Conclusion

Bonamia menziesii critical habitat units A and B are located within areas at high risk of training-related fire in the Makua action area and one percent of critical habitat unit C is located in the Puulu to Alaiheihe fuelbreak portion of the action area. Implementation of all fire suppression measures incorporated into this action and the Army's standard operating procedures will reduce the likelihood that a fire will ignite and travel outside of the firebreak road or that a misfired round will ignite outside of the firebreak road. The risk of training-related fire will be reduced due to the construction of a fuel modification zone between the impact area and the Kaluakauila Management Unit. In addition, fuel reduction within this management unit will further buffer critical habitat units A and B from fire. The portion of critical habitat unit B that is within Kaluakauila Management Unit will be managed to improve its baseline quality pursuant to the Makua Implementation Plan. Most importantly, even though there may be a temporary loss of vegetation due to training-related fire, the restoration of these areas by the Army will provide habitat essential for the conservation of *B. menziesii* and promote long-term recovery of this species. Prescribed intensive grazing management of the proposed Puulu to Alaiheihe fuelbreak will temporarily reduce the establishment of shrubs and trees within one percent of critical habitat unit C. However, fuelbreak establishment and Army ungulate exclusion efforts will minimize fire risk to the 94 percent of critical habitat unit C that is within the Puulu to Alaiheihe Management Unit. Without Army management, critical habitat units B and C would eventually lose most of the elements essential to the survival and recovery of the species because of the ongoing threats to this habitat (e.g., ungulates, fires ignited by the public, and non-native plant encroachment). We considered this continued degradation of *B. menziesii* critical habitat in the evaluation of the effects of the proposed action. Therefore, training-related fire events and development of the proposed fuelbreak will not result in adverse modification of critical habitat for *B. menziesii.*

Effects of the Action on *Eugenia koolauensis* Critical Habitat

Approximately 14 percent (16 ha (40 ac)) of the 113 ha (280 ac) *Eugenia koolauensis* critical habitat unit A (accounting for approximately two percent of all critical habitat designated for this taxa) occurs within the Puulu to Alaiheihe Fuelbreak portion of the Makua action area. Impacts of grazing management of the fuelbreak area are described in the general effects section of this Amendment. In summary, prescribed intensive grazing will minimize hardwood seedlings establishment, deplete the hardwood soil seed bank, and result in an increase in cover of invasive grass.

Because hardwood species are among the primary constituent elements of critical habitat for *Eugenia koolauensis,* fuelbreak maintenance will result reduced conservation value of this small portion of the critical habitat unit. However, the impacts of fuelbreak implementation will not be substantially different than the impacts of continued exposure to grazing and fire threats already present at the site. Ninety nine percent of *E. koolauensis* critical habitat in the fuelbreak portion of the action area was classified as alien vegetation (Hawaii Gap Analysis Program 2005), the site is currently managed as a pasture for cattle and goats (Cherry 2008) and 90 percent of the *E. koolauensis* critical habitat within the fuelbreak area was burned in the 2007 Waialua Fire (Figure 22).

A total of 38 ha (94 ac) (34 percent) of *Eugenia koolauensis* critical habitat unit A will be protected from fire and grazing within the new Puulu to Alaiheihe Management Unit. Approximately 80 percent (90 ha (223 ac) of *E. koolauensis* critical habitat unit A was burned in the Waialua Fire (see Figure 22).

Approximately 14 percent (16 ha (40 ac)) of *Eugenia koolauensis* critical habitat unit A (accounting for approximately two percent of all critical habitat designated for this taxa) occurs within the Puulu to Alaiheihe Fuelbreak portion of the Makua action area (Figure 22). Impacts of grazing management in the fuelbreak area are described in the general effects section of this Amendment. In summary, prescribed intensive grazing will minimize hardwood seedlings establishment, deplete the hardwood soil seed bank, and result in an increase in cover of invasive grass.

Figure 22. *Eugenia koolauensis* critical habitat occurring within the Puulu to Alaiheihe fuelbreak portion of the action area.

