

EXHIBIT "I-9"
PART S

APPENDIX K

**Presentation Made at
Public Fence Meeting
04/11/2000**

Lanai Watershed Protection Fence Options



- Introduction
- Watersheds & Water
- Advisory Committee Priorities
- Lanai Species
- Protective Measures
- Peer Review Committee Advice
- Deer & Deer Damage
- Deer Control Options
- Fencing Options
- Close

Cloud Forest



Cloud Condensation
Complex Understory
Multiple Layers



Healthy
Uluhe
and
Moss Cover

WATERSHEDS & WATER

- COLLECTION
- STORAGE
- REGULATION OF DISCHARGE
- EROSION CONTROL
- WATER QUALITY

COLLECTION



COLLECTION



STORAGE



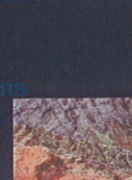
Regulation of Discharge



Erosion Control

canopy & understory
break impact of rain

root systems
hold soil



Water Quality

- Adsorption
- Absorption
- Filtration
- Uptake



- ♦ Diverse Cover
- ♦ Multiple Layers
- ♦ Interception
- ♦ Condensation
- ♦ Adsorption
- ♦ Leaf & Stem Drip
- ♦ Absorption



BIODIVERSITY = Diverse Forms of Life

One part of an ecosystem affects the other parts. The ecosystem is healthier when all of its parts are intact.

Forms of Life Unique to Lanai
(Ex. Halapepe, *Partulina variabilis*)

Ama'u & Uluhe



Cyrtandra



Halapepe



Ho'awa



Hue Hue



Isachne distichiophylla



Kawa'u



'Ohi'a



Pukiawe



Uki



Uki uki



Partulina Variabilis



`Apapane



WORKING GROUP PRIORITIES

- Protect Watershed
- Protect Native Ecosystems
- Consistent with Community Values

Protective Measures

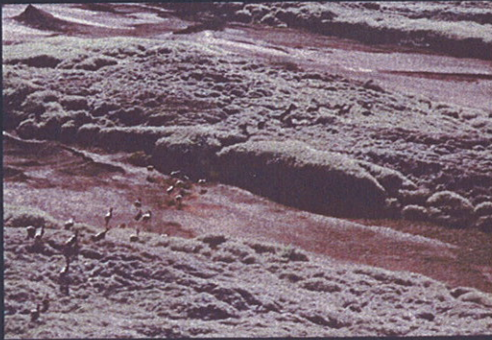
- Control deer, sheep and rodents
- Control invasive plant species
- Prevent introduction of invasive plant and animal species (including insects)
- Provide fire protection
- Selective re-planting
- Collection, storage and maintenance of plant genetic material
- Protection from human disturbance
- Monitoring
- Public Education

Peer Review Committee #1 Issue:
Reduce Deer Population

WHY WORRY ABOUT DEER
DAMAGE IN THE WATERSHED

? ? ? ? ? ? ?

Deer & Deer Damage



Trampling



Trampling



Trampling



Trampling



Trampling
Compaction
Disturbance
Trail Formation
Invading Plants

Browsing



Browsing



Browsing

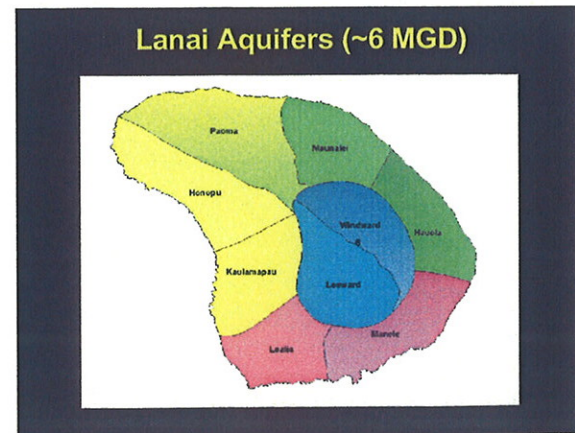
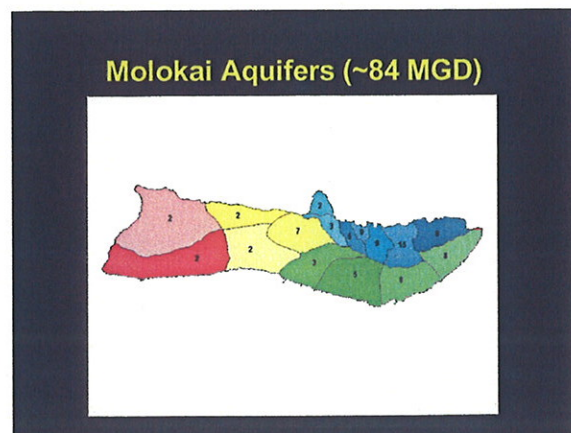
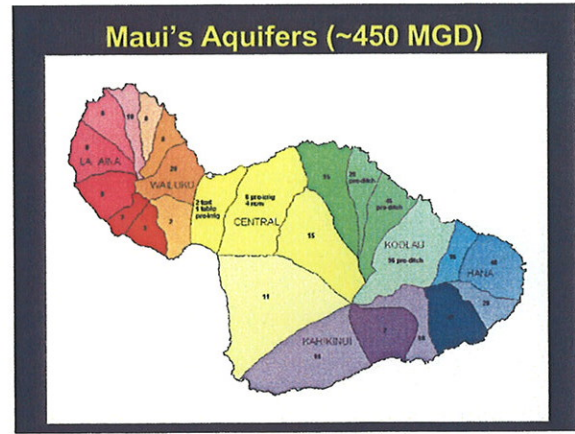


