

vegetation (Hawaii Gap Analysis Program 2005), it is currently actively managed as a pasture for cattle and goats (Cherry 2008) and all of it was burned in the Waialua Fire (Figure 25).



Figure 25. *Nototrichium humile* critical habitat in the Puulu to Alaiheihe Gulch area.

The proposed fuelbreak will minimize fire risk to the 67 percent (159 ha (392 ac)) of the 237-ha (586-ac) *Nototrichium humile* critical habitat unit C 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 25). In addition to reducing fire threat, the Army is enhancing the conservation value of critical habitat unit C by excluding ungulates and controlling non-native invasive plant species within the Management Unit.

Conclusion

Nototrichium humile critical habitat unit A and one percent of unit B are located within areas at risk of training-related fire in the Makua action area and three percent of critical habitat unit C is located in the Puulu to Alaiheihe fuelbreak portion of the action area where it will be impacted by grazing. Implementation of all fire suppression and fuel management 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. In addition, 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 *N. humile* 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 67 percent of critical habitat unit C that is within the Puulu to Alaiheihe Management Unit. Without Army management, critical habitat units A 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 *N. humile* critical habitat in the evaluation of the effects of the proposed action. Therefore, training-related fire events and impacts of the proposed fuelbreak will not result in adverse modification of critical habitat for *N. humile*.

CUMULATIVE EFFECTS

Cumulative effects are those impacts of future State and private actions that are reasonably certain to occur within the area of action subject to consultation. Cumulative effects include the impacts of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Amendment. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Endangered Species Act.

Hibiscus brackenridgei and plant critical habitat in the training and fuelbreak portions of the action area are likely to be exposed to stressors associated with fires ignited by local arson incidents or by public carelessness. Brushfires are common throughout leeward Oahu each summer and are reasonably certain to occur in the future. During June through August 2005, for example, brushfires burned over approximately 2,327 ha (5,750 ac) in the Waianae area (Waianae Valley, Waianae, Maili, and Lualualei) and were attributed to arson or fireworks (*Honolulu Advertiser*, January 2, 2006). Non-military fires of unknown origin burned about 405 ha (1,000 ac) in the Keawaula portion of the action area in July 2006 (*Honolulu Advertiser*, July 14, 2006; U.S. Army Garrison 2006b). Non-military fires also have burned parts of Makua Military Reservation from ignitions along Farrington Highway outside the installation (State of Hawaii Department of Land and Natural Resources 2007). One such fire in July 2006, spread into the Lower Okikilolo Management Unit of Makua, where it burned within 150 m (495 ft) of *H. brackenridgei* ssp. *mokuleianus* plants (U.S. Army Garrison 2006a). Another July 2006, fire burned from along Farrington Highway up to the Kaluakauila Management Unit, where it impacted more than 81 ha (200 ac) that supported genetic storage reintroductions of *H. brackenridgei* ssp. *mokuleianus* (U.S. Army Garrison 2006d). The August 2007 Waialua Fire, burned 2,268 ha (5,606 ac) within and adjacent to the Puulu to Alaiheihe fuelbreak portion of the action area.

Future State actions in the action area include continued management of State lands according to their current designations as Forest Reserves or Natural Area Reserves. The State will continue to manage threatened and endangered species on their lands to the best of their ability. In addition, there will be continued threats to *Hibiscus brackenridgei* in the action area from

feral ungulates as a result of State regulated hunting activities in Forest Reserves and Game Management Areas.

CONCLUSION

After reviewing the current status and environmental baseline of *Hibiscus brackenridgei*, critical habitat for *Abutilon sandwicense*, *Bonamia menziesii*, *Eugenia koolauensis*, *Euphorbia haeleeleana*, *H. brackenridgei* and *Nototrichium humile*, and the effects of military actions in the action area (Makua and the Puulu to Alaiheihe Management Unit/fuelbreak), including the cumulative effects, it is our biological opinion that implementation of the proposed action is not likely to jeopardize the continued existence of *H. brackenridgei* or adversely modify or destroy designated critical habitat for the six plant species addressed in this Amendment.