Conclusion

Prescribed intensive grazing management of the proposed Puulu to Alaiheihe fuelbreak will temporarily reduce the establishment of shrubs and trees within approximately 14 percent (16 ha (40 ac)) of *Eugenia koolauensis* critical habitat unit A (accounting for approximately two percent of all critical habitat designated for this taxa). However, fuelbreak establishment and Army ungulate exclusion efforts will minimize fire risk to the 38 percent of critical habitat unit

A that is within the Puulu to Alaiheihe Management Unit. Without Army management, large portions of critical habitat unit A would continue to lose most of the elements essential to the survival and recovery of the species because of the ongoing threats to this habitat (e.g., ungulates, fires ignited by the public, and invasive plant encroachment). We considered this continued degradation of *E. koolauensis* critical habitat in the evaluation of the effects of the proposed action. Therefore, we have determined the development of the proposed fuelbreak will not result in adverse modification of critical habitat for *E. koolauensis.*

Effects of the Action on *Euphorbia haeleeleana* Critical Habitat

Euphorbia haeleeleana critical habitat unit A (4 ha (10 ac)) is located entirely within the high fire risk zone of the training action area and approximately 75 percent of the unit is vegetated by native plants (Kawelo 2004; Service 2004a). Approximately six percent (20 ha (51 ac)) of the 357-ha (881-ac) critical habitat unit B is within the Puulu to Alaiheihe fuelbreak portion of the action area, where vegetation is classified as non-native (Hawaii Gap Analysis Program, 2005), 90 percent of it was burned in the 2007 Waialua Fire, and it is currently managed as pasture for goats (Cherry 2008). The primary constituent elements essential for this species include, but are not limited to, dry forest dominated by *Diospyros* sp. The primary constituent elements that may be affected by a training-related fire and fuelbreak management include those associated native plant species found within dry forest dominated by *Diospyros* sp.

Training Effects Critical habitat unit A is approximately 1 km (0.6 mi) from the impact area and is almost entirely (95 percent) within the Kalaukauila Management Unit where it is at high risk of being burned in fires ignited by the military and the public. Pursuant to the Makua Biological Opinion, the Army will minimize the fire risk to this critical habitat unit by implementing weapons restrictions, installing fuelbreaks, and staffing resources to suppress fires ignited by training and the public. Additional Army management within Kaluakauila Management Unit, including ungulate and weed control, enhances the conservation value of critical habitat unit A.

Puulu to Alaiheihe Fuelbreak Effects Approximately six percent 20 ha (51 ac) of the 357-ha (881-ac) critical habitat unit B is located within the proposed Puulu to Alaiheihe fuelbreak. Impacts of grazing management in the fuelbreak area are described in the general effects section of this Amendment. In summary, prescribed intensive grazing will minimize hardwood seedlings establishment, deplete the hardwood soil seed bank, and result in an increase in cover of invasive grass. Because hardwood species are among the primary constituent elements of critical habitat for *Euphorbia haeleeleana,* fuelbreak maintenance will result reduced conservation value of this portion of the critical habitat unit. However, the impacts of fuelbreak implementation will not be substantially different than the impacts of continued exposure to grazing and fire threats already present at the site. Over 99 percent of *E. haeleeleana* critical habitat in the fuelbreak portion of the action area was classified as alien vegetation (Hawaii Gap Analysis Program, 2005), the site is currently actively managed as a pasture for cattle and goats (Cherry 2008) and 90 percent of the *E. haeleeleana* critical habitat within the fuelbreak area was burned in the Waialua Fire (Figure 23).

Figure 23. *Euphorbia haeleeleana* critical habitat in the proposed Puulu to Alaiheihe fuelbreak and Management Unit.

The fuelbreak will minimize fire risk to the 35 percent (123 ha (304 ac)) of *Euphorbia haeleeleana* critical habitat unit B that occurs within the Puulu to Alaiheihe Management Unit. Approximately 52 percent of *E. haeleeleana* critical habitat on Oahu (all within unit B) was burned in the Waialua Fire (see Figure 23). In addition to reducing fire threat, the Army is enhancing the conservation value of critical habitat unit B by excluding ungulates and controlling non-native invasive plant species within the Management Unit.

