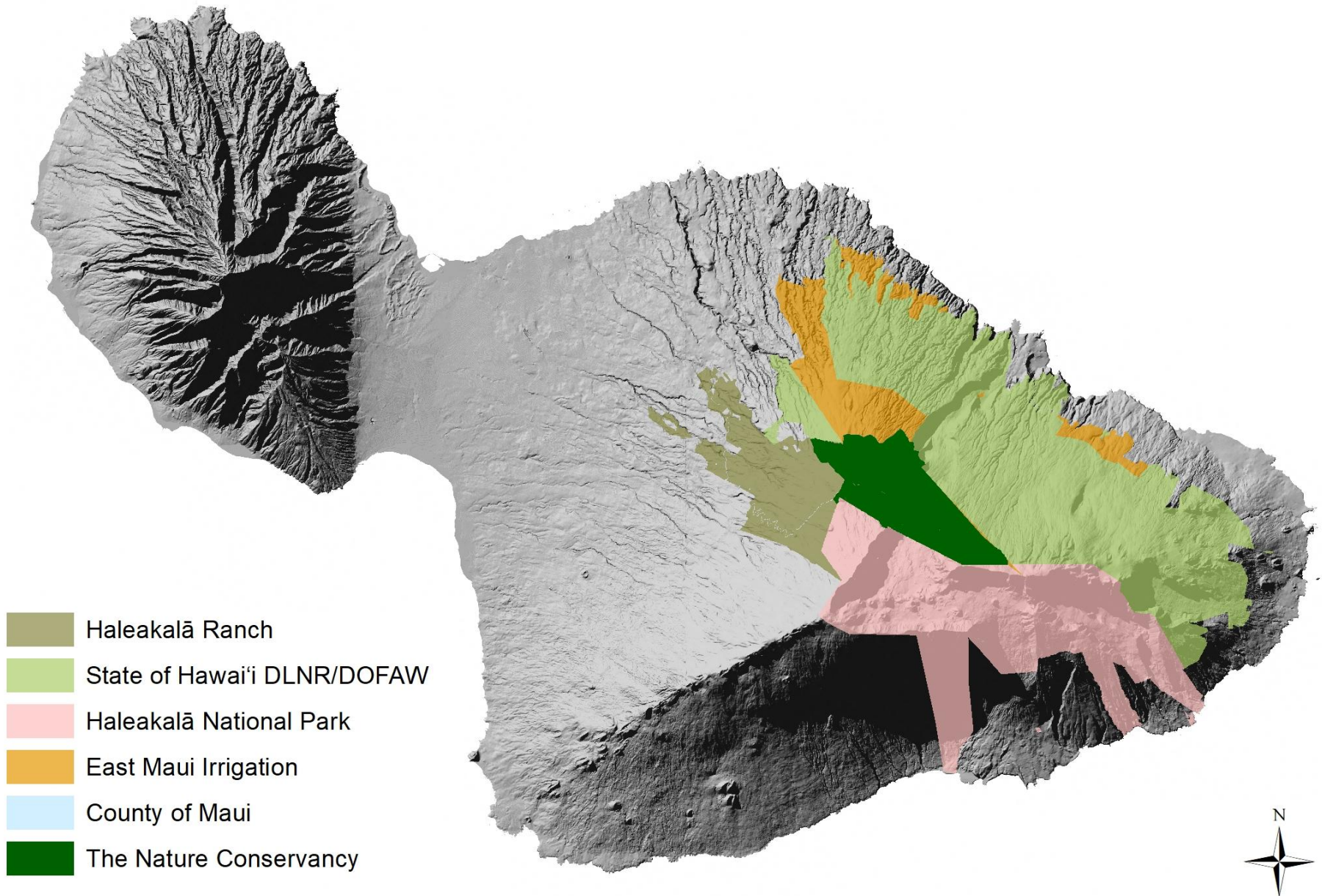


Ginger Control Efforts by EMWHP

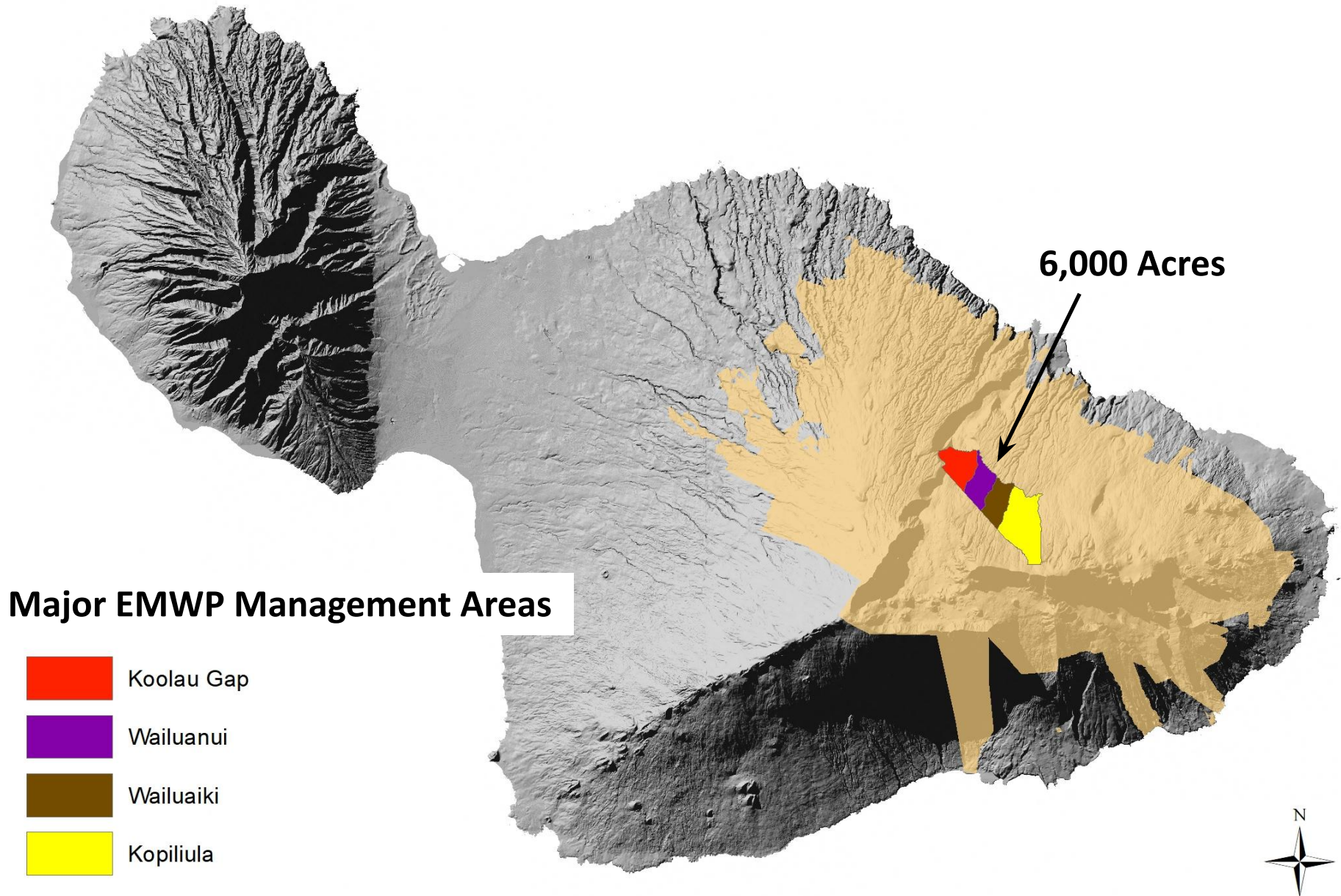
Chris Radford & Dan Eisenberg
East Maui Watershed Partnership



East Maui Watershed Partnership Lands



East Maui Watershed Partnership Lands



Weed Problem

(Hedychium gardnerianum)

- Common Names: Kahili Ginger, Himalayan Ginger, Toilet Brush Ginger...
- Native to India, Nepal, Bangladesh
- Introduced to Maui 1950's or 1960's - E. Maui Cul
- Naturalized on Maui from 1,200 – 6,360 ft elevation
- Coarse, Perennial Herb with Leafy Shoots
- Grows 1.5 – 2m Tall From Large Branching Rhizome



Weed Problem

(Hedychium gardnerianum)

- Aggressive Growth
- Shade Tolerant
- Spreads Through Rhizomes and Frugivorous Birds
- **Average** production is >100 seeds per flower head



Photos by Forest & Kim Starr



Weed Problem

(Hedychium gardnerianum)

- Forms Dense Monotypic Thickets in Open & Closed Canopy Native Hawaiian Forests
- Smothers Young Native Seedlings, Prevents Forests Regeneration, Outcompetes Native Plants
- Reduces Nitrogen
- Promotes Erosion
- Inhibits Stream Flow



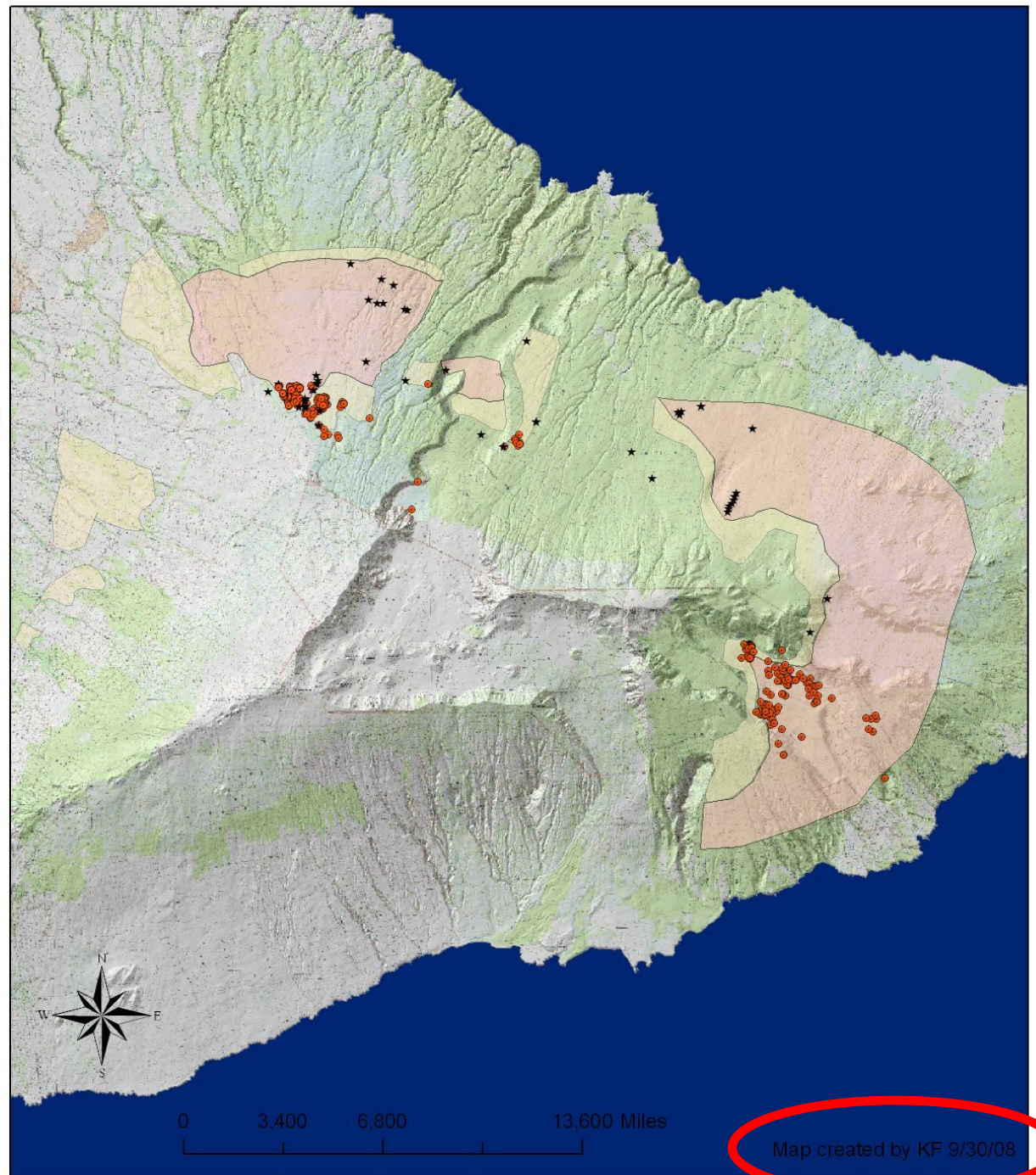
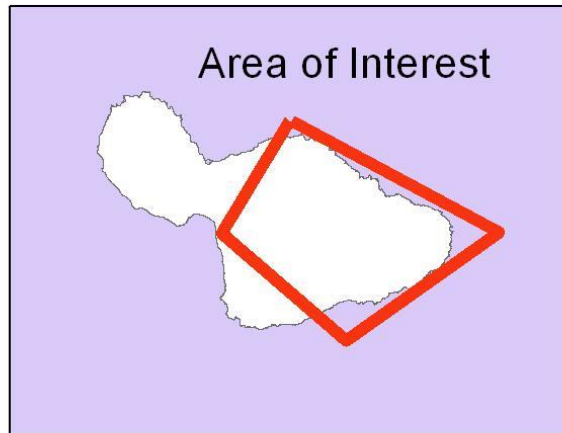
East Maui Ginger Distribution

