Ka ʻOhana o Kahikinui
April 2022

1 INTRODUCTION

Native dry and mesic forests once formed a contiguous watershed around Haleakalā, Maui, providing habitat for hundreds of species of plants and animals found nowhere else on earth. The forests of leeward Haleakalā were striking in stature and rich in species, dominated by towering canopies of koa and ʻōhiʻa, and carpeted in a diversity of understory trees, shrubs, lichens, and ferns that formed complex and stable ecosystems that supported communities with sustainable fresh water and forest products. Following western contact, cattle, goats, and deer were introduced to the islands with devastating impacts to the forests of leeward Haleakalā. These forests are now experiencing extreme degradation from grazing and trampling, invasion by alien plant species, and habitat fragmentation. In old growth forests, feral ungulates destroy native understory plants, leading to the loss of culturally important species, and facilitating invasion by noxious weeds. Ungulates can also facilitate the increase of Rapid Ohia Death (ROD) by damaging trees and creating openings for the disease to spread. While large canopy tree species often persist for some time despite ungulate disturbance, forest understory declines dramatically, soils become exposed, and erosion cycles take hold. More importantly, this disturbance suppresses the natural regeneration of canopy species. Without recruitment, the stands eventually age and die, leaving no keiki, and leading eventually to total forest destruction.

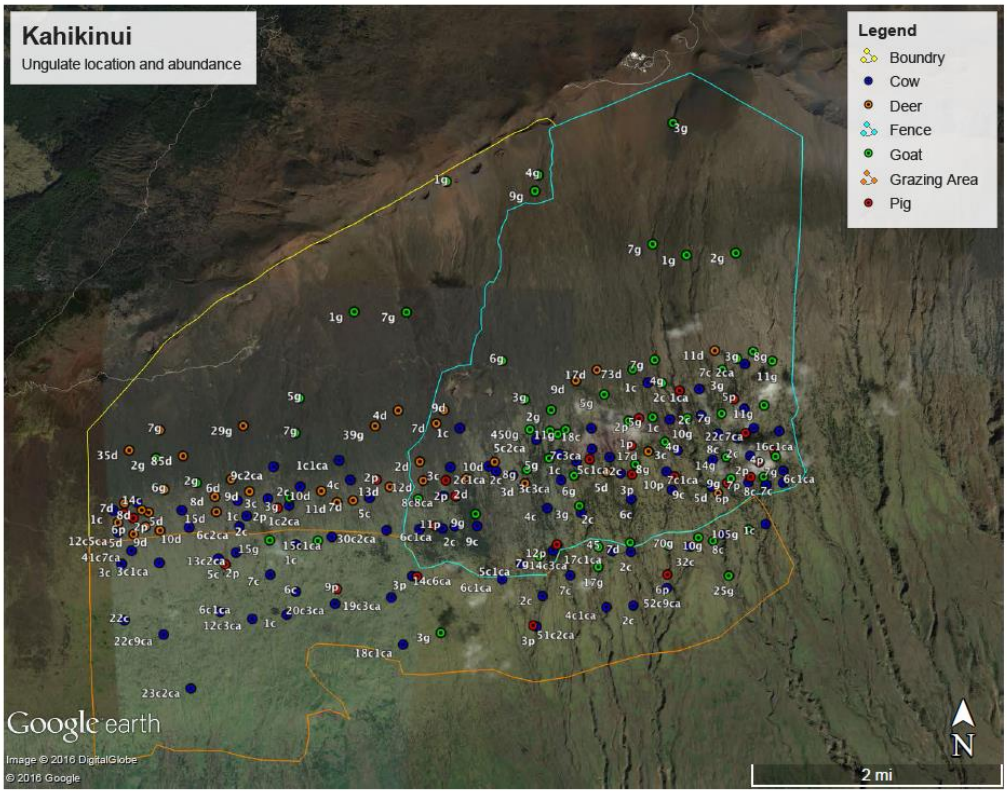
In 1995, a visionary group of kupuna, community leaders, scientists, and land managers developed the Kahikinui Forest Reserve Community Management Conceptual Plan to reverse the decline of the native forests on Hawaiian Homelands in the Kahikinui moku as part of their plan for the resettlement and restoration of the ahupuaʻa of Kahikinui. Key partners in the development of the plan were the Department of Hawaiian Home Lands (DHHL), Ka ʻOhana o Kahikinui (KOOK), Living Indigenous Forest Ecosystems (LIFE), and Kahikinui Game and Land Management ʻOhana (KGLMO). The plan articulated as its guiding principles, a vision to restore traditional management principles and ensure the long-term sustainability of the forest to support the community. Central to that vision, was a commitment to the removal of all feral ungulates within the 7,500-acre forest restoration area, and a recognition that fencing within the restoration area would be needed to keep them out. The plan was approved by the Hawaiian Homes Commission in 1995.

