebook page.
- Using Google Analytics, we had 3,185 page views and 1,984 sessions on our website during this quarter. A session is the period time a user is actively engaged with the website. Fifteen percent were returning visitors and 85% were new visitors to the site.

Task 2: WaterStory Educational Sessions

- One WaterStory session was conducted this period as well as time spent updating and revising the powerpoint slideshow with MEDB staff.

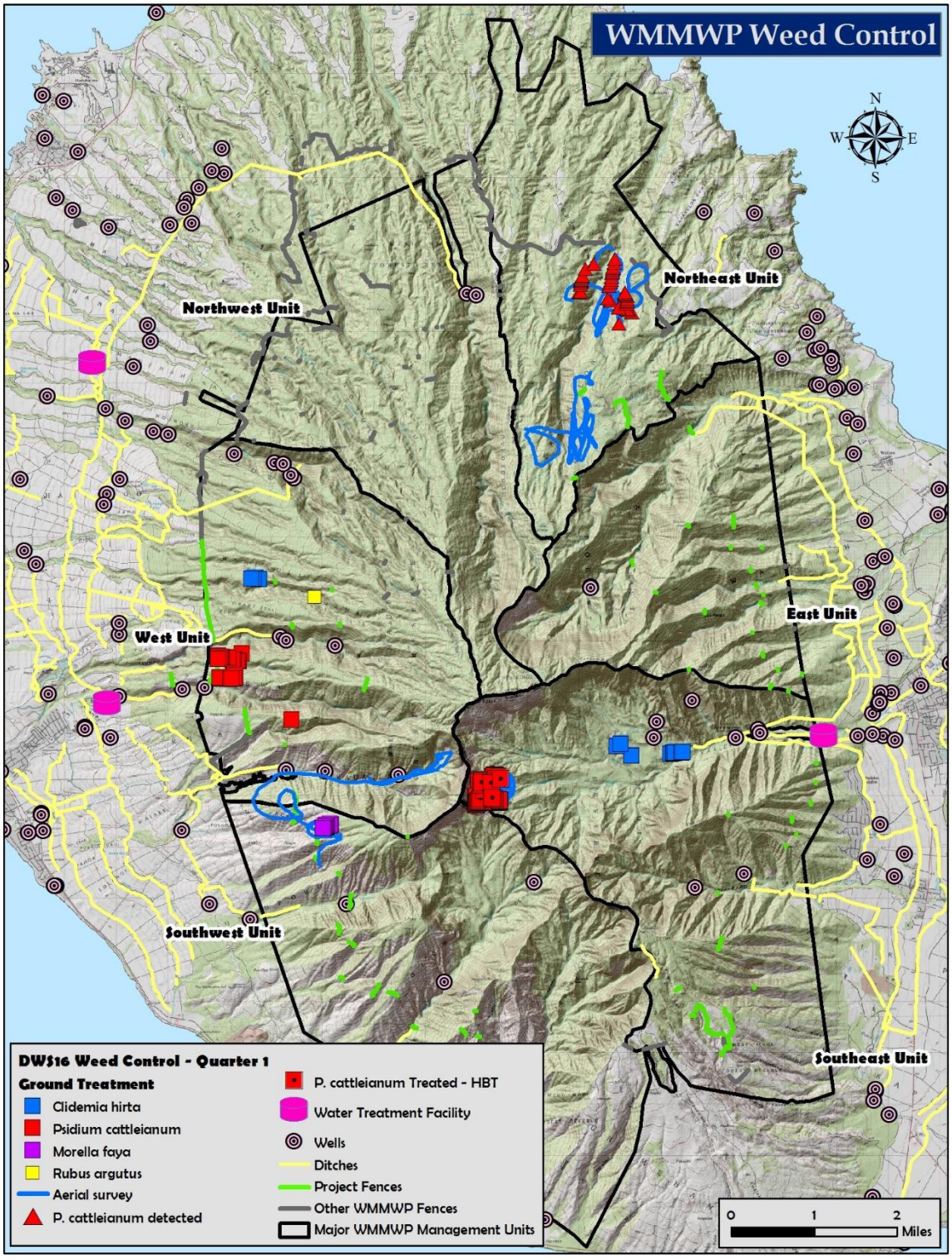
Task 3: Outreach Events

- WMMWP participated in one community outreach event this quarter, the Hawaiian Islands Land Trust Annual Picnic at the Waihe'e Coastal Dunes and Wetlands Refuge. Staff directly interacted with 65 community members.

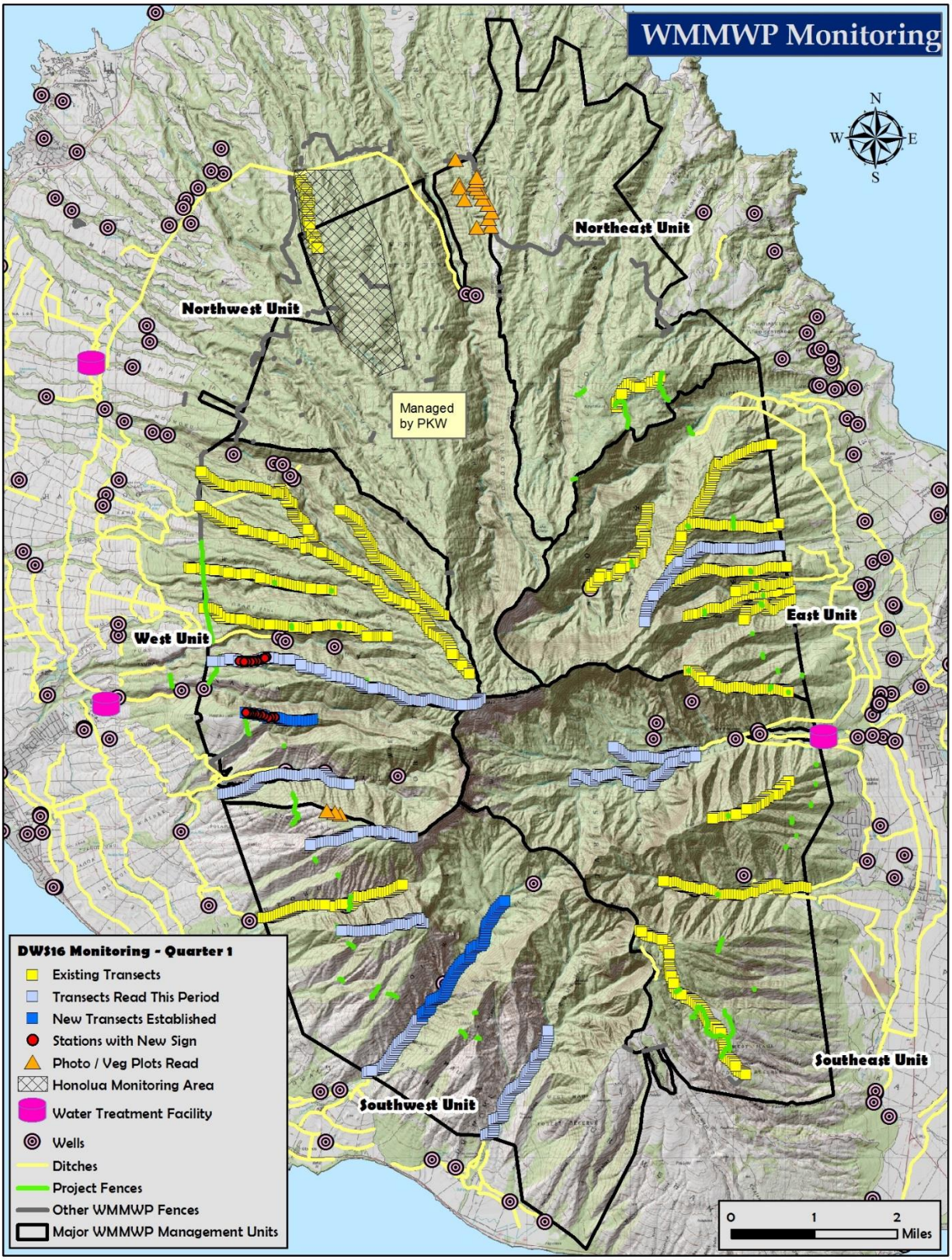
3) *Budget Summary:*

a. Monies spent this quarter include staff payroll for fieldwork, coordination, and outreach; utilities (phone/internet); UH indirect cost; services for helicopter operations, backcountry per diem, vehicle gas, and printing materials were rendered in July but paid for in August.

b. See budget summary attached**.**



Map 1. DWS16 Weed Control. *All priority and incidental weed control points are shown watershed wide. Also mapped are the aerial surveys and the locations of Psidium cattleianum detected and treated by HBT.*



Map 2. DWS16 Monitoring. *Map depicting the eleven transects read this period as well as the new stations established on the Pa'u Pa'u and Olowalu Mauka transects (dark blue squares). Stations with fresh ungulate sign are shown in red. The photo/veg plots monitored are portrayed by orange triangles.*

County of Maui
Department of Water Supply

Watershed Protection Grants

Project Budget Summary

Fiscal Year: 2016
Organization: WMMWP

Expense Categories	Grant Amount	DRAW 1	DRAW 2	DRAW 3	DRAW 4	Balance
A. Personnel	209,838.00	54,936.36				154,901.64
B. Transportation	0.00	0.00				0.00
C. Contractual	25,000.00	0.00				25,000.00
D. Utilities	5,150.00	131.73				5,018.27
E. Travel	2,000.00	0.00				2,000.00
F. Field Crew Costs	5,000.00	0.00				5,000.00
G. Supplies and Materials	9,676.00	0.00				9,676.00
H. Administrative & Overhead	26,136.00	5,506.81				20,629.19
I. Other Costs	4,700.00	0.00				4,700.00
Total:	287,500.00	60,574.90	0.00	0.00	0.00	226,925.10

Quarterly Progress Report
Quarter 2
West Maui Mountains Watershed Source Protection Program
FY 2016 Grant
Acct #4502392; Contract # WC-0873
to

County of Maui Department of Water Supply

By:

County of Maui
Ka'anapali Land Management Corp.
Kahoma Land Holdings, LLC
Kahoma Land Company, LLC
Kamehameha Schools
Makila Land Company, LLC
Maui Land & Pineapple Company, Inc.
Maui County Department of Water Supply
State of Hawaii DLNR
The Nature Conservancy
Wailuku Water Company, LLC
Tri-Isle RC&D
US Fish and Wildlife Service

&

Prepared by:
Chris Brosius – Program Manager
Jill LaBram – Natural Resource and GIS Technician
Kimberly Thayer – Program and Data Assistant
West Maui Mountains Watershed Partnership
P.O. Box 13240, Lahaina, Hawaii 96761
(808) 661-6600
brosius@westmauiwatershed.org

Quarterly Progress Report
Quarter 2
West Maui Mountains Watershed Source Protection Program
FY 2016 Grant
Acct #4502392; Contract # WC-0873

1) Background

The DWS 16 deliverables are on track to be completed by the end of the contract. Tasks accomplished this period are shown below.

2) Tasks Completed During this Period:

a. Maintenance and inspection of fences

Tasks Completed

- WMMWP inspected 11,974 meters (7.44 miles) of fence this quarter (some were checked more than once) in the West, Southwest, Southeast, and East Units and performed 74 meters of maintenance. All of this maintenance occurred while inspecting our fences immediately after the big storm on September 13th and 14th to prevent any ungulate ingress. Trees that had fallen were cut off fence lines, sections that were pushed down by fast running water were lifted up and re-clipped or re-stretched, new posts were pounded and deadmen added, and stream curtains that had torn were re-sewn. While most of the fences were still deemed ungulate proof after the quick fixes, several were significantly damaged and still need repair. Ground scouting occurred and showed no evidence of ungulate sign posing imminent pressure, however it will be important to be vigilant, especially before fences can be repaired. Full fencing repairs for the storm damage is pending FEMA review for funding.

b. Ungulate control

Tasks Completed

- Feral ungulates have been controlled above project fences. While checking 1,745 animal control devices this period, a total of one pig was removed in Pana'ewa, shown in Table 1, below. Although Pana'ewa continues to be a hotspot, this is a significant decline since last quarter (had 12 captures), due to fence maintenance, a fence extension, and our newly constructed North Kanaha boundary fence which was funded by the DWS 14 supplemental award.

Table 1. Ungulate Control DWS16 - Quarter 2

Management Unit	Secondary Unit Name	# checked	# new installations	# removed	# pigs	# cows	# deer	# goats
1.5	Eke	0	0	0	0	0	0	0
2.1	Waihe'e	0	0	0	0	0	0	0
2.2	Mauna Alani	49	0	0	0	0	0	0
2.3	Waiehu	64	0	14	0	0	0	0
2.4	Pu'u Kane	0	0	0	0	0	0	0
3.2	Kapilau	0	0	0	0	0	0	0

3.3	Waikapu	21	0	0	0	0	0	0
3.4	Hanaula	249	0	0	0	0	0	0
4.7	Helu	195	0	44	0	0	0	0
5.2	Pana'ewa	294	18	7	1	0	0	0
5.4	Hahakea/Wahikuli	873	12	32	0	0	0	0
TOTAL		**1745**	**30**	**97**	**1**	**0**	**0**	**0**

c. Control of Priority Weed Species

Psidium cattleianum

Task 1: Weed Maintenance Area

- Follow up Surveillance of HBT Strawberry guava
  - Follow up of the HBT Strawberry guava points occurred last period.
- Ground Control Efforts
  - Ground control efforts occurred on Kahoma Ridge, Panaewa, Hanaula and East Kahakuloa (see table below and Map 1, p.7).

Species	Unit	Area	Control Type	Total # Controlled	# That Were Mature	# Acres Surveyed	Notes
PsiCat	Kahoma	Kahoma ridge	Ground	15	15		Incidental while sweeping for Clidemia points. Just below middle fence - W3
PsiCat	Hanaula	DROA ridge	Ground	2	0		Incidental while checking animal control groups
PsiCat	Hanaula	Upper Hanaula	Ground	17	3	4	Treated from summit to above Pu'u
PsiCat	Kahakuloa	East Kahakuloa	Ground	14	2	3.4	Controlled while creating transect
PsiCat	Panaewa	Panaewa (south ridge)	Ground	2	0		Incidental while doing animal control
PsiCat		**TOTAL**		**50**	**20**	**4**	**The totals for PsiCat control Watershed Wide**

Task 2: Biological Control Dispersal

- No new sites were created this quarter. However, WMMWP staff has continued to monitor the previously established *Tectococcus ovatus* release sites in the West Unit. The agent has spread to multiple plants, and branches in the canopy were infected up to heights of six feet (*photo at right*).

Task 3: Furthering Volunteer Weed Control

- No volunteer service trips were conducted this period. One trip was scheduled but several volunteers cancelled last minute.

