Persistent challenges and lessons learned in ant management efforts in Hawaii:

Argentine ants at Haleakala National Park

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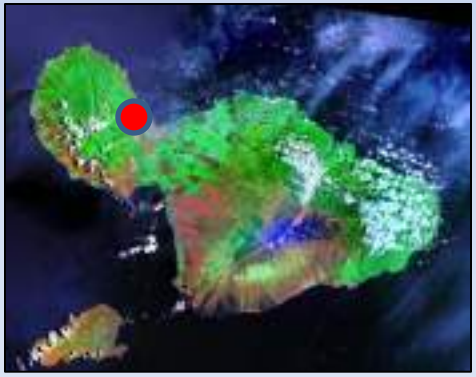
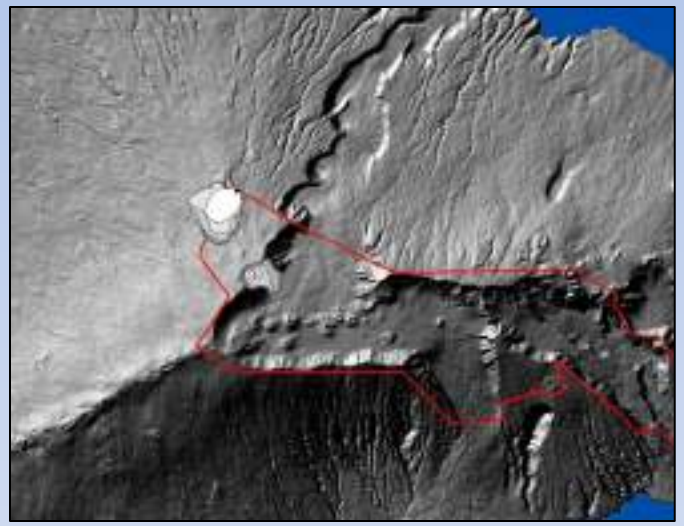
Ant management in Hawaii

Management/eradication efforts have tended to be restricted to:

