



Pelekunu Valley on the rugged north coast of Moloka'i

East Moloka'i Conservation Area Plan

What's at stake

East Moloka'i Conservation Area

The Island of Moloka'i is the fifth largest of the eight main Hawaiian Islands and has lost in area approximately 86% of its native ecosystems. East Moloka'i is 1 of 9 landscapes identified by the Conservancy's 1998 *Hawaiian High Islands Ecoregional Plan* as an area we wish to conserve.

The East Moloka'i conservation area extends from the north shore marine environment, over the northern sea cliffs, across the high interior mountains, down the south slope, and out to the south shore reefs. The landscape includes the Oloku'i State Natural Area Reserve which, because of its surrounding cliffs, has remained virtually free of non-native ungulates and may be the most biologically intact rainforest in the state. The marine portion of the conservation area encompasses one of the largest fringing reefs in the United States.

On land, the conservation area encompasses more than 40,000 acres and contains perennial streams with renowned ecological integrity, supporting all of the endemic, freshwater macro-fauna known from Moloka'i. The terrestrial biodiversity includes more than 50 natural communities (four of which are unique to Moloka'i). The area also includes 248 endemic Hawaiian flowering plant species of which 39 are endangered and 25 are found only on Moloka'i.



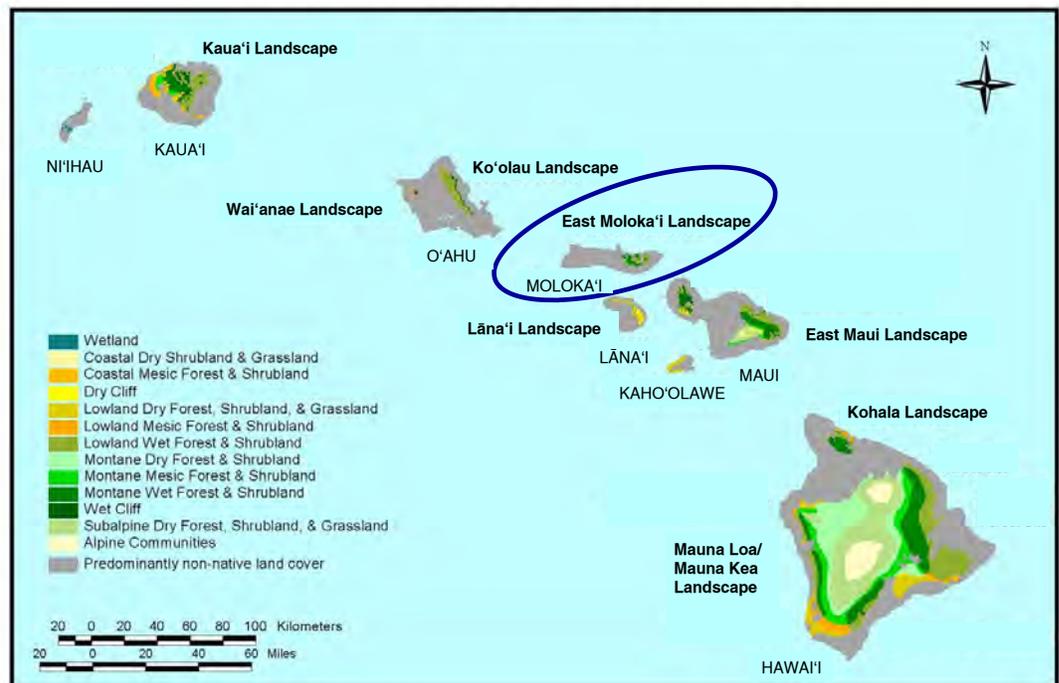
Above Top:
Native 'apapane
(*Himatione sanguinea*)