Clidemia hirta

Task 1: Lahaina Clidemia Control

- 820 Clidemia were controlled during a 4.8 acre sweep on Wahikuli ridge (Map 1, p.7). Five were mature.
- The reduction and removal of this population, which can threaten source water recharge areas in Lahaina, is a top priority for WMMWP.

- A new population was discovered on Kahoma ridge just below the middle fence and 117 were controlled (11 were mature). We will continue to monitor this area during our regular management deliverables.

Task 2: Iao Valley Clidemia Control

- No control occurred in Iao Valley this quarter.

Other Weed Objectives

- One Australian tree fern (*Sphaeropteris cooperi*) was found and controlled in Waihe'e Valley during a 2.2 acre survey (*photo at right*).
- Two *S. cooperi* were found and controlled in Hanaula near an old treatment site.
- Five keiki *Rubus argutus* were pulled in Hahakea valley at a previously treated site (Map 1, p.7).

d. Watershed monitoring

Task 1: Ungulate Monitoring Transects

- Nine transects were read for ungulate sign this period: Wahikuli, Kahoma, Launiupoko, Hanaula, Waikapu, Wai 1, Wai 2, Mauna Alani and Mauna 2. New sign was only recorded on three of the 69 stations on the Mauna 2 transect (Map 2, p.8).
- Two new transects were established on East and West Kahakuloa ridges, with 49 and 58 stations (5 meters wide X 50 meters long), respectively (Map 2, p.8). Fresh ungulate sign was found on three of the East Kahakuloa stations and on the entire lower half of the West Kahakuloa transect (26 stations). Old sign was also recorded on four of the East Kahakuloa stations. These transect stations will allow us to monitor future threats affecting the Kahakuloa, Waihe'e, and Honokohau ahupua'a, which are important DWS water recharge areas.

Transect	# of Stations	Avg. % of new sign	# of Stations with new sign	Avg. % of old sign	# of Stations with old sign
Wahikuli	54	0	0	0	0
Kahoma	77	0	0	0	0
Launiupoko	58	0	0	0	0
Hanaula	63*	0	0	0	0
Waikapu	60	0	0	0	0
Wai1	42	0	0	0	0
Wai2	48	0	0	0	0
Mauna Alani	33	0	0	0	0
Mauna 2	69	0.58	3	0	0
East Kahakuloa (new)	49	0.05	3	0.09	4
West Kahakuloa (new)	58	2.28	26	0	0

*The original Hanaula transect has 76 stations that go down to the makai boundary fence. This lower fence is no longer a complete natural barrier and a more secure fence has been constructed mauka at the location of Station 63. There is fresh or old sign within all 13 stations below station 63. It is our hope to reduce this ungulate pressure with the use of the aerial shoot program.

Task 2: Invasive Weed Monitoring Transects

- Of the nine transects read this period, four were on the weed monitoring cycle this year.
- *Ardisia elliptica* was found for the first time on three stations along the Wai 2 transect (~1900' elevation) (Map 1, p.7). Although this species is present and rather established within the adjacent valley floors, it may be important to map the spread and entertain any weed control strategies.
- There were no additional significant findings to report, but as always, these records are used as a baseline for future transect readings.

Task 3: Water Quality Monitoring in Honolua

- The sonde had previously been sent to YSI for maintenance. It was just returned and will be re-installed in the field in the upcoming quarter.

Task 4: Forest Health Observations and Monitoring

- We continue to educate our staff about Rapid Ohia Death and Naio thrips and monitor for early detection and response.
- During the course of other work, we continue to monitor populations of *Erythrina sandwicensis* (Wiliwili) which are still showing sign of recovery.

Task 5: Photo / Vegetation Plot Monitoring

- No photo / vegetation plots were monitored this period.

Task 6: Aerial Surveys

- After the big storm in September, an aerial survey was conducted to assess the fences and any ungulate sign. No new ingress had occurred; however, as stated above, it will be important to remain attentive in areas where the fences have been compromised until repairs can be made.
- Additionally, an aerial survey was conducted around Eke crater and below to document the elevation extent of strawberry guava. Two new locations of *Clidemia hirta* were also recorded, which may represent a high elevation range in the gulch west of Eke (Map 1, p.7). The area will continue to be mapped.

e. Public Education and awareness

Task 1: Maintain Use of Media and Social Media

- WMMWP maintains and frequently updates our website and Facebook page. During this quarter we hit 1,000 likes on our Facebook page. We created 33 posts which reached thousands more.

Task 2: WaterStory Educational Sessions

- No WaterStory Sessions were conducted this period. Scheduling has occurred for the upcoming quarter.

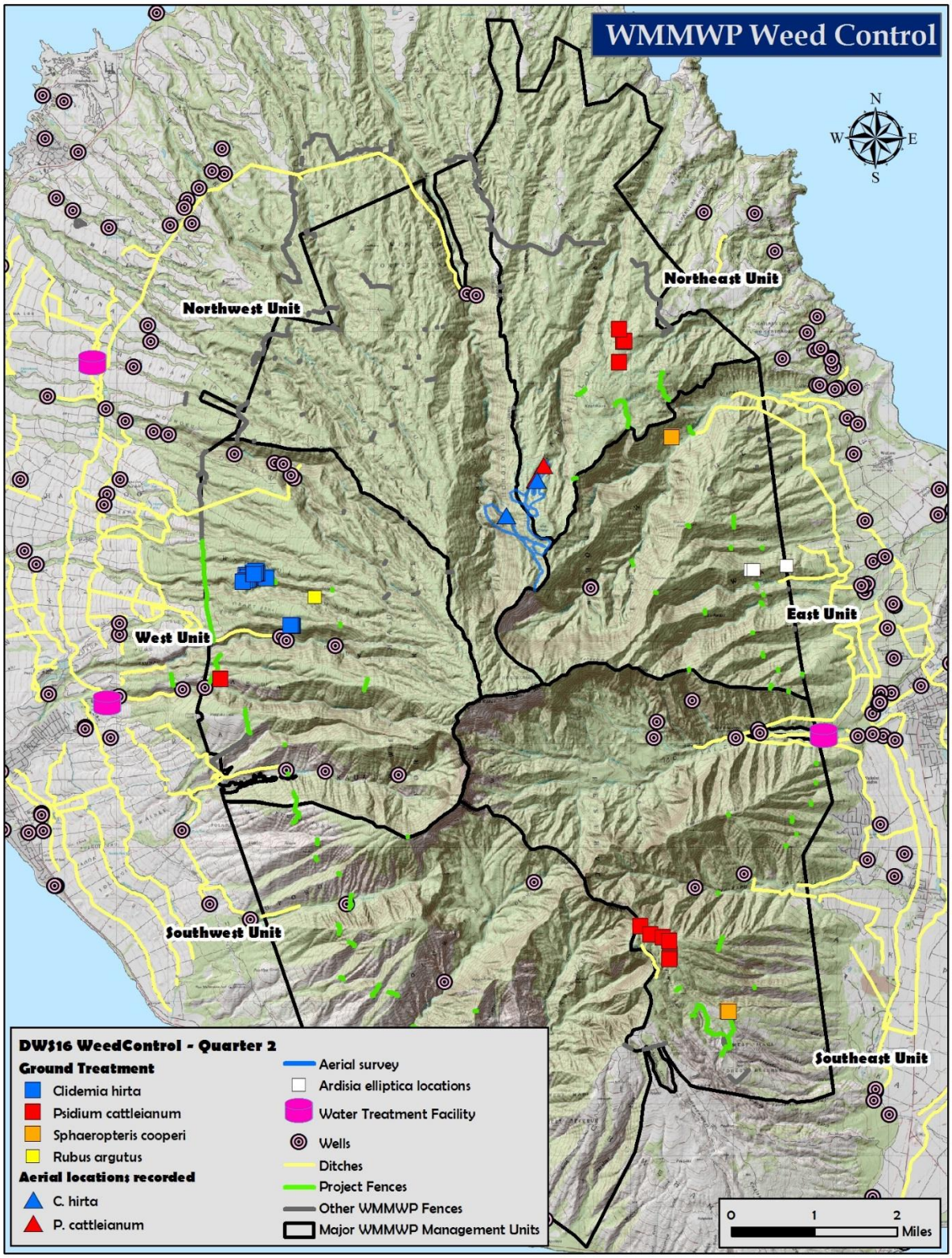
Task 3: Outreach Events

- WMMWP participated in two community outreach events this quarter:
    - We held a booth at Kahekili Beach Park for the Ridge to Reef Rendezvous. We directly interacted with 75 people.
    - The Natural Resource/GIS technician did a presentation for Career Day at Maui Waena Intermediate School and answered students' questions. There were three sessions of 25 7th graders, totaling a direct interaction with 75 students.

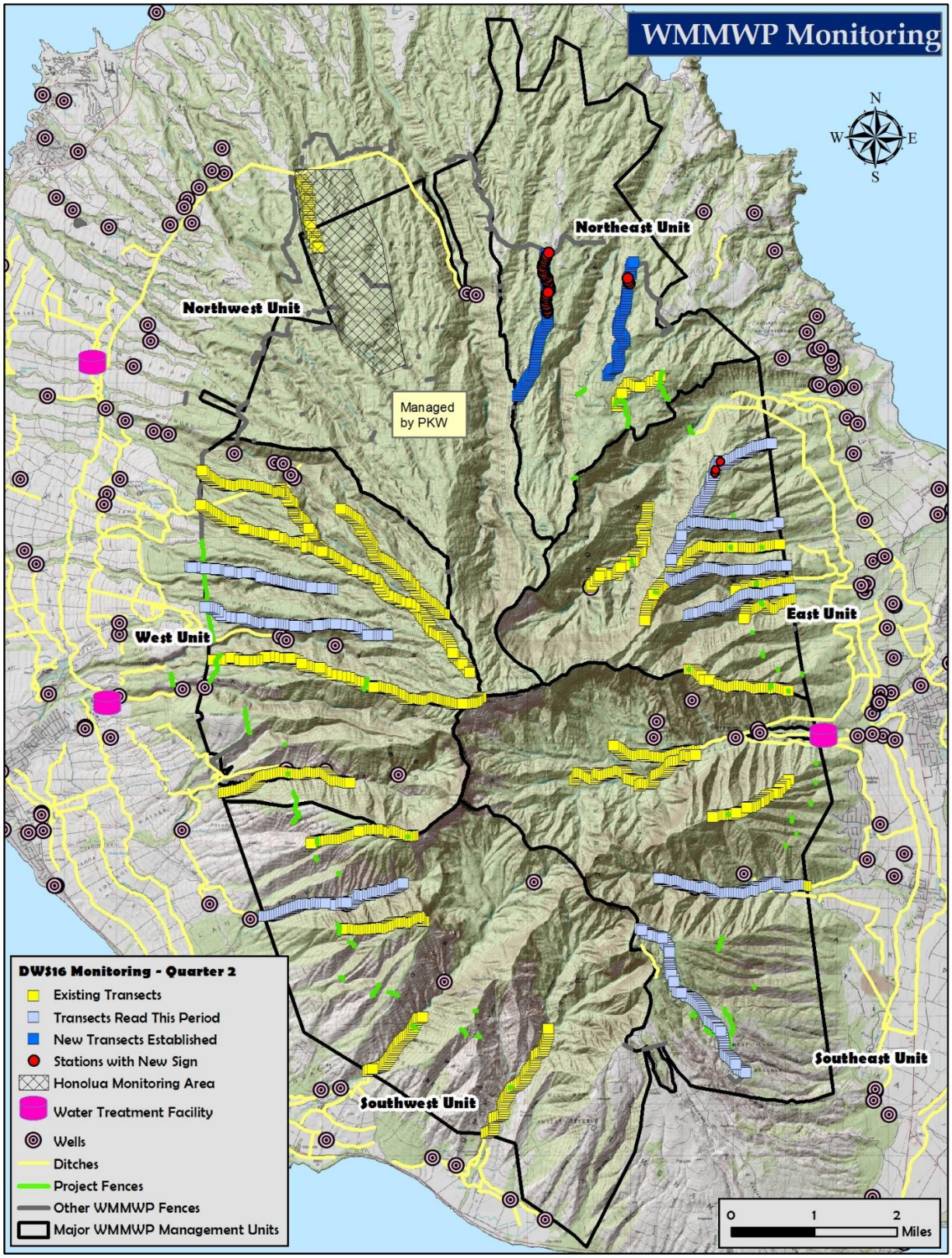
3) *Budget Summary:*

a. Monies spent this quarter include staff payroll for fieldwork, coordination, and outreach; helicopter operations and backcountry per diem; utilities (electricity, phone/internet, and water/sewer); field and office supplies; vehicle maintenance; printing and publication materials and UH overhead.

b. See budget summary attached**.**



Map 1. DWS16 Weed Control. *All priority and incidental weed control points are shown watershed wide. Also mapped are the aerial survey points and track and the locations of Ardisia elliptica found on the Wai 2 transect.*



Map 2. DWS16 Monitoring. *Map depicting the nine transects read this period as well as the new stations established on East and West Kahakuloa (dark blue squares). Stations with fresh ungulate sign are shown in red.*

County of Maui
Department of Water Supply

Watershed Protection Grants

Project Budget Summary

Fiscal Year: 2016
Organization: WMMWP

Expense Categories	Grant Amount	DRAW 1	DRAW 2	DRAW 3	DRAW 4	Balance
A. Personnel	209,838.00	54,936.36	74,442.83			80,458.81
B. Transportation	0.00	0.00	0.00			0.00
C. Contractual	25,000.00	0.00	7,960.00			17,040.00
D. Utilities	5,150.00	131.73	909.67			4,108.60
E. Travel	2,000.00	0.00	233.31			1,766.69
F. Field Crew Costs	5,000.00	0.00	0.00			5,000.00
G. Supplies and Materials	9,676.00	0.00	757.24			8,918.76
H. Administrative & Overhead	26,136.00	5,506.81	8,457.37			12,171.82
I. Other Costs	4,700.00	0.00	270.76			4,429.24
Total:	287,500.00	60,574.90	93,031.18	0.00	0.00	133,893.92

Quarterly Progress Report
Quarter 3
West Maui Mountains Watershed Source Protection Program
FY 2016 Grant
Acct #4502392; Contract # WC-0873
to

County of Maui Department of Water Supply

By:

County of Maui
Ka'anapali Land Management Corp.
Kahoma Land Holdings, LLC
Kahoma Land Company, LLC
Kamehameha Schools
Makila Land Company, LLC
Maui Land & Pineapple Company, Inc.
Maui County Department of Water Supply
State of Hawaii DLNR
The Nature Conservancy
Wailuku Water Company, LLC
Tri-Isle RC&D
US Fish and Wildlife Service

&

Prepared by:
Chris Brosius – Program Manager
Jill LaBram – Natural Resource and GIS Technician
Kimberly Thayer – Program and Data Assistant
West Maui Mountains Watershed Partnership
P.O. Box 13240, Lahaina, Hawaii 96761
(808) 661-6600
brosius@westmauiwatershed.org

Quarterly Progress Report
Quarter 3
West Maui Mountains Watershed Source Protection Program
FY 2016 Grant
Acct #4502392; Contract # WC-0873

1) Background

The DWS 16 deliverables are on track to be completed by the end of the contract. Tasks accomplished this period include fence inspection and maintenance, ungulate and weed control, watershed monitoring, and public education and outreach. These are described in detail below.