Conclusion

Euphorbia haeleeleana critical habitat unit A is located within an area of high risk of training-related fire in the Makua action area and six percent of critical habitat unit B is located in the Puulu to Alaiheihe fuelbreak portion of the action area. The Army will minimize the fire risk to this critical habitat unit by implementing weapons restrictions, installing fuelbreaks, and staffing resources to suppress fires ignited by training and the public. The portion of critical habitat unit A that is within Kaluakauila Management Unit will be managed to improve its baseline quality pursuant to the Makua Implementation Plan. Most importantly, even though there may be a temporary loss of vegetation due to training-related fire, the restoration of these areas by the Army will provide habitat essential for the conservation of *E. haeleeleana* and promote long-term recovery of this species. Prescribed intensive grazing management of the Proposed Puulu to Alaiheihe fuelbreak will temporarily reduce the establishment of shrubs and

trees within one percent of critical habitat unit B. However, fuelbreak establishment and Army ungulate exclusion efforts will minimize fire risk to the 35 percent of critical habitat unit B that is within the Puulu to Alaiheihe Management Unit. Without Army management, critical habitat units A and B would eventually lose most of the elements essential to the survival and recovery of the species because of the ongoing threats to this habitat (e.g., ungulates, fires ignited by the public and non-native plant encroachment). We considered this continued degradation of *E. haeleeleana* critical habitat in the evaluation of the effects of the proposed action. Therefore, training-related fire events and development of the proposed fuelbreak will not result in adverse modification of critical habitat for *E. haeleeleana.*

Effects of the Action on *Hibiscus brackenridgei*

Hibiscus brackenridgei is already is in a phase of quasi-extinction due to its low numbers and intense range-wide fire, weed, and ungulate threats, in addition to demographic and other stochastic events that can expose populations to local extirpation. We infer from these circumstances, conservation biology principles, and examples from other species that *H. brackenridgei* has a very high background extinction risk in the action area and range-wide. Any additional threats associated with training-related wildland fire and introduction of invasive species would increase the risk of extinction in absence of the implementation of offsetting measures. Additional measures proposed by the Army in this Amendment include actions to minimize adverse impacts as well as increase the likelihood of persistence of plant populations and contribute to the recovery of the species. *Hibiscus brackenridgei* was identified as an expedited stabilization species as a conservation measure to protect this taxon from extinction while full stabilization measures are being implemented. Detailed analyses of training-related fire risk within the Action Area, non-native invasive species impacts, human disturbance, demographic stochasticity, fire suppression, Army conservation and stewardship programs, and expedited stabilization provided in the General Effects section of the Makua Biological Opinion remain applicable and to our analysis in this Amendment.

Species Response to the Proposed Action

The proposed military training and unexploded ordinance disposal, and the fires associated with these actions, could result in direct injury or mortality of *Hibiscus brackenridgei* ssp. *mokuleianus* individuals in the Makua (in situ) and Kaluakauila (reintroduced for genetic storage) population units. *Hibiscus brackenridgei* ssp. *mokuleianus* in the action area also will be exposed to the direct and indirect impacts of competition from non-native plants, particularly alien grasses that spread as a result of wildland fires. In the absence of implementation of the Army's proposed fire risk minimization measures, the population of 104 *H. brackenridgei* ssp. *mokuleianus* in the Makua population unit, located in the Lower Ohikilolo Management Unit and the 35 experimental plants growing in the Kaluakauila Management Unit would be exposed to a high risk of fire resulting from live-fire training (see Figure 17) or those ignited by the public in the vicinity of the installation.