Deer Rub









Control of Deer and Sheep

- hunting or other removal
- catch and transport
- fencing and other obstruction
- repellants, sterilizers
- habitat alteration
- introduced predators

Why Select Fencing?

- **Capture & Transport** very expensive, may not be places to send the deer, deer may die in transport
- **Sterilization or reproductive intervention** - administered either by darting or orally with bait. Vaccines still under development. Must be approved by FDA because deer is seen as "food animal", darting vaccine needs to be repeated annually, difficulty getting all deer reliably..OR, if animals are captured and surgically altered..difficulty getting all deer, very expensive, may not help situation in time to save watershed.

Why Select Fencing? (continued)

- **Repellants** - garlic oil, putrid egg solids, predator odor oils, sulphated cod liver oil have been tried. Putrid egg solids had some success in reducing browsing. But no information on how this impacts plants, insects, birds, pollination cycles, etc. Also will not address population problem.
- **Habitat Alteration** - planting desirable forage plants outside watershed, providing water outside watershed, surrounding watershed with thorny plants, etc. Such measures alone will not control population, may risk introduction of species, provision of water could lead to population increase.

Why Select Fencing? (continued)

- **Physical Barriers** - fence, canal, cattle guard, etc. can help keep deer out of desired exclosure or in desired area - not foolproof, but good in concert with other control measures.
- **Hunting** - animals may be able to be eradicated with one huge hunt, or numbers managed with on-going hunting. However steep grades, access problems and other issues mean that if this measure is used it would be more successful concert with other measures, and with some ongoing management .
- **Release of Predators** - introduction of new species poses multiple risks to already threatened watershed.





FENCELINE OPTIONS

Option 1
 13.9 Miles
 \$330,000/410 K
 Enclosed Area:
 32,055 Acres
 HI Volcanoes Nat'l Park
 Assumes:
 • \$25,000/mile for
 materials &
 construction
 • 7' woven wire fence
 • fence follows roads



Option 1

• ADVANTAGES

- Protects large area
- Maintenance & monitoring easier near road
- Per mile costs lower
- Protects secondary recharge area (windward below cloud forest) as well as upper reaches
- Requires tie-off in the ocean

• DISADVANTAGES

- Prone to vandalism
- More fence to maintain
- Needs more coordination to mitigate hunter impacts

Option 2
 14.7 Miles
 \$370,000/450 K
 Enclosed Area:
 26,555 Acres
 HI Volcanoes Nat'l Park
 Assumes:
 • \$25,000/mile for
 materials &
 construction
 • 7' woven fence
 • 1 mile off roads



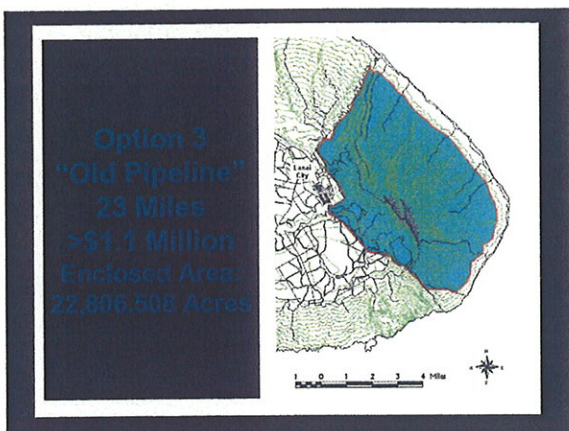
Option 2

• ADVANTAGES

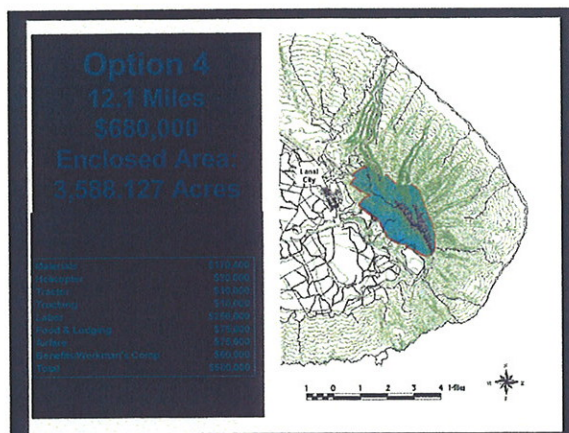
- Protects large area
- Maintenance & monitoring easier near road
- Per mile costs lower
- Protects secondary recharge area (windward below cloud forest) as well as upper reaches
- Second fence could be added in future to create different control level enclosures
- Requires Tie-off in the ocean