2) Tasks Completed During this Period:

a. Maintenance and inspection of fences

Tasks Completed

- WMMWP inspected 10,840 meters (6.74 miles) of fence this quarter in the West, Southwest, Southeast, East and Northeast Units and performed five meters of maintenance. This maintenance occurred on the SE5 fence in Hanaula, where debris that had accumulated from the big storm on September 13th and 14th was dug out. The photos below show the fence before (left) and after (right) maintenance to alleviate the pressure on the fence.

b. Ungulate control

Tasks Completed

- Feral ungulates have been controlled above project fences. While checking 1,242 animal control devices this period, there were no ungulate captures, and no fresh sign was present. See Table 1, below.

Table 1. Ungulate Control DWS16 - Quarter 3

Management Unit	Secondary Unit Name	# checked	# new installations	# removed	# pigs	# cows	# deer	# goats
1.5	Eke	24	0	0	0	0	0	0
2.1	Waihe'e	99	0	0	0	0	0	0
2.2	Mauna Alani	0	0	0	0	0	0	0
2.3	Waiehu	36	0	0	0	0	0	0
2.4	Pu'u Kane	4	0	0	0	0	0	0
3.2	Kapilau	131	0	7	0	0	0	0
3.3	Waikapu	0	0	0	0	0	0	0
3.4	Hanaula	332	0	0	0	0	0	0
4.7	Helu	24	0	15	0	0	0	0
5.2	Pana'ewa	262	0	0	0	0	0	0
5.4	Hahakea/Wahikuli	330	0	16	0	0	0	0
TOTAL		**1242**	**0**	**38**	**0**	**0**	**0**	**0**

c. Control of Priority Weed Species

Psidium cattleianum

Task 1: Weed Maintenance Area

- Follow up Surveillance of HBT Strawberry guava
  - Follow up of the HBT Strawberry guava points occurred in Quarter 1.
- Ground Control Efforts
  - A follow up control trip from last quarter occurred on Kahoma Ridge. 156 *P. cattleianum* were treated just below our middle strategic fence (3000' elevation) (See table below and Map 1, p.7). All plants found on the ridge within the 4.4 acre survey were treated, however it was noted that there were still several trees off the edge that were inaccessible and at lower elevation.
  - A ground control effort also occurred on Grant Ridge (the north ridge of Kahoma). The highest extent of known strawberry guava on this ridge was ~3400' elevation at an area where control occurred in 2010. An aerial survey confirmed this extent, allowing us to focus our efforts within the old treatment site. Of our three acre survey, 0.5 acres overlapped with the 2010 survey. Within this overlap, only one tree needed re-treatment, and 21 additional plants were controlled (11 were mature). The remaining 2.5 acres allowed for a more complete coverage of the ridge and control of 122 additional plants down to an elevation of ~3300'.

Species	Unit	Area	Control Type	Total # Controlled	# That Were Mature	# Acres Surveyed	Notes
PsiCat	Kahoma	Kahoma Ridge	Ground	156	48	4.4	Just below middle fence - W3
PsiCat	Kahoma	Grant Ridge	Ground	144	89	3.0	At old 2010 treatment site. No plants found above during aerial survey
PsiCat		**TOTAL**		**300**	**137**	**7.4**	**The totals for PsiCat control Watershed Wide**

Task 2: Biological Control Dispersal

- Two new *Tectococcus ovatus* release sites were created in Pana'ewa. Two infected *P. cattleianum* were planted at each site within a mass of guava seedlings to ensure inoculation through touching leaves. Branches were trimmed on the surrounding strawberry guava to stimulate new growth at plant height and help the spread of *T. ovatus*. Site data and gps locations were recorded (Map 1, p.7). Plants were inspected prior to taking to Panaewa to verify there were no other insects or obvious pathogens in the media.

Task 3: Furthering Volunteer Weed Control

- Two Waihe'e Ridge Volunteer Service Trips were conducted this period. Seventeen volunteers controlled 238 *P. cattleianum* within 0.6 acres. One additional trip to Kahoma Ridge was scheduled but cancelled due to illness and inclement weather.

<u>*Clidemia hirta*</u>

Task 1: Lahaina Clidemia Control

- Within the new population discovered on Kahoma ridge that was reported in last quarter, an additional 498 Clidemia were controlled during the *Psidium cattleianum* 4.4-acre sweep, noted above (Map 1, p.7). We will continue to monitor this area during our regular management deliverables.
- Additionally, 39 Clidemia were controlled during a 1.3 acre sweep on Pu'u Kane ridge (Map 1, p.7) above our established landing zone. Three were mature.

Task 2: Iao Valley Clidemia Control

- No control occurred in Iao Valley this quarter.

<u>Other Weed Objectives</u>

- Two sweeps, totaling 9.3 acres, also occurred in the back plateau of Waihe'e Valley, to search for Mule's foot fern (*Angiopteris evecta*). Two plants were found and controlled. Other individuals were recorded in the surrounding inaccessible gulches during an aerial survey and were controlled using HBT (with other funds).
- Six *Morella faya* were controlled in Helu while inspecting our lower fence (~2900'). In the past, others have been found and controlled up to 3600'

elevation. This is a priority species and the area will continue to be monitored.

- One Australian tree fern (*Sphaeropteris cooperi*) at an old treatment site in Hanaula was still alive and was re-treated.
- A patch of *Rubus argutus* was found and pulled in Hanaula, just below the Pu'u. This is the only patch that has been noted in the area, so the effort was made to prevent the spread of this species.
- Two incidental *Senna septemtrionalis* were pulled during the *P. cattleianum* sweep on Grant Ridge.
- One immature Albizia (*Falcataria moluccana*) was controlled on the Waihe'e Ridge trail during a Volunteer Service Trip at 1500' elevation. This is at the makai end of our regular weed control area (Map 1, p.7).

d. Watershed monitoring

Task 1: Ungulate Monitoring Transects

- Seven transects were read for ungulate sign this period: Honolua Stream, Lihau, Olowalu, Kapilau, PuuKane, Wai3 (upper part) and Keahikauo. No new sign was recorded. The remainder of the Wai3 stations will be recorded during the next quarter.
- Twenty new stations were added to extend the Panaewa transect down to our new boundary fence (Map 2, p.8). Although no new sign was recorded, this unit has been a hotspot previously, and these stations will allow us to document any additional new sign in the future.

Task 2: Invasive Weed Monitoring Transects

- Of the seven transects read this period, four were on the weed monitoring cycle this year.
- On the Puu Kane transect, all Clidemia found above station ten (~3650' elevation) were recorded and controlled (noted in weed control above). Unfortunately, after reaching the top of the transect one mature plant was just out of reach off the edge. Possible attempts will be made to remove this plant.
- There were no additional significant findings to report, but as always, these records are used as a baseline for future transect readings.

Task 3: Water Quality Monitoring in Honolua

- The Honolua Water Quality Monitoring site was assessed after heavy rains over the last two quarters. Minor improvements will be made, re-calibration will occur, and the sonde will be deployed next quarter.

Task 4: Forest Health Observations and Monitoring

- We continue to educate our staff about Rapid Ohia Death and Naio thrips and monitor for early detection and response.
- During the course of other work, we continue to monitor populations of *Erythrina sandwicensis* (Wiliwili) which are still showing sign of recovery.

Task 5: Photo / Vegetation Plot Monitoring

- Four photo / vegetation plots in Helu were monitored this period, as well as one outstanding plot in Kapilau. In Helu, native vegetation continues to dominate the plots, with the small exception of *Andropogon virginicus*.

Task 6: Aerial Surveys

- An aerial survey was conducted along Grant ridge, above 3300' elevation, to guide our ground control and record any outlier *Psidium cattleianum* above our old treatment sites (Map 1, p.7). None were found above these old treatments and this allowed us to focus below old treatments and gain more land.

Additional Task: WMMWP Manager lead USGS and UH researchers to prospective field sites over two days in both the Wailuku and Lahaina districts to assess impacts of invasive weeds on forest hydrology.

e. Public Education and awareness

Task 1: Maintain Use of Media and Social Media

- WMMWP maintains and frequently updates our website and Facebook page. We have over 1,000 likes on our Facebook page. During this quarter, we created 37 posts which reached thousands more.

Task 2: WaterStory Educational Sessions

- One WaterStory Session was conducted for a group of teachers as part of a workshop organized by Learning Endeavors under a NOAA BWET grant. There were 22 teachers and two additional staff members.

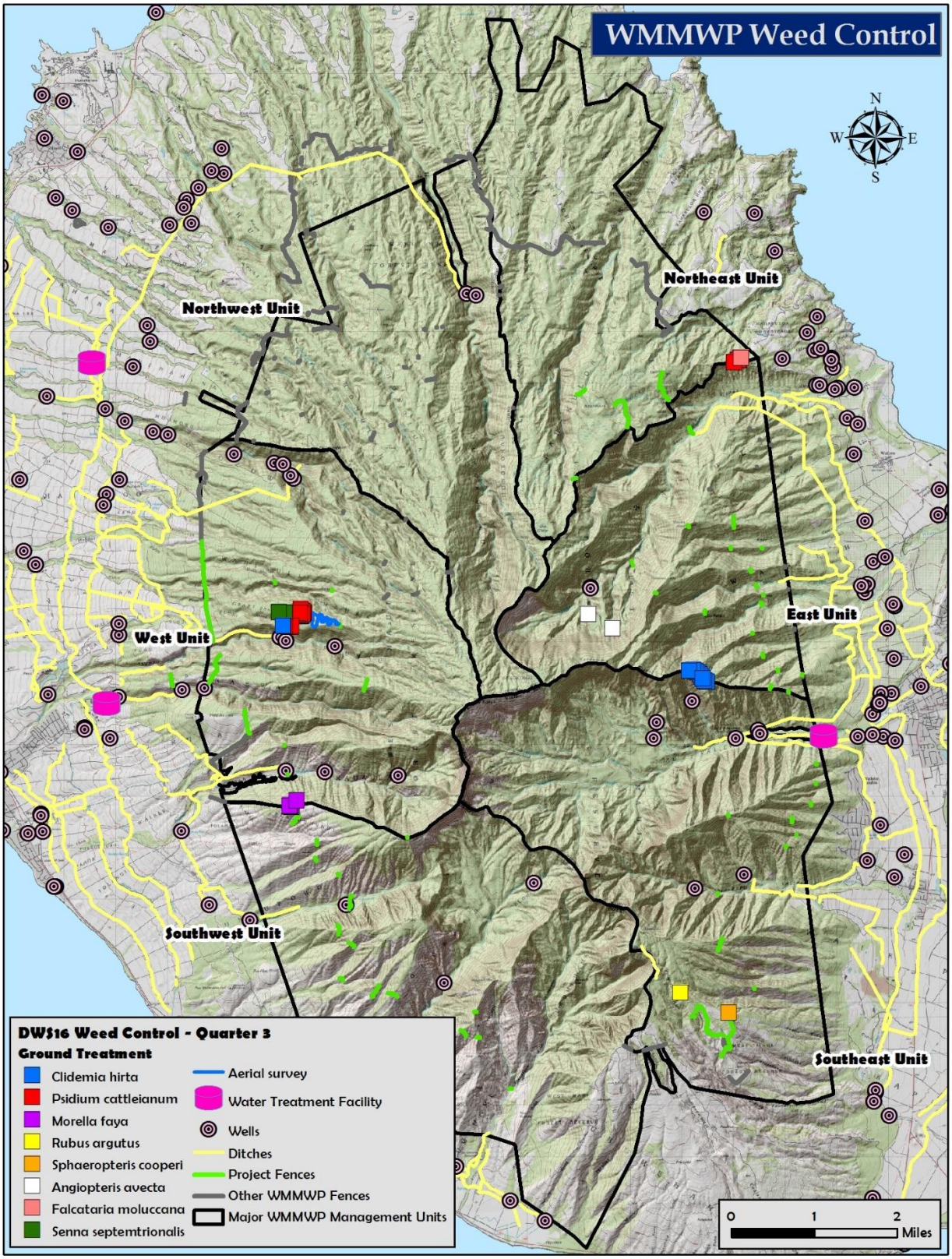
Task 3: Outreach Events

- WMMWP participated in two community outreach events this quarter:
  - We held a booth at the Maui Nui Botanical Garden for Arbor Day and in downtown Wailuku for the First Friday Event. We directly interacted with 37 and 50 people, respectively.