Offshore islets

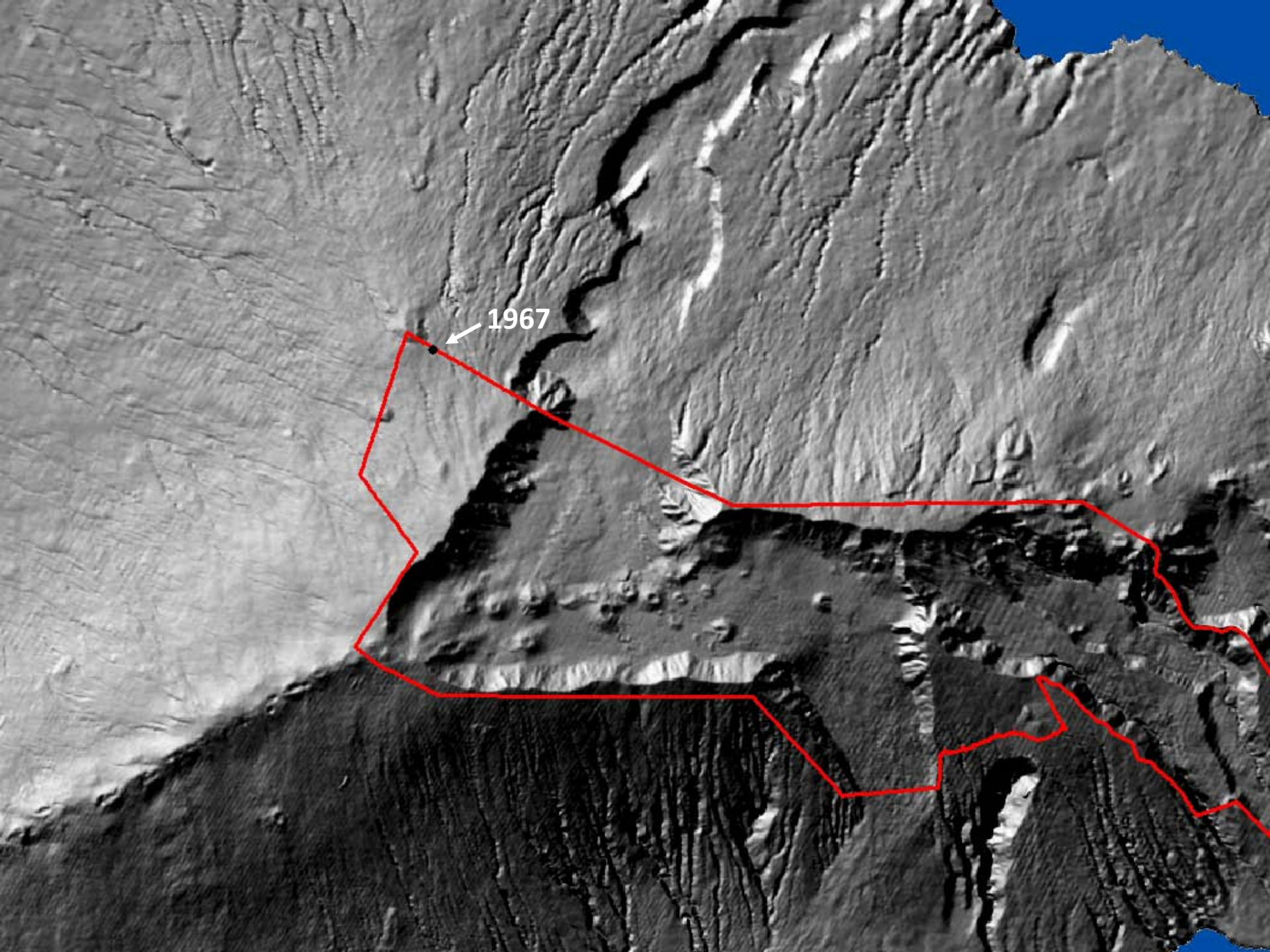


New/incipient populations



Discrete upland populations


Maui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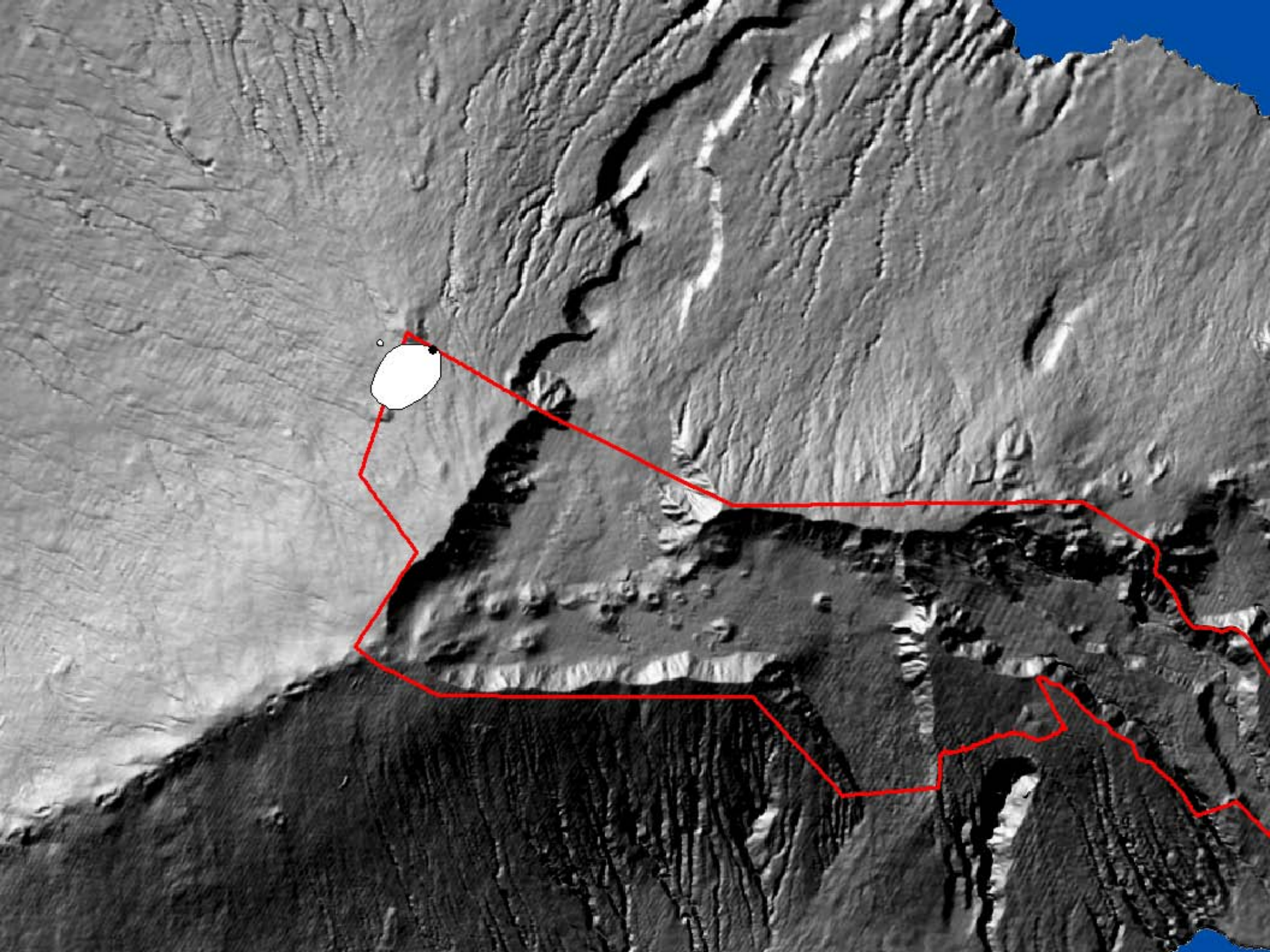