To minimize fire impacts to *Hibiscus brackenridgei* ssp. *mokuleianus* growing in the training portion of the action area, Army Natural Resources Staff will clear grass to less than one percent cover within 3 m (10 ft) of the plants in the Lower Ohikilolo Management Unit to prevent fire spread to the plants. Because of this intensity of vegetation clearing around each

H. brackenridgei ssp. mokuleianus individual, the entire area is relatively devoid of grasses (see Figure 3). Although existing grass control has been adequate to protect plants from fire in this area to date, the additional clearing of grass (maintained below 20 percent cover or vegetation is kept mowed shorter than 0.3 m (1 ft)) within the newly expanded Lower Ohikilolo Management Unit weed control area will further minimize fire risk to the plants within this area.

Weapons restrictions, improved grass mowing around the interior of the south lobe of the firebreak road, and improved fire suppression staffing requirements minimize the risk that fires will escape containment by initial attack fire suppression resources. Prior to implementation of Column C weapons restrictions, which permit the use of weapons that are more likely to ignite fires outside the firebreak road, a fuelbreak and firebreak will be established to minimize fire risk to the 35 *H. brackenridgei* ssp. *mokuleianus* plants in the Kaluakauila Management Unit (see Makua Biological Opinion Project Description Section 3.1.4.2). In the event that a fire threatens this site, the fuel treatments installed along the edge of the forested areas of the Kaluakauila Management Unit will provide firefighters, including red-carded Army Natural Resources Staff and fire suppression helicopters, a high likelihood of successfully preventing fire from burning additional forest in this area. No 2.75-caliber rockets or Javelin or TOW missiles will be used until expedited stabilization thresholds are achieved for all four stabilization population units of this species. A second manage for stability population unit will be introduced in the Keaau portion of the action area in accordance with the timelines established by the Makua Implementation Plan (2003) and prior to implementation of Table PD 2 Column D weapons restrictions (see Makua Biological Opinion).

The potential damage to, or loss of *Hibiscus brackenridgei* ssp. *mokuleianus* individuals, due to wildland fires associated with live-fire training will be further offset by the ongoing efforts of the Army to complete stabilization actions for population units outside the action area pursuant to the Makua Implementation Plan Addendum (U.S. Army Garrison 2005). In addition, Army contributions to interagency fire suppression efforts in the vicinity of Pohokuloa Training Area on the island of Hawaii will directly or indirectly benefit those populations of *H. brackenridgei*, which contain between 35 and 54 percent of all known individuals of this species. Stabilization actions include out-planting, ungulate control, off-site Army fuelbreak establishment, fire suppression assistance, and genetic storage are likely to result in increased probability that this species will persist. Four population units will be managed for stability because of the extreme fire threat to this taxon, and because stabilization relies on reintroductions of plants into unoccupied areas. *Hibiscus brackenridgei* ssp. *mokuleianus* is successfully propagated from cuttings and many plants can be quickly propagated. Intensive Army management will benefit two existing population units outside the action area on Oahu (Haili to Kawaiu and Puulu to Alaiheihe). At this time, it is our understanding the owner of the land occupied by the Puulu to Alaiheihe population unit would sell the property at fair market value (Takemoto 2008) and the Army Compatible Use Buffer program funds are available to secure interagency purchase of the site (Yuh 2008). If access to the Puulu to Alaiheihe site is not secured, the effort which would be required to establish a comparable population elsewhere would be substantial.

Interdependent and interrelated effects of the proposed action may result in incidental damage to or loss of *Hibiscus brackenridgei* ssp. *mokuleianus* individuals due to grazing and fence

model (Andrews *et al* 2005) predicts long-range spotting of 1.1 km (0.8 mi), given winds of 18 mph. Therefore, spot fires are likely to ignite above the fuelbreak. Although a number of fire suppression helicopter contractors were grounded and unavailable during the Waialua Fire due to high winds generated by a nearby hurricane (Moller 2007), the Army was able to contribute two fire suppression helicopters to Waialua Fire suppression efforts (Ching 2007). If the fuelbreak had been in place at the time of the Waialua Fire, forest loss would have been minimized within the area currently designated as the Puulu to Alaiheihe Management Unit.