The non-jeopardy conclusion is based on the following: (1) a risk assessment regarding the potential of a fire igniting and burning plants; (2) Army conservation and stewardship programs that will increase the baseline number of individuals pursuant to the criteria stipulated in the Makua Implementation Plan and the Makua Implementation Plan Addendum; (3) weapons restrictions, fuels management, fire suppression, and construction of fuelbreaks and firebreaks will minimize the risk of wildland fire within and outside the action area; and (4) Army invasive species control including ungulate removal and invasive plant management.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Endangered Species Act (Act) directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The recommendations provided relate only to the proposed action and do not necessarily represent complete fulfillment of the Army's section 7(a)(1) responsibilities for the species. In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

- 1) The Army should develop and implement daily fire suppression helicopter staffing protocols to ensure the interagency and Army-funded fire suppression force is adequate to protect the Army's stabilization population units, particularly when live herbaceous fuel moisture is below 120 percent at the Makua Range weather station.
- 2) The Army should maintain cooperative agreements with Hawaii County and the State of Hawaii to ensure Army fire suppression resources are able to assist with fire suppression efforts, as necessary, on a case by case basis, to protect the *Hibiscus brackenridgei* populations on the island of Hawaii from fire.
- 3) To facilitate communications between Makua and wildland firefighters and cooperators stationed outside Makua valley, the Army should install a new radio repeater within range of Makua Valley.

- 4) To facilitate reintroduction, fire suppression, and fuelbreak planning, Army Natural Resources Staff should add GPS locations of individual plants to their GIS database.
- 5) The Army should hire a fuels management specialist to coordinate the expedited development of Waianae Mountains fuelbreaks, supervise the fire suppression operations of the Army Natural Resource Staff, assist the Army with the development and maintenance of cooperative agreements with interagency fire suppression organizations, and to coordinate fuel moisture and fire behavior research and data collection. This person should be qualified as a National Wildfire Coordinating Group Incident Commander Type 4, should be certified as a single resource boss, and should have completed S-490 (Advanced Fire Behavior) and/or S-491 Intermediate National Fire Danger Rating System.
- 6) The Army should aggressively pursue acquisition and transfer of title to a public or private conservation organization, of the Puulu to Alaiheihe Gulch and Haili to Kawaiu areas to better ensure access for long-term Army stabilization actions. This could be accomplished through the Army Compatible Use Buffer program.
- 7) The Army should establish protocols for hydro-mulching or other large-scale native plant seeding to be used in native habitat restoration efforts.
- 8) The Army should increase nursery facilities with the goal of creating a production-scale facility that is capable of producing large quantities of native plant materials for use in revegetation projects. This native plant stock and seed could be used by the Integrated Training Area Management staff for their revegetation projects. Also, there would be plant materials readily available in case a fire does burn critical habitat and habitat restoration is warranted.
- 9) In order to substantially reduce the fire risk associated with live-fire training, the Army should close Makua to live-fire training (except for short-range training ammunition blanks used in specified areas) when live herbaceous fuel moisture falls below 100 percent at the Makua Range weather station.

REINITIATION STATEMENT

This concludes formal consultation on this action. As required in 50 CFR § 402.16, reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease pending reinitiation.

The Army will coordinate with the Service if a fire due to military activities or actions occurs outside of any of the firebreak roads established at Makua. No military training activities with live-fire weaponry, except for those that are addressed in this consultation may be used at this installation without coordination with the Service. As stated in the Conclusion (above), the Service's finding of non-jeopardy is based in large part on the conservation measures built into the project by the Army. Should there be a failure to carry out any or all of the described measures, or if the measures are not effective, or if these measures are modified in any way without Service coordination, reinitiation of consultation will be required. References not previously cited in the Makua Biological Opinion are enclosed. If you have any questions regarding this Amendment, please contact Dawn Greenlee at (808) 792-9400.

Sincerely,

A handwritten signature in black ink that reads "Patrick Leonard". The signature is written in a cursive, flowing style.

for Patrick Leonard
Field Supervisor

Enclosure:

References not previously cited in the Makua Biological Opinion

**REFERENCES NOT PREVIOUSLY CITED
IN THE MAKUA BIOLOGICAL OPINION**

- Alexander, M.E.C. Tymstra and K.W. Frederick. Incorporating breaching and spotting considerations into Prometheus - the Canadian wildland fire growth model. Chisholm/Dogrib Fire Research Initiative, Quicknote 6, 2 pp.
- Andrews, P.L. 1986. BEHAVE: fire behavior prediction and fuel modeling system - burn subsystem, Part 1. U. S Forest Service, Intermountain Forest Research Station, Ogden, Utah, General Technical Report INT-194, 130 pages.
- Beachy, Jane. 2007. Meeting during Waialua Fire field survey, Waialua, Hawaii. August 29-30, 2007.
- Beavers, A. 2008. Center for Environmental Management of Military Land, U.S. Army Garrison Hawaii contractor. Telephone conversation. May 14, 2008.
- Bell, T. 2003. Effects of fire retardants on vegetation in eastern Australia heathlands: a preliminary investigation. Research Report No. 68, Fire Management, Department of Sustainability and Environment, Victoria, Australia. 41 pp.
- Bradstock, R.A., J. Sanders and A. Tegart. 1987. Short term effects on the foliage of a eucalyptus forest after an aerial application of a chemical fire retardant. Australian Forestry 50(2): 71-80.
- Castillo. J.M., A. McAdams, M. Nakahara, D. Weise, and G. Enriques 2006. Effects of prescribed grazing and burning treatments on fire regimes in alien grass-dominated wildland-urban interface areas, leeward Hawaii. Final Report to the Joint Fire Science Program. Project No. 01-3-4-14. 97pp.
- Cherry, Robert. 2008. Rancher, Meeting at Flying R Ranch, Waialua, Hawaii (February 26, 2008).
- Ching, Susan. 2008a. U.S. Army Garrison, Hawaii, Natural Resource Staff, Implementation Plan Project Coordinator. Telephone interview. May 15, 2008.
- Ching, Susan. 2008b. U.S. Army Garrison, Hawaii, Natural Resource Staff, Implementation Plan Project Coordinator. Meeting at Army Baseyard, Wheeler Army Airfield, Hawaii. May 7, 2008.
- Ching, Susan. 2007. U.S. Army Garrison, Hawaii, Natural Resource Staff, Implementation Plan Project Coordinator. Meeting at Army Baseyard, Wheeler Army Airfield, Hawaii. August 30, 2007.
- Giambelluca, T.W., Nullet, M.A., and Schroeder, T.A. 1986. Hawaii Rainfall Atlas, Report R76, Hawaii Division of Water and Land Development, Department of Land and Natural Resources, Honolulu, vi 267p., Digitized by the Office of Planning.

Enclosure for Amendment of the Makua Biological Opinion (June 2008)

Greenlee, D. and A. Beavers. 2007. Fuel Model Map for Makua Action Area and Vicinity. Unpublished.

Greenlee, Dawn (Fish and Wildlife Biologist, U.S. Fish and Wildlife Service) in partnership with Jane Beachy, Susan Ching, Kapua Kawelo, Matt Keir, Jobi Rohrer (U.S. Army Natural Resources Staff); Mark Takemoto Castle & Cooke Natural Resources Administrator; Andy Beavers (Fire Ecologist, Center for Environmental Management of Military Lands); Robert Cherry (Flying R Ranch, Waialua, HI), Randall Kennedy, Ryan Peralta, Ruben Mateo, and Talbert Takahama (Hawaii Department of Land and Natural Resources); Greg Koob, Oahu District Conservationist Chad Kacir, and State Rangeland Management Specialist Loretta Metz (U.S.D.A Natural Resource Conservation Service); and Marie Bruegmann and Jeff Zimpfer (Fish and Wildlife Biologists, U.S. Fish and Wildlife Service). October 29, 2007.

Greenlee, J. 2007. Unpublished document: Spot Fires in Guinea Grass (*Panicum giganteum*), a Hazardous Fuel in Hawaii. 15pp.

Hawaii Gap Analysis Program. 2005. HI-GAP statewide land cover GIS layer.

Hirsch, S. N., G. F. Meyer and D. L. Radloff. Choosing an activity fuel treatment for southwest ponderosa pine. U. S. Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO., 15 pages.

Hough, W.A. and F.A. Albini. 1978. Predicting fire behavior in palmetto-gallberry fuel complexes. U.S. Forest Service, Southeastern Forest Experiment Station, Research Paper SE-174, 48 pages. Citation 34455.

Kacir, Chad. U.S.D.A. Natural Resource Conservation Service (NRCS). Meeting at NRCS Office, Aiea, Hawaii. September 5, 2008.

Kayll, A.J. 1968. Heat tolerance of tree seedlings. Tall Timbers Fire Ecology Conference 8:89-105.

Keir, Matthew. 2008. U.S. Army Natural Resource Management Rare Plants Program Manager. Meeting at Army Baseyard, Wheeler Army Airfield, Hawaii. January 17, 2008.

Keir, Matt. U.S. Army Garrison, Hawaii Rare Plants Program Coordinator and Ronald Cannarella, Hawaii Department of Land and Natural Resources. 2007. Waialua Fire Perimeter Map: Joint effort, drafted originally during the Waialua Fire by U.S. Army Garrison Natural Resources Staff. Flown via helicopter by Ronald Cannarella, who transferred GPS and video information to map with assistance from Dawn Greenlee (U.S. Fish and Wildlife Service). (Field surveys and GIS work completed, primarily by U.S. Army Natural Resource Staff. September 10, 2007).