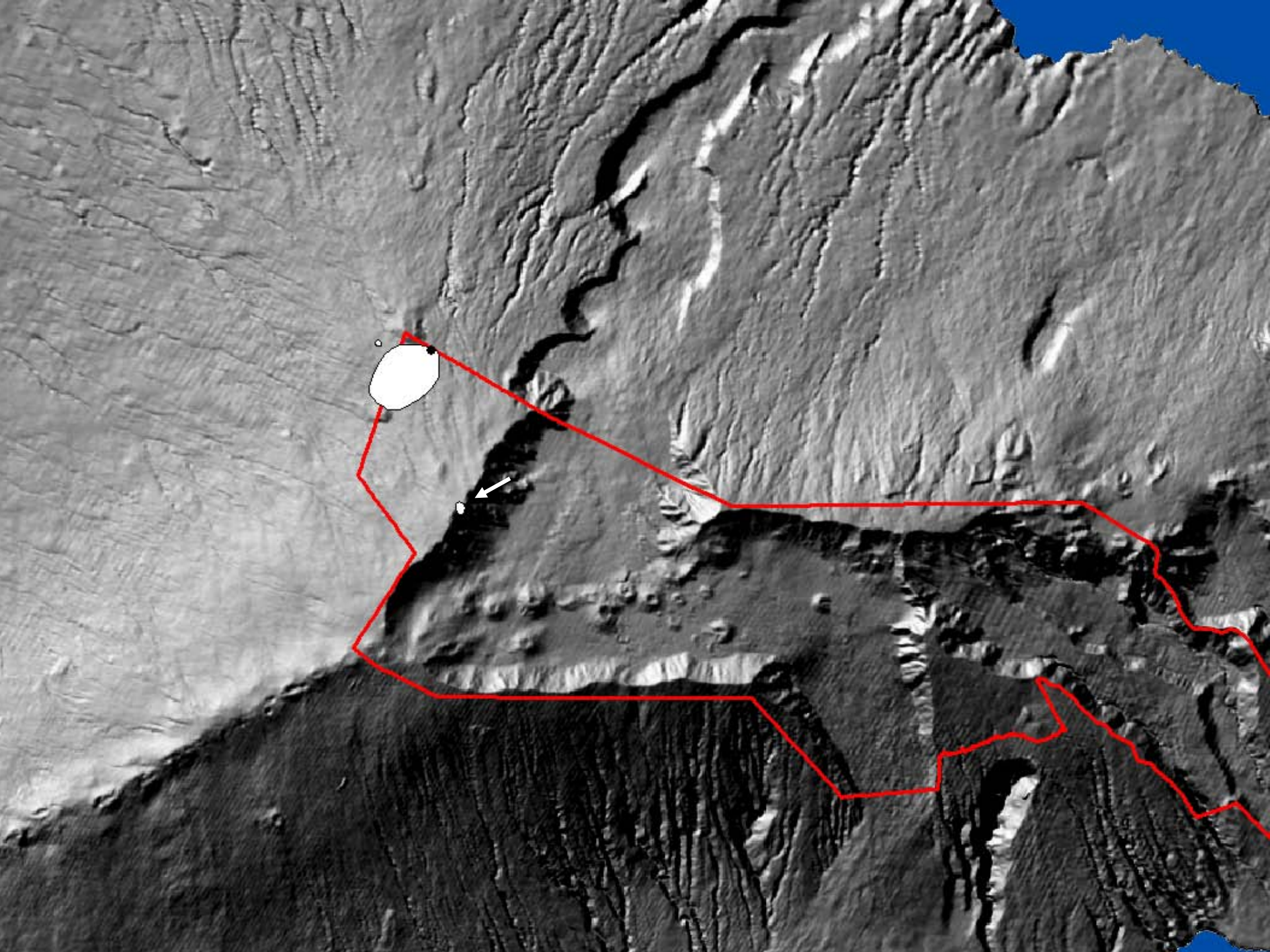

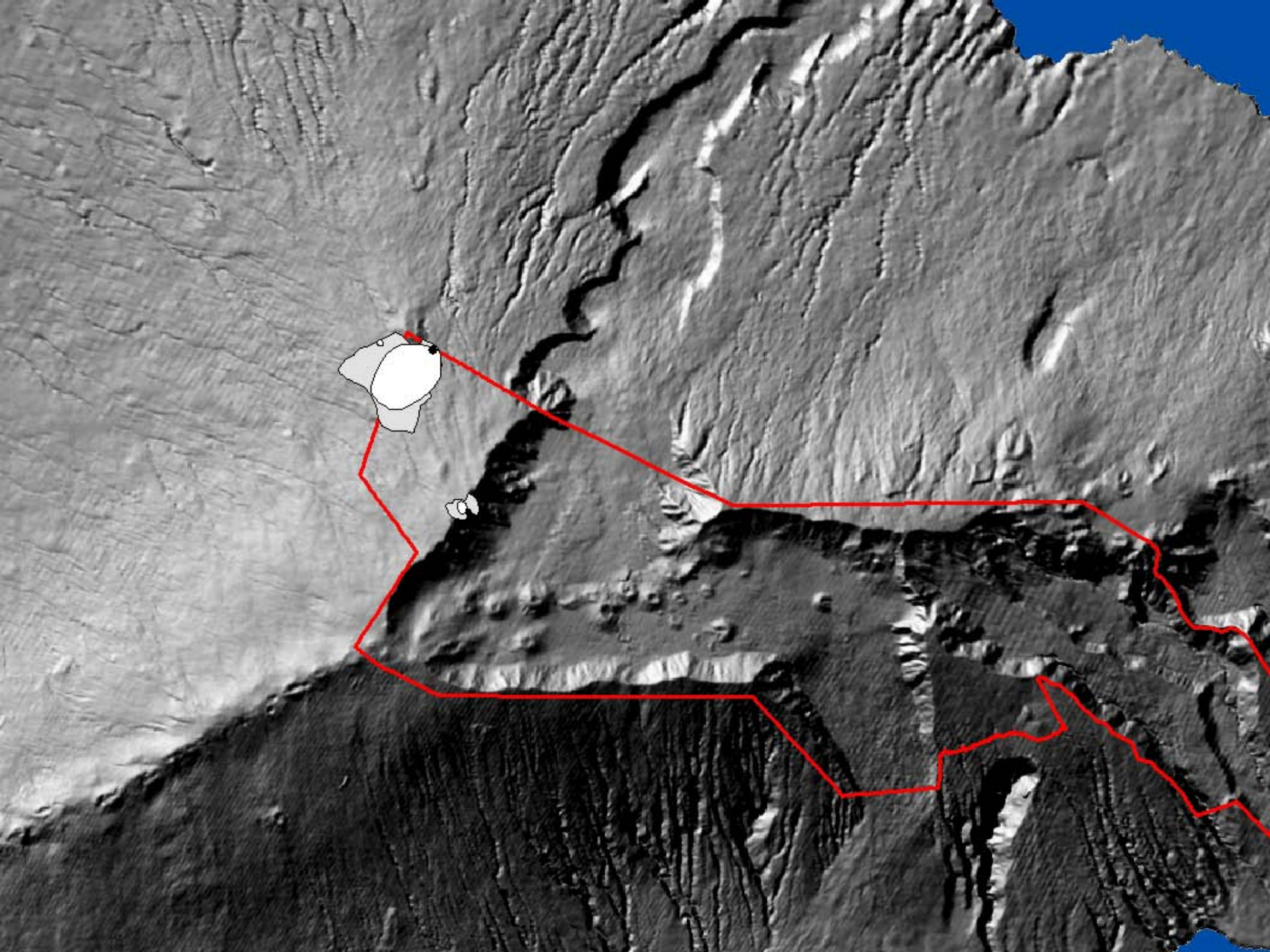

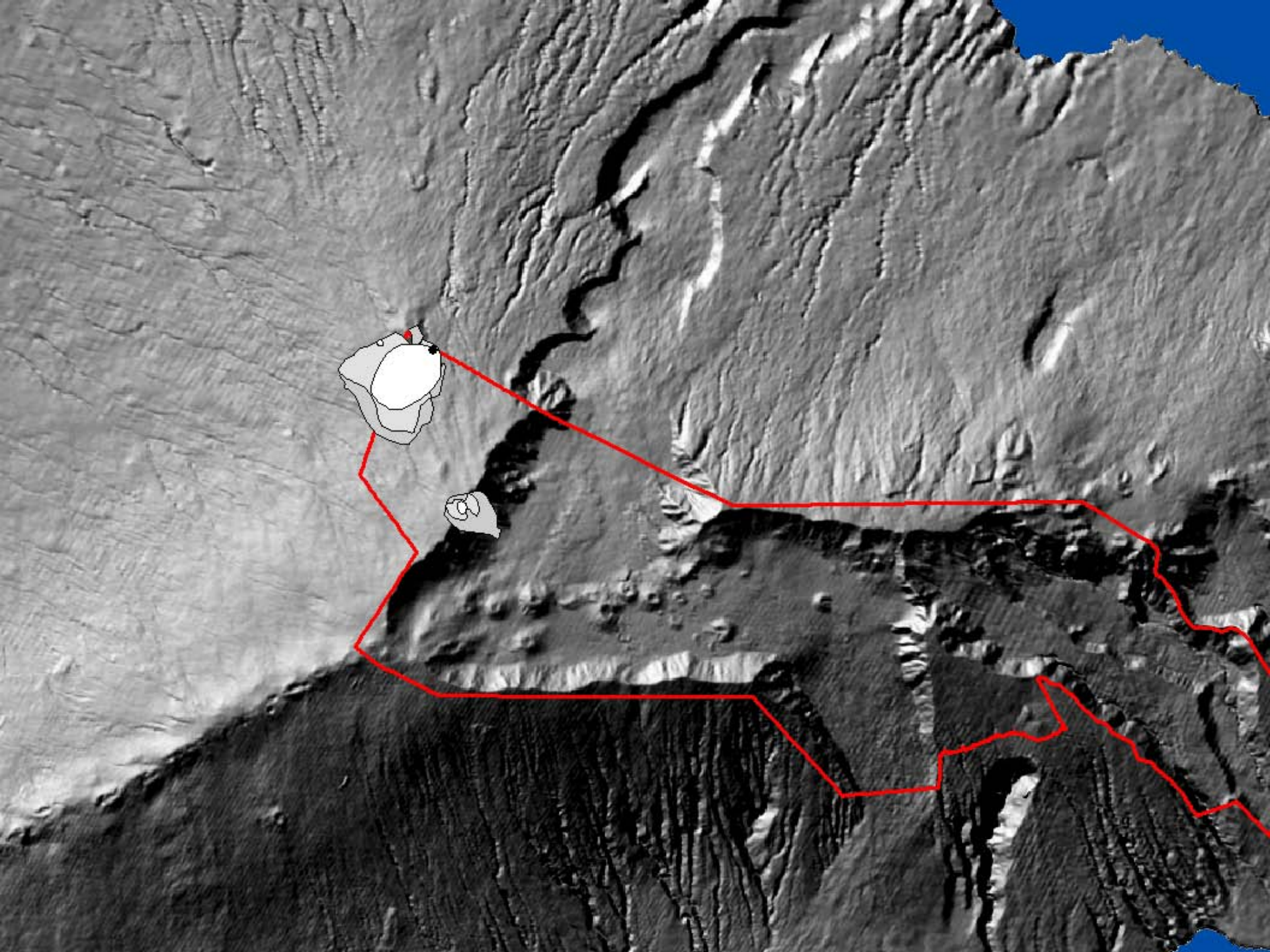