Although the fuelbreak's location, within critical habitat, is not ideal because it impacts critical habitat, the fuelbreak location ensures effectiveness. Approximately 52 percent of the burned management unit area is classified, by the Greenlee and Beavers (2007) pre-fire fuel model map, as forest fuels (see Figure 19). These burned forest areas, in addition to the areas which were not forested, are now dominated by guinea grass (Keir 2008). Because fires burning in cured guinea grass are more intense and spread more rapidly than fires burning in forest fuels, spot fires within these guinea grass areas may grow large (See Table PD 11 in the Makua Biological Opinion for examples of anticipated fire acreage). Plant critical habitat extends 300 to 800 m (984 to 2,625 ft) below the proposed fuelbreak's location, occupying a 92-ha (228-ac) area dominated by guinea grass. However, because multiple spot fires in a large area of guinea grass would more easily exceed the suppression capability of fire suppression resources (as noted on the Waialua Fire (Keir and Cannarella 2007)) the fuelbreak could not be situated farther downslope without sacrificing its effectiveness. The fuelbreak's location minimizes the extent of guinea grass on the upslope side of the fuelbreak, increasing the likelihood of successful spot fire containment, and reducing anticipated fire impacts to listed species and critical habitat. The fuelbreak will provide important conservation benefit to the management unit.

The Army will ensure that the fuelbreak and the ungulate exclusion fencing is constructed within three years and maintained to conserve an otherwise unprotected population of *Hibicus brackenridgei* that occurs in this area. The fencing of the Puulu to Alaiheihe Management Unit and ungulate removal will provide a long-term benefit for the *H. brackenridgei*, along with portions of six critical habitat units. Another option instead of a grazed fuelbreak would be to restore the habitat in this area to slow the spread of fire, however, at this time; the interagency conservation community is not financially equipped to fund fuel type conversion that can be very costly in an area dominated by grass. The adverse effects of grazing will reduce the conservation value of the critical habitat within the fuelbreak area but does not preclude future habitat restoration when funds and technology are available. By reducing fire threat, the proposed Puulu to Alaiheihe fuelbreak increases the suitability of the management unit area for interagency post-fire restoration efforts. The current landowner, Castle & Cooke Hawaii and current lessee Flying R Ranch are supportive of additional interagency efforts to conserve listed species and critical habitat on their land (Takemoto 2008).

General Effects of Fire Retardant and Foam Use

As described in the Project Description of the Makua Biological Opinion, the Army and partner fire suppression agencies may add foam and fire retardant chemicals to water to increase the effectiveness of fire suppression engines and helicopters. Based on a review of the best available scientific literature, most plants are not directly affected by this action. However,

construction. *Hibiscus brackenridgei* ssp. *mokuleianus* seedlings may germinate in the fuelbreak area where grass competition will be reduced, but these plants would not persist due to herbivory from the domestic livestock. However, the loss of the *H. brackenridgei* ssp. *mokuleianus* individuals in the grazed fuelbreak area will be offset by the exclusion of ungulates from the 210-ha (519-ac) management unit that will allow for the natural regeneration of seedlings free from grazing pressure. During fire suppression operations within and outside the action area, chemical fire retardant or foam additives which may be broadcast onto *H. brackenridgei* ssp. *mokuleianus* plants may adversely impact individual plants (see general effects section). Although it is not anticipated because it has not been observed in intensive historic monitoring (U.S. Army Garrison 2005, 2006, 2007), plants in areas where grass is intensively managed either with herbicide or mechanical means may be negatively impacted by the herbicide or may be inadvertently trampled or pulled up by Army Natural Resources Staff.

Conclusion

As a result of the 2007 Waialua Fire, the status of *Hibiscus brackenridgei* ssp. *mokuleianus* substantially declined (see Table 3). Despite the ongoing exposure to the Army's potential wildland fire impacts, Army conservation and stewardship programs will improve the baseline condition for this species in the action area and range-wide. Weapons restrictions, fuel management, fire suppression, invasive species control, and expedited stabilization actions over the next 30 years will increase baseline numbers of *H. brackenridgei* ssp. *mokuleianus* in four population units, including two outside the action area which will not be vulnerable to training-related wildland fire. Reaching expedited stabilization will improve the likelihood that *H. brackenridgei* ssp. *mokuleianus* will attain full stabilization and enhance its probability of persistence over the long-term. The construction of the Puulu to Alaiheihe Management Unit and fuelbreak will benefit this species by reducing the threat of future wildfire in this area and enhancing habitat for natural recruitment of this species. Based on our analysis of the effects of the actions outlined in the Makua Biological Opinion and this Amendment including fire minimization measures, the Service believes that the risks associated with the Army's proposed action are outweighed by the long-term benefits from the Army's expedited *H. brackenridgei* stabilization actions and ecosystem management.