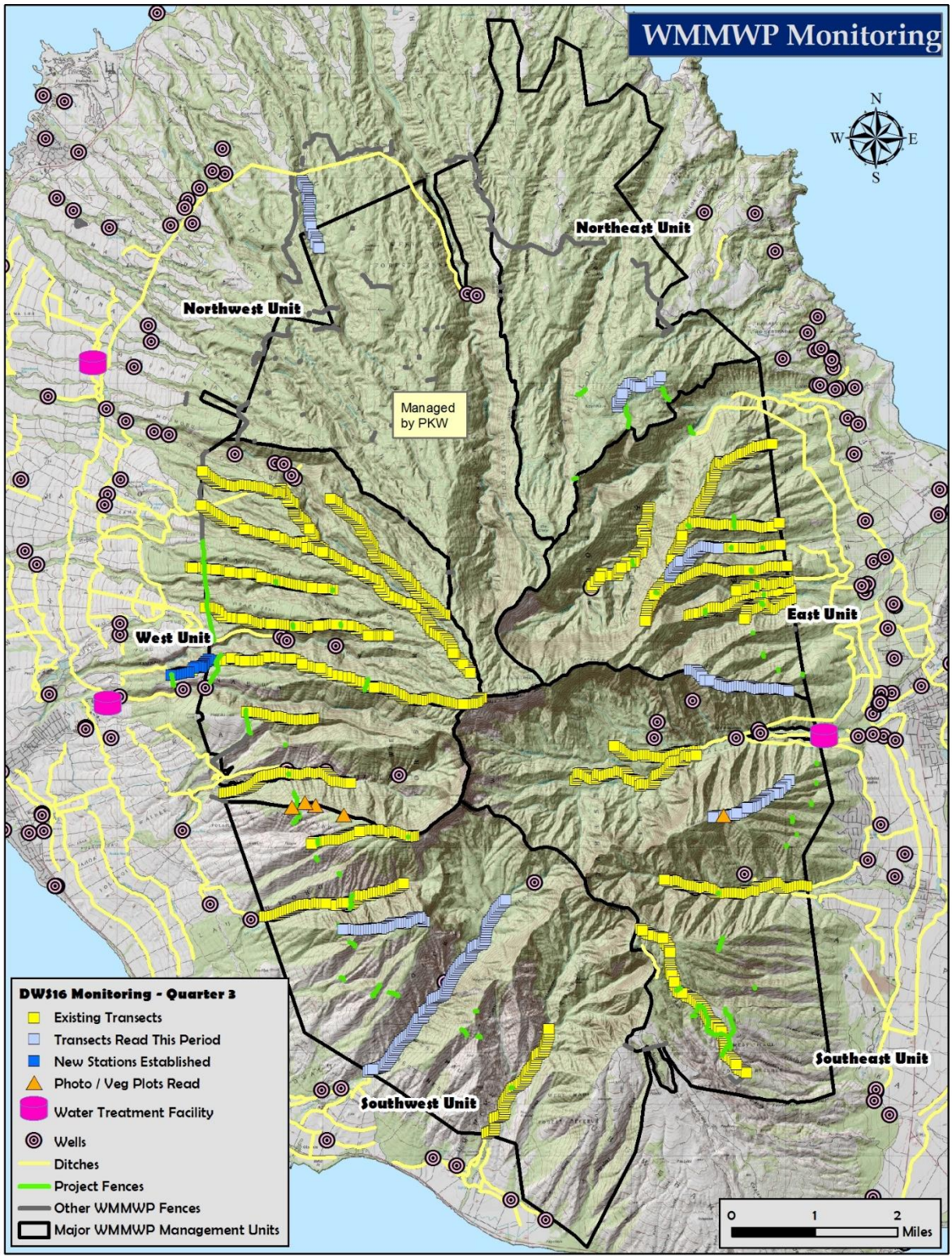
3) <u>Budget Summary:</u>

a. Monies spent this quarter include staff payroll for fieldwork, coordination, and outreach; helicopter operations and backcountry per diem; utilities (electricity, phone/internet, and water/sewer); field and office supplies; vehicle maintenance and fuel; native plants for outreach booth; printing and publication materials and UH overhead.

b. See budget summary attached (Page 9)**.**



Map 1. DWS16 Weed Control. *All priority and incidental weed control points are shown watershed wide. Also mapped is the aerial survey in Kahoma looking for outlier strawberry guava points. None were found.*



Map 2. DWS16 Monitoring. *Map depicting the seven transects read this period as well as the new stations established on lower Panaewa (dark blue squares) and photo / veg plots monitored this quarter. No fresh ungulate sign was recorded.*

County of Maui
Department of Water Supply

Watershed Protection Grants

Project Budget Summary

Fiscal Year: 2016
Organization: WMMWP

Expense Categories	Grant Amount	DRAW 1	DRAW 2	DRAW 3	DRAW 4	Balance
A. Personnel	209,838.00	54,936.36	74,442.83	66,995.80		13,463.01
B. Transportation	0.00	0.00	0.00	0.00		0.00
C. Contractual	25,000.00	0.00	7,960.00	14,946.50		2,093.50
D. Utilities	5,150.00	131.73	909.67	1,375.17		2,733.43
E. Travel	2,000.00	0.00	233.31	199.98		1,566.71
F. Field Crew Costs	5,000.00	0.00	0.00	0.00		5,000.00
G. Supplies and Materials	9,676.00	0.00	757.24	2,209.59		6,709.17
H. Administrative & Overhead	26,136.00	5,506.81	8,457.37	8,588.99		3,582.83
I. Other Costs	4,700.00	0.00	270.76	162.94		4,266.30
Total:	287,500.00	60,574.90	93,031.18	94,478.97	0.00	39,414.95

Final Report
May 19, 2016 – May 18, 2017
West Maui Mountains Watershed Source Protection Program
FY 2016 Grant
Acct #4502392; Contract # WC-0873
to

County of Maui Department of Water Supply

By:

County of Maui
Ka'anapali Land Management Corp.
Kahoma Land Holdings, LLC
Kahoma Land Company, LLC
Kamehameha Schools
Makila Land Company, LLC
Maui Land & Pineapple Company, Inc.
Maui County Department of Water Supply
State of Hawaii DLNR
The Nature Conservancy
Wailuku Water Company, LLC
Tri-Isle RC&D
US Fish and Wildlife Service

&

Prepared by:
Chris Brosius – Program Manager
Jill LaBram – Natural Resource and GIS Technician
Kimberly Thayer – Program and Data Assistant
West Maui Mountains Watershed Partnership
P.O. Box 13240, Lahaina, Hawaii 96761
(808) 661-6600
brosius@westmauiwatershed.org

Final Report
May 19th 2016 – May 18th, 2017
West Maui Mountains Watershed Source Protection Program
FY 2016 Grant
Acct #4502392; Contract # WC-0873

BACKGROUND

Complete a description of how your program achieved the goals, objectives and scheduled action steps outlined in grant proposal.

The West Maui Mountains Watershed Partnership (WMMWP) was created in 1998, making it the second-oldest Watershed Partnership in the State. The mission of WMMWP is to protect and preserve our island's water supply through collaborative forest management. Native Hawaiian forests compose a giant living sponge that soaks up rainwater and lets it percolate through the vegetation and soils. This process recharges our aquifers and streams while preventing runoff, erosion, and flashfloods that muddy our island's aquatic systems from mauka to makai. With the support of our Partners, our nine crew members and one Kupu AmeriCorps intern serve as stewards of our native forests to minimize the impacts of priority threats. With limited funding we aim to make the most positive impact on watershed protection, prioritizing actions that achieve the greatest benefit.

The priority actions undertaken by this grant—fencing, animal control, invasive weed control, watershed and water quality monitoring, and public education—have helped protect more native forest and watershed lands that sustain our water supply. Thus far, WMMWP staff and Partners have completed over 22 miles of ungulate fence that protect 29,962 acres of watershed lands—about 63 percent of the West Maui Forest Reserve—from damage caused by the rooting, digging, and browsing of feral pigs, goats, and deer. Ongoing maintenance of these fences is critical for continued exclusion and removal of ungulates to establish zero-tolerance zones that enable the forest to recover and function as a water collection system. Within the fenced, ungulate-free areas, ecosystem-modifying invasive weeds must be removed to regain native biodiversity and watershed functionality. The spread of invasive weeds like strawberry guava—a priority target of this grant—throughout native forest can reduce water collection effectiveness: Dr. Giambelluca of U.H. Manoa has found that strawberry guava can consume 53% more water in drought periods and 27% more water in wet periods as compared to native forest canopy. With this species completely covering 10% of WMMWP lands and ranging over much more, it is a serious threat that must be stopped. In this regard we have enlisted volunteer stewards, garnered support from collaborative researchers, implemented novel control techniques such as Herbicide Ballistic Technology (HBT), and conducted control efforts in strategically important areas. In addition, our public outreach and education efforts have extended into the community to draw the link between healthy watersheds and our faucets. All of our efforts are geared toward providing a clean and sustainable water supply for our island.

To recount the importance of this work, WMMWP helps to manage 47,321 acres across Mauna Kahalawai. Native Hawaiian forests dominate about 33,051 acres, roughly 70 percent of this area, some of which has yet to be protected behind ungulate fence. Pu'u Kukui, the summit of Mauna Kahalawai, is one of the wettest places on Earth, receiving nearly 400 inches of rain each

year. As such, the West Maui watershed is a key recharge area, producing 70 million gallons of water per day (MGD) of sustainable yield. This water feeds 76 percent of DWS customers, serving the Lahaina System (over 3,350 customers) and the Central and South Maui systems (over 20,260 customers). To sustain the needs of these users we have addressed watershed threats though the following strategies, objectives, and goals laid out in the grant proposal:

Key Strategies:

- Control feral ungulates through fencing and removal programs to reduce erosion, vegetation loss, and rare species loss, to improve water quality and limit health risks.
- Control invasive, habitat modifying weeds to prevent new species establishment, prevent further spread of those present, and expand weed-free areas.
- Decrease incidents of wildfires through planning, coordination, education, fuel management, and monitoring.
- Inhibit destructive human activities such as illegal dirt biking and trail blazing which impact watershed functions by impairing protective fences, spreading invasive species, causing erosion, and damaging native vegetation.
- Conduct public education and awareness programs and build understanding through volunteerism, stewardship, and community outreach.
- Protect rare species through landscape level watershed protection efforts and facilitate efforts to recover species with experienced collaborators.
- Monitor watershed parameters such as water quantity and quality, biological resources, and threats to inform appropriate management strategies.
- Enhance management coordination through qualified staffing, adequate infrastructure, knowledge growth, and collaborations with outside partners, agencies, and funders.

GOALS / OBJECTIVES

Provide a list of the goals and objectives from your grant application.

Project funding is focused on activities that further the mutual goals of protecting source water resources and ensuring a sustainable drinking water supply for Maui. We aim to elevate the level of watershed protection across 14,282 acres of designated DWS priority watersheds within our 47,321 acre landscape, including DWS lands owned in Waiheʻe, other adjacent lands protecting high water recharge areas in Central Maui, and forested watershed lands in West Maui that feed DWS systems in Mahinahina and Lahaina. Program goals and objectives include:

- Goal 1: Maintenance and Inspection of Fences – maintain and inspect approximately 5.5 miles of fence that protect 14,282 acres of priority forested watersheds that contain groundwater and surface water recharge areas.
- Goal 2: Zero Tolerance Control of Ungulates – conduct regular trap checks to remove ungulates within 14,282 fenced acres to protect watershed resources against further damage and enable re-vegetation of previously disturbed areas.
- Goal 3: Control of Priority Weed Species – control infestations and halt further colonization of priority habitat modifying weeds like strawberry guava and *Clidemia hirta* that alter the natural water cycle of the watershed. Objectives include maintaining strawberry guava control in key recharge areas of ʻIao and Waiehu; combat regeneration

of treated plants and new growth in Panaewa and Kanaha; facilitate further dispersal of the *T. ovatus* biological control agent; continue volunteer efforts on Waiheʻe Ridge; control satellite populations of *C. hirta* in Lahaina and ʻIao Valley; and opportunistically treat other priority species when encountered to prevent new infestations.

- Goal 4: Watershed and Water Quality Monitoring – monitor for new activity, changes, and recovery to provide feedback on management success, inform future management strategies, and evaluate effectiveness. Objectives include annual weed and ungulate transects, photo / vegetation plots, aerial surveys, water quality monitoring, and incidental observations of forest health.
- Goal 5: Public Education and Awareness – conduct educational sessions with various community groups to increase public awareness of the importance of watersheds for our water supply and educate community members about ways they can conserve water resources and advance watershed protection.

BENEFITS TO MAUI COUNTY

Describe how your project/program has benefited the people of Maui County in relation to the goal of the DWS (providing clean water more efficiently). Keep in mind that Maui County DWS manages approximately 36,000 services on Maui and Molokai, and that the funds provided to you are from their revenues, not the general fund (tax base for all of the residents and businesses of Maui County). Include the numbers and descriptions of people and/or businesses served (please include an excel table).

WMMWP is driven to sustain the ecological and hydrologic resources of the West Maui Mountains. Our watersheds are Maui's major source of fresh water, such that they support every aspect of daily life. By protecting the native forest from a myriad of threats, we perpetuate its ability to collect and produce water for agricultural, residential, and commercial purposes, for the health of our economy and our environment. The work supported by this grant empowers our team to maintain the following benefits (see Table 1 on pg.5 for list of benefactors):

- Improved water quality and quantity through effective management of native forests and watersheds that helps limit turbidity and animal born disease in surface waters. Sediments and total suspended solids in surface water is decreased which in turn limits the maintenance of water delivery systems and treatment costs.
- By protecting key recharge areas, WMMWP ensures a sustainable source of water for businesses, agriculture, residents, and visitors across West, South, and Central Maui—about 76 percent of DWS customers.
- Protection of native Hawaiian ecosystems that perpetuate cultural traditions and enrich the unique and beautiful backdrop that is cherished by residents and visitors alike.
- Our Public Involvement Program (PIP) educates residents and visitors about the relationship between healthy watersheds and our water supply and engages them in the protection of freshwater resources.
- DWS customers will realize compounded returns on their investment in watershed protection, as all of our DWS funds are matched to provide us with federal, state and private funding that enable us to protect in greater depth and across larger areas.

Table 1: List of Grant Benefits and Benefactors

WMMWP Landowners		10
WMMWP Associate Partners		2
Public Volunteers		139 hours
WMMWP AmeriCorps Volunteer		1700 hours
WMMWP Full Time Staff		9
DWS services_ Lahaina (as of FY2016)		3,359
DWS services _Central & South (as of FY2016)		20,264
DWS Total Services with WM Source Water		23,623
% of DWS Services from West Maui Source Water		**76%**
Locally Owned and Operated Businesses Used		16
Locally Operated Businesses Used		5
2014 Maui County Total Labor Force		130,748
2014 WMMWP Water Footprint* Labor Force Total		88,346
2014 WMMWP Water Footprint % of Maui County Labor Force		**67.57%**
2010 Maui Island Total Population		144,444
2010 WMMWP Water Footprint Population		106,522
WMMWP Water Footprint Percentage of Island Population		**73.75%**
2015 Maui County Total FDIC Deposits	$	2,971,117,000
2015 WMMWP Water Footprint FDIC Deposits Total	$	2,627,009,000
2015 WMMWP Water Footprint Percentage of FDIC Deposits		**88.42%**

Data on labor force, population, and FDIC deposits sourced from the 2015 Maui County Data Book.
* WMMWP Water Footprint is geographically based and defined on where water from WM sources has been distributed to support local communities and economy—generally West Maui, South Maui to Makena, and Central Maui to Kuau.

TASKS COMPLETED FOR FY16

1) Maintenance and Inspection of Fences:

The goal of inspecting and maintaining 5.5 miles of fence (ranging from annual to quarterly checks) was achieved. WMMWP inspected 42,626 meters (26.5 miles) of fence during this grant period in the West, Southwest, Southeast, Southwest, East, and Northeast Units. This includes multiple checks of the newly constructed W9A (length of 1020m) and W9B (278m) fences and extra checks immediately after the big storm on September 13th and 14th, 2016. A total of 481 meters of maintenance was required on the fences this year, 76 meters because of the storm to date. Fallen trees were cut off fence lines, sections that were pushed down by fast running water were lifted up and re-clipped or re-stretched, new posts were pounded and

deadmen and hog panels added, accumulated debris was dug out, and stream curtains that had torn were re-sewn. While most of the fences were still deemed ungulate proof after the quick fixes, several were significantly damaged and still need repair. Ground scouting found no evidence of ungulate sign posing imminent pressure; however it will be important to be vigilant, especially until fences can be repaired. Full fencing repairs are underway section by section and prioritized by outside ungulate pressure. Efforts to gain eligibility for FEMA reimbursement are still pending a letter of confirmation. (See previously supplied damage report for more details)

Photos above: An example of the effects of the September storm: A five meter section of the SE7a fence in Hanaula was destroyed by high water (left). New posts were pounded and hog panels were installed to prevent future ungulate ingress (right).