★ Not Treated

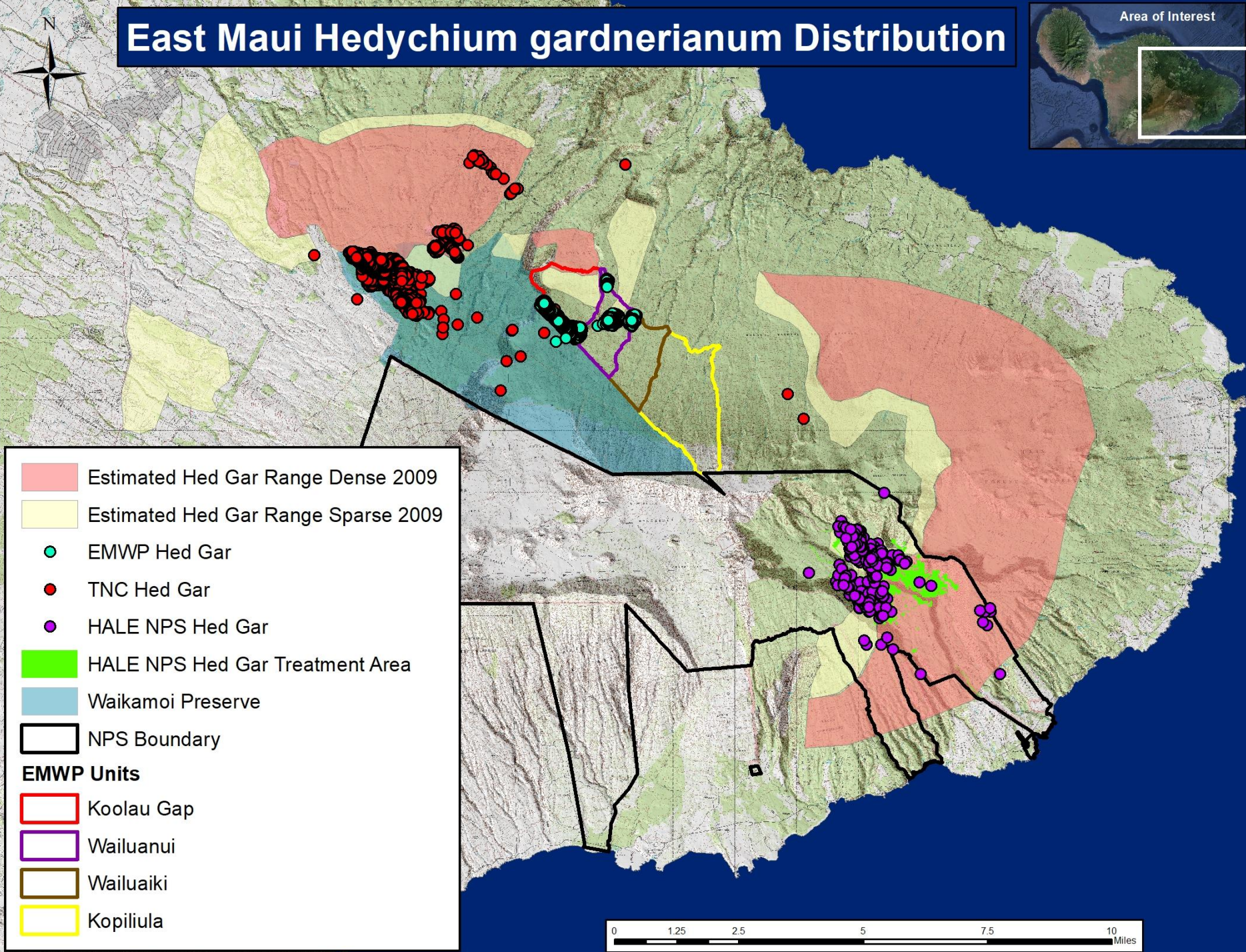
● Treated

HedgarEstRangeSparse09

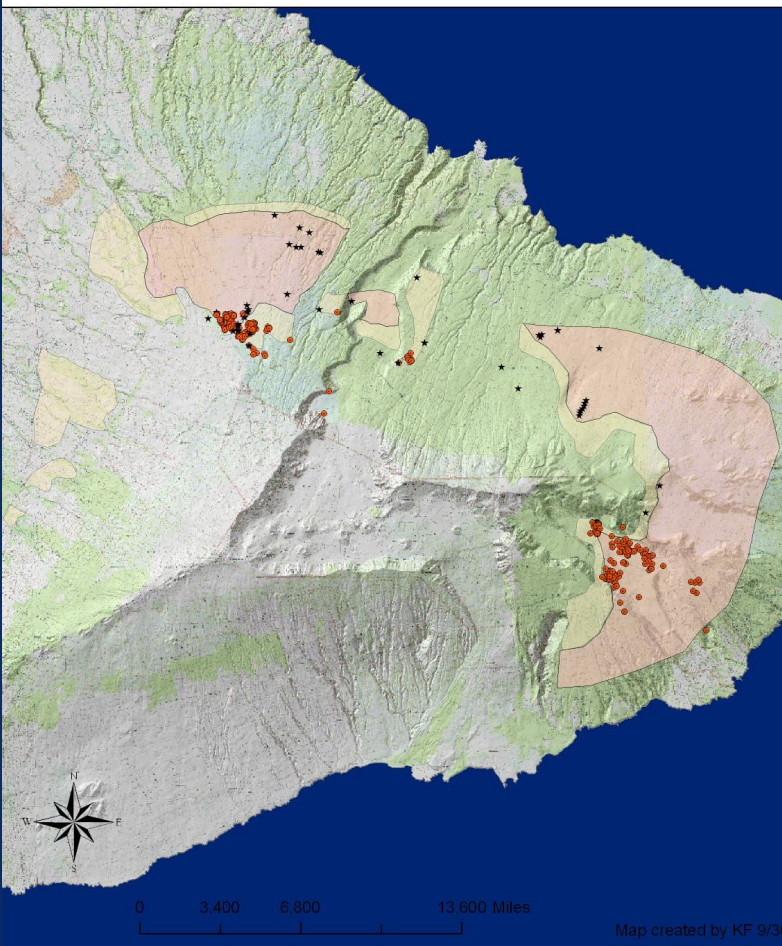
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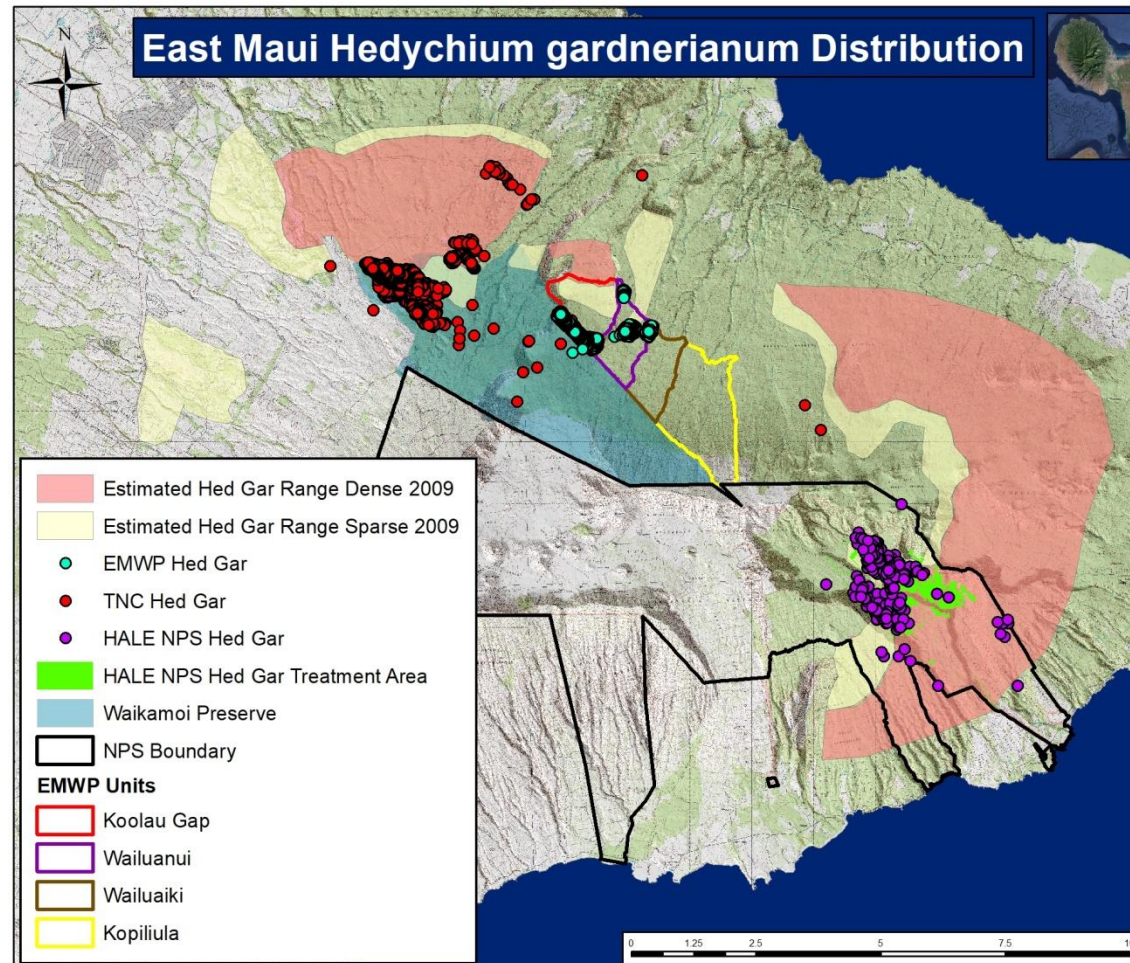
East Maui Hedychium gardnerianum Distribution