In the years that followed the approval of the plan, community partners convened numerous meetings and discussions as work progressed to implement the 1995 plan. From those discussions, additional guiding documents were developed, including the 2003 Leeward Haleakalā Watershed Restoration Partnership (LHWRP) Memorandum of Understanding, the 2011 DHHL Kahikinui Regional Plan, the 2018 LHWRP Management Plan, and detailed environmental and cultural assessments. These documents outline some of the details of the forest protection effort and articulate the goal of fencing and the complete removal of ungulates from within the forest restoration area as a guiding principle.

Management efforts following completion of the 1995 plan included a hunting program employed to control feral ungulates within the forest restoration area. However, securing the significant funds required to complete an ungulate-proof fence for such a large and remote area proved challenging. In the absence of a fence, the numbers of feral ungulates grew and the forest continued to decline. Aerial surveys for feral cattle in 2009 estimated the feral cattle population at 294 head. In 2011, the survey was repeated using the same methods and the population had risen to 650 cattle. In 2016, a more thorough survey using modern technologies determined the population of cattle had risen to a minimum of 988, with 114 of those being calves. The 2016 census also included other species of ungulates, recording a minimum of 1324 goats, 449 deer, and 124 pigs in the 7,500-acre forest restoration area (Figure 1). Since 13% of the survey area was visually unavailable due to tree cover, these numbers are likely below the true total number of ungulates. The 2016 surveys also provided population numbers for the feral ungulates contained within a 4,500-acre management unit that was proposed within the larger forest restoration area identified in the plan. Those numbers were estimated to be 389 cattle, 931 goats, 131 deer, and 89 pigs (Figure 1).

In 2016, construction started on a fenced management unit (Figure 1) within the larger forest restoration area. This 16.27-mile fence was completed in 2020 and encloses 4,500 acres of watershed forest, located at 3,600-9,800 feet elevation in the eastern portion of the forest restoration lands identified in the 1995 plan (Figure 2). The area was selected for fencing because it contains the last remaining native koa- ʻōhiʻa (*Acacia koa- Metrosideros polymorpha*) forest in the 1995 plan area, as well as upland māmane (*Sophora chrysophylla*) forest, subalpine shrubland, and alpine rocklands of high conservation and cultural value. In 2018, with the fence nearing completion, KIA Hawaiʻi, Ltd requested a month-to-month Right of Entry (ROE) from the DHHL and the Hawaiian Homes Commission to conduct feral ungulate removal for the protection and restoration of the watershed forest at Kahikinui. The ROE was approved, and KIA proceeded with the removal of all large, aggressive, problematic bulls from the interior and exterior of the fence. This effort, also known as The Kahikinui Project, was supported by KOOK, but ended after a year. KOOK and its partners are now proceeding with the challenging task of removing all remaining feral ungulates from within the 4,500-acre unit (Figure 2, Zone 1) and are planning for cattle removal in the adjacent lands (Figure 2, Zones 2 and 3) where wild cattle threaten homestead areas. In 2021, a survey was completed for feral ungulates throughout the

homestead lands makai of the 2016 survey area (Figure 1). The purpose of this Kahikinui Feral Ungulate Control Plan is to guide the ungulate control effort to a successful outcome and to serve to communicate transparently the actions to be taken to do so.