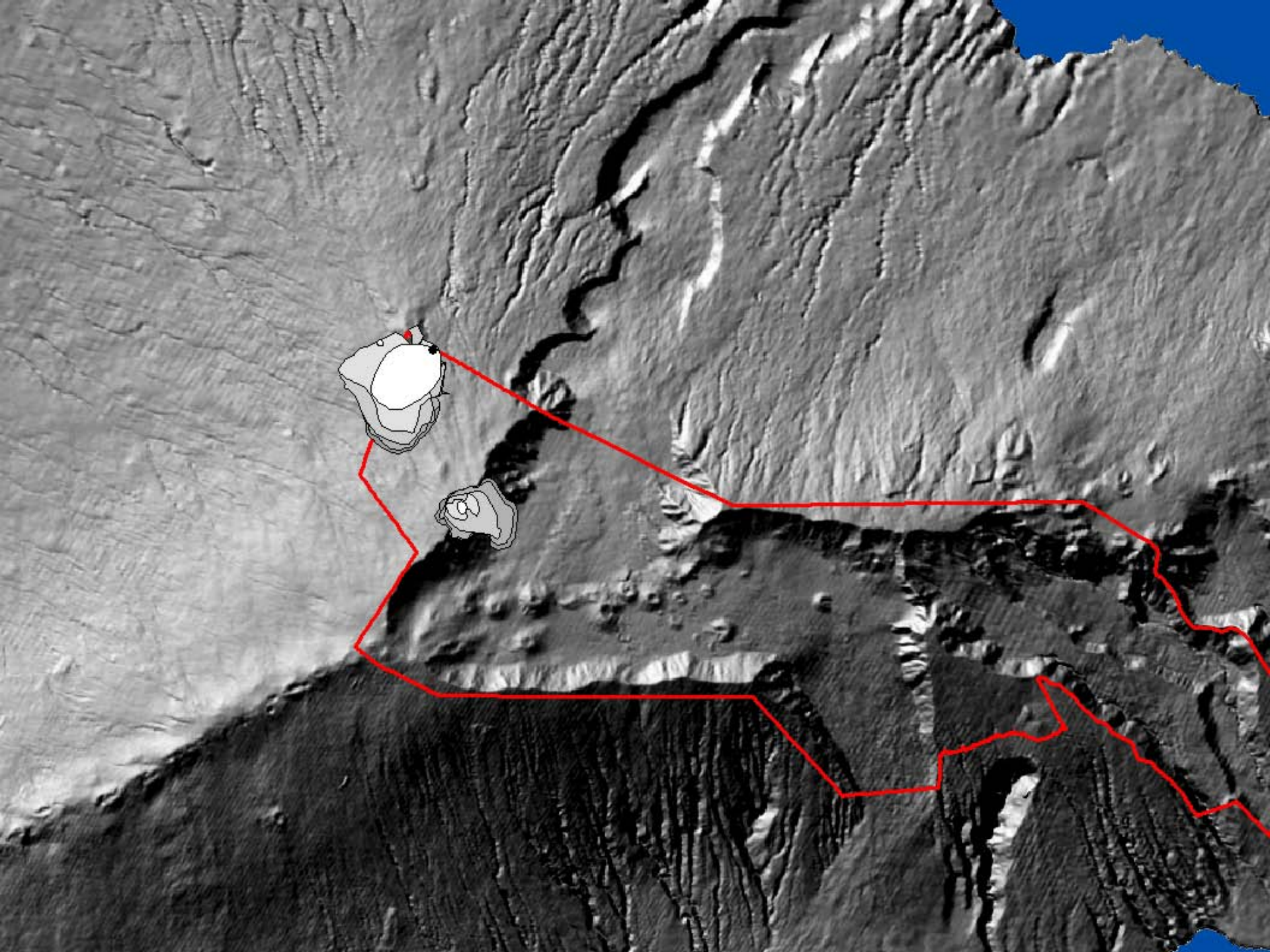

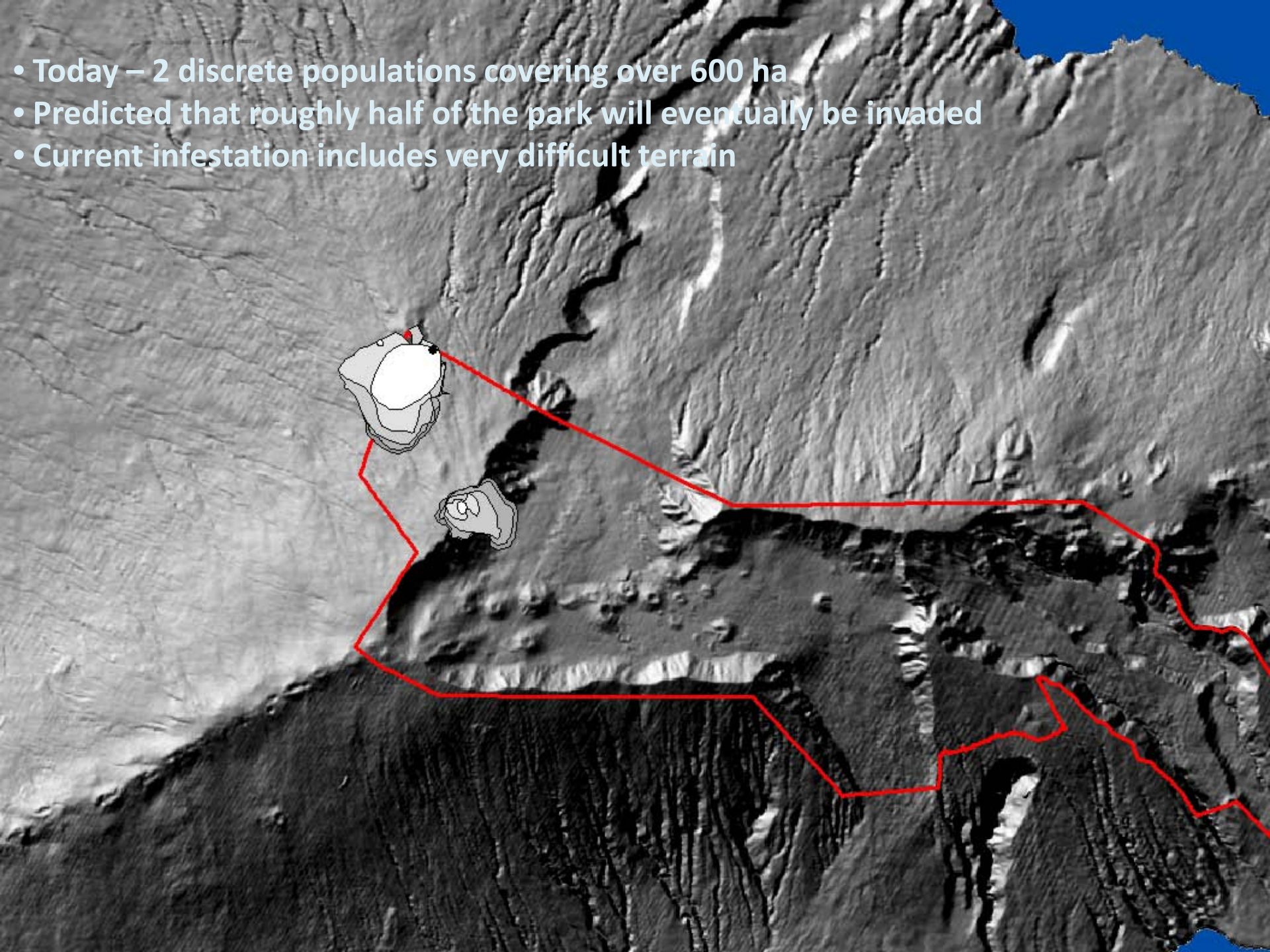
• Today – 2 discrete populations covering over 600 ha
• Predicted that roughly half of the park will eventually be invaded
• Current infestation includes very difficult terrain