Effects of the Action on *Hibiscus brackenridgei* Critical Habitat

In total, the training and fuelbreak portions of the action area contain two percent of all range-wide critical habitat designated for *Hibiscus brackenridgei*. Critical habitat unit C is a 0.04 ha or 0.1 ac sliver of land within the high fire risk zone at Makua and the Puulu to Alaiheihe fuelbreak portion of the action area contains six percent (35 ha (86 ac) of *H. brackenridgei* critical habitat unit B. In both portions of the action area, the *H. brackenridgei* critical habitat is heavily disturbed and currently dominated by invasive, exotic grasses (Hawaii Gap Analysis Program 2005 and Keir 2008) thereby degrading the vegetative primary constituent elements of the critical habitat.

Training Effects Less than one percent of the total critical habitat for *Hibiscus brackenridgei* is found in one unit within the training portion of the Makua action area (see Figure 17). The small critical habitat sliver is located entirely within the high fire risk area. The primary

constituent elements that may be affected by a training-related fire include those associated native plant species found within a dry shrubland community. It is estimated that critical habitat in this area contains less than 25 percent native plant cover, indicating that this unit is predominantly characterized by non-native vegetation (Kawelo 2004; 68 FR 35950). Portions of this critical habitat may have been impacted by past fire events, which diminishes the conservation value of the habitat by removing the vegetative primary constituent elements. Non-native plant species subsequently out-compete the native plants. In the absence of habitat management, additional fires resulting from future training actions could add to the degradation of this critical habitat unit by removing the remaining vegetative primary constituent elements.

The critical habitat unit is approximately 0.4 km (0.2 mi) from the fire source, and there is a high risk that a fire started in the impact area could move south and impact this unit. Currently, the Army conducts fuel modification in the immediate habitat area of the *H. brackenridgei* var. *mokuleianus* plants, which will reduce the risk of fire and enhance the conservation value of this adjacent critical habitat unit.

To reduce the negative impacts to this critical habitat unit from any fire that escapes the firebreak road, the Army has committed to revegetate burned areas with native plant species to restore the area to pre-burn conditions. While there may be a temporary loss of the conservation value of the critical habitat unit during the revegetation process, the ability of this unit to provide a portion of the habitat essential for the conservation of *Hibiscus brackenridgei* will not be diminished, in the long term, by the proposed action.

Puulu to Alaiheihe Fuelbreak Effects The Puulu to Alaiheihe fuelbreak portion of the action area contains six percent (35 ha (86 ac)) of *Hibiscus brackenridgei* critical habitat unit B. With the exception of a small sliver along its eastern edge, the entire fuelbreak action area is designated critical habitat for *H. brackenridgei* (Figure 24).

Figure 24. *Hibiscus brackenridgei* critical habitat in vicinity of the Puulu to Alaiheihe fuelbreak.

Like the *H. brackenridgei* critical habitat found in the training portion of the action area the site is dominated by invasive, exotic grasses as a result of historic and ongoing grazing and fire impacts (Gap Analysis Program 2005 and Keir 2008). The proposed fuelbreak will minimize fire risk to the 28 percent (159 ha (392 ac)) of the 560-ha (1385-ac) *Hibiscus brackenridgei* critical habitat unit B that occurs within the Puulu to Alaiheihe Management Unit. Approximately 44 percent (104 ha (258 ac) of unit C was burned in the Waialua Fire (see Figure 24). Army fire suppression protection to the Makua, Puulu to Alaiheihe, and Haili to Kawaiu *H. brackenridgei* population units will reduce fire impacts to co-occurring areas of critical habitat. In addition to reducing fire threat, the Army is enhancing the conservation value of critical habitat within the Puulu to Alaiheihe Management Unit and in the vicinity of the Haili to Kawaiu *H. brackenridgei* population unit by excluding ungulates and, to varying extents, controlling non-native invasive weeds.