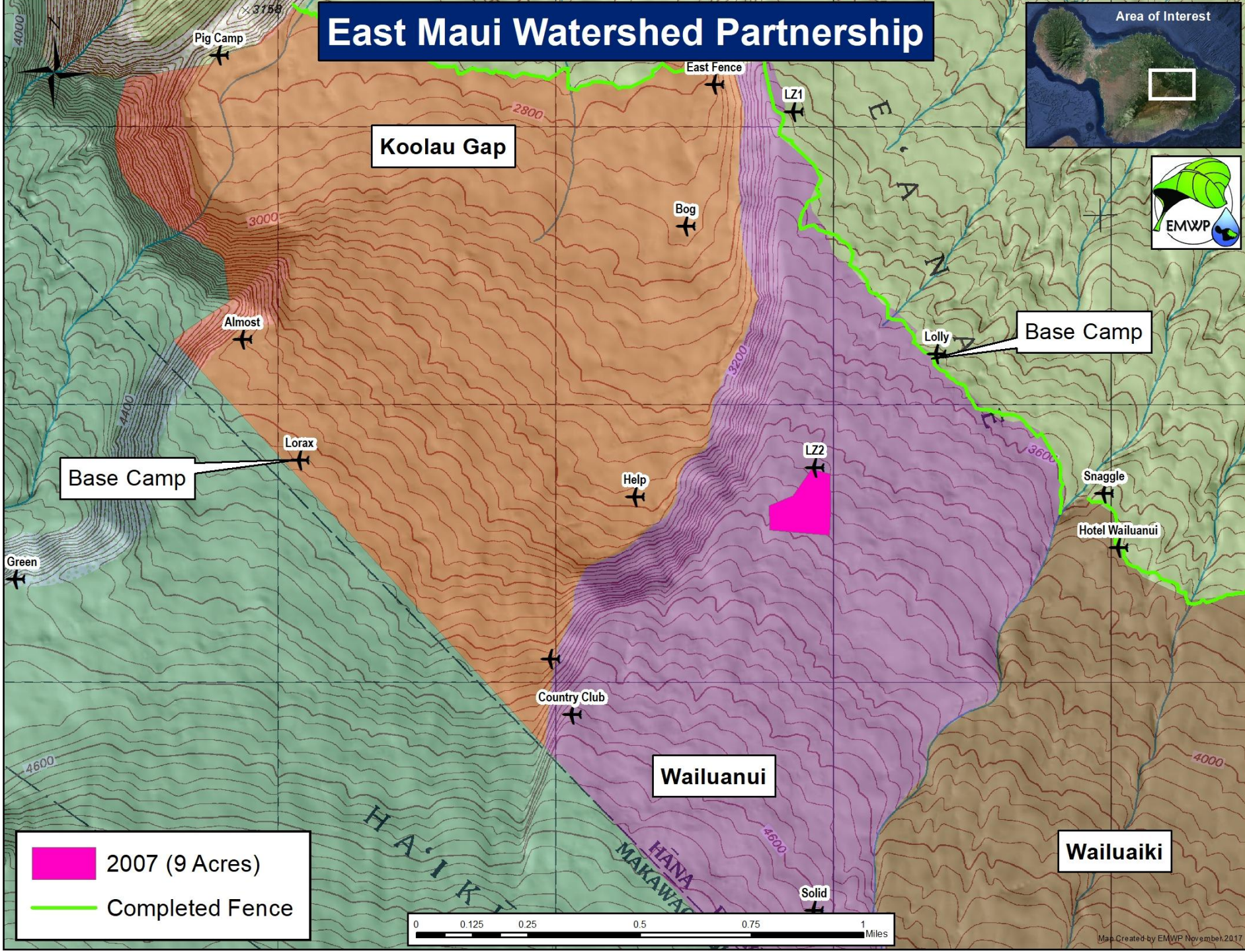
2008



2017

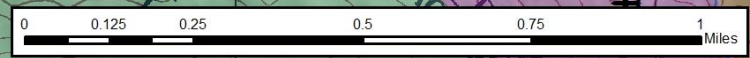


East Maui Watershed Partnership



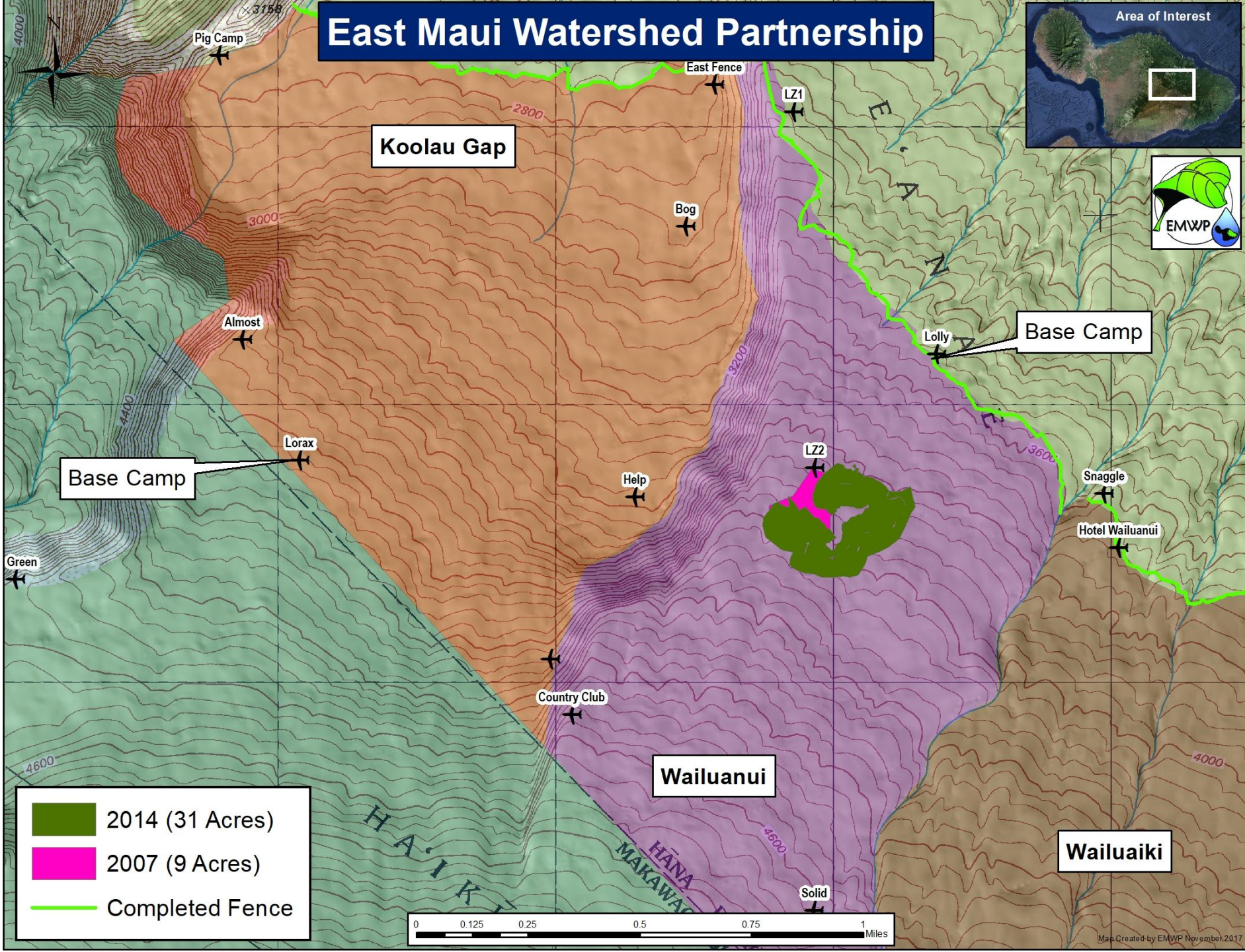
 2007 (9 Acres)

 Completed Fence



Wailuaiki

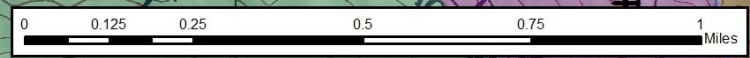
East Maui Watershed Partnership



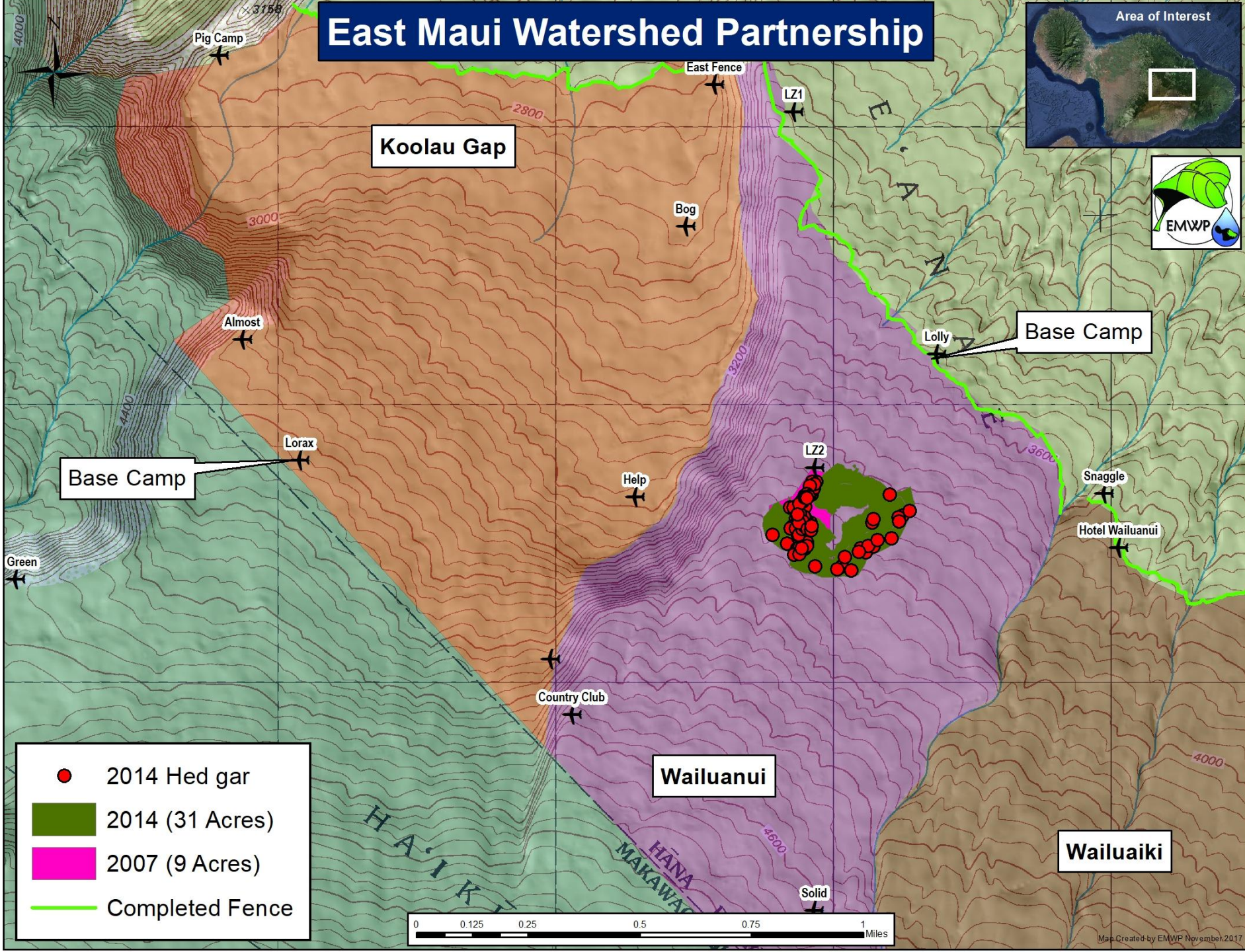
2014 (31 Acres)

2007 (9 Acres)

