

Coqui – The Noisy Invasion of Hawaii Volcanoes NP

How to Maintain a Coqui-Free Zone in and outside the Park

2008 May 13 - (Revised)

2007 March 27 - Kim Tavares (original)

a.k.a. "My Coqui Story"



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1996 B.C. (Before Coqui)

- Once upon a time, there were quiet nights.
- Not silent by any means, but not noisy either.
- Crickets, an occasional screech from an owl, a flock of some unidentified birds traveling at night.
 - “The wonders of the rainforest at night are there for those who listen.”
 - Anonymous Puna Resident, c. 1996

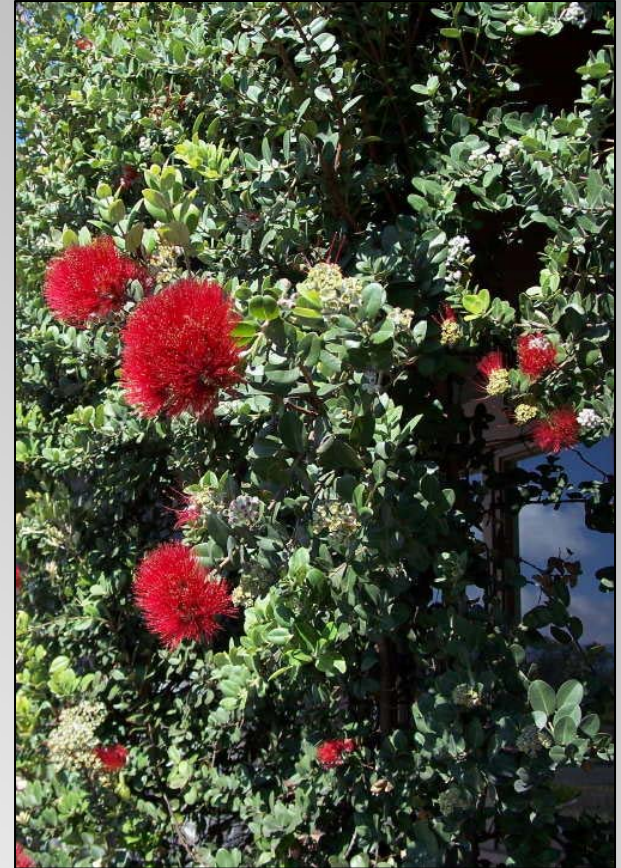
Coqui History

- Otherwise known as, “How Coqui changed my life ...”



Slow But Sure Advance on Volcano

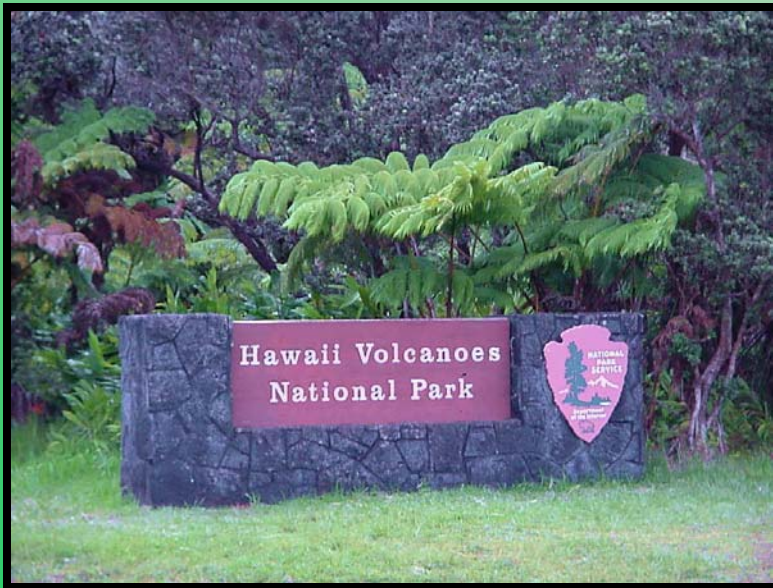
- Mid-1990's: 1st Reports on the island
 - Kurtistown, Kailua-Kona, Hilo
- 1999: 1st Report in Volcano Area
 - Volcano Golf Course Subdivision
- 2001: 1st Indication of a new challenge for HAVO
 - Hawaii Volcanoes (3)
 - Volcano Village (6)
 - Mauna Loa Estates (1)
 - Royal Hawaiian Estates (2)
 - Fern Forest (1)