Conclusion

In total, the two portions of the action area contains two percent of all range-wide critical habitat designated for *Hibiscus brackenridgei*. In both portions of the action area, the *H. brackenridgei* critical habitat is heavily disturbed and currently dominated by invasive, exotic grasses (Hawaii Gap Analysis Program 2005 and Keir 2008). Implementation of all fire suppression and fuel management measures incorporated into this action and the Army's

project description will reduce the likelihood that a fire will ignite and travel outside of the firebreak road or that a misfired round will ignite outside of the firebreak road. In addition, even though there may be a temporary loss of shrubs within critical habitat unit C due to a training-related fire, the restoration of this area by the Army will prevent the loss, due to Army actions, of habitat essential for the conservation of *H. brackenridgei* var. *mokuleianus* and provide for the long-term recovery goals of this species. The Army's proposed Puulu to Alaiheihe fuelbreak, and ungulate removal and fire suppression protection to the Puulu to Alaiheihe Management Unit will conserve 159 ha (392 ac) of critical habitat unit B. In the absence of proposed Army actions, the primary constituent elements of this portion of the critical habitat unit would continue to be degraded as a result of exposure to threats such as ungulates, fire, and non-native plant encroachment. Therefore, training-related fire events and the proposed fuelbreak will not result in adverse modification of critical habitat for *H. brackenridgei.*

Effects of the Action on *Nototrichium humile* Critical Habitat

The action area contains a total of slightly more than one percent of the total critical habitat for *Nototrichium humile* on Oahu, including 6 ha (16 ac) within the training portion of the action area and 7 ha (17 ac) within the proposed Puulu to Alaiheihe fuelbreak.

Training Effects Effects of the proposed action to the one percent of *Nototrichium humile* critical habitat that occurs within the training portion of the action area as described in the Makua Biological Opinion remain valid. In summary, critical habitat unit A is a total of 5 ha (13 ac), located almost entirely within Kaluakauila Management Unit and is exposed to high risk of training-related fire. Less than one percent (1 ha (3 ac)) of the 229-ha (567-ac) critical habitat unit B overlaps with the very low fire risk zone on the east edge of the training action area. Based on historic fire perimeter maps, Unit A was within the perimeter of 1970 and 1984 fires ignited by the military at Makua (Costales 2006). Approximately 30 percent of critical habitat unit A was impacted by the 2003 escaped prescribed burn at Makua (Enriques 2003). Implementation of all fire suppression measures incorporated into this action and the Army's standard operating procedures will reduce the likelihood that a fire will ignite and travel outside of the firebreak road or that a misfired round will ignite outside of the firebreak road. The risk of training-related fire will be reduced due to the construction of a fuelbreak between the impact area and critical habitat unit A, within Kaluakauila Management Unit. In addition, even though there may be a temporary loss of vegetation due to training-related fire, the restoration of these areas by the Army will provide habitat essential for the conservation of *N. humile* and promote long-term recovery of this species.

Puulu to Alaiheihe Fuelbreak Effects Three percent (7 ha (17 ac)) of the 237-ha (586-ac) *Nototrichium humile* critical habitat unit C is located within the proposed Puulu to Alaiheihe fuelbreak. Impacts of grazing management of the fuelbreak area are described in the general effects section of this Amendment. In summary, prescribed intensive grazing will minimize hardwood seedlings establishment, deplete the hardwood soil seed bank, and result in an increase in cover of invasive grass. Because hardwood species are among the primary constituent elements of critical habitat for *N. humile,* fuelbreak maintenance will result reduced conservation value of this portion of the critical habitat unit. Ninety-seven percent of *N. humile* critical habitat in the fuelbreak portion of the action area was classified as alien