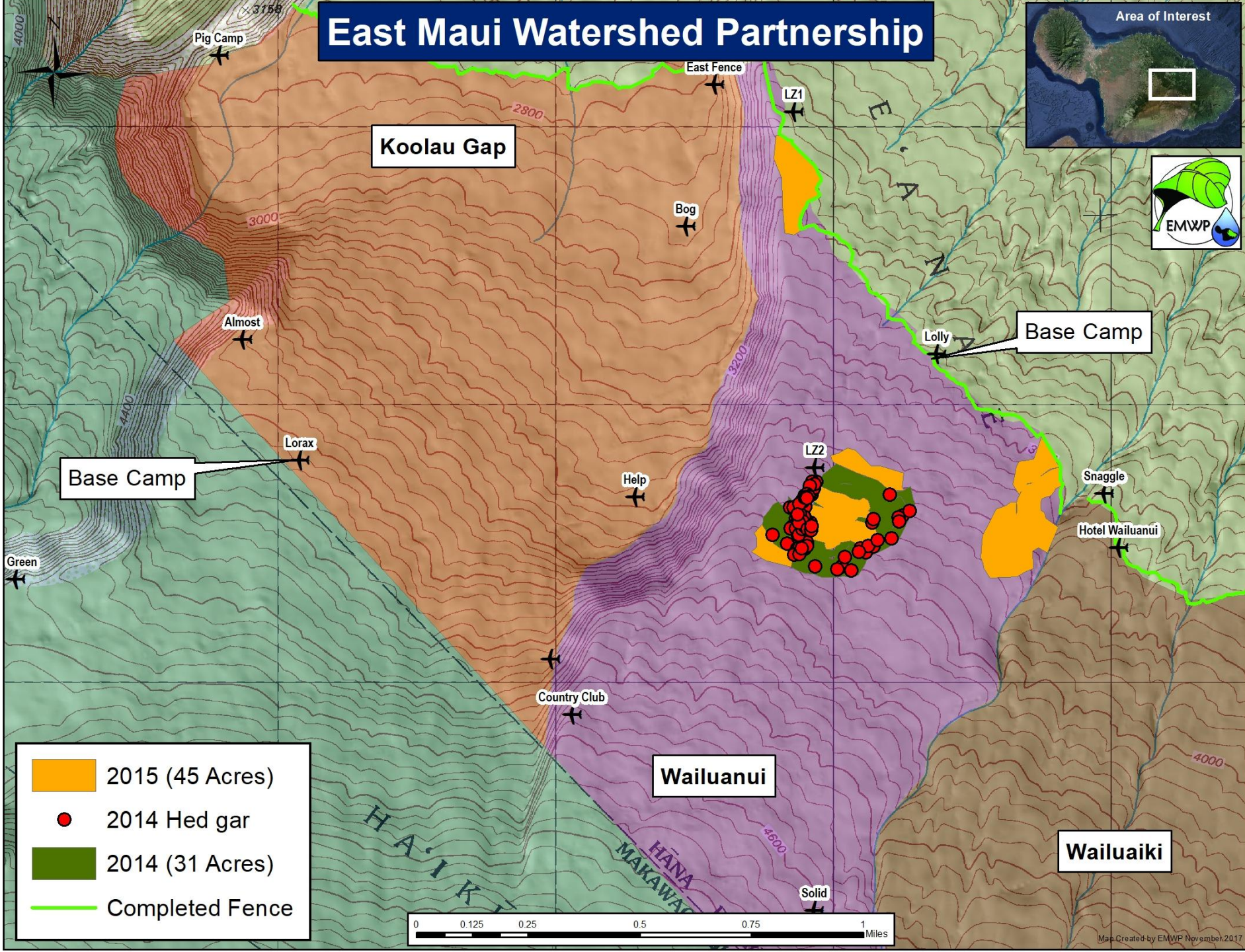
Completed Fence



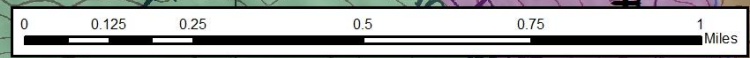
East Maui Watershed Partnership



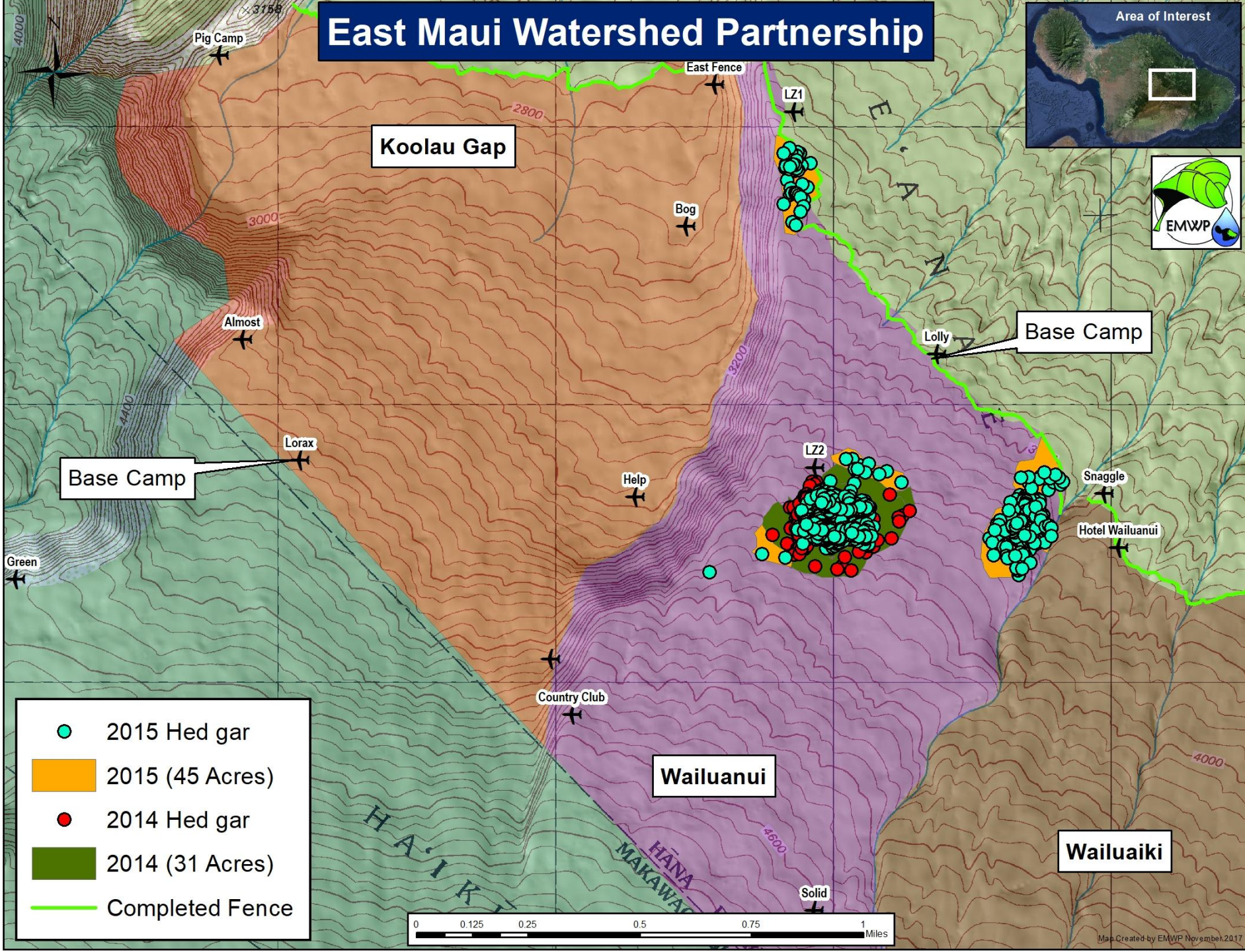
East Maui Watershed Partnership



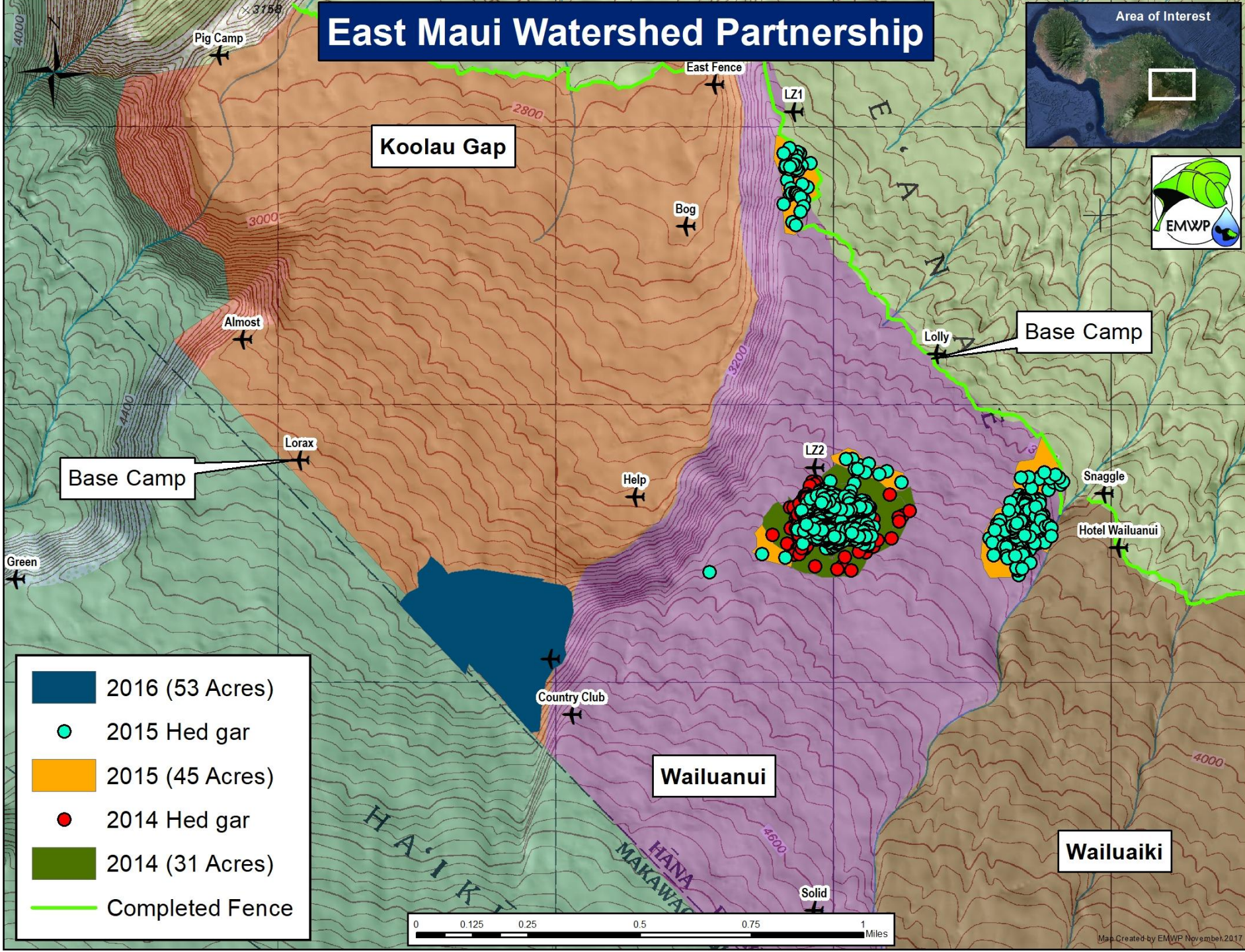
- 2015 (45 Acres)
- 2014 Hed gar
- 2014 (31 Acres)
- Completed Fence



East Maui Watershed Partnership



East Maui Watershed Partnership



2016 (53 Acres)

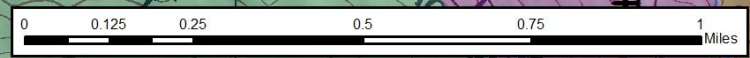
2015 Hed gar

2015 (45 Acres)