13 Coqui Captured in 2001

2001-2005 Coqui Advance on Hawaii Volcanoes NP

- 7 Locations
- 10 Captures



2001 (4) Puna Entrance Sign

2002 (1) Rainshed

2004 (1) Enviro-Ed Center

2004 (1) KMC gas station

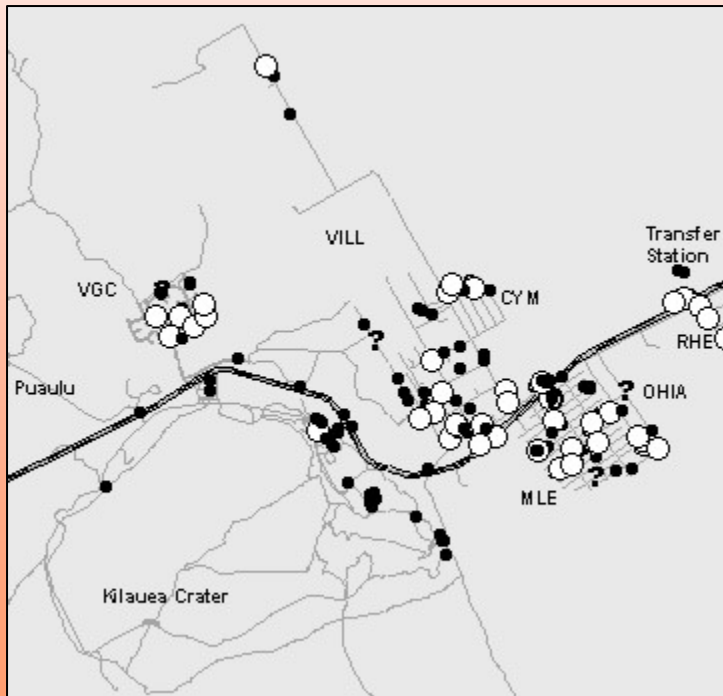
2004 (1) Entrance station

2004 (1) Volcano House

2005 (1) Kilauea Iki Overlook

2006 HAVO Season Results

- 18 Locations
- 35 Captures



- (3) Entrance station
- (2) Volcano House
- (1) Kilauea Iki Overlook
- (3) Park Headquarters staff parking
- (1) Hawaiian Volcano Observatory
- (2) Park Auto Shop
- (3) Volcano Art Center near restrooms at VC
- (9) Research & Resources Management
- (2) Roadside under powerline Hilo side of entrance
- (1) Crater Rim at Research-RM intersect
- (1) Fire cache
- (4) Thurston Lava Tube vicinity
- (1) Highway & Mauna Loa Strip Road
- (1) Highway Ka'u side of Rainshed back gate
- (1) KMC Chapel vicinity
- (1) KMC Post Office
- (1) Quarters 7 Interpretation

Coqui Captures around HAVO

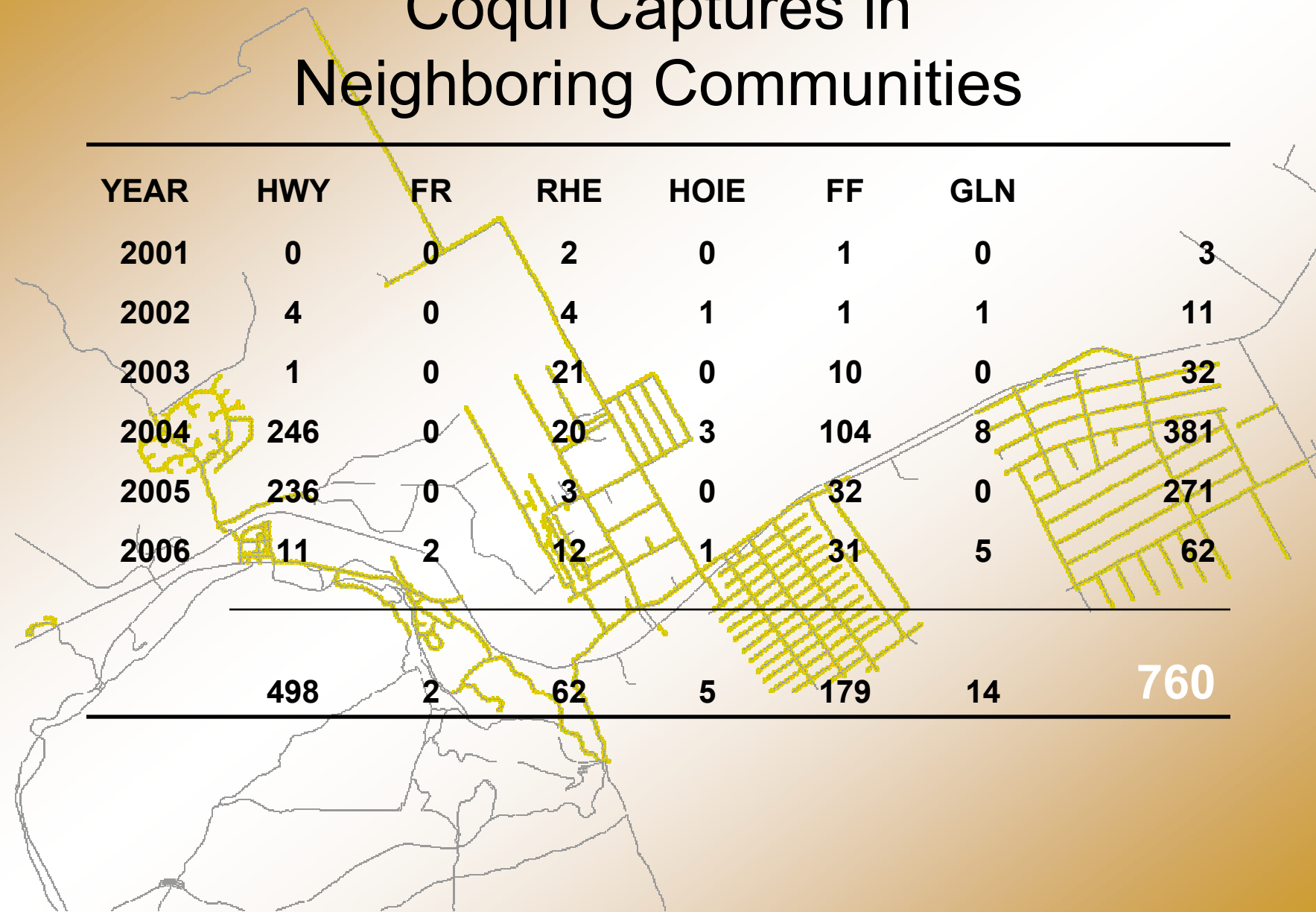
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YEAR	HAVO	VGC	VILL	CYM	MLE	OHIA	
2002	1	0	2	0	2	0	5
2003	0	0	3	1	2	1	7
2004	4	4	8	0	8	1	25
2005	2	0	2	0	0	1	5
	7	4	15	1	12	3	