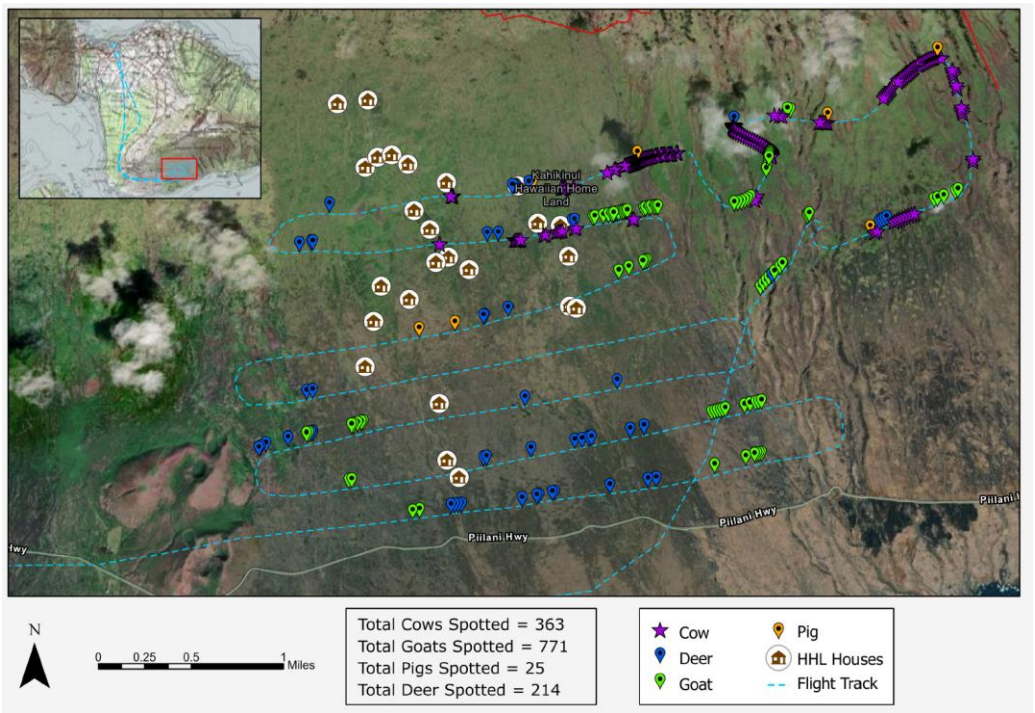


Figure 1. Top: Census location and records from 2016. The 4,500 acre fenced management unit is shown by the blue line. The survey area is shown by the orange line. TMK boundaries are shown by the yellow line. Bottom: Census location and records for the homestead areas below the fence (red line) from 2021.

2 PROJECT AREA

The project area consists of portions of the lands identified as TMKs (2) 1-9-001:007 and (2) 1-9-001:003. For implementation and management purposes, the project area is divided into three management zones that differ in geographic location, management goals, and ungulate control objectives. The management zones are defined as follows.

2.1 ZONE 1

Defined as those lands contained within the recently completed 4,500-acre ungulate-proof fence. Zone 1 is bounded by the Na Kula Natural Area Reserve to the east, Haleakala National Park to the north, and the recently constructed fence ungulate-proof to the west and south, as shown in Figure 2 below. The management goals for Zone 1 are forest and watershed restoration, as described and referenced above. The ungulate control objective for Zone 1 is removal of all feral ungulates, including cattle, goats, deer, and pigs. Zone 1 also contains internal management units that may facilitate incremental restoration as appropriate.

2.2 ZONE 2

Includes the homestead lands makai of the Zone 1 fence that comprise TMK (2) 1-9-001:003 south to Piilani Hwy. The management goal with respect to feral ungulates in Zone 2 is to protect public safety and property in the homestead areas. The ungulate control objective for Zone 2 is removal of all feral cattle. Control of deer, goats, and pigs in Zone 2 is not within the scope of this plan.

2.3 ZONE 3

Includes those lands west of the Zone 1 and north of Zone 2 that comprise TMK (2) 1-9-001:007. The management goal for Zone 3 is to reduce impacts of feral cattle on the remnant native forest and to prevent damage to the fence and forest restoration program ongoing in Zone 1. The objective for Zone 3 is the removal of all feral cattle. Control of deer, goats, and pigs in Zone 3 is not within the scope of this plan.