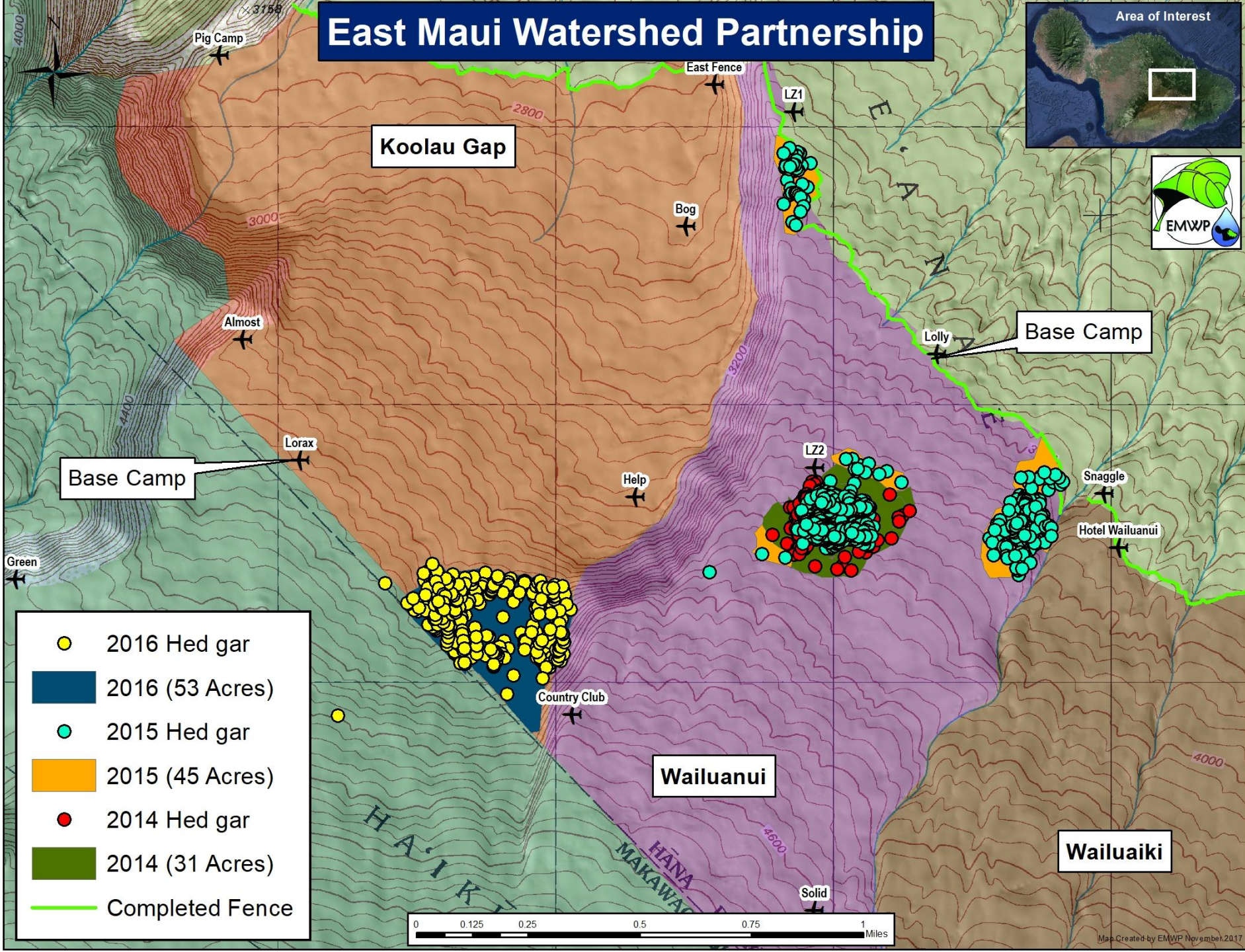
2014 Hed gar

2014 (31 Acres)

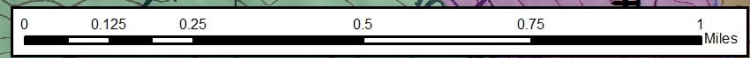
Completed Fence



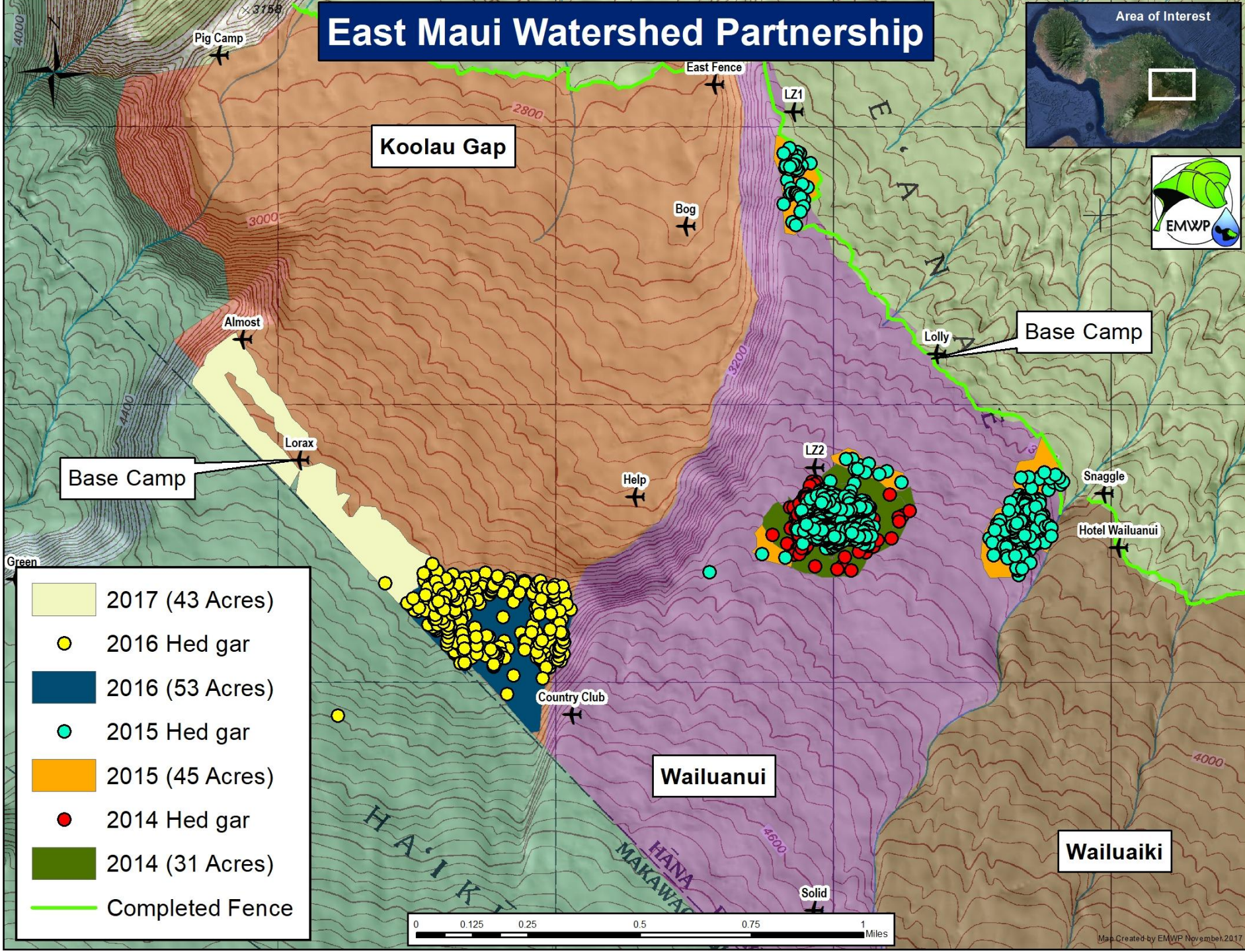
East Maui Watershed Partnership



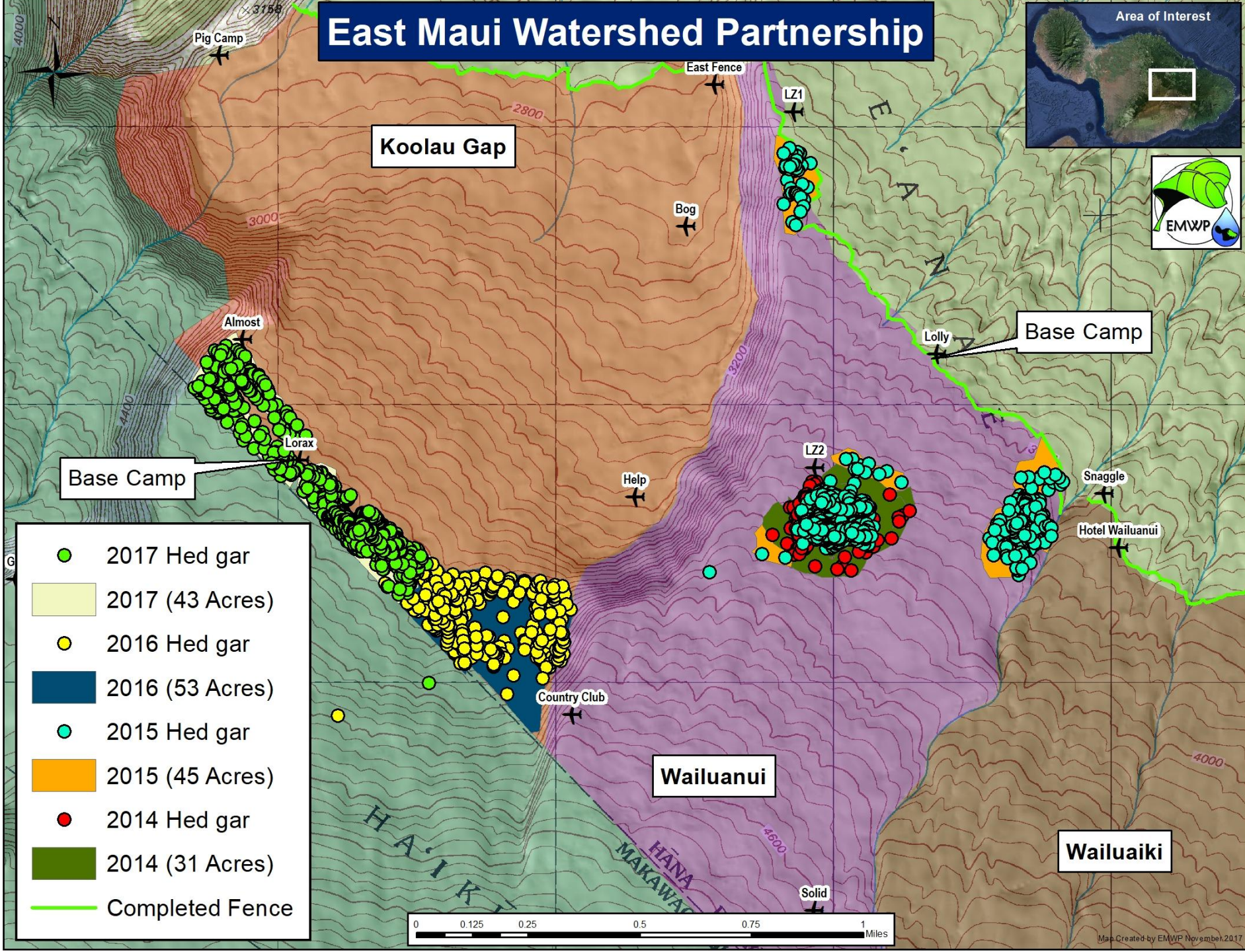
- 2016 Hed gar
- 2016 (53 Acres)
- 2015 Hed gar
- 2015 (45 Acres)
- 2014 Hed gar
- 2014 (31 Acres)
- Completed Fence