Haleakala Argentine Ant Project

• Seemed like broadcast of bait was the only realistic option for this situation

• Started a year-long bait preference test in 1994, using mostly granular baits (blanks)

• Identified Maxforce Granular Ant Bait as the most attractive

• Moved on to test Maxforce in exploratory small field plots (25 m x 25 m) in 1995

• Tested several application rates (2 and 4 lbs/acre), application methods (broadcast and piles of bait), concentrations of active (0.9% and 0.5% hydramethylnon), solvents (standard and alternate), and granule types (regular protein granules and mix of protein and sugar-based granules)

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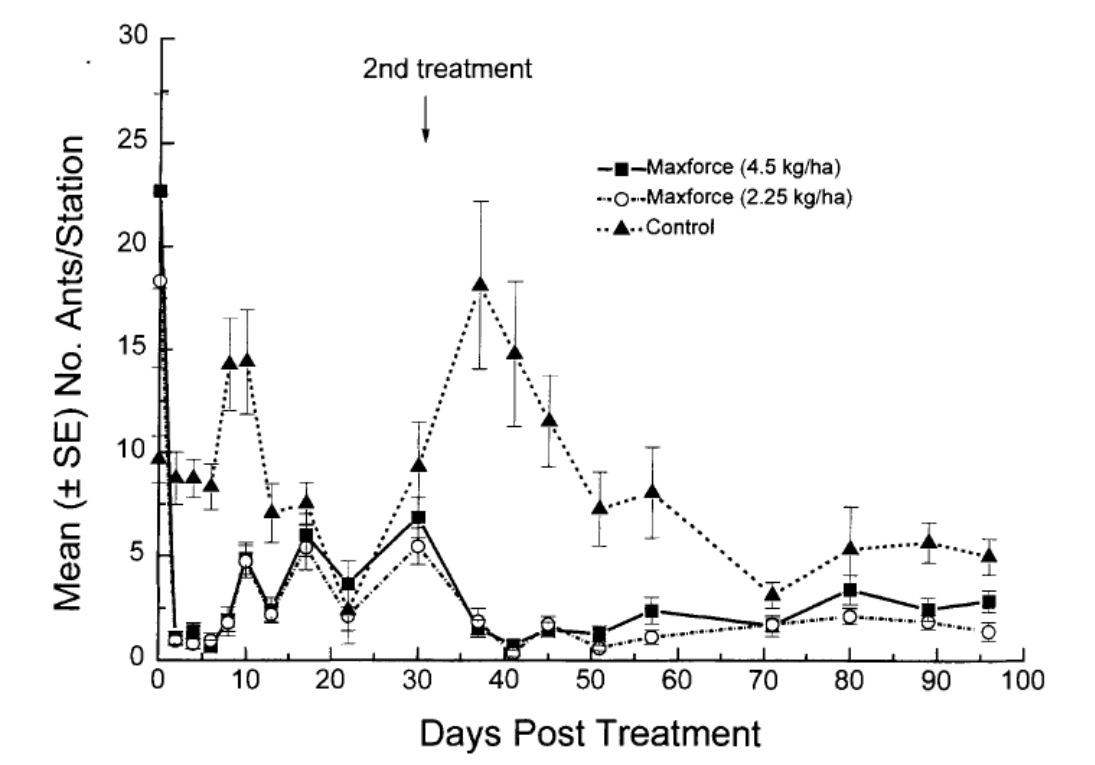
• Most treatment types yielded very similar results: large initial kill of workers (as judged by foragers at baits), but substantial survival of nest fragments in the plots (under-rock nest surveys)



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• Despite the survival of nests, these early results were felt to be fairly promising, and additional variations with Maxforce were attempted in 1996-97, still using 25 x 25 m plots:

• Time of day: morning application vs evening application
• Application rate: up to 8 lbs/acre (versus 2 and 4 lbs tested initially)
• Location: lower population, upper population, crater floor
• Season: winter/spring vs summer/fall

•All again yielded similar results

• Eventually increased plot size to 100 x 100 m, and tested up to 4 consecutive applications, each separated by 5 weeks
• Also tested Maxforce in combination with other products (see later)

• Yielded similar results

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• In 1996 shifted strategies – tested whether perimeter treatment with Maxforce could contain the two populations

• This would buy time, allow us to keep testing eradication methods and products, while preventing further spread

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- A 120 m perimeter plot, treated once with Maxforce, prevented outward spread of the lower population boundary for at least 1 year