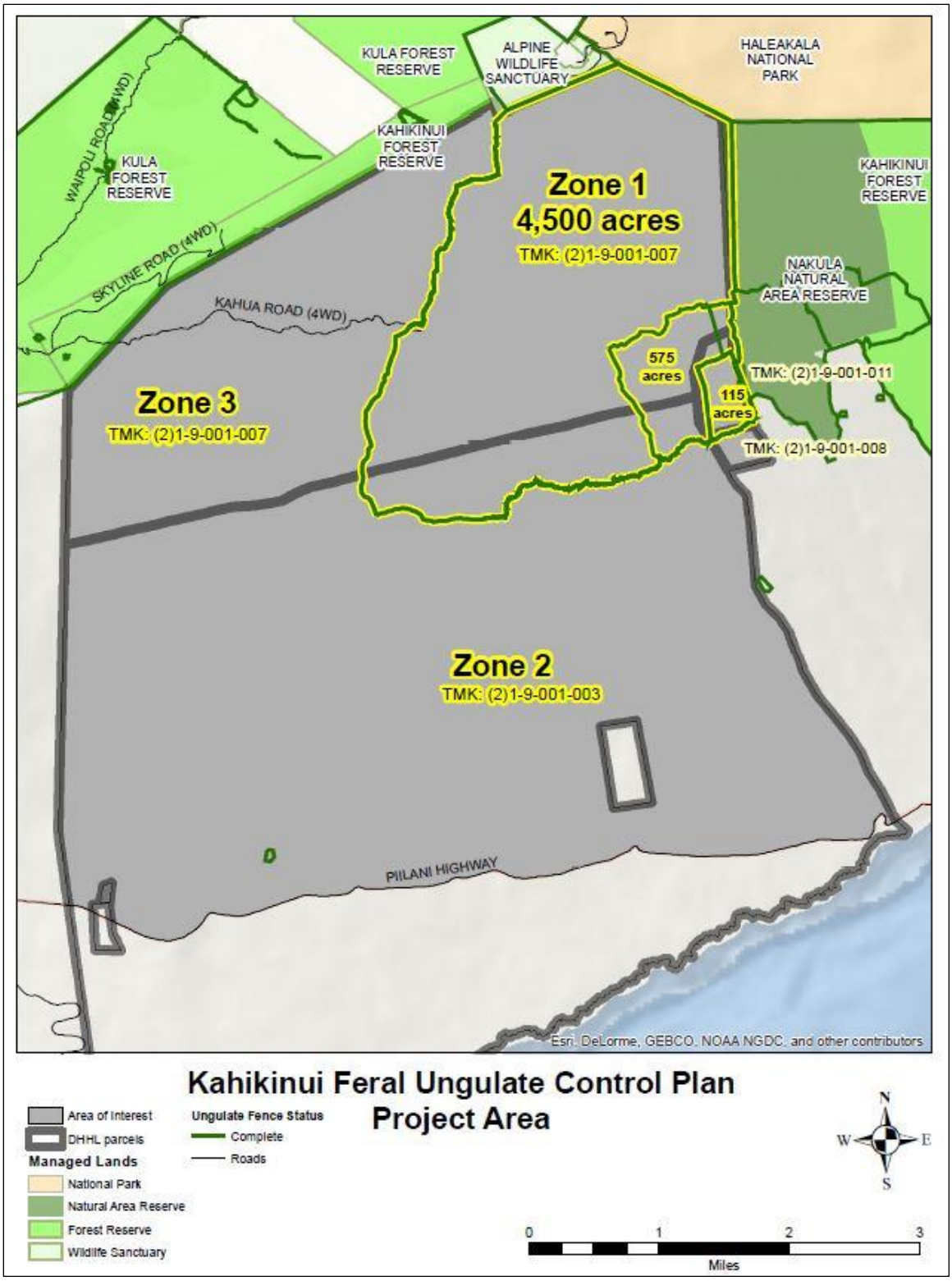


Figure 2. Map showing the project area and management zones.

3 STRATEGY

There are estimated to be more than 2,000 feral ungulates targeted for removal in the project area. Removal of those animals from such a large, rugged, and remote area is expected to be extremely challenging. The ungulate removal strategy to be employed is based on the establishment of the management zones, which are defined by their management goals and ungulate control objectives, and by the assumption that the ungulate species to be controlled within each zone represent a closed population that will increase in numbers over time through recruitment. Successful removal of all the target ungulates within each zone over a specified time period will require that the rate of removal of the target ungulate species proceeds at a pace that, 1) exceeds the rate of reproduction, and 2) reduces the standing population at an incremental rate that is commensurate with the time specified to achieve zero target feral ungulates within the unit. By employing this strategy, the partners can establish the approximate target numbers of animals that must be removed each month and approximate benchmarks that are expected for size of the standing population over the course of the removal operation. It is understood that the targets and benchmarks are estimates only and that the actual numbers required and achieved may vary. An adaptive approach will be employed. Figure 3 provides an example of a series of monthly harvest targets that would need to be met for ungulate populations in Zone 1 that are naturally reproducing at typical rates.