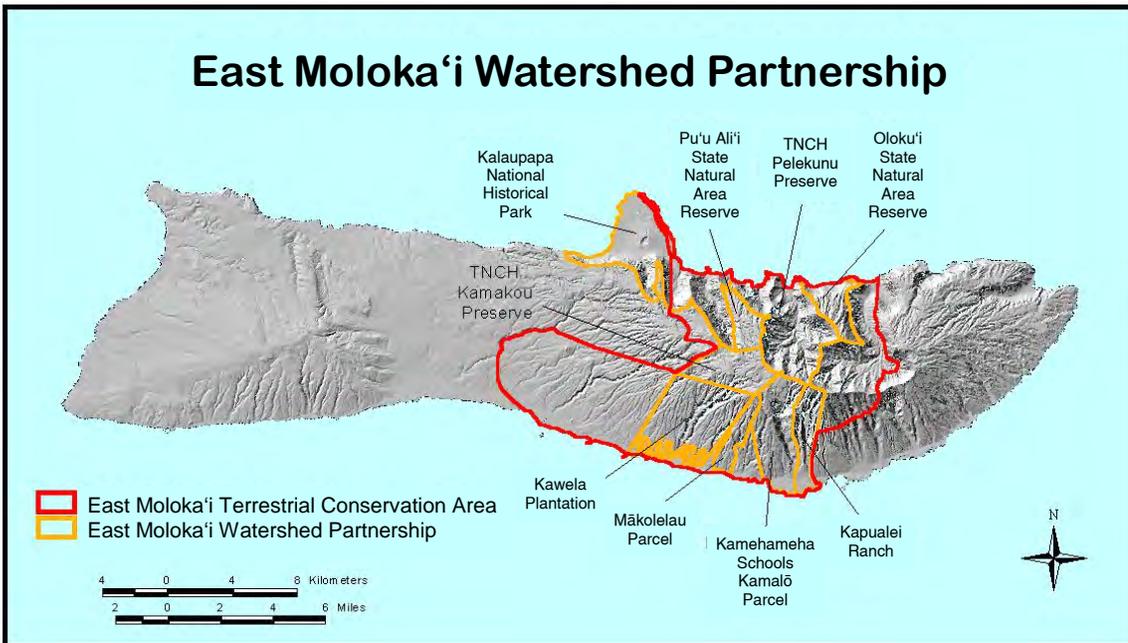
Above Middle:
A rare Moloka'i tree
snail (*Partulina*)

Above Bottom:
Native stream goby,
'o'opu naniha
(*Stenogobius hawaiiensis*)

Upper Right:
The native, upland for-
ests of Moloka'i

Landscapes in the Hawaiian High Islands Ecoregional Plan





The forests, shrublands, and streams comprise the primary watershed for the island. Conserving these native ecosystems is the best way to ensure an adequate water supply for the island's 7,000 residents.

Our Partners

In November 1999, the East Moloka'i Watershed Partnership (EMoWP) was formalized through the signing of a Memorandum of Understanding. The EMoWP is the key vehicle for current and future conservation projects on Moloka'i.

EMoWP members manage their lands for conservation at: Kalaupapa National Historical Park (10,726 acres); 2 State of Hawai'i Natural Area Reserves, Pu'u Ali'i



East Moloka'i Watershed Partnership members:

1. Kalaupapa National Historical Park
2. Kamehameha Schools
3. Kapuālei Ranch
4. Kawela Plantation
5. Mākolelāu (McAfee)
6. Maui Board of Water Supply
7. Maui County
8. Moloka'i Enterprise Community Governance Board (Ke Aupuni Lōkahi)
9. Moloka'i-Lāna'i Soil and Water Conservation District
10. Natural Resources Conservation Service
11. The Nature Conservancy of Hawai'i
12. State Department of Health, Polluted Runoff Control Program
13. State Division of Forestry & Wildlife
14. U.S. Environmental Protection Agency
15. U.S. Fish and Wildlife Service
16. U.S. Geological Survey