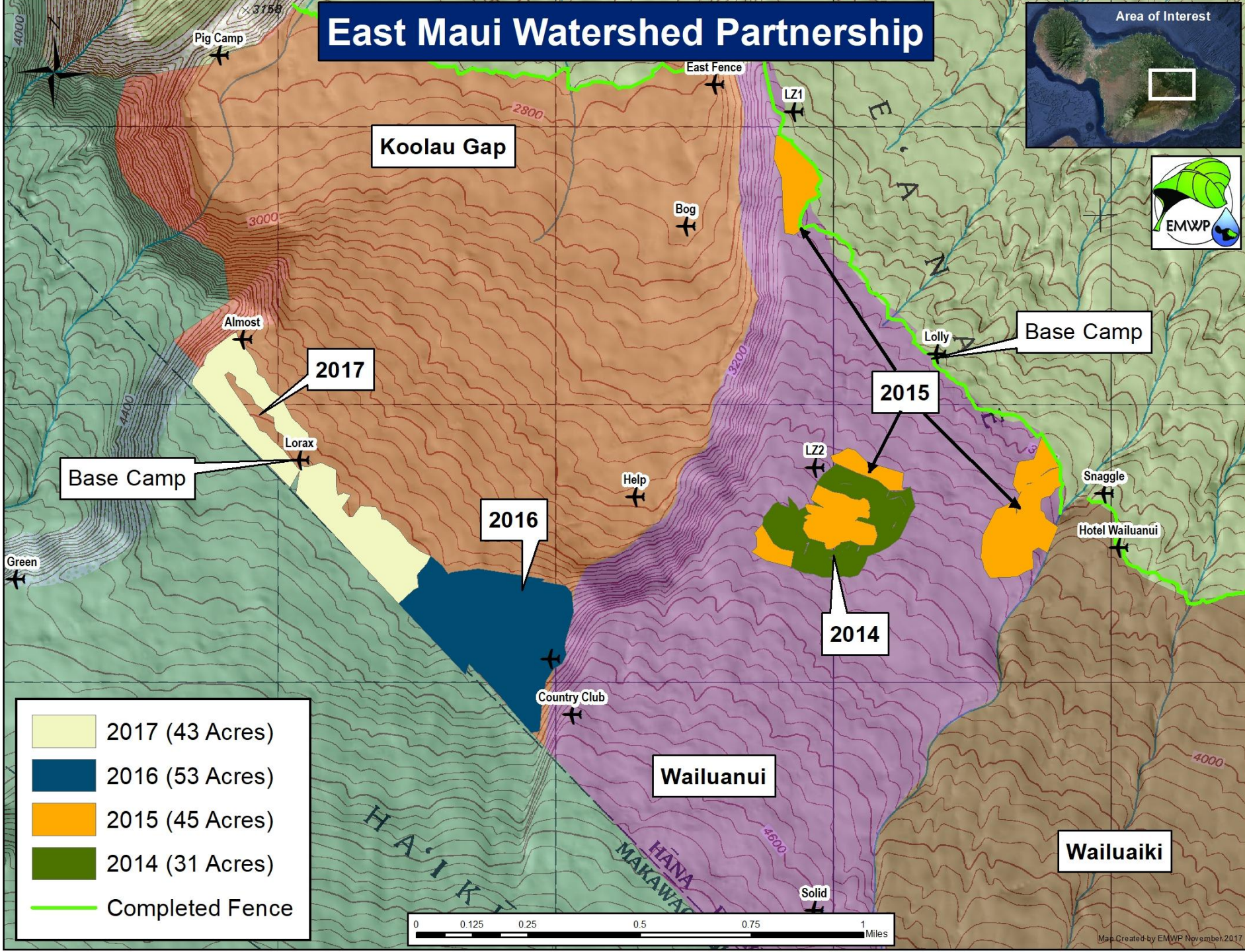
East Maui Watershed Partnership



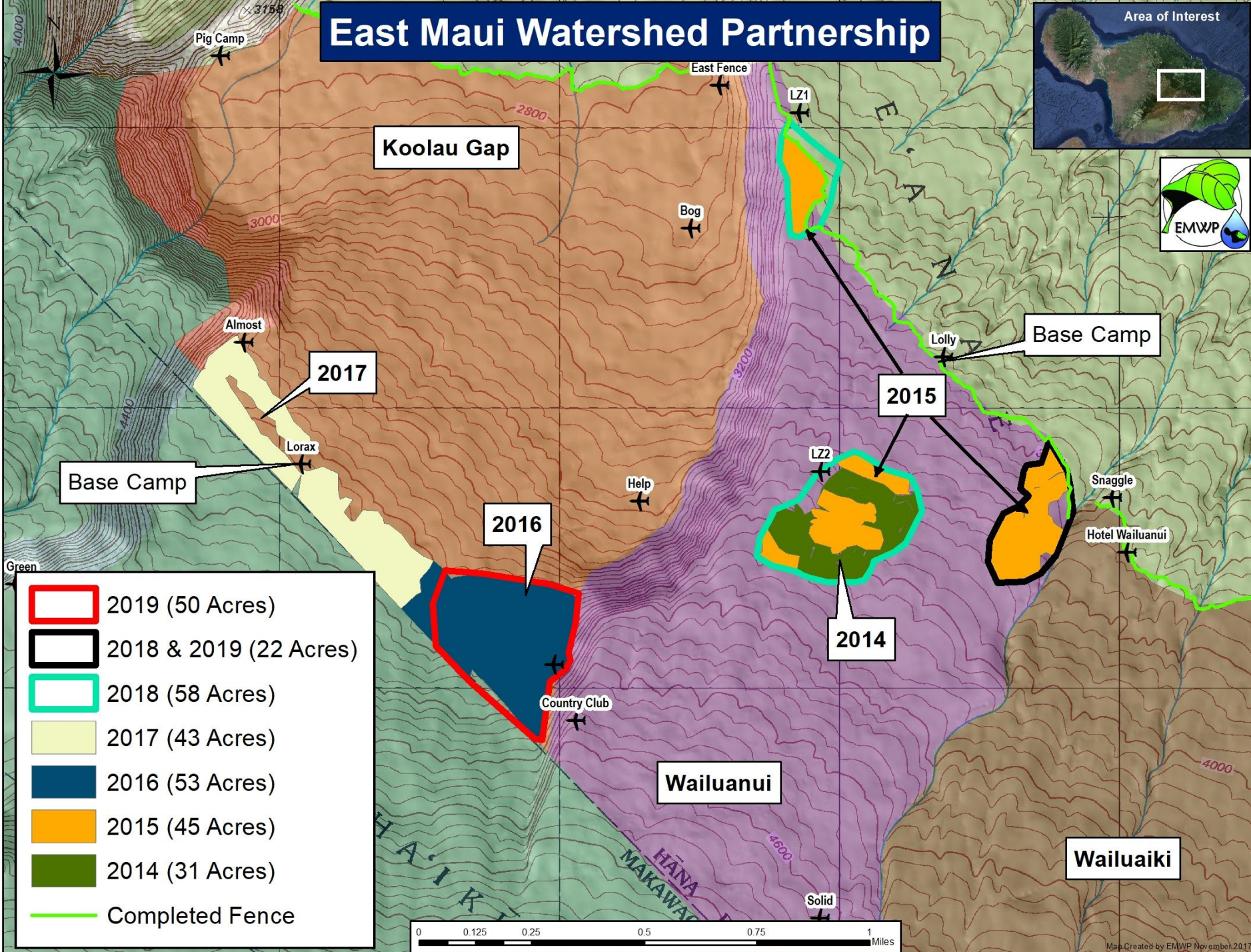
East Maui Watershed Partnership



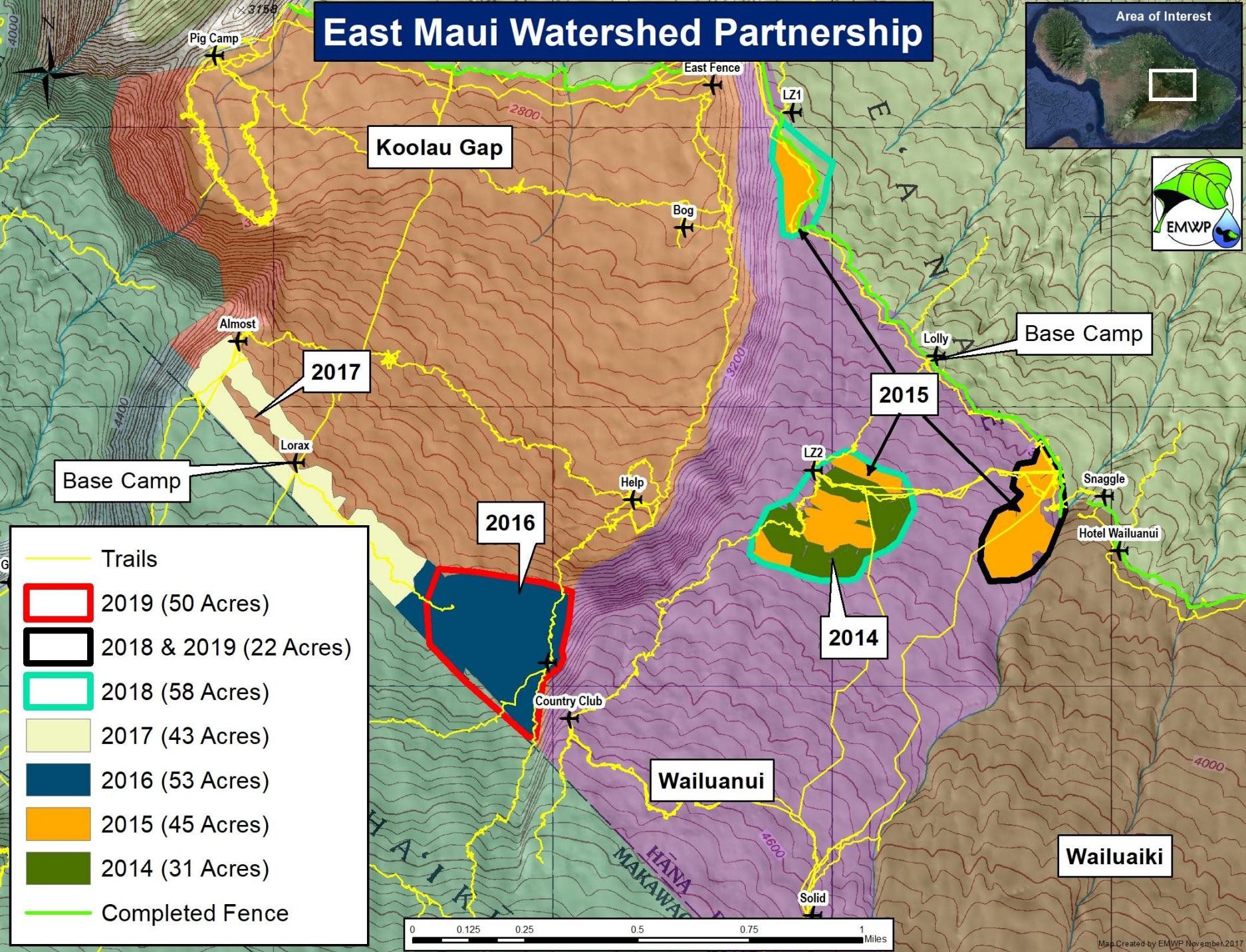
East Maui Watershed Partnership



East Maui Watershed Partnership



East Maui Watershed Partnership

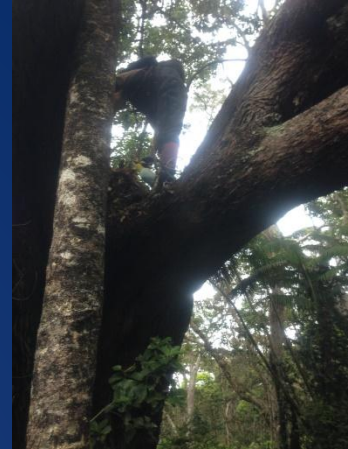


Ginger Control Strategy & Approach

- Scout to Determine Extent of Infestation
- Propose Work Area for the Year & Secure Funding
- Establish Base Camp (Shelter & Catchment)
- Sweep Proposed Work Area
- Maintain 3 Year Revisit Interval



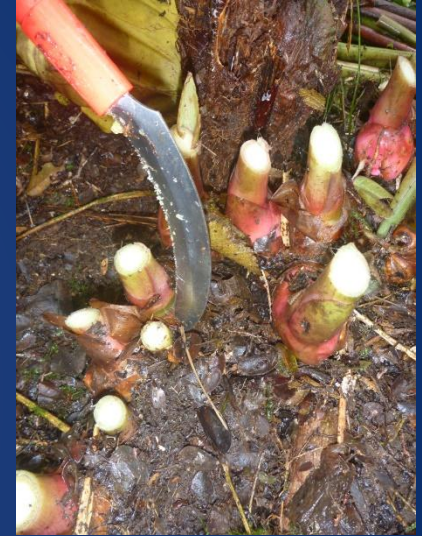
Ginger Control Strategy & Approach



- Requires Meticulous Search & Control Technique
- Cut Stump Using Sickle + Stabbing
- Spot Spray Rhizomes With Herbicide
1/2 gram Escort + 10 ml Methylated Seed Oil (MSO)
per liter Water
- Cover Treated Area With Cut Ginger Leaves
- GPS Point (Square Meters, Maturity)



Ginger Control Strategy & Approach





GROUP 2 HERBICIDE

Escort[®]
XP

HERBICIDE

Dry Flowable

Active Ingredient

Metsulfuron methyl

Methyl 2-[[[4-methoxy-6-methyl-1,3,5-triazin-

2-yl)amino]-carbonyl]amino]sulfonyl]benzoate..... 60%

Other Ingredients 40%

TOTAL **100%**

EPA Reg. No. 432-1549

EPA Est. No. 065604-AR-001

Nonrefillable Container

**KEEP OUT OF REACH OF
CHILDREN
CAUTION**

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand this label, find someone to explain it to you in detail.)