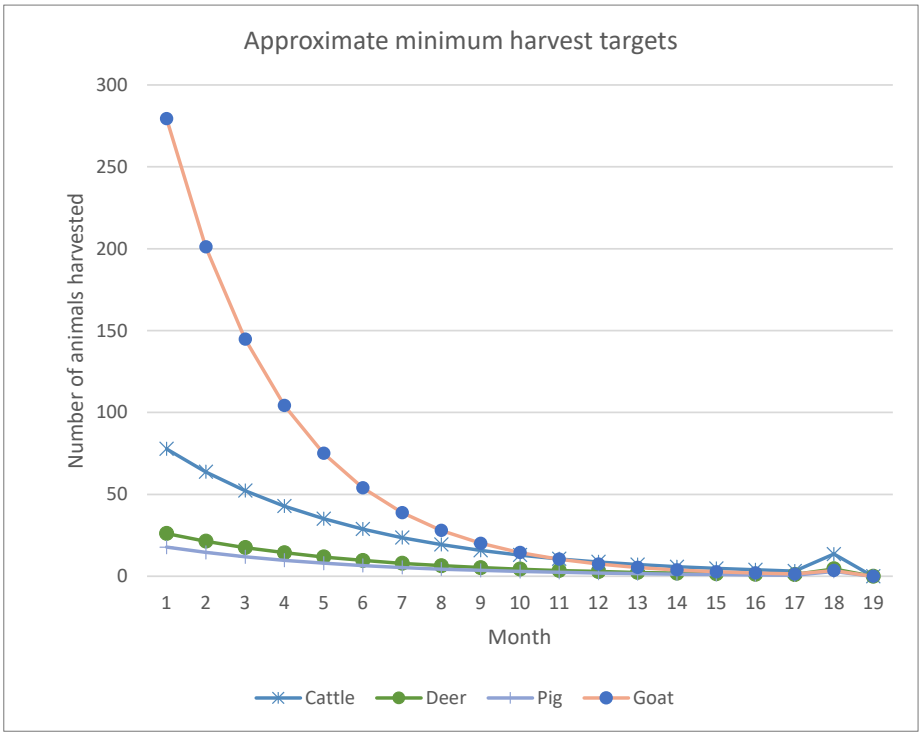


Figure 3. Example of a set of minimum monthly harvest targets expected for ungulate populations increasing at an annual rate of 24%, with starting populations based on the 2016 surveys for Zone 1. Figure is for guidance only. Actual numbers may vary.

4 GUIDING PRINCIPLES

In carrying out the ungulate removal operation, Ka ʻOhana o Kahikinui and its partners follow certain guiding principles. These are:

1. Safety – All activities will be carried out by experienced staff and or in coordination with Ka Ohana O Kahikinui and experienced partners. Ungulate removal activities will not be conducted within the Kahikinui Homestead area.
2. Sanitation – All ungulate management activities conducted under this plan will comply and exercise the most current protocols implemented by the State of Hawaii, Department of Agriculture for preventing the spread and introduction of Rapid Ohia Death pathogen, invasive shrub gorse and other priority invasive species. All clothing, vehicles, gear, equipment, or tools will be decontaminated before use in Kahikinui and all participants shall utilize dedicated gear that remains on Maui.
3. The objective of the ungulate control program for the Zone 1 fenced unit is to remove all the feral ungulates from within the unit and maintain the number at or as close to zero as practicable through regular ungulate control methods.
4. The objective of the feral ungulate control program for Zones 2 and 3 is to remove wild cattle only, and to maintain the numbers of wild cattle at or as close to zero as practicable through regular cattle control methods.
5. To the maximum extent practicable, animals that are removed from the management zones will be salvaged for food or otherwise processed in a manner that directly benefits the beneficiaries.
6. The operation to remove the feral ungulates from all management zones is designed to be completed within an 18-month time period.
7. Consideration and assessment will be undertaken for any potential methods for the removal, salvage, and harvest of feral ungulates that are deemed safe, feasible, and effective.

5 METHODS

5.1 FENCING

Fences are an important component in ungulate control efforts. Fences prevent ingress, ensuring that the number of animals requiring removal is finite and limited to those animals contained within the unit at the time of closure. Fencing also keeps long term maintenance costs down by minimizing the numbers of animals that need to be removed on a regular basis. The 4,500-acre Zone 1 unit is fenced with an 8’ deer fence and several internal units (Figure 2). Fence maintenance is conducted quarterly by the partners. Currently there are several openings in the fence left intentionally for ungulates to exit the unit, there are also several repairs that need to be done. The planned closing of all openings and repairs is at 6 months

and will be coordinated with the end of live capture efforts in Zone 1. There are currently no plans to fence Zones 2 and 3.