Enclosure for Amendment of the Makua Biological Opinion (June 2008)

- Koob, Greg. 2007. Meeting at U.S.D.A. Natural Resource Conservation Service office in Honolulu, Hawaii. September 5, 2008.
- Larson, J. R. and D. A. Duncan. 1982. Annual grassland response to fire retardant and wildlife. *Journal of Range Management* 35(6): 700-703.
- Larson, D. L. and W. E. Newton. 1996. Effects of fire retardant chemicals and fire suppressant foam on North Dakota prairie vegetation. *Proceedings of the North Dakota Academy of Science* 50: 137-144.
- Lau, Joel. 2008a. U.S. Army Garrison Hawaii contract botanist. Makua Implementation Team Meeting at Windward Community College, Kaneohe, HI discussion of *Hibiscus brackenridgei* ssp. *mokuleianus* phenotypes (January 28, 2008).
- Lau, Joel. 2008b. U.S. Army Garrison Hawaii contract botanist. Makua Implementation Team Meeting at Windward Community College, Kaneohe, HI discussion of Keaau grazing (January 28, 2008).
- Methven, I.R. 1971. Prescribed fire, crown scorch and mortality: field and laboratory studies on red and white pine. Petawawa Forest Experiment Station, Chalk River, Ontario, Information Report PS-X-31, 10 pp.
- Moller, Eric. 2007. U.S. Army Garrison, Hawaii. Fire Chief. Telephone conversation regarding helicopter availability during hurricane and Waialua Fire. August 13, 2007.
- Omi, P. H. 2005. *Forest Fires*. ABC CLIO, Santa Barbara, California, 347 pp.
- Takemoto, Mark. 2008. Castle & Cooke Natural Resources Administrator, Meeting at Castle & Cooke, Hawaii, Inc. Office in Mililani Technical Park, Mililani, Hawaii, attended by Daniel X. Nellis (Dole Food Company, Hawaii Operations Director), Michelle Mansker (U.S. Army Garrison Hawaii Natural Resource Manager) and Dawn Greenlee (Service). February 8, 2008.
- U.S. Army Garrison. 2008. Kaukonohua Fire Report. September 12, 2007. Memorandum for Record IMPC-HI-PWE. Directorate of Public Works, Environmental Division; Schofield Barracks. 32pp.
- U.S. Army Garrison. 2007. 2007 Status Reports for the Makua Implementation Plan and the Draft Oahu Implementation Plan. Directorate of Public Works, Environmental Division; Schofield Barracks.
- U.S. Army Garrison. 2006f. Reconnaissance for fire burning into Makua Military Reservation, started in the Keawaulu area, north of Makua Valley, July 25, 2006 Memorandum for record IMPA-HI-PWE (200-3), Directorate of Public Works, Environmental Division; Schofield Barracks.

Enclosure for Amendment of the Makua Biological Opinion (June 2008)

U.S. Army Garrison. 2003e. Final Implementation Plan, Makua Military Reservation, Island of Oahu. May 2003. Prepared by the Makua Implementation Team, Wil Chee-Planning, Inc, and the Hawaii Natural Heritage Program. Contract No. DACA83-96-D-0007, Delivery Order No. 0055).

U.S. Geological Survey. 2003. Western Geographic Science Center. Digital Raster Graphic (DRG) dataset. August 2003.

Yuh, Peter. 2008. Lunch meeting next door to Castle & Cooke Castle & Cooke, Hawaii, Inc. office, Mililani Technical Park, Mililani, Hawaii, attended also by Mark Takemoto (Castle & Cooke Natural Resources Administrator), Alvin Char and Michelle Mansker (U.S. Army Garrison Environmental Division), and Dawn Greenlee (Service). February 1, 2008.

FEDERAL REGISTER PUBLICATIONS

(68 FR 12982-13141) Endangered and threatened wildlife and plants: final designation or nondesignations of critical habitat for 42 plant species from the island of Molokai, HI: final rule. Department of the Interior, Fish and Wildlife Service, 50 CFR Part 17, March 18, 2003. Federal Register 68(52): 12982-13141.

(68 FR 35949-35998, 35951, 36016, 36020, 36021, 36400) Endangered and threatened wildlife and plants; final designation and nondesignation of critical habitat for 46 plant species from the island of Hawaii, HI; final rule. Department of the Interior, Fish and Wildlife Service, 50 CFR Part 17, June 17, 2003. Federal Register 68 (116): 35949-35998, 35951, 36016, 36020, 36021, 36400.