See inside leaflet for complete First Aid Instructions,
Precautionary Statements, Directions for Use and
Storage and Disposal Instructions.

Net Weight

1 Pound
84122394

A01798371 150622AV4

FIFRA Section 24(c) Special Local Need Label

FOR DISTRIBUTION AND USE ONLY WITHIN THE STATE OF HAWAII

For Spot Treatment for the Control of Wild Ginger

Escort XP Herbicide[®]

EPA Reg. No. 432-1549

SLN. No. HI-160002

THIS LABEL IS VALID UNTIL 10/10/2021 UNLESS OTHERWISE AMENDED, WITHDRAWN, CANCELED, OR SUSPENDED.

Escort Herbicide is a dispersible granule that is mixed in water and applied as spray. The use of Escort XP Herbicide under this Special Local Need registration is specific to spot application(s) for control of wild ginger (*Hedychium sp.*) in forests (montane wet forest, mesic forest), forest margins, and other mid to high elevation wildland areas where this plant is invasive.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. This label must be in the possession of the user at the time of pesticide application. Follow all applicable directions, restrictions, Worker Protection Standard requirements, and precautions on the EPA registered label.

Escort XP Herbicide is recommended for the control of wild ginger (*Hedychium sp.*) in forests, forest margins, and access roads and trails.

Apply Escort XP Herbicide at 0.067-0.133 ounces (1.9 -3.8 grams) per gallon of water (½ -1 gram Escort XP Herbicide per liter of water) for spot treatments, not to exceed 3 ounces (85 grams) per acre per year within the spot treatment area.

HOW TO USE

Spot applications may be made using backpack sprayers, hand-held tanks, spray bottles, or lab squirt applicator bottles. Apply to the leaves, exposed rhizomes, and cut surface or stalks and rhizomes. To maximize uptake when treating cut ginger stems and rhizomes, cut into dormant corns and apply Escort XP Herbicide solution. When applying Escort XP herbicide solution, avoid run-off or overspray onto soil by directing spray at ginger surface rhizomes or foliage only.

Escort XP Herbicide may be combined with non-ionic surfactant to improve foliar uptake.

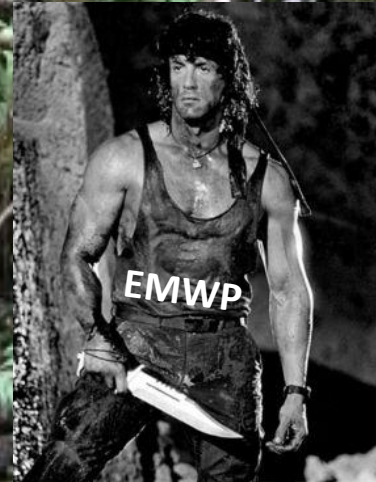
The use of dye is recommended to track spray solution.

Spot applications to limit regrowth may be made on as-needed basis.

ACCEPTED

October 11, 2016

**Under Hawaii Pesticides Law
as Supplement to Product No.
9346.388**



Resources & Logistics

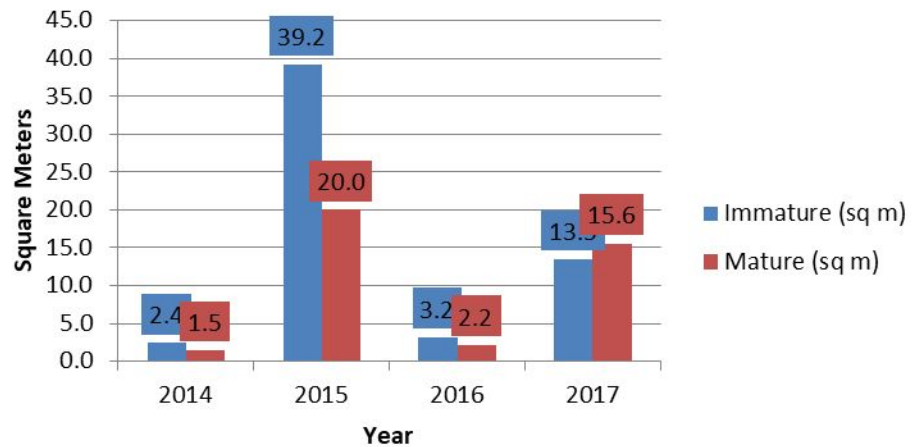
- Backcountry – Helicopter Only Access
- Catchment Water to Mix Herbicide
- Average 1 Week Camp Trip per Month
- Funded by Maui County Department of Water Supply & DLNR Division of Forestry & Wildlife
- EMWP's 2017 Ginger Control Project Cost About \$60,000



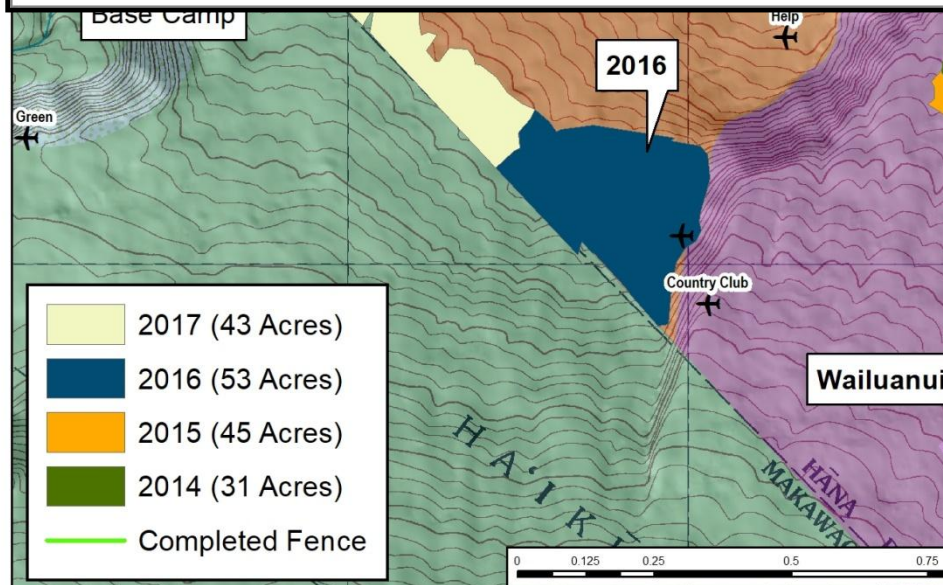
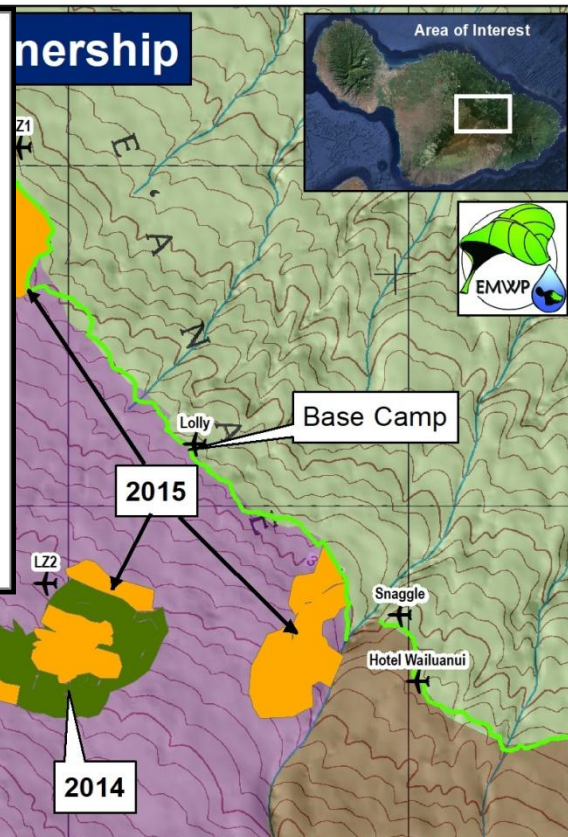
Expected 2017 Outcomes

- Weeds treated: *Hedychium gardnerianum*, *Psidium cattleianum*, *Clidemia hirta*, *Spathodea campanulata*
- Staff time: 27 person days
 - 5 Camp Trips (4 People)
 - 1 Day Trip (5 EMWP + 2 LHWRP)
- 1 More Camp Trip Needed To Finish & Break Down Camp – Scheduled for Next Week
- Area protected: 2017 Polygon = 43+ Acres