5.2 COMMUNITY ROUND UP AND CORRALLING (LIVE CAPTURE)

Traditional and modern cattle round-up methods may provide a cost-effective approach to harvest or salvage cattle for use by the beneficiaries, provided that trained and skilled personnel are engaged to ensure that operations are conducted in a safe manner. The animals captured may be distributed to the beneficiaries for food or may be brought to market, with the revenues secured for use by the beneficiaries. This method will be developed, if feasible, through solicitation and consultation with qualified parties that possess the expertise to conduct the operations. Qualified parties may include beneficiaries, volunteers, professionals, or other partners. Given the very large size of the project area, with three separate zones, we expect that up to three qualified providers may be selected and employed to separate management zones for the cattle removal operations.

Preliminary discussions with qualified parties suggest this approach may be feasible and cost effective. Further review is needed to assess the merits of each with regards to the benefits each will provide to the beneficiaries in terms of food and revenue. DHHL, Ka ʼOhana o Kahikinui and its partners will assemble a review committee composed of beneficiaries and experts to review the merits of all proposals submitted and select any to be recommended for implementation. Proposals reviewed may include those that will be self-funded by revenues generated from the sale of the cattle, with a portion of the cattle and revenues to be distributed to the beneficiaries, as well as those requiring a fee for services provided. If proposals seeking a fee for services are recommended, Ka ʼOhana o Kahikinui will work with partners to seek funding for support. Ka ʼOhana o Kahikinui or parties involved in the live round up of feral cattle will obtain authorization from DHHL for the trapping, movement and sale of feral cattle from DHHL lands in Kahikinui. Authorization by the Hawaiian Homes Commission may also be required.

5.3 HELICOPTER ASSISTED COMMUNITY HARVEST

Helicopter assisted harvest of Feral cattle has been employed in Kahikinui in the recent past and was successful in removing over 30 cattle per event. Helicopters are a valuable tool to locate cattle, transport passengers/ground crew, and deliver cattle from remote areas of Kahikinui to areas where they can be processed and distributed for beneficiary use. Helicopter assisted harvesting of cattle also makes it possible to focus on and harvest the most remote cattle, where other methods of control, like live capture methods are not feasible. Though helicopter use has many benefits, it is expensive and requires skilled program managers and teams to coordinate, manage and implement safe, efficient, and successful harvest events. This method will be developed, if feasible through consultation with qualified beneficiary groups.

Consideration of this method will be made in relation to other available methods to determine the areas where this helicopter assisted harvest would be the most useful and how often it should be used compared to lower cost methods.

Helicopter assisted harvest of feral cattle can be considered if there is an experienced team to implement events safely, coordination with beneficiaries for processing and distribution of cattle and dedicated funding for each event. DHHL, Ka ʼOhana o Kahikinui and its partners will assemble a review committee composed of beneficiaries and experts to review the merits of proposals submitted by beneficiary groups and consider whether and under what conditions helicopter assisted harvest will be implemented. All on-site volunteers will need to complete all applicable safety trainings and certifications related to work involving helicopter operations. If DHHL funding is requested for helicopter assisted harvest, DHHL will consider available funding, and whether the procurement of helicopter services for this harvest method increases DHHL responsibility and liability for harvest events.

5.4 DRIVING

Ungulates may be driven using ground or aerial methods. Driving animals provides a means to move animals from one location to another. Driving may be employed to drive animals out of the fenced unit to relocate deer, pigs and goats to less sensitive areas and to relocate feral cattle to areas more accessible for live trapping or other methods being employed to harvest. Driving may also be employed to relocate animals into holding areas for processing at a later time. Driving can be effective in removing animals from certain locations, but it may have the undesirable effect of relocating them to another area where they are equally undesirable. Driving must therefore be used judiciously. For example, driving cattle into a holding pen or harvest site may be effective, but simply relocating wild cattle from one location in the project area to another is not expected to be advantageous. It is envisioned that at least 1 helicopter assisted driving event will take place at month 6 in Zone 1 and will be coordinated with the closure of the fence unit and the end of live trapping efforts in Zone 1.

5.5 TARGETS AND BENCHMARKS

Ka ʻOhana o Kahikinui and its partners plan to reduce the target feral cattle population within each of the management zones down to zero and removal of all ungulates from Zone 1 over an 18-month period. Since the population of animals is increasing through reproduction each month, the number of animals removed per unit time must exceed the number produced by an amount sufficient to draw the population to zero over an 18-month period. By monitoring the numbers of animals harvested each month, managers will be able to assess whether the project is proceeding on schedule. Ka ʻOhana o Kahikinui and its qualified partners will employ the ungulate control methods identified above each month to harvest and salvage as many animals as possible to provide food or revenue to the beneficiaries. In the event the harvest and

salvage efforts are unable to meet benchmarks, additional methods described below will be deployed to ensure the project stays on schedule to complete the removal goal.