Above:
Partners erecting fence to protect the watershed from ungulate damage

Left:
The watershed in scenic Kamakou Preserve receives more than 100 inches of rainfall annually

What we want to conserve



Above Top:
Pēpē'ōpae Bog in
the Montane Wet
Forest of Kamakou
Preserve

Above Middle:
A perennial stream
in Pelekunu Valley

Above Bottom:
South Shore
Fringing Reef of
Moloka'i

(1330 acres) and the aforementioned Oloku'i (1620 acres); 2 Nature Conservancy preserves, Kamakou Preserve (2774 acres) and Pelekunu Preserve (5850 acres); and portions of Kawela, Mākole-lau, Kamalō, and Kapualei.

Conservation Targets

The majority of native-dominated ecosystems, natural communities, and important species on Moloka'i are contained within 7 ecological groupings that we are trying to protect. We call these our "conservation targets." We did not select two notable species assemblages as conservation targets – native forest birds and rare tree snails – due to their perceived low viability. Rather, we aim to protect them by protecting their habitats.

We made an initial assessment of viability for the 3 terrestrial conservation targets, as shown in Appendix A. An assessment of our freshwater and coastal/marine targets is forthcoming.

Conservation Targets

Terrestrial

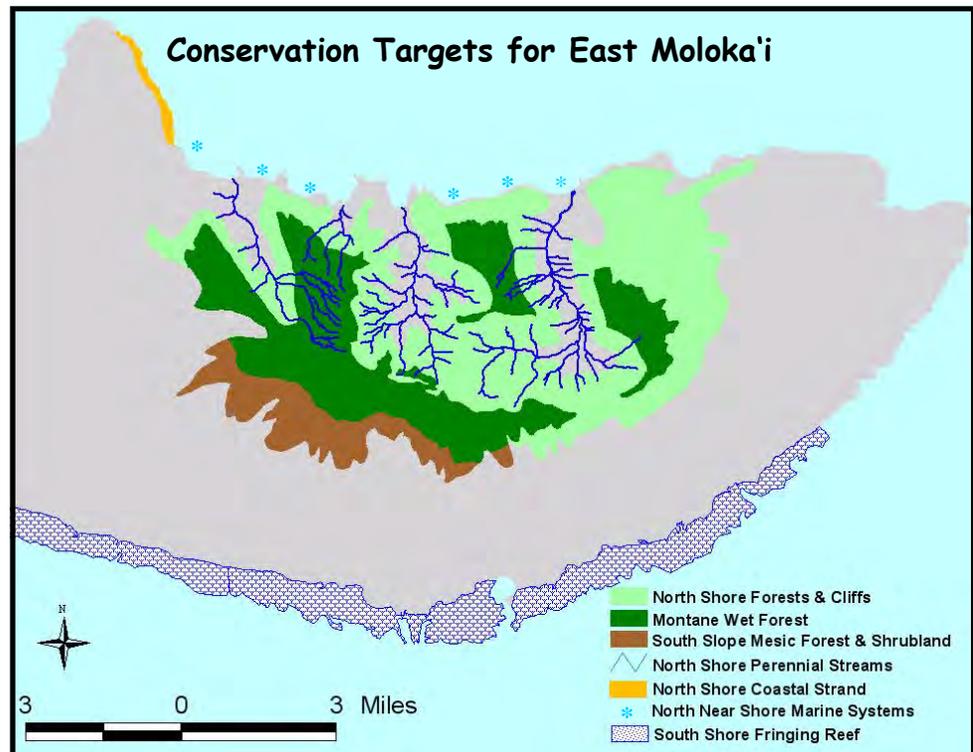
1. North Shore Forests and Cliffs
2. Montane Wet Forest
3. South Slope Mesic Forest and Shrubland