• DISADVANTAGES

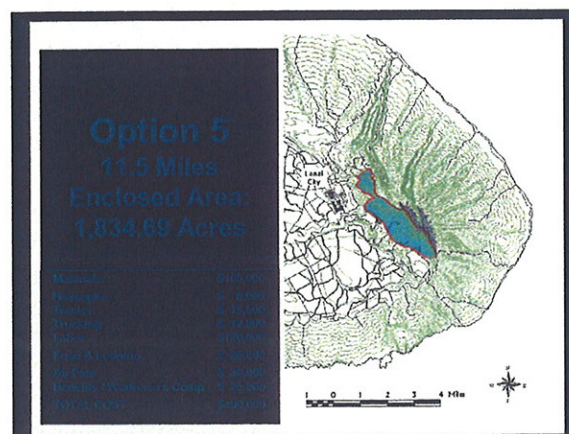
- Prone to vandalism
- More fence to maintain
- Needs more coordination to mitigate hunter impacts



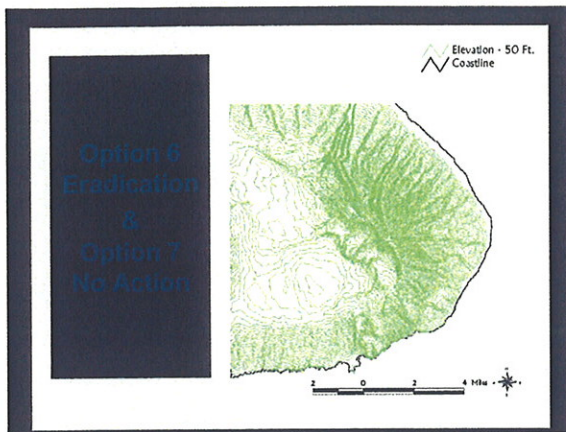
- ### Option 3
- **ADVANTAGES**
 - Protects large area
 - Doesn't require ocean tie-off
 - Maintenance & monitoring easier near road
 - Per mile costs lower on upper side only
 - Protects secondary recharge area (windward below cloud forest) as well as upper reaches
 - **DISADVANTAGES**
 - Most expensive option
 - Prone to vandalism
 - More fence to maintain - old pipeline route is not road - not efficient use of fence
 - Needs more coordination to mitigate hunter impacts



- ### Option 4
- **ADVANTAGES**
 - Protects most critical recharge area
 - One of the less expensive options
 - Leaves lower reaches for hunter control
 - May be somewhat less prone to vandalism
 - Less impact on hunting community
 - Addresses both deer and sheep
 - **DISADVANTAGES**
 - More difficult terrain for maintenance & monitoring
 - May be more expensive to repair



- ### Option 5
- **ADVANTAGES**
 - Protects part of most critical recharge area
 - Leaves lower reaches for hunter control
 - May be somewhat less prone to vandalism
 - Less impact on hunting community
 - Addresses both deer and sheep
 - **DISADVANTAGES**
 - Leaves out portion of most critical recharge area
 - More difficult terrain for maintenance & monitoring
 - May be more expensive to repair



Option 6 Eradication

- **ADVANTAGES**
 - Most protective of watershed
 - End of deer problem
 - No fencing expense
 - No maintenance Expense
- **DISADVANTAGES**
 - Hunters likely to object
 - Massive undertaking
 - Loss of hunting-related economic input to community
 - Doesn't address sheep

Option 7 No Action

- **ADVANTAGES**
 - No effort until problems arise
 - No vandalism
- **DISADVANTAGES**
 - Watershed would be lost
 - Expense to re-create recharge greater than expense to preserve
 - loss of biodiversity

Fenceline Evaluation

	Cost	Miles	Acreage Protected	Recharge Impact *	Hunting Impact *
Option 1	\$410,000	13.9	32,055		
19	4 (330K)	4	5	5	1
Option 2	\$450,000	14.7	26,555		
15	3 (370 K)	2	4	4	2
Option 3	\$1,100,000	23	22,807		
11	1	1	3	3	3
Option 4	\$680,000	12.1	3,588		
14	2	4	2	2	4
Option 5	\$400,000	11.5	1,835		
17	5	5	1	1	5

* Items from 1-5 where higher score is better

IN THE BLEACHERS By Steve Moore