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	HAVO	VGC	VILL	CYM	MLE	OHIA
2006	35	9	40	5	27	3

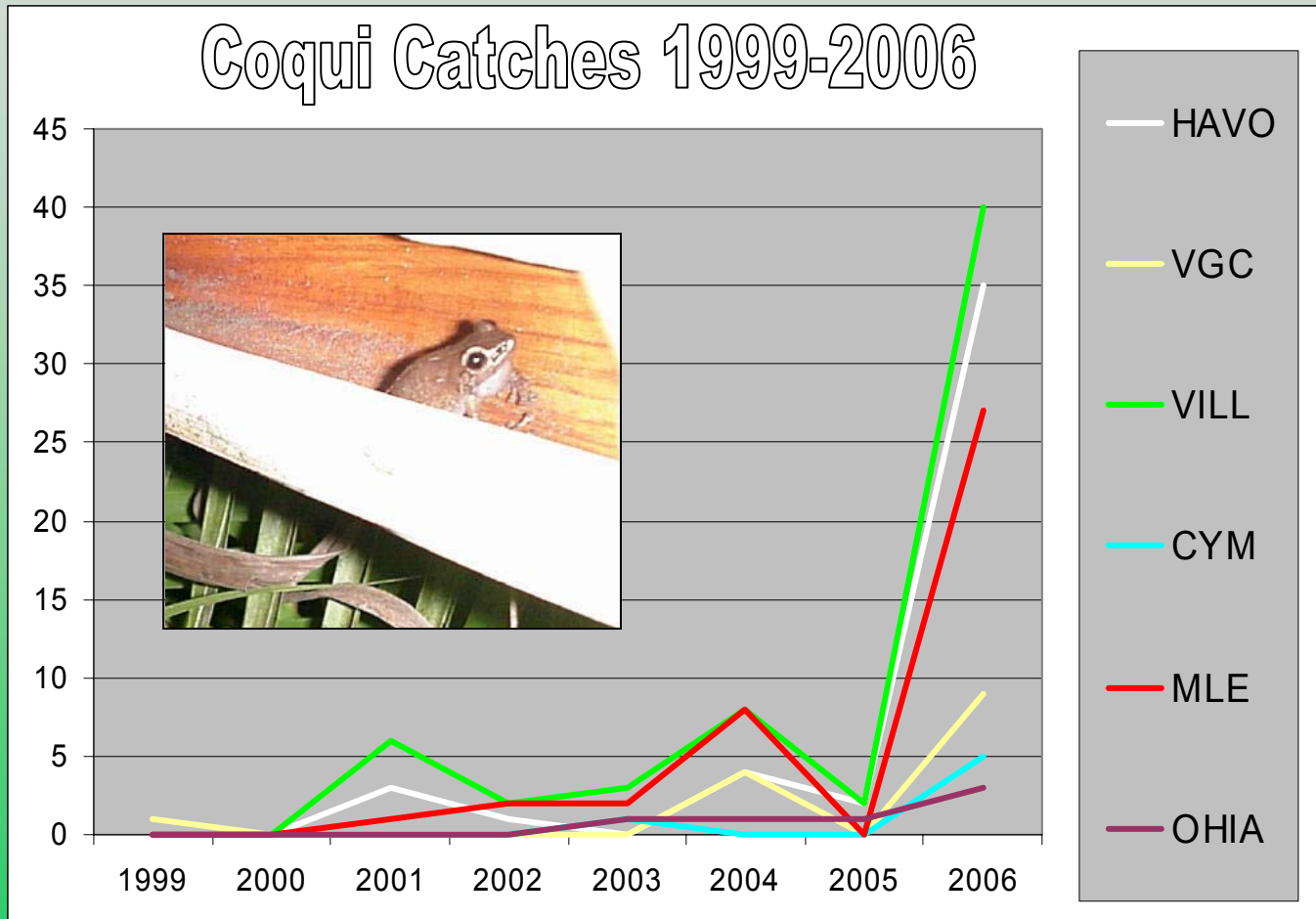
Coqui Captures in Neighboring Communities