Freshwater

4. North Shore Perennial Streams

Coastal/Marine

5. North Shore Coastal Strand
6. North Near Shore Marine Systems
7. South Shore Fringing Reef



Critical threats to our conservation area

Critical Threats

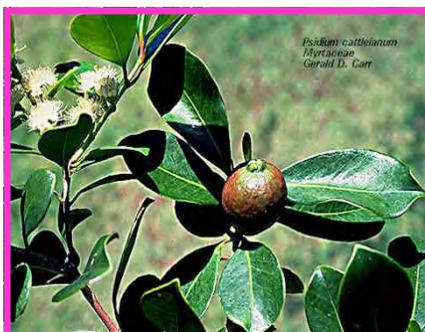
All of the conservation targets are impacted by multiple threats, which act together to alter their viability.

Based on information from surveys, monitoring, and personal observations over the last several decades, we ranked the main threats for each conservation target on Moloka'i (see Appendix B). Our highest ranking critical threats are:

- 1) Established Non-Native Ungulates
- 2) Established Habitat-Modifying Weeds
- 3) New Invasive Plant & Animal Species
- 4) Wildfires

This suite of threats has direct impacts on the terrestrial and coastal ecosystems of Moloka'i. Non-native ungulates eat native vegetation (which evolved in the absence of large herbivores) and cause severe soil disturbance. Weeds compete for habitat and other resources with native species and spread more easily with ungulate disturbance. Invasive species, like *Miconia* and snakes which have not yet reached Moloka'i, have the potential to disrupt and change the ecological balance of native ecosystems. Hawaiian species are not fire-adapted, and wildfires can change the very character and composition of native ecosystems.

The suite of high ranking threats above also indirectly affects freshwater and marine ecosystems. Severe overgrazing by ungulates coupled with wildfires destroys soil-holding vegetation and causes severe erosion. Resulting sedimentation adversely affects aquatic biota, especially coral reefs. Other threats to freshwater and marine ecological systems (e.g., incompatible diversions, over harvesting) exist, but such threats are lower ranked.



Top:
This feral goat is 1 of the 3 non-native ungulate species ravaging Moloka'i

Top Middle:
The weedy and highly invasive Strawberry Guava (*Psidium cattleianum*)

Bottom Middle:
Miconia calvenscens, a potential invader currently growing on neighbor islands

Bottom:
Wildfire is catastrophic to Hawaiian ecosystems

Our goals and objectives

Conservation Goals & Objectives

Our overall conservation goal in the East Moloka'i conservation area is to:

Enhance the viability of each conservation target.

In particular, we intend to maintain and/or improve the landscape context, condition, and size of native ecosystems by abating or eliminating their most critical threats.

To address the urgent and pervasive threats, we identified four threat-reduction objectives.

The objectives below are the agreed upon focus of our work on East Moloka'i, and they will serve as the basis for measuring our success (see **Measures and Monitoring**).

Description of Landscape Context, Condition, and Size

LANDSCAPE CONTEXT

An integrated measure of two factors: 1) the dominant environmental regimes and processes that establish and maintain the target and 2) connectivity.

CONDITION

An integrated measure of the composition, structure, and biotic interactions that characterize the target.

SIZE

Size is a measure of the area of the target, i.e., its geographic coverage. Minimum dynamic area, or the area needed to ensure survival or reestablishment after a natural disturbance, is another aspect of size.

Objective 1	Within 10 years, reduce the frequency of ungulate activity to less than 10% in areas with active ungulate control programs.*
Objective 2	Within 10 years, reduce or contain (as appropriate to specific species) the range and/or density of habitat-modifying weeds within selected management units.
Objective 3	Prevent the establishment of new invasive plant or animal species on the island.
Objective 4	Within 5 years, reduce the amount of burned native ecosystems to zero.