- Decided to apply this strategy to all expanding borders of both populations

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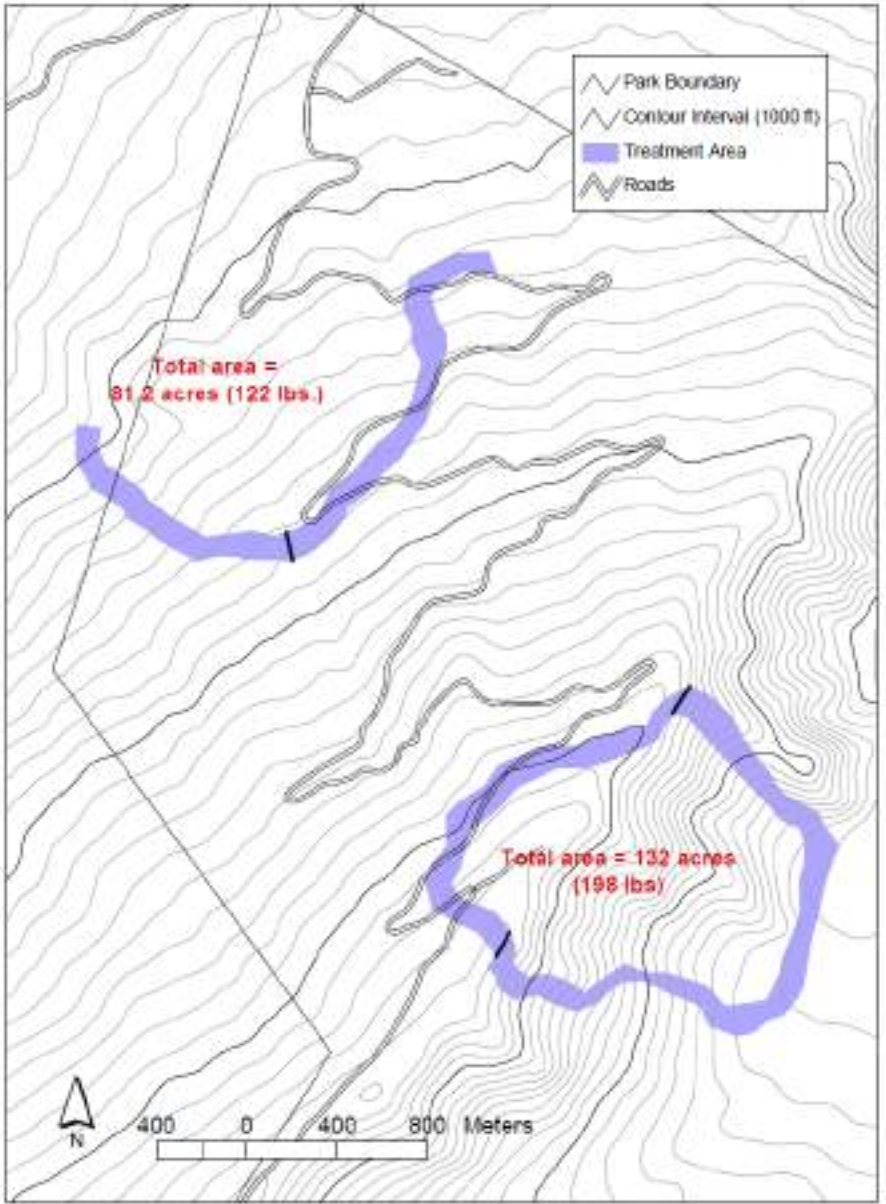
• First ‘border treatment’ occurred in 1997, and covered 86 ha



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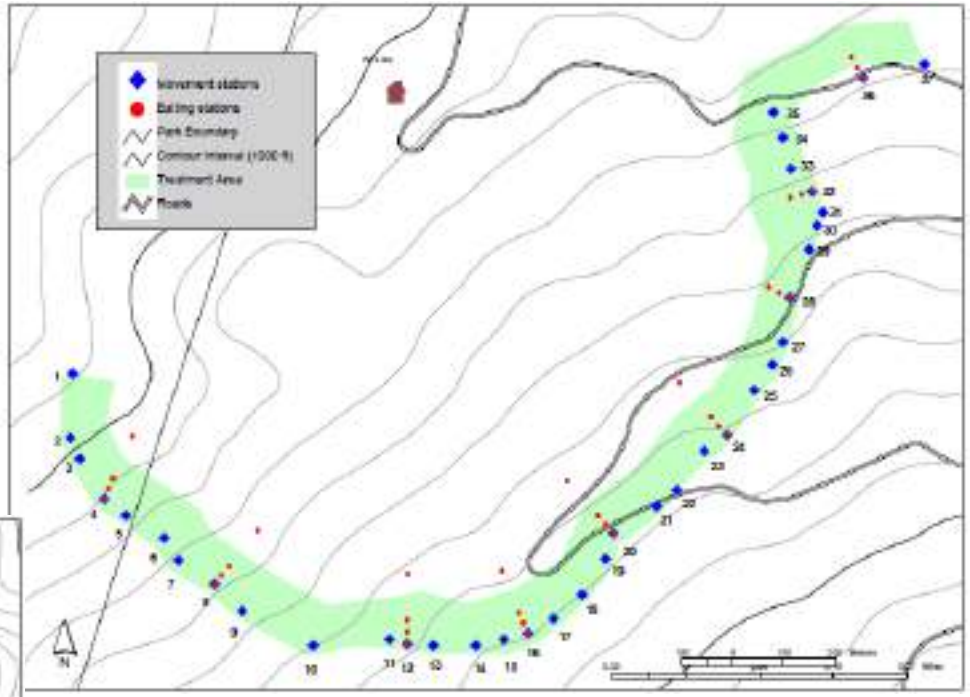
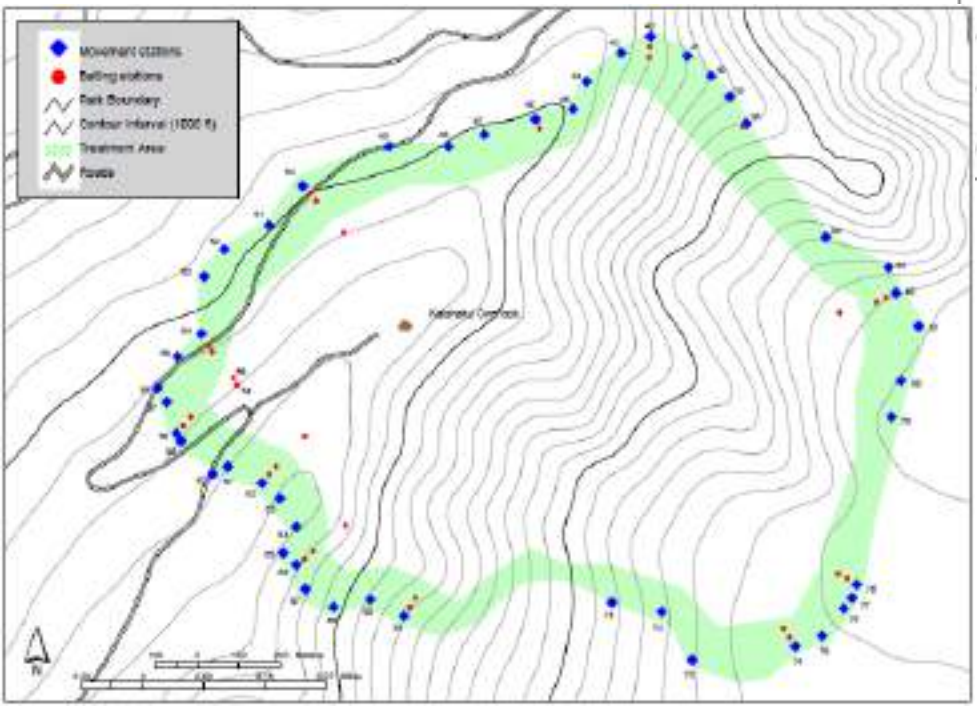
• Monitored rate of outward spread at 84 stations around perimeters