Photos above: The accumulation of debris on the SE5 fence in Hanaula following the September storm (left), and after maintenance (right) to alleviate the pressure of debris on the fence.

The additional maintenance this year included 370 meters of brushing in Hanaula and Paʻu Paʻu, patching holes and adding deadmen on aprons in the West Unit, and adding a T-post corner to the fence in Kauaula Valley (which was since washed away in the storm). The one critical situation was the breach in the Panaʻewa NAR fence W9, just above Paʻu Paʻu. Staff added a deadman and smooth wire to create an ungulate-proof barrier; however, pigs unfortunately had tunneled under the fence and gotten in to the preserve (noted in ungulate control section below).

2) Ungulate Control Program:

Task 1: Feral Ungulate Management:

Feral ungulates have been controlled above project fences. While checking 5,326 animal control devices this grant period, 13 pigs were removed in Panaʻewa, one in Kapilau, and one goat in Waiehu, shown in Table 2, below. Panaʻewa has been a hotspot for the last several

years due to breaches in the fence in the past, but sign had reduced significantly in the few months just prior to this grant (due to fence maintenance, a fence extension, and our newly constructed North Kanaha boundary fence which was funded by the DWS FY14 supplemental award). However, in July 2016, fresh sign was recorded and a trail was found coming up from Kahoma Valley. An aerial survey and ground scout were conducted and new traps were added. Kamehameha Schools was contacted to discuss the installation of a new strategic fence in Kahoma Valley to cut off access. Additionally, a small breach in the fence was found on the north section of the new lower boundary fence (W32). A one-meter section was repaired. Twelve of the 13 pig captures in Panaʻewa occurred during this July check (Map 1 p 23.). Five of these captures were in between the North Kanaha boundary fence and the old boundary fence. The other seven captures were above the old boundary fence, six of these in Halona gulch.

In total, 17 new groups (80 traps) were added to the transect ridge and in and around Halona gulch. On the next check in October, there was only one pig removed and there was considerable reduction of ungulate sign in the valley. Over the next two subsequent quarterly checks (in January and April 2017), there were no captures and no sign was recorded.

In Kapilau, the pig was removed from Ridge 1, and although there has been no new sign recorded on the ground or from the air, it is surmised that the pig came up from Waikapu Valley. Additionally, a goat was removed on Waiehu Ridge 2 in February 2017. There was still sign found above the fence; therefore, five new animal control devices were installed. This area will be monitored again within the upcoming months.

While assessing Paʻu Paʻu for locations of *Morella faya* and *Psidium cattleianum* during an aerial survey, fresh ungulate sign was noted above the Paʻu Paʻu boundary fence (due to a breach in the fence, as stated above) in the Panaʻewa NAR. An immediate ground response was deployed the next work day to repair the fence, add new ungulate control groups, and establish a new monitoring transect. Eight new groups containing 40 traps have now been added to this specific area.

Table 2. Ungulate Control

Management Unit	Secondary Unit Name	# checked	# new installations	# removed	# pigs	# cows	# deer	# goats
1.5	Eke	53	0	0	0	0	0	0
2.1	Waihe'e	134	0	0	0	0	0	0
2.2	Mauna Alani	86	0	0	0	0	0	0
2.3	Waiehu	132	5	15	0	0	0	1
2.4	Pu'u Kane	8	3	0	0	0	0	0
3.2	Kapilau	255	5	18	1	0	0	0
3.3	Waikapu	42	0	5	0	0	0	0
3.4	Hanaula	693	0	0	0	0	0	0
4.7	Helu	353	0	69	0	0	0	0
5.2	Pana'ewa	1165	120	11	13	0	0	0
5.3	Kahoma	0	0	0	0	0	0	0
5.4	Hahakea/Wahikuli	2405	12	82	0	0	0	0
TOTAL		**5326**	**145**	**200**	**14**	**0**	**0**	**1**

3) Control of Priority Weed Species:

Psidium cattleianum

Task 1: Weed Maintenance Area

- Follow up Surveillance of HBT Strawberry guava
  - In combination with some HBT resources from Dr. James Leary, we flew a subsection of the previously covered area in the back of Iao Valley to compare the number of trees found previously. A survey area of 73.6 acres was flown and 44 targets were treated during this quarter's mission (Map 2, p 24.). Fewer trees were found as compared to the original 65 previously treated in the same area. This is a reduction in the number of *P. cattleianum* found, and was also a reduction in the time and resources spent searching and controlling the plants. It should be stressed that these results are preliminary and that further examination of the assessment data is in process with Dr. Leary. A future re-assessment within the same survey area is warranted with the hopes that even fewer plants will be found.
  - When flying over the Waihe'e survey area, it was noted that plants previously treated with HBT showed various degrees of mortality to regeneration. This shows that the Waihe'e population is behaving similarly to Iao and would also require retreats.
- Ground Control Efforts
  - *P. cattlieanum* ground control efforts occurred on Kahoma Ridge, Pa'u Pa'u, Pana'ewa, Hanaula, East Kahakuloa (see Table 3 below and Map 2, p 24.). Trips to Keahialoa were scheduled and canceled twice due to inclement weather this period.
  - A follow up control trip from last year occurred on Kahoma Ridge. 156 *P. cattleianum* were treated just below our middle strategic fence (3000' elevation) (See table below). All plants found on the ridge within the 4.4 acre survey were treated, however it was noted that there were still several trees off the edge that were inaccessible and at lower elevation.
  - A ground control effort also occurred on Grant Ridge (the north ridge of Kahoma). The highest extent of known strawberry guava on this ridge was ~3400' elevation at an area where control occurred in 2010. An aerial survey confirmed this extent, allowing us to focus our efforts within the old treatment site. Of our three acre survey, 0.5 acres overlapped with the 2010 survey. Within this overlap, only one tree needed re-treatment, and 21 additional plants were controlled (11 were mature). The remaining 2.5 acres allowed for a more complete coverage of the ridge and control of 122 additional plants down to an elevation of ~3300'.
  - In Hanaula, treated all 17 *P. cattleianum* found from the summit to the pu'u.
  - Eight incidental plants were treated on Keahialoa ridge and four on lower Kahoma ridge while doing an ungulate check.
  - The upper most P. cattleianum were controlled on Puu Kane in the East Unit and Pau Pau Ridge in the West Unit during a 1.6 and 2.2 acre survey, respectively.

Table 3: Summary of Invasive Weeds Removed from WMMWP by Species

Species	Unit	Area	Control Type	Total # Controlled	# That Were Mature	# Acres Surveyed	Notes
PsiCat	Pa'u Pa'u	Pa'u Pa'u	Ground	13	0	1.2	Monitored PsiCat while reading transect. Controlled highest trees.
PsiCat	Panaewa	South ridge	Ground	1029	27	4	ridge south of Halona gulch. 14 were re-treats
PsiCat	Panaewa	North ridge	Ground	76	39	5.6	on Transect ridge, north of Halona gulch.
PsiCat	Kahoma	Kahoma ridge	Ground	15	15		Incidental while sweeping for Clidemia points. Just below middle fence - W3
PsiCat	Hanaula	DROA ridge	Ground	2	0		Incidental while checking animal control groups
PsiCat	Hanaula	Upper Hanaula	Ground	17	3	4	Treated from summit to above Pu'u
PsiCat	Kahakuloa	East Kahakuloa	Ground	14	2	3.4	Controlled while establishing transect
PsiCat	Panaewa	Panaewa (south ridge)	Ground	2	0		Incidental when checking animal control groups
PsiCat	Kahoma	Kahoma Ridge	Ground	156	48	4.4	Just below middle fence - W3
PsiCat	Kahoma	Grant Ridge	Ground	144	90	3	At old 2010 treatment site. No plants found above during aerial survey
PsiCat	Keahialoa	Keahialoa Ridge	Ground	8	8		Incidental while doing ungulate check
PsiCat	Kahoma	Kahoma ridge	Ground	4	4		Incidental while doing ungulate check
PsiCat	Puu Kane	Puu Kane	Ground	29	2	1.6	Controlled the upper most PsiCat on ridge
PsiCat	Pau Pau	Pau Pau Ridge	Ground	8	8	2.19	Controlled the upper most PsiCat on ridge

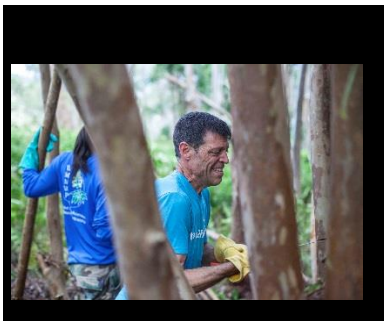
Task 2: Biological Control Dispersal

- Two new *Tectococcus ovatus* release sites were established in the Panaʻewa NAR. Two infected *P. cattleianum* were planted at each site, spaced ~2m apart, within a mass of guava seedlings to ensure inoculation through touching leaves. Branches were trimmed on the surrounding strawberry guava to stimulate new growth at plant height and help the spread of *T. ovatus*. Taller trees were even bent and tied down in the hopes of infecting the upper leaves which could potentially be released in to the canopy level. Site data and GPS locations were recorded (Map 2, p 24.). Plants were inspected prior to taking to Panaʻewa to verify there were no other insects or obvious pathogens in the media.
- We continued to monitor the previously established *T. ovatus* release sites in the West Unit. The agent has spread to multiple plants, and branches in the canopy were infected up to heights of six feet (*photo right*).

Task 3: Furthering Volunteer Weed Control

- Four Waihe'e Ridge Volunteer Service Trips were conducted this period. Twenty-nine volunteers (139 volunteer hours) controlled 448 *P. cattleianum* within 0.8 acres. Two additional trips to Kahoma Ridge and Waihe'e were scheduled but cancelled due to illness and inclement weather. One was also cancelled last minute due to volunteer cancellations. To substitute these, we did have two volunteer trips at Olowalu Cultural Reserve to remove invasive kiawe and plant native plants for fire mitigation.
- These trips included students from Baldwin High School, Lokelani Middle School, organizers from Travel2Change ecotourism, and members of the general public. The Baldwin High School students created a video for the 1st Annual Source Water Protection Video Contest (photos below and link http://www.co.maui.hi.us/CivicMedia?VID=15) and brought home honorable mention!





Photos above: WMMWP Program and Data Assistant, Kim Thayer teaching volunteers about the importance of our watershed and recorded in a video for Baldwin High School (middle). At right, a Travel2Change volunteer works hard to girdle a strawberry guava.

Clidemia hirta

Task 1: Lahaina Clidemia Control

- Early in the year, two sweeps occurred in Wahikuli: 326 *C. hirta* were controlled during a 3.3 acre sweep (25 mature) and 820 were controlled during a 4.8 acre sweep (5 mature) (Maps 2 p. 24 & Map 3, p. 25).
- Because the reduction and removal of this population, which can threaten source water recharge areas in Lahaina, is a top priority for WMMWP, an extensive two-day follow-up assessment of the *C. hirta* population occurred on Wahikuli ridge. A total of 21.7 acres were covered. All 1,639 plants found within this area were controlled (25 were mature), and with the exception of some possible plants off the north edge, the entire population was assumed to be covered (required 11 person days). This is the southernmost population in West Maui and therefore a high priority. Further consideration and analysis will be needed to determine the feasibility of maintaining the control of this population.
- A new population was discovered on Kahoma ridge just below the middle fence and 117 were controlled (11 were mature). On a following trip, an additional 498 *C. hirta* were controlled during the *Psidium cattleianum* 4.4-acre sweep, noted above (Map 2, p 24). We will continue to monitor this area during our regular management deliverables.
- Additionally, 39 *C. hirta* were controlled during a 1.3 acre sweep on Puʻu Kane ridge (Map 2, p. 24) and an additional 37 on a subsequent trip, above our established landing zone. Fifteen were mature.
- *C. hirta* has also been a part of the control efforts on Waiheʻe Ridge volunteer trips. During this period, 12 mature *C. hirta* were controlled.

Task 2: Iao Valley Clidemia Control

- 279 Clidemia were controlled during a 7.5 acre survey in Iao valley along the makai transect. Nine of these plants were mature. This was the most number of plants we have seen to date, and although it is in the lower part of the valley, it is heavily traveled by hikers. This specific control trip is easily accessible and can make a difference as well as educate the public.
- 1 keiki Clidemia was found and pulled on Iao Transect 2 (in the back part of the valley) at station six.

Other Weed Objectives

- Controlling *Morella faya* in Helu is a new WMMWP priority. This is West Maui's only known population; therefore it was deemed necessary to control and prevent spread. During the first survey of this grant period, a total of 34 *M. faya* plants were controlled within a 4.3 acre sweep (Map 2, p. 24), 23 of which were mature. During a follow-up mission, six more *M. faya* were controlled while inspecting our lower fence (~2900'). In the past, others had been found and controlled up to 3600' elevation. Twelve more plants were found after another 13.9 acres surveyed. All known *M. faya* plants have now been controlled in Helu (52 plants this grant period), but we will continue to monitor this population. Also during these surveys, 33 *Grevillea robusta* and one *Schinus terebinthifolius* were controlled.
- One Australian tree fern (*Sphaeropteris cooperi*) was found and controlled in Waiheʻe Valley during a 2.2-acre survey (photo right).

- Two *S. cooperi* were found and controlled in Hanaula near an old treatment site; one of these found still alive on a follow up trip was re-treated. Two more were found by the puʻu and treated.
- Two sweeps, totaling 9.3 acres, occurred in the back plateau of Waihe'e Valley to search for mule's foot fern (*Angiopteris evecta*). Two plants were found and controlled. Other individuals were recorded in the surrounding inaccessible gulches during an aerial survey and were controlled using HBT (with other funds).
- *Ardisia elliptica* was recorded on the Wai 2 transect for the first time and the outlier plants (3) up to 1900' were controlled. This is a higher elevation than what has been typically recorded statewide (~1500'). On Wai 3, two outliers were controlled but once reaching station 41 (1500'), it is quite prevalent. While this species is present and rather established within the adjacent valley floors, it may be important to map the spread and entertain any weed control strategies. One *S. terebinthifolius* was treated on the transect.
- During a survey in Hahakea valley (12.9 acres) in the west unit, two patches of *Rubus argutus* were found. One population was controlled (20 mature plants) within this period (Map 2, p. 24). Five more keiki were pulled on a subsequent animal control trip.
- A patch of *Rubus argutus* was found and pulled in Hanaula, just below the puʻu. This is the only patch that has been noted in the area, so the effort was made to prevent the spread of this species.
- Two incidental *Senna septemtrionalis* were pulled during the *P. cattleianum* sweep on Grant (Kealiʻi) Ridge.
- One immature Albizia (*Falcataria moluccana*) and seven *Flindersia brayleyana* (Queensland maple) were controlled on the Waiheʻe Ridge Trail during a volunteer service trip at 1500' elevation. This is at the makai end of our regular weed control area.
- While controlling *P. cattleianum* on Paʻu Paʻu, three *S. terebinthifolius*, one *G. robusta* and one *P. guajava* were found and treated.
- The only African tulip (*Spathodea campanulata*) found in Hanaula (near HB&G camp 3200') was controlled.