5.6 AERIAL CONTROL

Dispatch of feral ungulates using helicopters is a highly cost-effective means of removing ungulates from management units, especially when carried out in areas that have secure fences to prevent ingress. Aerial control may be used in combination with salvage operations that enable workers to retrieve the animals for distribution to beneficiaries. However, in many cases salvage of animals in connection with aerial control may not be safe or cost effective if the areas are remote and inaccessible. Aerial control of feral ungulates requires specialized training and can be legally carried out only by authorized DLNR employees. Ka ʻOhana o Kahikinui and its partners have requested the assistance of DLNR to conduct aerial control of feral ungulates in the management unit for those animals that cannot be harvested or removed by any of the methods employed above. DLNR has agreed to cover its costs for the operations, including helicopter and personnel time. Aerial control will only be scheduled as a last resort after other methods have failed to meet harvest level targets in accordance with the schedule below. All aerial control operations follow strict State protocols for safety of operations.

6 SCHEDULE AND COORDINATION

DHHL and Ka ʻOhana o Kahikinui will select a dedicated coordinator to serve as the operations manager for all ungulate control activities. Methods employed require scheduling and coordination to ensure safe and effective operations. In some cases, methods may be employed concurrently, in others, methods must be separated in time and space. The coordinator will maintain ungulate removal records and track progress. The schedule below has been developed to maximize the numbers of animals harvested for the benefit of the beneficiaries while ensuring the operation meets its stated goal of removal within an 18-month period for Zone 1 (Figure 4). Aerial shooting in Zones 2 and 3 is not planned during the 18-month period of this project.

6.1 CATTLE

Cattle are scheduled for removal from all zones of the project area, consistent with project goals. Cattle are the most valuable of the ungulate species in the unit and are the species most likely to be cost effective to harvest in a manner that enables their meat to be distributed or brought to market. The challenge will be to devise and implement methods and approaches that will remove the animals in sufficient numbers to outpace reproduction and draw the numbers down. The schedule for cattle removal will be as follows.

- Quarter 1. In the first 3 months of the operation, the partners will employ the live capture as the primary method of cattle removal. Helicopter assisted harvest can be

used if funding is available and safety concerns can be mitigated. It is expected that methods in the first quarter will need to be developed and adapted. At the end of the first quarter, the partners will review the data on the numbers of animals harvested and make any adjustments needed to improve success, as appropriate.

- Quarter 2. In the second quarter, the round-up method will continue for cattle harvest. If numbers are not meeting targets, additional methods may be deployed, including Helicopter assisted harvest and driving if a determination is made for need. Aerial methods will not be deployed for cattle during the first 6 months to ensure that the harvest methods are given opportunities for success.
- Quarter 3. In the third quarter, work will continue with the round-ups and other methods. If harvests have not met targets, aerial control may be deployed to remove a sufficient number of cattle to meet the removal targets. The initial aerial control work for cattle in the third quarter will focus only on the mid elevation areas where the cattle are higher and more difficult to capture using other methods. Closure of fence will be considered as cattle in Zone 1 are reduced.
- Quarter 4. In the fourth quarter, work will continue with the round-ups and other methods. If harvests continue to fall short of targets, aerial control will be deployed to remove a sufficient number to meet the removal targets. The aerial control work for cattle in the fourth quarter will focus initially only mid elevation areas and proceed to lower areas to meet targets. Closure of fence will be considered as cattle in Zone 1 are reduced.
- Quarters 5-6. Work in the final two quarters will proceed as in the fourth quarter, focusing on methods to salvage first, and using aerial control for the animals that cannot be captured by those methods.

6.2 DEER

Deer are scheduled for removal from Zone 1 only. Deer are highly valued for their meat but are not expected to be captured using cattle round up methods. Deer may be driven from Zone 1 by ground and or aerial methods in coordination with final fence closure.