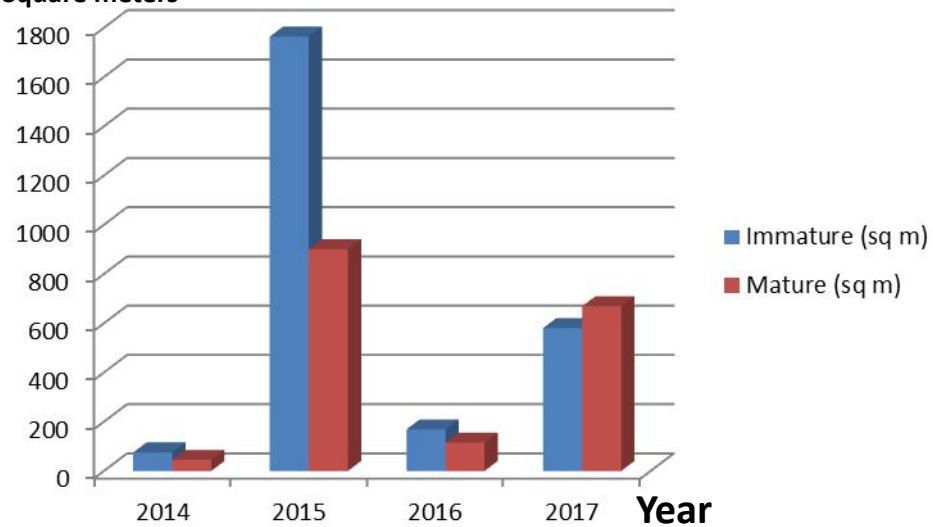
Avg. Square Meters Per Acre



Ownership



Square meters

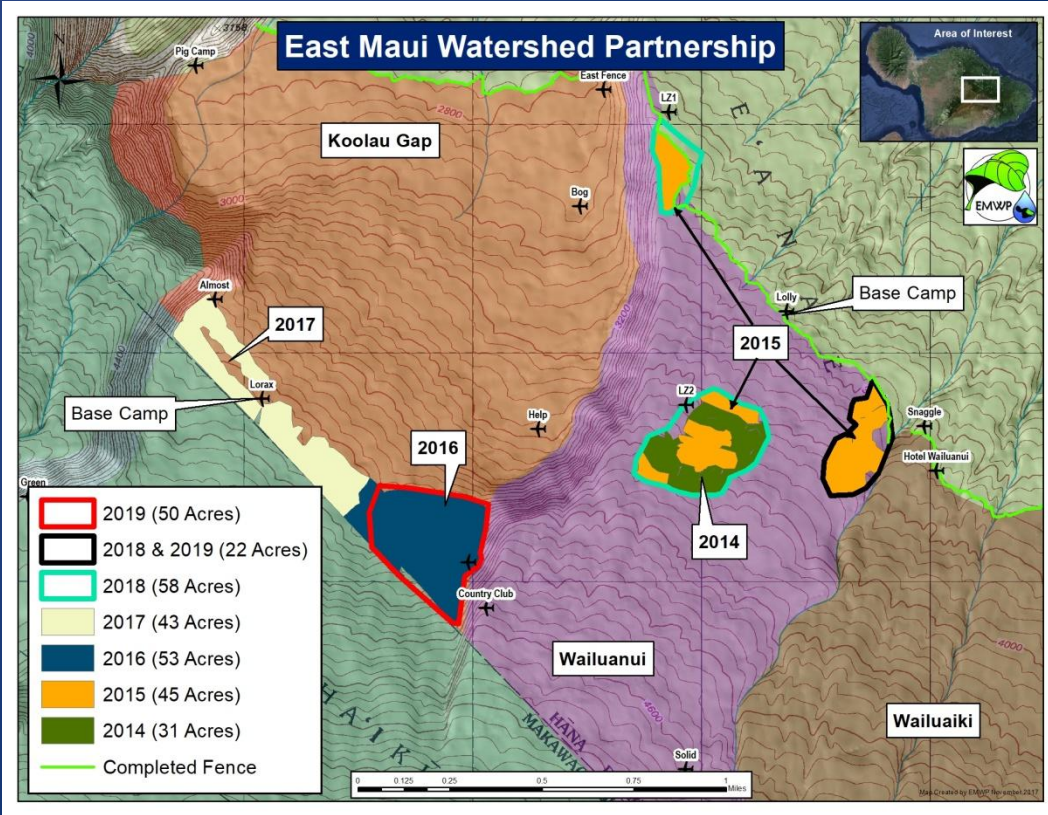


Challenges & Limitations

- Very Wet, Remote Environment
- Source Populations Remain
- Hard to Find & Treat Every Tiny Individual (Epiphytic)
- Resprouting If You Cut Wrong, or Don't Treat Every Rhizome (Including Subterranean) and Seedlings
- Dense Canopy Makes Aerial Detection Difficult
- Herbicide Mixture Designed for Immediate Use – Limited Storage Time



- Re-Establish Wailuanui Base Camp (Lolly)
- Begin Re-Sweeping Wailuanui Polygons in 2018
 - 44 Acres
 - 14 Acres
- Explore Alternative Herbicide Cocktails & Tools?



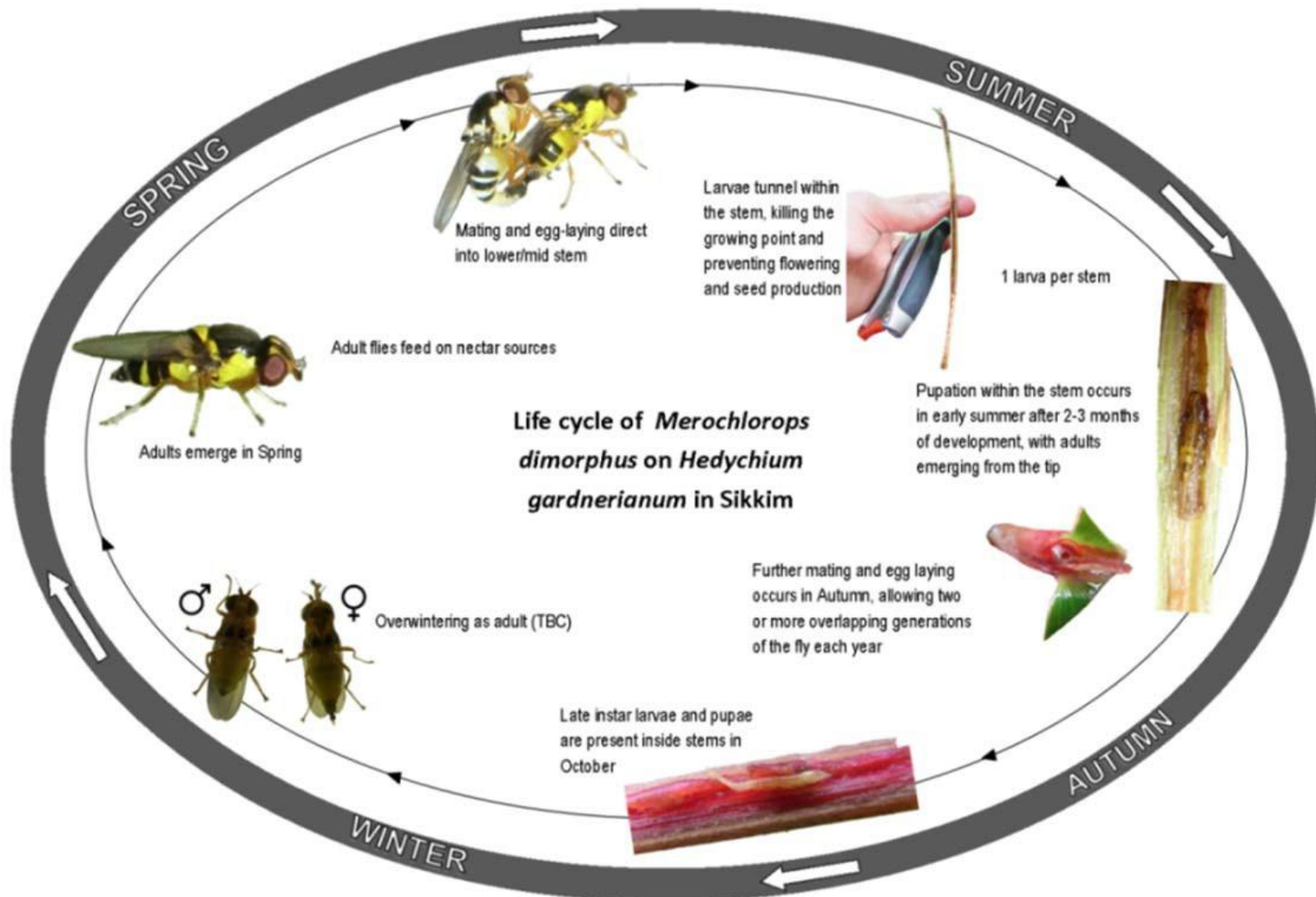
Thank You!



Discussion Questions

- **Best cocktail? Escort Storage Limitations?**
- **Revisit schedule?**
 - Based on reproductive biology & resources
- **Best control methods?**
- **Strategy?**
- **Any other threats we should be looking for at this location?**
- **Anything anyone wants GPS'ed in this area?**

Merochlorops Life Cycle

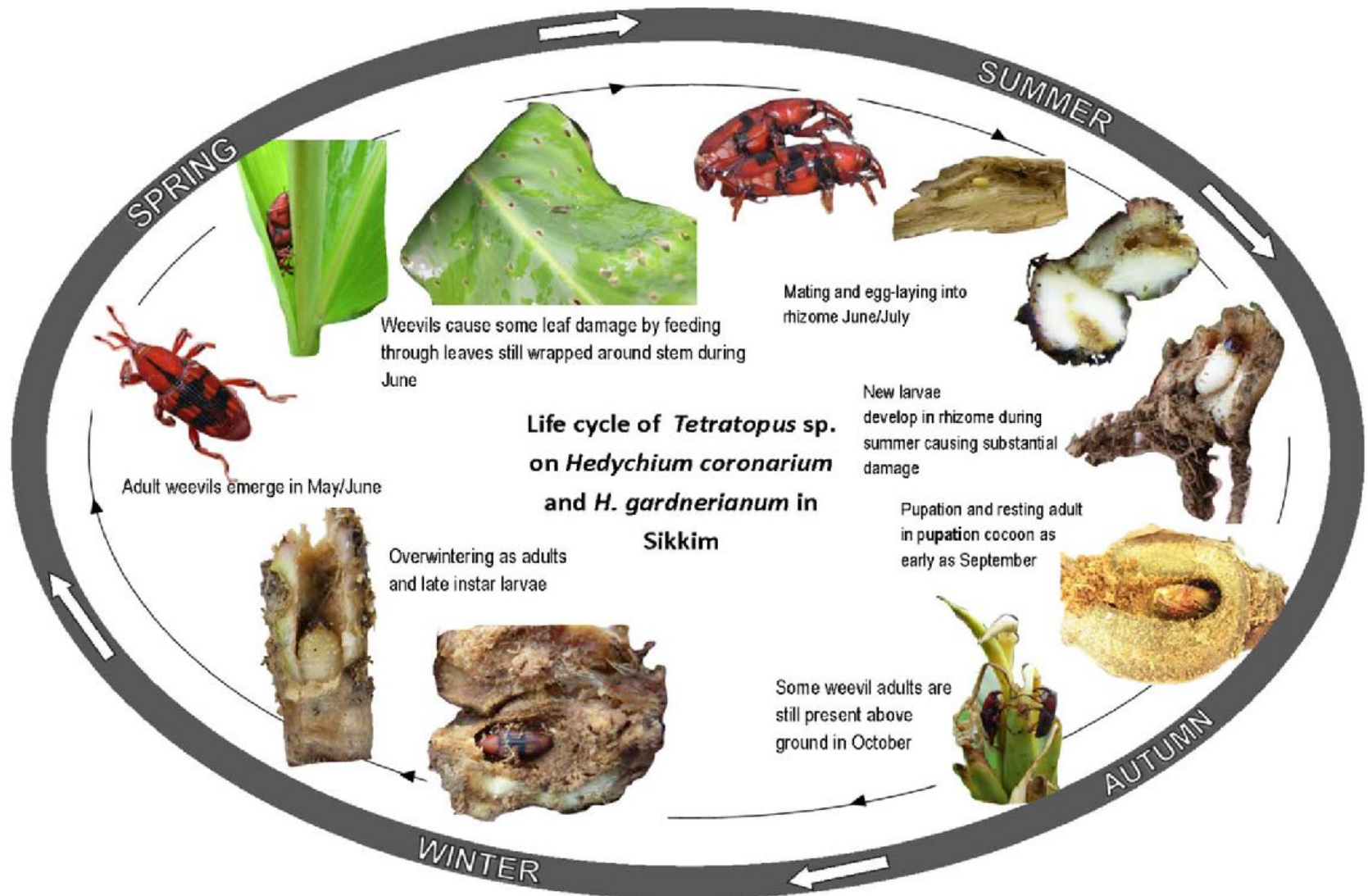


Black Hispine-Prionispa sp



Hed Gar exposed to Hispine Beetles

Proposed lifecycle for *Tetratopus* sp. weevil on *H. coronarium* and *H. gardnerianum*



Newly emerged adult *Tetratopus* weevil in
quarantine (ex India
H. gardnerianum-collected as larva)



Damage to *Hedychium coronarium* rhizome
caused by
Tetratopus weevil larva in quarantine



Tetratopus larva in *H. coronarium* in Sikkim



FIFRA Section 24(c) Special Local Need Label



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ACCEPTED

October 11, 2016

**Under Hawaii Pesticides Law
as Supplement to Product No.
9346.388**

- 85 g / Acre
- 85g = 42.5gal
- 2g/gal
- .5/L