4) Watershed and Water Quality Monitoring:

Task 1: Ungulate Monitoring Transects

- Twenty-seven existing transects were read for ungulate sign this period (Table 4 below and Map 4, p. 26). In these transects, ungulate sign was only found on the Panaʻewa and Mauna 2 transects. In Panaʻewa, new sign was recorded on 13 and old sign on seven of the 106 stations. Three of the 69 stations on the Mauna 2 transect had new sign.
- Two new transects were established on East and West Kahakuloa ridges, with 49 and 58 stations (5 meters wide X 50 meters long), respectively (Map 4, p. 26). Fresh ungulate sign was found on three of the East Kahakuloa stations and on the entire lower half of the West Kahakuloa transect (27 stations). Old sign was also recorded on four of the East Kahakuloa stations. These transect stations will allow us to monitor future threats to Kahakuloa, Waiheʻe, and Honokohau ahupuaʻa, all important DWS water recharge areas.
- After finding ungulate sign above the fence in Paʻu Paʻu (as stated above), another new monitoring transect, measuring 25 stations long, was established. Fresh sign was recorded on 11 of the 25 stations. These transect stations will create a baseline and allow us to monitor future ungulate and weed threats in the area.
- The Olowalu transect was extended in the back valley creating a new transect called "OlowaluMauka" with 59 stations.
- Twenty new stations were added to extend the Panaʻewa transect down to our new boundary fence. Although no new sign was recorded, this unit has been a hotspot previously, and these stations will allow us to document any new sign in the future.
- Since the transect reading of Puʻu Kane, there is now ungulate sign (as stated in ungulate section above) along the ridge. New animal control has been added and a follow up scout and animal control mission has been scheduled in the upcoming weeks. A small amount of sign was found in Ukumehame after the annual transect reading and will be noted on the next transect check.
- Due to time constraints and weather cancellations, only the lower 31 Waiheʻe stations were checked. There was no ungulate sign on the transect and an aerial survey above (using other funds) found no sign.

Table 4. Ungulate Transect Results

Transect	# of Stations	Avg. % of new sign	# of Stations with new sign	Avg. % of old sign	# of Stations with old sign
Pana'ewa	110	2.58	13	1.35	7
Pana'ewa (new stations)	20	0	0	0	0
Kauaula Valley	53	0	0	0	0
Helu	42	0	0	0	0
Lihau	34	0	0	0	0
Olowalu	32	0	0	0	0
OlowaluMauka (new)	59	0	0	0	0
Ukumehame	52	0	0	0	0
Iao1	33	0	0	0	0
Iao2	31	0	0	0	0
Iao3	28	0	0	0	0
Keahialoa	20	0	0	0	0
Wai3	50	0	0	0	0
Pa'u Pa'u (new)	25	2.72	11	0	0
Wahikuli	54	0	0	0	0

Kahoma	77	0	0	0	0
Launiupoko	58	0	0	0	0
Hanaula	63*	0	0	0	0
Waikapu	60	0	0	0	0
Wai1	42	0	0	0	0
Wai2	48	0	0	0	0
Mauna Alani	33	0	0	0	0
Mauna 2	69	0.58	3	0	0
East Kahakuloa (new)	49	0.05	3	0.09	4
West Kahakuloa (new)	58	2.38	27	0	0
Honolua Stream	30	0	0	0	0
Kapilau	37	0	0	0	0
Puu Kane	42	0	0	0	0
Keahikauo	22	0	0	0	0
Waihee	42**	0	0	0	0
North Waiehu	15	0	0	0	0
South Waiehu	25	0	0	0	0

*The original Hanaula transect has 76 stations that go down to the makai boundary fence. This lower fence is no longer a complete natural barrier and a more secure fence has been constructed mauka at the location of Station 63. There is fresh or old sign within all 13 stations below station 63. We hope to reduce this ungulate pressure with the use of the aerial shoot program.

**Only 31 of the 42 Waihee stations were checked this period due to time constraints and weather cancellations. No ungulate sign was found in the valley.

Task 2: Invasive Weed Monitoring Transects

- Of the 27 transects read this period, weeds were recorded on 12 transects. (Northeast and East units). Honolua Stream was a make up from last year.
- *Ardisia elliptica* was found for the first time on three stations along the Wai 2 transect (up to ~1900' elevation) (Map 2, p. 24). On the Wai 3 transect, *A. elliptica* has been recorded in previous years, but it is encroaching mauka (up to 1200' in 2010, 1500' in 2012 and 1800' in 2017). Although this species is present and rather established on the adjacent valley floors, it may be important to map the spread and consider weed control strategies.
- On the Puu Kane transect, all *Clidemia hirta* found above station ten (~3650' elevation) were recorded and controlled (noted in weed control above). Unfortunately, after reaching the top of the transect one mature plant was found, just out of reach off the edge. Future attempts will be made to remove this plant.
- On the Iao 2 transect, one keiki *C. hirta* was found and pulled on station six.
- In Waiheʻe, a mule's foot fern was found in the lower part of the transect on the south side wall. It was unable to be controlled by foot, so the point was recorded for possible future aerial HBT treatment.
- There were no additional significant findings to report, but as always, these records are used as a baseline for future transect readings.

Task 3: Water Quality Monitoring in Honolua

- The Honolua Water Quality Monitoring site was assessed after heavy rains over the last two quarters and was still in decent condition. The sonde had previously been sent to YSI for maintenance. It was just returned in Quarter 3, and after re-calibrating, it was re-deployed in the field. There is no data to report on this grant period.

- Seven of the ten erosion bridge sites were monitored in the Northwest Unit this period. Several other attempts were made to get to the other three sites on PKW Transect 3 but were cancelled due to inclement weather.

Task 4: Forest Health Observations and Monitoring

- We continue to observe for forest health and monitor for early detection and response. One staff member, Kainoa Marchello, participated in a Rapid ʻOhiʻa Death (ROD) training on Hawai'i island held by J.B. Friday, extension forester, and Corie Yanger, ROD outreach specialist with the University of Hawai'i College of Tropical Agriculture and Human Resources. Knowledge learned and identification tips were relayed to all WMMWP staff members.
- During the course of other work, we continue to monitor populations of *Erythrina sandwicensis* (Wiliwili) which are still showing sign of recovery.
- WMMWP recorded new locations of *Liparis hawaiiensis* (SOC) in Helu and Wahikuli.
- Found 1 *Exocarpus gaudichaudii* in Waikapu Valley (ground survey) and 4 during an aerial survey off North side of Wahikuli ridge.
- WMMWP staff accompanied Hank Oppenheimer (PEPP) to assist in out-planting an undescribed *Tetramolopium* species in Wahikuli and Hahakea gulches.

Task 5: Photo / Vegetation Plot Monitoring

- All of the seven photo / vegetation plots in Helu were monitored (Map 4, p 26). These were plots that were established within and below the burn zone of the fire in 2007. Vegetation has recovered up to 90% in some plots. With the exception of *Andropogon virginicus* and *Melinis minutiflora* (molasses grass), native species such as māmane (*Sophora chrysophylla*), ʻōhiʻa (*Metrosideros polymorpha*), aʻaliʻi (*Dodonaea viscosa*), pūkiawe (*Styphelia tameiameiae*), and uluhe (*Dicranopteris linearis*) are the most dominant. The photos below show the Helu 3 plot in 2008 (top) and 2016 (bottom). Recovery is positive in some plots, owing to the resilience of the forest at higher elevations. However, when going down in elevation the trend is less positive. Proximity to other weeds, less precipitation, and higher intensity of the fire may all be contributing toward less recovery. The take home message here is two sided: while fires will have an easier time of burning again due to the infestation of fire adapted weeds at low elevations, native forest can recover and flourish in the absence of competition. Future weed control of lower elevation study plots may help us understand how management may be able to aid recovery to lower elevation plots.

- Fifteen of the 20 photo / vegetation plots in Anakaluahine were monitored (Map 4, p. 26). The remaining five plots were extremely overgrown or could not be read due to time constraints and will be discontinued. Coffee and *Clidemia hirta* dominate the understory in the valley plots (photo at right). This speaks to the destructive force of *C. hirta* when combined with pig disturbance and the need to limit the spread of *C. hirta* so that other parts of the watershed do not similarly suffer.
- Three of the 12 Northwest Unit plots were monitored along the PKW boundary fence. All old disturbance has been filled in with vegetation. Dominant understory species included non-native *Melinis minutiflora, Oplismenus hirtellus, Hedychium flavescens* and native *Dicranopteris linearis*. The remainder of the sites were unable to be checked and are scheduled for next quarter.
- One outstanding plot in Kapilau was also read this period.

Task 6: Aerial Surveys

- Multiple aerial surveys to monitor weed and ungulate threats were conducted this grant period (Map 2, p. 24):

Table 5: Aerial Surveys

Area	Purpose	Results
Pa'u pa'u	MorFay and PsiCat survey	No plants noted but found breach in fence (Pa'u pa'u) and fresh ungulate sign in Reserve. Maintenance and installation of new traps immediately followed.
Pa'u pa'u	Follow up on ungulate hotspot	No new ungulate sign. Also attempted to fly to Eke but raining and low clouds.
Helu / Ukumehame	MorFay survey / Ungulate scout	No MorFay found. No ungulate sign. Scouted for LZ in Ukumehame. Recorded a *Toona ciliata.*
Kahakuloa	PsiCat	Due to low clouds, could only get to 2000' elevation. Recorded PsiCat locations on ridges east and west of Kahakuloa valley.

Kahakuloa	PsiCat	Attempted to fly Eke but wind came in and no PsiCat points were taken. One *Grevillea robusta* recorded.
Pana'ewa	Ungulate survey	Fresh ungulate sign found. Trail coming up from Kahoma valley. Contacted Kamehameha Schools about a possible new strategic fence in the valley.
WMMWP wide	Assess fences and any ungulate sign after Sept storm	No new ingress had occurred.; however, as stated above, it will be important to remain attentive in areas where the fences have been compromised until repairs can be made.
Eke crater and below	PsiCat	Documented the elevation extent of strawberry guava in the area. Two new locations of Clidemia hirta were also recorded, which may represent a high elevation range in the gulch west of Eke.
Grant Ridge	PsiCat	Goal was to record any outlier PsiCat above our treatment sites. None were found above these old treatments and this allowed us to focus below old treatments and gain more land.
Helu	MorFay	Found three more Morella faya trees and treated them during a ground control mission.

Additional Tasks:

- WMMWP Manager lead USGS and UH researchers to prospective field sites over two days in both the Wailuku and Lahaina districts to assess impacts of invasive weeds on forest hydrology. Helped to coordinate access and landowner permission for site selections and assessments.
- WMMWP focused on the production of visual graphics and clear metrics to show long term trends in management and presented in proposals for FY2018. We hope these will guide future management and help funders understand the rate of progress and coverage which is being taken on by management with the support of all funding available to WMMWP.

5) Public Education and Awareness:

Task 1: Maintain Use of Media and Social Media

- WMMWP maintains and frequently updates our website and Facebook page. We have over 1,000 likes on our Facebook page. During this period, we created 138 posts which reached thousands more.
- Using Google Analytics, we had 16,963 page views and 9,579 sessions on our website this year. A session is the period time a user is actively engaged with the website. Nineteen percent were returning visitors and 81% were new visitors to the site.

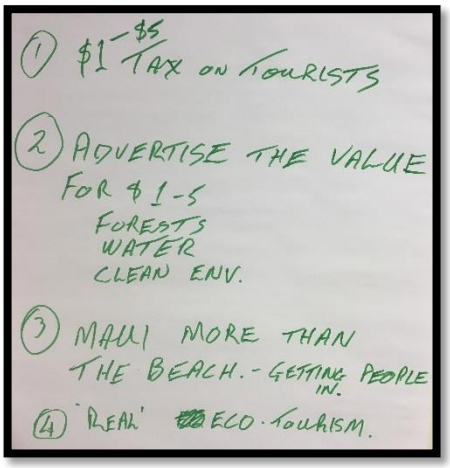
Task 2: WaterStory Educational Sessions

During this grant year, Kimberly Thayer conducted eight presentations with a range of groups.

- In collaboration with Learning Endeavors, presented to 20 teachers and two staff at the HILT Waihee Coastal Dunes and Wetlands Preserve. Due to time constraints, a full WaterStory session was not conducted; however, the water source mapping exercise was incorporated (participants plot on a map their guesses on where on Maui their water comes from).

- Presented to 15 elementary school students at Big Brothers, Big Sisters of Maui. Due to time constraints, a full WaterStory session was not conducted; still**,** the water source mapping exercise was incorporated. Each student was given an ʻaʻaliʻi plant to take home as a prize for correctly answering a question about the watershed (photo at right).
- With the Maui Economic Development Board (MEDB), did a WaterStory session with 12 West Maui residents. Responses to the feedback survey question of "What I learned" included "Level of involvement by different organizations in understanding & preserving water resources on Maui" and "The water issues facing Maui are COMPLEX. Everybody can do something."

- Presented to ~60 members of the Hawaii Farmers Union United - Mauna Kahalawai Chapter about WMMWP's mission, programs, and volunteer opportunities. Although a WaterStory session could not be conducted due to time constraints and large group size, the group was highly engaged, asking follow-up questions and signing up to volunteer.
- Presented to 25 members of the Rotary Club of Lahaina on WMMWP's mission, programs, and volunteer opportunities. Due to time constraints, a WaterStory session could not be conducted. Having been well received, K. Thayer was later invited to speak at the Maui Rotary District Assembly about freshwater resources and WMMWP's work.



Left: Kimberly Thayer teaching school teachers about where on Maui their water is sourced. On the table in the foreground is the map where they plotted their guesses on where their water is sourced.
Right: Recommendations from a WaterStory role-playing group of council members, business owners, and residents for increasing funding for watershed protection.

- At the Maui Rotary District Assembly, delivered two presentations to groups of eight and ten people. To address Maui's freshwater resources, the WaterStory mapping exercise was conducted with both groups. In attendance were DWS Deputy Director Gladys Baisa as well as two members of the Rotary Club of Lahaina who attended the last presentation and came to learn more about WMMWP.
- With MEDB, did a WaterStory session with 13 members of the 2017 class of Ka Ipu Kukui Fellows. Responses to the feedback survey question of "What I learned" included "Where my water comes from—very important, knowing creates caring."

