Live-Fire Training at Makua

1943 Use of Makua by military for live-fire exercise

1988 Company combined-arms assault course with live-fire range constructed and operational at Makua Military Reservation

1988-1998 Makua Military Reservation prepared Soldiers for combat according to Army doctrine

1998 (September) Training suspended temporarily due to wildfires, and the Army's investigation, assessment and mitigation efforts to reduce the impact of its activities.

2001 (July) U.S. District Court barred live-fire training at Makua Military Reservation pursuant to NEPA

2001 (October) Pursuant to a settlement agreement and stipulated order, the Army resumed limited live-fire exercises at Makua Military Reservation for three years and agreed to prepare an environmental impact statement

2001-2004 Makua Military Reservation prepared Soldiers for Operations Enduring Freedom and Iraqi Freedom

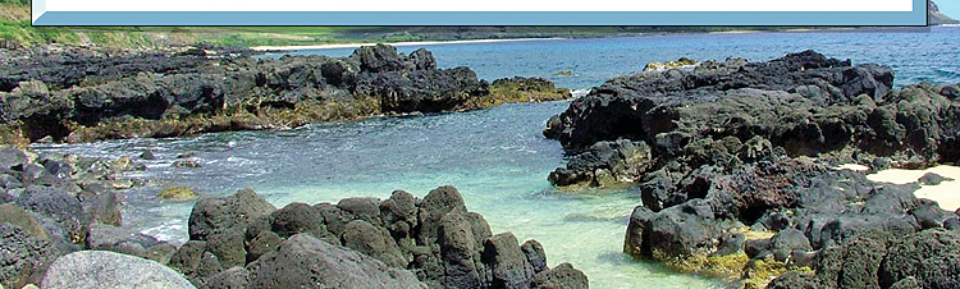
2004 Army halted live-fire training and continued limited, nonlive-fire training at Makua Military Reservation

Possible Sources of Substances Found

Compounds identified for analysis by the settlement agreement cannot uniquely be attributed to military activities because there are and have been many natural and man-made sources that contributed substances to the Makua area.

Substance Found	Possible Sources		
Pesticides (organochlorine, such as Aldrin, Alpha-BHC, Heptachlor epoxide)	Termite control and agriculture		
Arsenic	Natural component of the Earth's crust Naturally occurring in some marine algae/seaweed Smelting of non-iron (called nonferrous) metals Producing energy from fossil fuels Manufacturing Arsenic pesticides Wood preservatives Military munitions		
bis(2-ethylhexyl)phthalate	Plastic toys Vinyl upholstery Food packaging	Shower curtains Adhesives Cosmetics	Coatings Inks Pesticides
Cadmium	Lubricating oils Diesel oils Tires Iron and steel manufacturing	Sewage sludge Insecticides Electroplating Military munitions Batteries	Coal and oil combustion Non-ferrous metal production Refuse incineration Phosphate fertilizers
Chromium	Manufacturing of military and civilian materials/ equipment	Naturally occurring in the rock of the Waianae Mountain Range	
Cobalt	Production of steel and other alloys Automotive repair shops Military munitions Manufacture, use, and disposal of paints and varnishes Natural sources such as soil, dust, seawater, volcanic emissions and smoke from forest and brush fires		
Dioxins/Furans	Commercial and municipal waste incineration Burning fuels such as wood, coal, or oil Chemical manufacturing Forest fires		
Manganese	Naturally occurring element found in rock, soil, and water, ocean spray, and forest fires Man-made sources such as municipal wastewater; sewage; mining; emissions from alloy, steel, and iron production; military munitions; and combustion of fossil fuels		
Nitroglycerin	Military ordnance Fireworks	Rodenticides Demolition blocks	Heating fuel
Perchlorate	Military munitions Fireworks Flares	More than 80 manufactured products used by private industry	
RDX* (Cyclotrimethylene-trinitramine)	Military munitions	Fireworks, detonators, blasting caps, and demolition charges	

* identified in study as possible false positive



Species Collected

Table 2-1
Marine Resources Sampling Locations and Species of Interest at MMR

Common Name	*Scientific Name*
Muliwai Target Species	
Hawaiian flagtail (aholehole)	*Kuhlia sandvicensis*
Striped mullet (`ama`ama)	*Mugil cephalus*
Medaka	*Poeciliidae* sp.
Tilapia	*Talapia zillii, T. rendalii, Oreochromis macrochir, O. mossambicus, Sarotherdon melanotheron melanotheron*
Samoan crab	*Scylla serrata*
Hawaiian prawn	*Macrobrachium grandimanus*
Malaysian snail	*Thiaridae sp.*
Rock crab	*Pachygrapsus minutus*
Red rock crab	*Plagusia depressa tuberculata*
Nearshore Target Species	
Picasso triggerfish (humuhumu nukunuku a puaa)	*Rhinecanthus rectangulus*
Blackspot sergeant (kupipi)	*Abudefduf sordidus*
Christmas wrasse (hinalea)	*Thalassoma trilobatum*
Saddle wrasse (hinalea lau-wili)	*T. duperry*
Manybar goatfish (moano)	*Parupeneus multifasciatus*
(Limu wawae`iole)	*Codium edule*
(Limu manauea)	*Gracilaria coronopifolia*
Kona crab	*Ranina ranina*
Slipper lobster	*Parribacus antarcticus*
Helmet urchin	*Colobocentrotus atratus*
Oblong urchin	*Echinometra oblonga*
Thin-shelled rock crab	*Grapsus tenuicrustas*
Black purse shell	*Isognomon californicum*
Dotted periwinkle	*Littoraria pintado*
Black nerite	*Nerita picea*
Rock-boring urchin	*Echinometra mathaei*
False `opihi	*Siphonaria normalis*
Purple rock barnacle	*Nesochthamalus interextus*
Pleated rock crab	*Pachygrapsus plicatus*
Snakedhead cowry	*Cypraea caputserpentis*
Blue-back urchin	*Echinotrhix diadema*
Black-foot `opihi	*Cellana exarata*