• Monitored ant densities using bait cards at every fourth station





• Continued this containment strategy from 1997 through 2004

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- Analysis of the effectiveness of this containment strategy indicated that it reduced rates of outward spread by about 61-65%, on average
- However, in fastest spreading areas, reduction was less than 50%

- Because of insufficient effectiveness, cost, and a variety of other contributing factors, the border treatment was discontinued after 2004

Prevented Spread of Argentine ant Populations as of Summer 2001

Average annual distance spread (m) by region during years prior to treatment and during years after treatment (measured using ArcView).

Lower Population:

Region	1994-1996	1997-2001	% Reduction
West Lower	49	27	46%
East Lower	42	10	76%
Average Lower	**44m**	**17m**	**61%**

Upper Population:

Region	1993-1996	1997-2001	% Reduction
North Crater Rim	25	3	88%
South Crater Rim	25	6	76%
Kalahaku Pali	54	20	63%
Leleiwi Pali	103	22	79%
Crater Floor	105	56	46%
Average Upper	**48m**	**17m**	**65%**

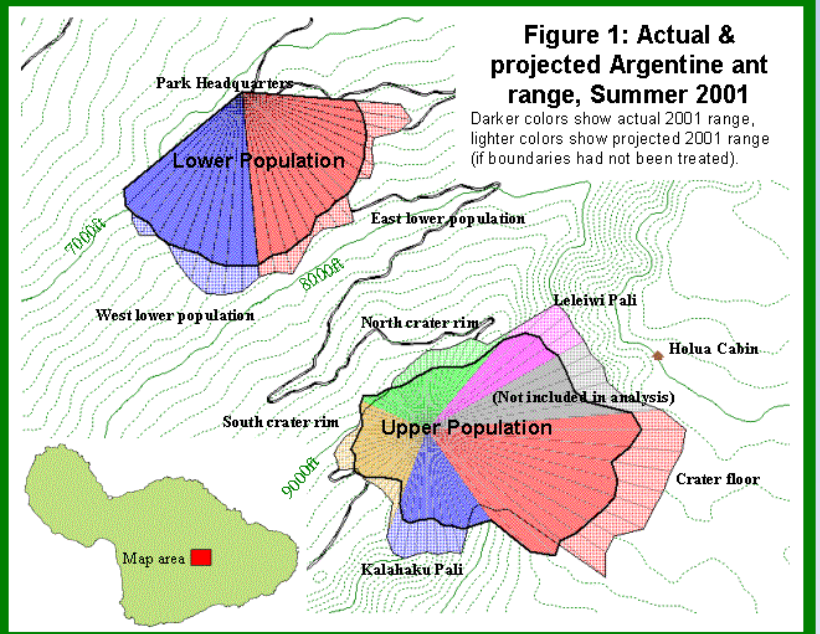

Figure 1: Actual & projected Argentine ant range, Summer 2001

Darker colors show actual 2001 range, lighter colors show projected 2001 range (if boundaries had not been treated).

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• In the meantime, continued testing new ant bait products from 1998-2008, in the hopes of finding something that works better than Maxforce – something more likely to achieve eradication
• Most tests conducted in 1 ha or larger plots

Product	active	type
Grants Kills Ants	arsenic	bait stake
Maxforce FC	fipronil	granular
Pharorid	methoprene	user made – liquid (bait stations)
Pharorid & Maxforce		
Advance GCAB	abamectin	granular
Boric acid/sugar water	boric acid	liquid (bait stations)
Gourmet Liquid Ant Bait	boric acid	liquid (bait stations)
0.5 HP Granular Ant Bait	hyd./pyriproxyfen	granular
Advion Insect Granule	indoxacarb	granular

• Other products investigated for bait attractiveness

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• With exception of Maxforce FC, none of the tested baits produced results qualitatively better than Maxforce

• Maxforce FC (with fipronil) may have approached eradication in 1 ha plots (after 4 applications), but this product was discontinued as a granular bait

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Lessons and conclusions:

- Argentine ant is a very difficult species to eradicate/control

- Results may differ substantially when products tested in different settings or at different scales

    - Advance GCAB and Gourmet Liquid Ant Bait both performed well in field-based bait preference trials, but yielded poor control in field plots
    - Advion IG caused high mortality in lab colonies, but no control in 1 ha field plots (Maxforce had opposite results)

- Large scale field trials are necessary to accurately assess efficacy of an ant bait product

- A bait specially designed for Haleakala may be necessary for better results

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Continuing challenges:

- Logistical and biological
  - 2 populations are now very large
  - includes much difficult terrain – impinges on methods that will be feasible
  - sensitive environment – many rare & endangered native species

- Regulatory environment
  - products change ownership, label languages change – label language often quite restrictive and rarely specifies use in natural areas
  - Experimental Use Permit required for most work – restricts total area to 10 acres (4 ha)
  - endangered species adds another level of regulatory oversight (USFWS)
  - closer scrutiny of regulations than in the past

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• Challenges of the Haleakala situation are formidable, but we continue to view it as a good site to test new products and strategies due to methods and knowledge developed over 15+ yrs

• Results from new trials can be applied to other situations even if strategies not feasible at Haleakala

Thanks to the many collaborators on this project:

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