Task 3: Outreach Events

WMMWP participated in five community outreach events this year:

- A booth at Hawaiian Islands Land Trust Annual Picnic at the Waihe'e Coastal Dunes and Wetlands Refuge; 65 direct interactions with community members.
- A booth at Kahekili Beach Park for the Ridge to Reef Rendezvous; 75 direct interactions.
- The Natural Resource/GIS technician did a presentation for Career Day at Maui Waena Intermediate School and answered students' questions. There were three sessions of 25 7th graders, totaling a direct interaction with 75 students.
- A booth at the Maui Nui Botanical Garden for Arbor Day; 37 direct interactions.
- A booth at Wailuku First Friday; 50 direct interactions.

STAFF EMPLOYED*Include the number of Full Time Employees (FTEs) as paid by these grant funds; total number of hours worked during the fiscal year, and total amount of grant funds spent in salary (including benefits and fringe).*

DWS has funded an average of 3.8 FTEs out of WMMWP's 9 person staff for a total of 7,904 hours of staff time.

Program staff job titles (# of positions):

- Program Manager (1 FTE)
- Program & Data Assistant (1 FTE)
- Natural Resource & Data Technician (1 FTE)
- Field Crew Supervisor (1 FTE)
- Field Crew Leader (1 FTE)
- Field and Data Technician (1 FTE)
- Field Assistants (3.5 FTE)
- AmeriCorps Intern (1 Intern for 11 months/year)

The total amount of grant funds spent on staff payroll was $236,868.74, which included $173,045.94 in salary, $52,822.80 in fringe benefits, and $11,000.00 toward the AmeriCorps Intern.

INVENTORY OF EQUIPMENT (costing individually $500 or more acquired with DWS grant)

Equipment Item (name and brand)	Value when purchased	How used	When acquired
Not Applicable			

AMOUNT OF FUNDING LEVERAGED

Please include an excel table that identified the amount of funding you received from DWS, amount received from other sources. Please identify all sources by name, and state/federal/county government and or private, nonprofit entity.

Name of Partner	Type of Entity (government/ private/ nonprofit)	Amount of Funds Leveraged	
		Cash	In-Kind
Dept. Of Water Supply	government	$ 287,500.00	
Olowalu Elua, Associates	private	$ -	$ 12,000.00
State of Hawaii DLNR CIP	government	$ 200,000.00	$ -
State of Hawaii HISC	government	$ 20,000.00	$ -
State of Hawaii, DLNR Watershed Partnerships Program FY15	government	$ 280,000.00	$ -
Atherton Family Foundation	nonprofit	$ 25,000.00	
The Nature Conservancy	nonprofit	$ 118, 245.00	$ -
Skyline Eco Adventures	private	$ 5,000.00	

FUNDING NEEDED AND WHAT YOU COULD DO IF THERE WAS MORE FUNDING

Provide an explanation of how you would spend additional grant funds if you had them. Please include whether or not new initiatives could be started, if these would include additional outreach opportunities, new equipment to be purchased and or if you had additional revenues whether it may impact amount of potential revenues to be leveraged.

Additional funding could be leveraged to further implement our 5-year Watershed Management Plan, the guiding document for WMMWP programs which calls for **$2.7 million** each year to support comprehensive management of the entire West Maui watershed. While 61.3% of the watershed is under active watershed management, 38.7% of watershed lands remain unfenced and undermanaged for priority threat control. With additional funding and additional positions, WMMWP could implement some of the following programs to broaden our management reach:

- Achieve a level of zero ungulates within an additional ~19,525 acres via quarterly or more frequent management checks.
- Retrofit 10.9 miles of boundary fence to increase fence heights from 4 feet to 8 feet to exclude expanding deer populations.
- Construct over 14 miles of fence across Forest Reserve boundaries and strategic fence segments. Construct dirt bike prevention barricades and fencing in Waihe‘e.
- Prioritize the 15,000-acre watershed interior (i.e. areas above the 2,800 foot elevation) by further eliminating habitat modifying invasive weeds from within this management zone.
- Promote and enhance wildfire preparedness and planning and implement the West Maui Community Wildfire Protection Plan to protect watershed resources.
- Enhance WMMWP’s capacity to integrate and manage volunteer assistance in meaningful, informative, and rewarding resource management projects.
- Continue to integrate AmeriCorps, Hawaii Youth Conservation Corps, University of Hawaii, and Kupu volunteer programs within WMMWP projects.

- Establish relationships with nearby communities and developments to educate and prevent introductions of invasive species, minimize human impacts, and solicit support for watershed values and protection.
- Facilitate the access of credible and fully permitted visiting researchers, biologists, and botanists attempting to answer key questions and develop new methods to ensure the long term survival and recovery of species.
- Continue the collection of water quality and quantity data throughout the watershed.
- Support Partner agency efforts to collect stream flow, rainfall, and water quality data from existing stations and support additional water quality and quantity monitoring.
- Coordinate monitoring efforts with lead agencies such as DOH, NOAA, Army Corps of Engineers and EPA to support mauka to makai efforts in watershed protection.
- Further implement and maintain monitoring data sufficient to measure success, inform adaptive management, and educate funders and policy makers.
- Procure equipment such as masticating machines and boom sprayers for fire fuel mitigation programs.
- Procure vehicles such as UTVs and vans to transport volunteers and staff to remote off-road field sites.
- Create a nursery for out-plantings to rehabilitate fire scars and restore eroded areas.

CONSEQUENCES OF A DECREASE IN FUNDING

*If, during the course of budget, there was to be a decrease **in** funding available for watershed programs- how would this impact your program/project? Please describe and if possible provide documentation as to whether you would lose staff, amount of time previously spent on specific activities would have what type of detrimental effect? How would a decrease **in** funding impact any leveraging activities (funds and or resources from other sources)?*

High value watershed lands would revert to a degrading trend, succumbing to uncontrolled threats from feral ungulates and invasive species. With decreased funding, positions would be lost and leveraged funds would be reduced to further compound the problem. Knowledgeable personnel take years to cultivate in this highly specific discipline, such that extensive training, time, and resources would be required to make up for any loss in veteran staff. No further gains in protection would be achieved as it would be a stretch to maintain status quo if at all possible. Populations of feral ungulates and weeds would rebound and previous public investment in managed areas would be lost due to lack of maintenance. Two to three times the funding would be required to recover from budget reductions and regain previous levels of management success. The bottom line is that losses in management capabilities would translate to diminished water recharge as ungulates and invasive species colonize unprotected watershed lands. The sustainability of the island's water supply would be compromised if forest degradation by invasive species is permitted to go unchecked.

PARTNERS

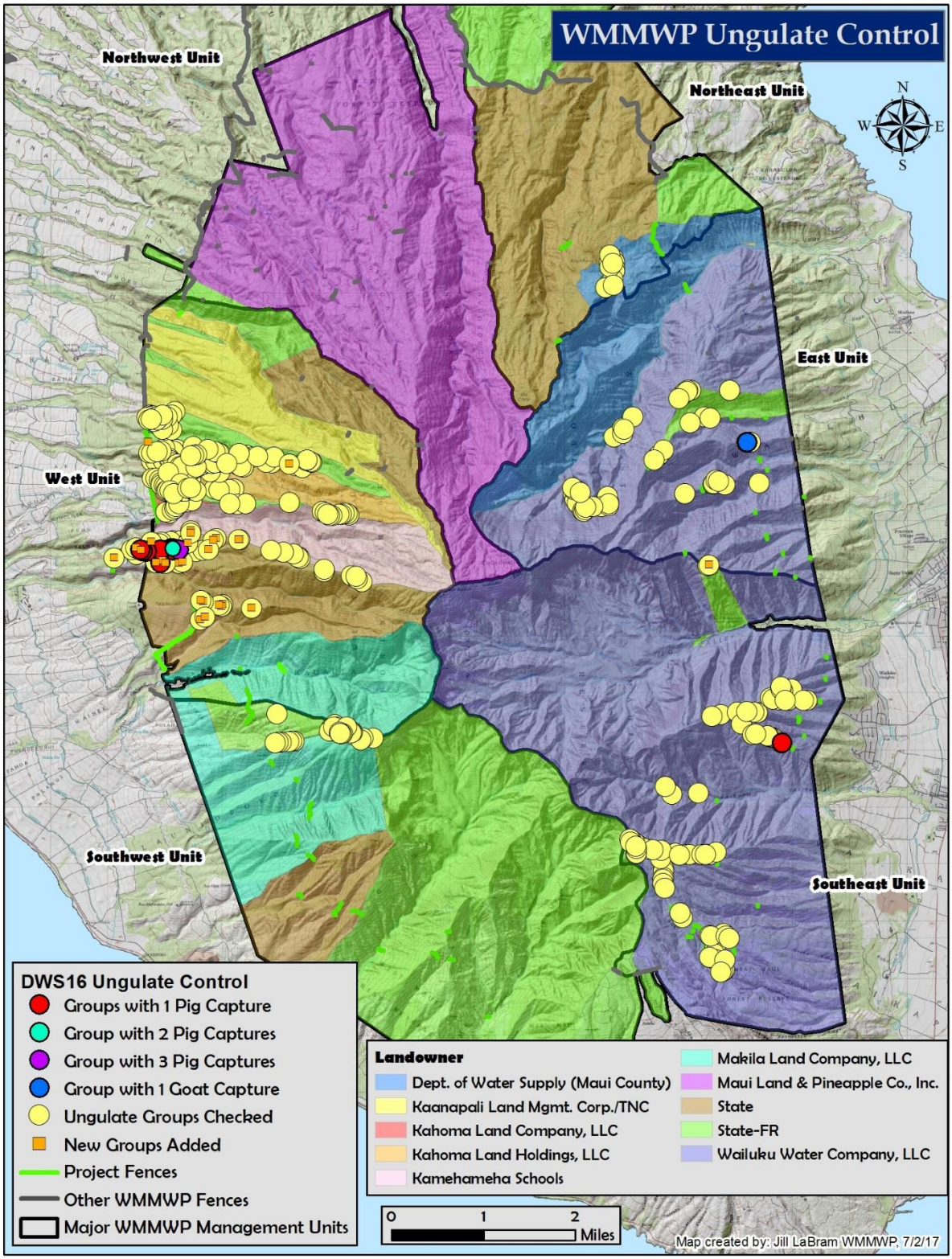
"Watershed Program Partners"

Name of Partner	Type of Entity (government/ private/ nonprofit)	Contact Person	Contact Information	Amount of Funds Leveraged	
				Cash	In-Kind
County of Maui	government	Rob Parsons	Email: Robert.Parsons@co.maui.hi.us	$ -	$ -
Ka'anapali Land Management Corp.	private	Jeff Rebugio	Email: Jeff@Kaanapaliland.com	$ -	$ -
Kahoma Land Company, LLC	private	Kimo Falconer	Email: jkimof@msn.com	$ -	$ -
Kahoma Land Holdings, LLC	private	Tom Brzozowski	Email: tombmaui@msn.com	$ -	$ -
Kamehameha Schools	private	Mililani Browning	Email: rebrowni@ksbe.edu	$ -	$ -
Makila Land Company, LLC	private	Rory Frampton	Email: rory@westmauiland.com	$ -	$ 12,000.00
Maui Land & Pineapple Company, Inc.	private	Pomaika'i Kaniaupio-Crozier	Email: pcrozier@mlpmaui.com	$ -	$ -
Maui County Department of Water Supply	government	Robert DeRobles	Email: Robert.DeRobles@co.maui.hi.us	$ 287,500.00	$ -
State of Hawaii, Department of Land & Natural Resources	government	Scott Fretz	Email: Scott.Fretz@hawaii.gov	$ 500,000.00	$ -
The Nature Conservancy	nonprofit	Alison Cohan	Email: acohan@tnc.org	$ 155,954.00	$ -
Wailuku Water Company, LLC	private	Avery Chumbley	Email: abc@aloha.net	$ -	$ -
Tri-Isle Resource Conservation & Development	nonprofit	John A. Hau'oli Tomoso	Phone: 808-871-1010 Email: tomoso@tri-isle.org	$ -	$ -
U.S. Fish & Wildlife Service	government	William O'neill	Email: william_oneill@fws.gov	$ New Grant Pending	$ -

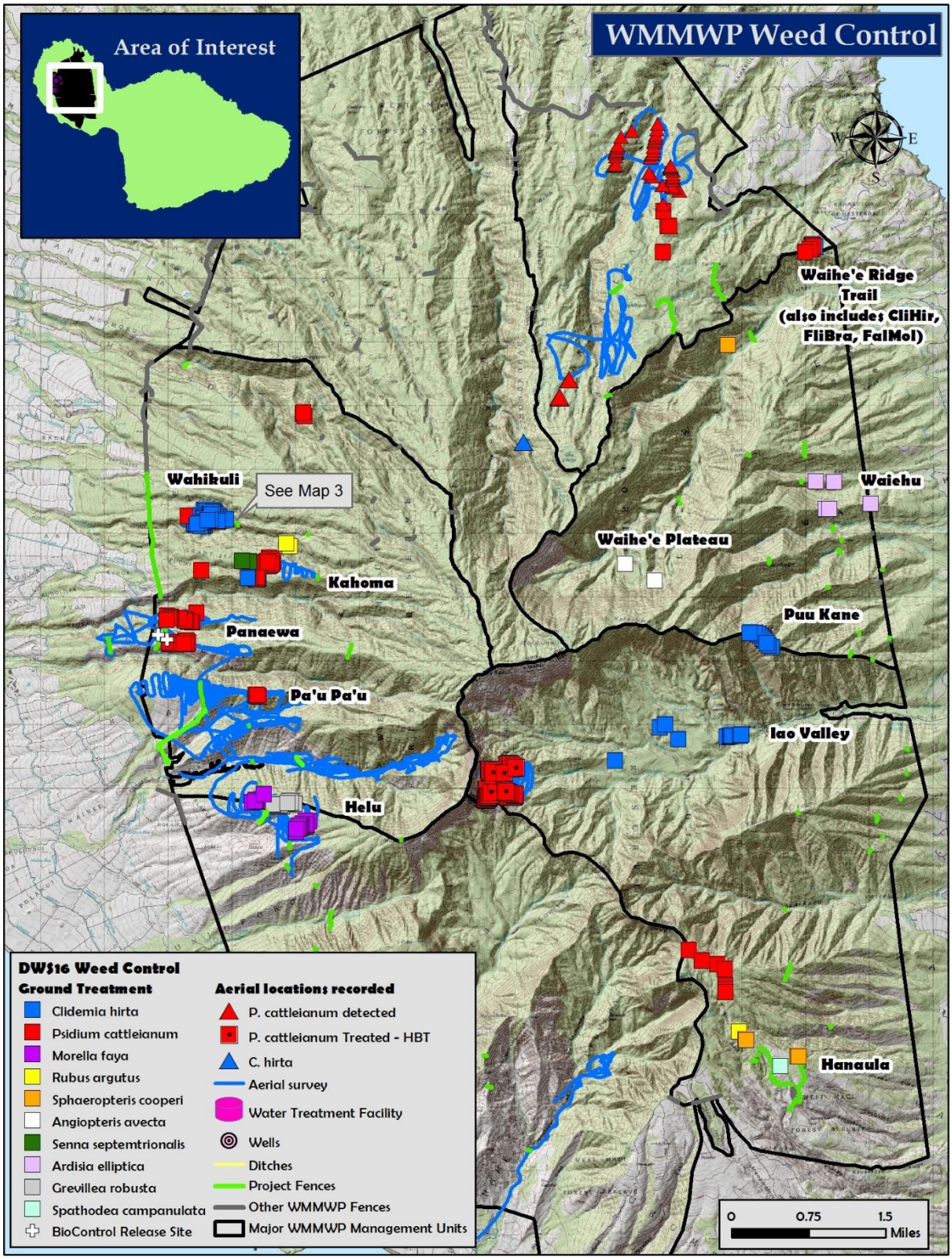
Please note: Significant in-kind services are provided in terms of professional services and time from many partners which has not been quantified.