- Quarters 1-2. No deer control will be carried out in the first two quarters in order to avoid disruption of the cattle control operations.
- Quarters 3-6. , supplemental aerial control in Zone 1 as needed to complete the project. Aerial control is envisioned to take place after closing of fence around Zone 1

6.3 GOATS

Goats are scheduled for removal primarily from Zone 1. Goats have reached extremely high numbers in management Zone 1 and have relatively lower value for harvest. Goats co-occur in areas where control for cattle and deer will be ongoing and will be salvaged opportunistically during operations. We expect salvage and harvest levels for goats to be relatively low.

Removal of goats may be considered and authorized by live capture partners if there is a demand for goats and partners are willing to remove goats at no cost to DHHL. Goats may be driven from Zone 1 by ground and or aerial methods in coordination with final fence closure.

- Quarters 1-2. Goat control will be conducted using aerial control methods only in the subalpine sections of zone 1 during the first two quarters. This will minimize disruption of the ongoing control work for the other species. Removal of goats may be authorized for live capture partners
- Quarters 3-6. Goat control using aerial methods will be carried out in other areas of the management Zone 1 to complete the removal. Scheduling will be coordinated with the other methods to minimize disruption.

6.4 PIGS

Pigs will be removed from Zone 1 only. Pig numbers are relatively low in the unit. Pigs co-occur in areas where control for cattle and deer will be ongoing and will be salvaged opportunistically during operations. Special dog hunts for pigs may be deployed if there is interest from qualified hunters. Pig control using aerial methods will be carried out in quarters 3-6.

6.5 SUMMARY

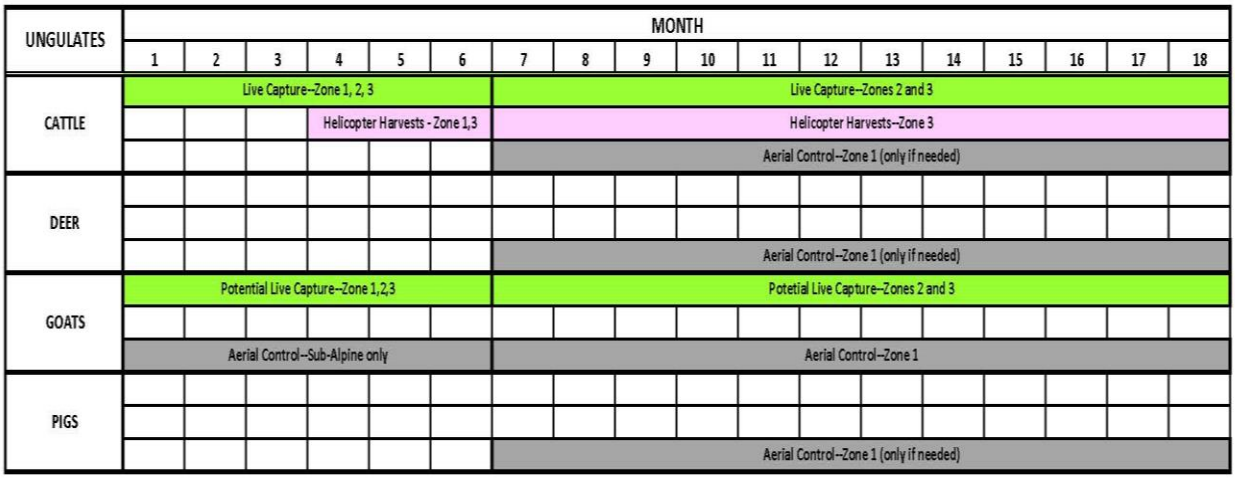


Figure 4. Schedule of operations for methods employed. Aerial control to be employed only in Zone 1 and only as needed to meet reduction targets.

7 REFERENCES

Kahikinui Forest Reserve Community Management Conceptual Plan. 1995. Kahikinui Forest Partnership Working Group.

Leeward Haleakala Watershed Restoration Partnership. 2018. Management Plan.

Kahikinui Regional Plan. 2011. Department of Hawaiian Homelands.

Kahikinui Ungulate Management Plan Agreement

All agencies and organizations and their staff and or representatives shall conduct all activities related to the Ungulate Management of Kahikinui in accordance with this Kahikinui Ungulate Management Plan.

State of Hawaii, Department of Hawaiian Home Lands

_____ _____

William J. Aila, Jr, Chairman Hawaiian Homes Commission Date

State of Hawaii, Department of Land and Natural Resources, Division of Forestry and Wildlife

_____ _____

Scott Fretz, Maui Island Branch Manager Date

Ka ʻOhana O Kahikinui Inc., Kahikinui Homestead Association

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Francis Kaleo Cullen, President Date