* Because of the difficulty in counting ungulates directly, we measure ungulate "activity" as a substitute. To establish activity levels, we record the level of ungulate sign, e.g., ground diggings and fecal matter. The 10% annual activity level for ungulates was determined by the Moloka'i Hunter's Working Group (MHWG) in 1999. The MHWG consists of community members and staff of The Nature Conservancy of Hawai'i, the State Division of Forestry and Wildlife, and National Park Service. There is no quantitative evidence to indicate that 10% represents a biologically significant threshold. However, it was a level nearly achieved in 1993 after 3 years of snaring and aerial hunting in Pelekunu and a level at which Conservancy staff perceived an improvement in ecosystem condition.



Above Top:
The size of the South Slope Mesic Forest and Shrubland has been greatly reduced to form the "middle eroded zone"

Above Bottom:
The remaining native forest now borders highly degraded areas

Our strategies

Conservation Strategies

We designed four strategies to achieve our conservation objectives on Moloka'i, all of which emphasize working with partners. Each conservation strategy directly addresses one critical threat and often indirectly addresses another (e.g., strategies to control ungulates will likely stem the spread of weeds). Each strategic action below is comprised of several action steps with varying time frames.

Strategic Action 1 – Ungulate Control

Continue to develop and implement a comprehensive ungulate control program through the East Moloka'i Watershed Partnership.

Primary Action Steps:

- Expand acreage managed for ungulate control
- Employ new tools to further reduce unacceptable activity levels in currently managed areas
- Continue to engage the local community and the Watershed Partnership in control efforts

Strategic Action 2 – Integrated Weed Management

Develop and implement a 25-year comprehensive and integrated weed management plan for the landscape.

Primary Action Steps:

- Create whole-landscape distribution maps of key weed species
- Prioritize management actions and develop species specific and management area objectives
- Continue highest priority eradication efforts and monitor results
- Test new weed control methods, including biocontrol

Strategic Action 3 – MoMISC Collaboration

Work with the Moloka'i subgroup of the Maui Invasive Species Committee to respond to new introductions and educate the public on reporting new species.

Primary Action Steps:

- Develop and implement an island-wide education & outreach program, including developing a volunteer watch group
- Become more strategic in searching for new invasive species (e.g., initiate surveys at likely points of entry)
- Investigate and respond to new sightings
- Increase funding for MoMISC

Strategic Action 4 – Collaborative Fire Management

Work with key fire management partners to develop and implement a landscape fire management strategy and action plan.

Primary Action Steps:

- Form task force to organize partners and develop strategies to achieve better fire suppression
- Secure funding to develop and maintain firebreak infrastructure
- Maintain winter livestock grazing in surrounding buffer areas to reduce fuel load
- Experiment with “green” firebreaks

Future Strategies

Future iterations of this Plan will likely yield additional marine-focused strategies, such as building sediment detention ponds and developing early warning systems for alien algae. For now, the terrestrial-based strategies should go a long way toward abating the critical threats to the marine conservation targets. We believe additional objectives and strategies will emerge as we learn more about threats to marine systems and potential additional actions to address them.



Above Top:
Moloka'i pig hunters
with hunting dogs

Above Top Middle:
Weed removal

Above Bottom Middle:
Moloka'i Invasive
Species Committee logo

Above Bottom:
Fighting fire on East
Moloka'i

Right:
Conservancy staff
engaged in stream
monitoring

Measures and Monitoring

The fundamental question facing any conservation project team is: “Are the conservation strategies we are using having their intended impact?” To answer this question, we are collecting data on a number of indicators that gauge how well we are keeping the critical threats in check and, in turn, whether the viability of our conservation targets is improving. At present, a monitoring framework for terrestrial ecosystems has been developed (below). Indicators for freshwater and marine ecosystems will be developed in the near future.