APPENDIX B

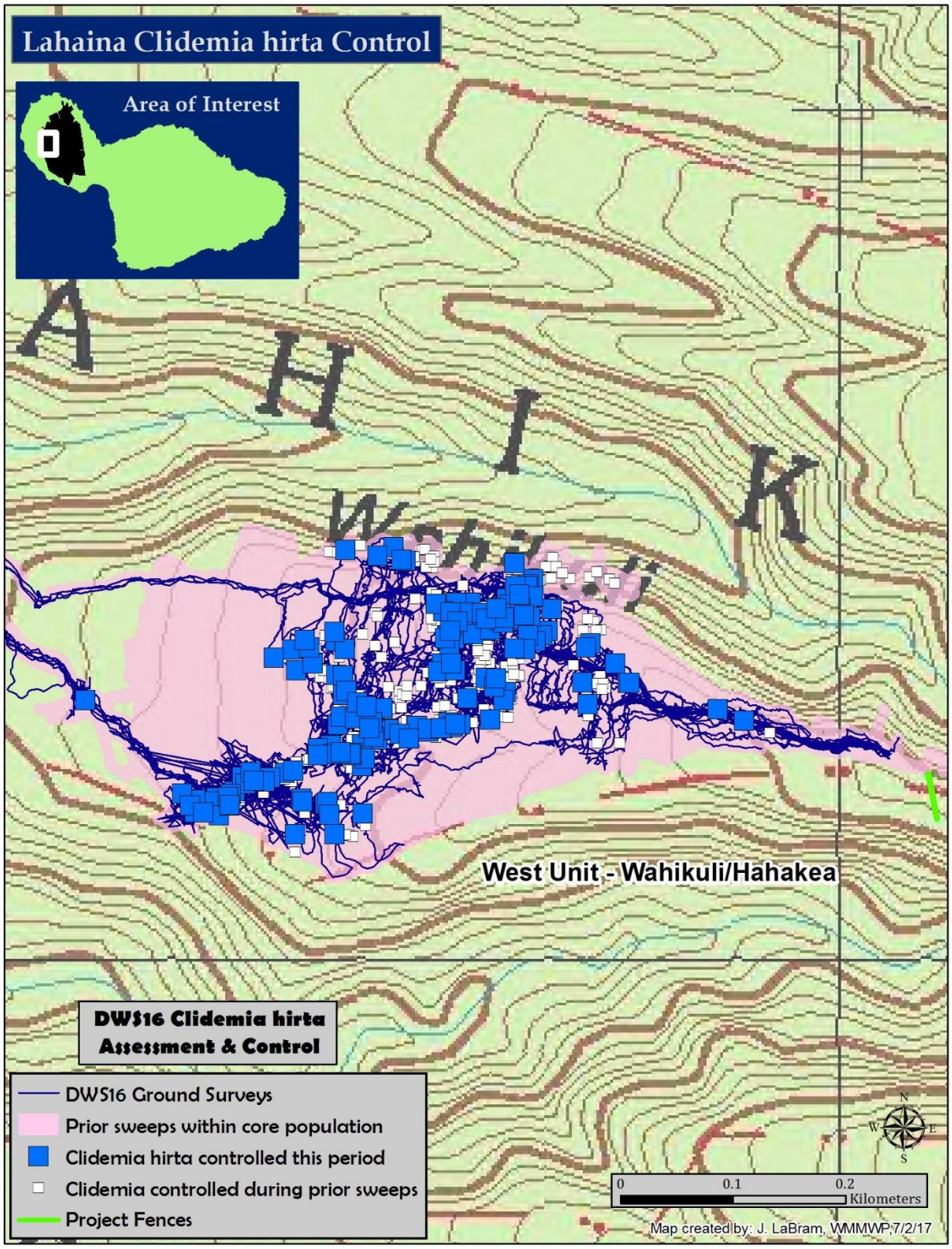
See Attached Excel File



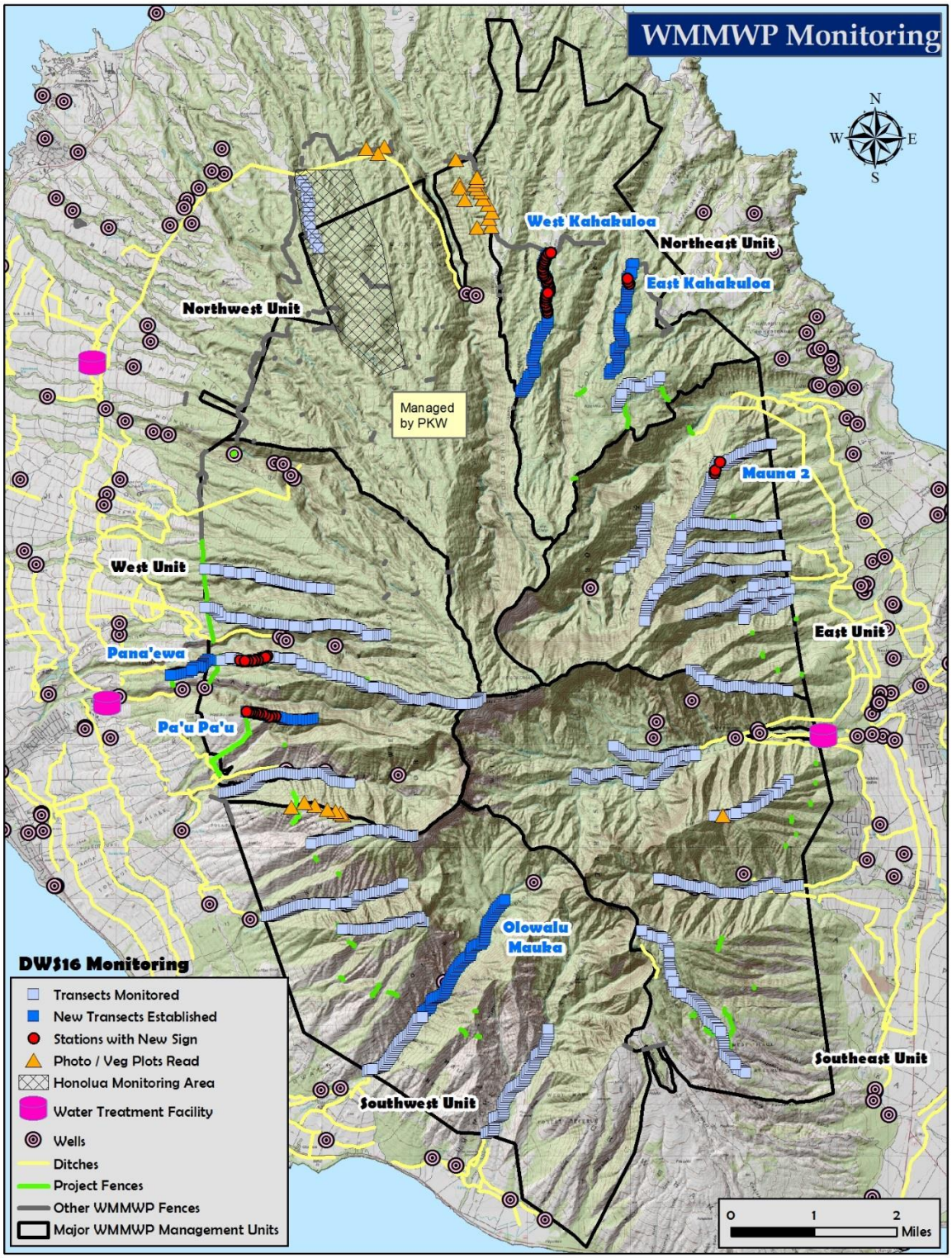
Map 1: DWS16 Ungulate Control. Map showing animal management and control activities across fenced regions of the WMMWP project area. Depending on the magnitude of ungulate infestations, managed areas are monitored and maintained between one and four times per year. A total of 14 pigs and one goat were captured.



Map 2. Priority Weed Control. All priority and incidental weed control points are shown watershed wide. See Map 3 for a closer look at the Wahikuli Clidemia and the Kahoma Clidemia / P. cattleianum weed control. The Tectococcus ovatus (biocontrol for P. cattleianum) release sites are also depicted on this map.



Map 3. Lahaina Clidemia Control; Task 1. The reduction and removal of this Wahikuli population, which can threaten source water recharge areas in Lahaina, is a top priority for WMMWP. During this DWS16 period, 2785 C. hirta *were controlled within sweeps of 29.8 acres.*



Map 4: DWS16 Monitoring. Map depicting monitoring transects and photo points/vegetation plots completed. Twenty-seven existing transects and 26 photo/vegetation plots were read. Four new transects were established (in blue) along with an additional 20 stations in Pana'ewa. Fresh ungulate sign on the Pana'ewa, Pa'u Pa'u, East and West Kahakuloa, and Mauna Alani2 transects are shown in red.

WR Committee

From: Jill LaBram <labram@westmauiwatershed.org>
Sent: Monday, March 19, 2018 6:36 PM
To: Kimberly Thayer
Cc: WR Committee; Chris Brosius
Subject: Re: WR-5, Watershed Management and Protection
Attachments: WMMWP Eradication Matrix.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Aloha,

Sorry we forgot to attach the Eradication Matrix.

Mahalo,
Jill

On Mon, Mar 19, 2018 at 6:29 PM, Kimberly Thayer <thayer@westmauiwatershed.org> wrote:

Aloha Water Resources Committee staff,

Here attached is our response to your request. Also attached, as referenced in our response letter, is our DWS FY19 proposal and quarterly reports for our FY15 DWS grant. Due to file size, we will send the quarterly reports for our FY16 and FY17 DWS grants by separate email.

Mahalo nui,
Kim

Kimberly (Skog) Thayer
Program Associate

Office Hours:
* Monday - Friday : 8:30am - 5:00pm *

West Maui Mountains Watershed Partnership
Post Office Box 13240
Lahaina, Hawaii 96761
Office: 808-661-6600
Cell: 808-281-4917
Fax: 808-661-6604
thayer@westmauiwatershed.org
www.westmauiwatershed.org

---------- Forwarded message ---------
From: WR Committee <WR.Committee@mauicounty.us>
Date: Fri, Mar 16, 2018, 8:41 AM
Subject: WR-5, Watershed Management and Protection
To: brosius@westmauiwatershed.org <brosius@westmauiwatershed.org>
Cc: WR Committee <WR.Committee@mauicounty.us>

Mr. Brosius,

Please review attached correspondence for response to the Maui County Council's Water Resources Committee. The hard copy is being mailed to you as well.

Thank You,

Water Resources Committee staff

--
Jill LaBram
NRM / Operations Manager
West Maui Mountains Watershed Partnership
(808) 661-6600
labram@westmauiwatershed.org

WMMWP Eradication Efforts Matrix
October 1, 2014 - December 31, 2017

Taxon Name	Common Name	Acres Surveyed	Mature Plants Controlled	Immature Plants Controlled	Total Controlled	Plants Controlled Chemically	Plants Controlled Manually
PLANTS							
*Angiopteris evecta**	Mule's Foot Fern	744.6	91	0	91	89	2
Ardisia elliptica	Inkberry	2.3	2	0	2	0	2
Clidemia hirta	Clidemia / Koster's Curse	256.9	995	10,663	11,658	798	10,860
Cortaderia jubata	Pampas Grass	10.3	1	4	5	0	5
*Cyathea cooperi**	Australian Tree Fern	4.3	9	2	11	6	5
Grevillea robusta	Silky Oak	7.3	57	0	57	57	0
Hedychium gardnerianum	Himalayan Ginger	6.0	455	41	496	496	0
Morella faya	Fire Tree	22.1	41	15	56	45	11
Psidium cattleianum	Strawberry Guava / Waiawi	1,679.8	6,289	9,300	15,589	10,278	5,311
Tibouchina herbacea	Tibouchina	15.8	186	298	484	15	469

**735 acres of the A. evecta surveys also include the search for C. cooperi*

	Weed Control Hours	Ungulate Control Hours
WMMWP Staff	4,714.5	7,874.0
Partners	317.0	398.0
Volunteers	1,286.5	187.0
TOTAL	6,312.0	8,459.0

INCIDENTAL PLANTS

Acacia mearnsii	Black Wattle	-	1	1	2	1	1
Buddleia asiatica	Butterfly Bush	-	34	4	38	9	29
Cestrum nocturnum	Night Blooming Jasmine	-	2	0	2	2	0
Cirsium vulgare	Bull Thistle	-	1	0	1	0	1
Clusia rosea	Autograph Tree	-	0	4	4	4	0
Falcataria moluccana	Moluccan Albizia	-	11	0	11	11	0
Flindersia brayleyana	Queensland Maple	-	6	4	10	10	0
Macaranga tanarius	Parasol Leaf Tree	-	1	0	1	0	1
Psidium guajava	Common Guava	-	11	5	16	11	5
Rubus argutus	Florida Blackberry	-	83	11	94	59	35
Schefflera actinophylla	Octopus Tree	-	1	1	2	1	1
Schinus terebinthifolius	Christmas Berry	-	129	4	133	131	2
Senna septemtrionalis	Smooth Senna / Kolomona	-	2	0	2	0	2
Spathodea campanulata	African Tulip Tree	-	7	0	7	7	0
Toona ciliata	Toon Tree	-	1	0	1	1	0
	TOTALS	**2,749.4**	**8,416**	**20,357**	**28,773**	**12,031**	**16,742**

VERTEBRATES

Sus scrofa	Pig	-	-	-	33	-	-
Capra hircus	Goat	-	-	-	5	-	-