Overview of Measures Framework for Terrestrial Ecosystems

	INDICATORS
THREAT MONITORING	
1. Ungulate activity	<ul style="list-style-type: none"> • Frequency of ungulate sign
2. Extent of habitat-modifying weeds	<ul style="list-style-type: none"> • Acres and density of weeds
3. New invasive plants & animals	<ul style="list-style-type: none"> • Number of priority incipient, invasive species kept off the island • Number of discovered or reported incipient, invasive species eradicated
4. Extent of wildfires	<ul style="list-style-type: none"> • Acres of ecosystem burned • Miles of firebreak • Number of hours between reporting & containment
VIABILITY MONITORING	
Landscape Context	
5. Connectivity to native or protected areas	<ul style="list-style-type: none"> • Percent of ecosystem boundary adjacent to lands managed for threat reduction or biodiversity conservation
Condition	
6. Vegetation canopy condition	<ul style="list-style-type: none"> • Percent of native canopy cover
7. Vegetation understory condition	<ul style="list-style-type: none"> • Percent of native understory and/or ground cover
8. Diversity of indicator plant species	<ul style="list-style-type: none"> • Percent and frequency of native, indicator plant species in understory
Size	
9. Extent of ecosystem	<ul style="list-style-type: none"> • Acres of ecosystem

Appendix A. Viability Assessment of Terrestrial Conservation Targets in the East Moloka'i Conservation Area

Conservation Targets	Landscape Context ^a	Condition ^b	Size ^c	Viability Rank
North Shore Forests & Cliffs	Fair	Good	Fair	Fair
Montane Wet Forest	Fair	Very Good	Fair	Good
South Slope Mesic Forests & Shrublands	Poor	Good	Poor	Fair
Site Biodiversity Health Rank				Fair

a. Our current understanding of the land use patterns surrounding our focal targets is based on vegetation maps from 1979, which show the landscape context of our targets is poor (South Slope Mesic Forest & Shrubland shares only 24% of its boundary with other protected native ecosystems) or fair (North Shore Forests & Cliffs share 65% and Montane Wet Forest shares 70% of boundary with native ecosystems). We plan to track adjacent land use patterns through the Hawai'i GAP program.

b. Preserve staff perceive the canopy and understory condition to be good to very good. The trend for the whole landscape is probably worsening, especially at lower elevations. We plan to track changes in canopy and understory condition using both aerial imagery and ground surveys. In the future, condition of the target may also factor in a measure of plant species diversity.

c. Our current understanding of the target size is also based on data from 1979 maps, which show that the size of the focal terrestrial targets is poor (South Slope Forest is only 2500 acres) or fair (Montane Wet Forest is 8500 acres & North Shore Forest is 14,000 acres). We plan to track ecosystem size in the future using aerial imagery and may use an additional indicator to track size (percent of ecosystem remaining).

Appendix B. Overview of Threats, East Moloka'i Conservation Area

Threat	Terrestrial Targets			Freshwater Target	Coastal/Marine Targets			Overall Rank by Threat
	North Shore Forests & Cliffs	Montane Wet Forest	South Slope Mesic Forest & Shrublands	North Shore Perennial Streams	North Shore Coastal Strand	North Near Shore Marine	South Shore Fringing Reef	
Established non-native ungulates (pigs, goats, axis deer)	High	High	High	Low	Medium	Low	High	High
Established habitat-modifying weeds	High	High	High	-	Medium	-	-	High
New invasive plants & animals	High	High	High	Medium	Medium	-	-	High
Wildfires	-	Medium	High	-	-	-	High	High
Over harvesting	-	-	-	Low	-	Low	High	Medium
Invasive marine species (other than algae)	-	-	-	-	-	Low	High	Medium
Invasive alien algae	-	-	-	-	-	-	High	Medium
Incompatible diversion systems	-	-	-	Medium	-	-	-	Low
Incompatible motorized access	-	-	-	-	Medium	-	-	Low
Incompatible recreational use	-	-	Low	-	-	-	-	Low
Invasive Tahitian Prawn	-	-	-	Low	-	-	-	Low
Overall Rank by Conservation Target	High	High	High	Medium	Medium	Low	High	Very High