A map of the region is overlaid on the table, showing various communities outlined in yellow. The communities are: HWY (top left), FR (top center), RHE (center), HOIE (center right), FF (bottom center), GLN (bottom right), and a large area on the far right. The table lists the number of coqui captures for each community from 2001 to 2006, with a total for each year and a grand total.

YEAR	HWY	FR	RHE	HOIE	FF	GLN	
2001	0	0	2	0	1	0	3
2002	4	0	4	1	1	1	11
2003	1	0	21	0	10	0	32
2004	246	0	20	3	104	8	381
2005	236	0	3	0	32	0	271
2006	11	2	12	1	31	5	62
	498	2	62	5	179	14	760

Coqui Captures – Near Neighbors



What Happened in 2006

- More infested areas in lower elevations
- Infestations growing larger in all areas
- Increased vehicle traffic from infested areas
 - Home construction material deliveries
 - Construction workers
 - Vehicles transporting park staff, visitors, delivery trucks



What Else Happened in 2006?

- More Outreach & Awareness Activities
- More Community Involvement
- More Coquistadores! (But still not nearly enough)



Coqui Biology



[frogcall.mpg]

Arnold Hara, Univ. of Hawaii

Beaumont Agricultural Research Center

- Male frogs perch and call females
- Females stay closer to the ground
- Frogs breed, female lays eggs, male protects them.

Male Frog Guards the Egg Clutch



A.H. Hara – Univ. of Hawaii Hilo

Life Cycle of the Coqui Tree Frog

(From Townsend & Steward 1994, Krauss et al. 1999, Stewart & Woolbright 1996)

*No tadpole stage.

*Males guard eggs and keep them from drying out.



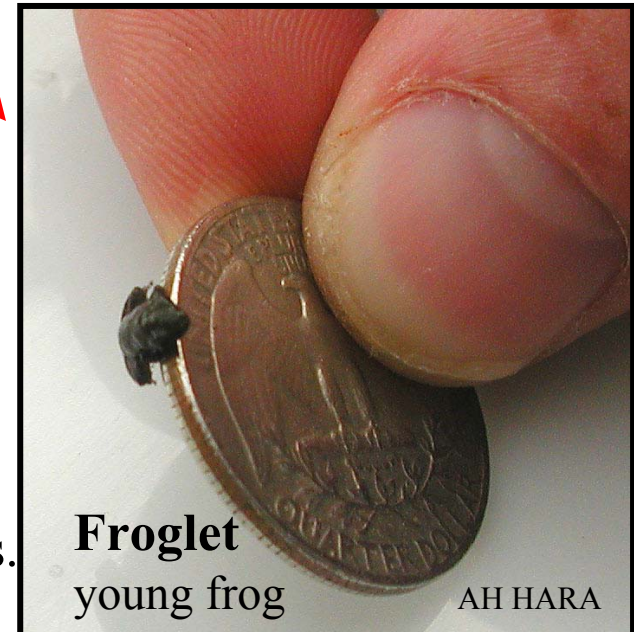
Egg cluster

Deposits 4-6 clusters of about 28 eggs per cluster in a year.

Each egg = 1/8" diam.
(Hatches in 17-26 days)



Eight months
from egg to
egg-laying adult.
Adults may live as
long as 4 to 6 years.



Coqui Frog Egg Development (Days after laid)



1 to 2 days



3 to 4 days



8 to 9 days



8 to 9 days



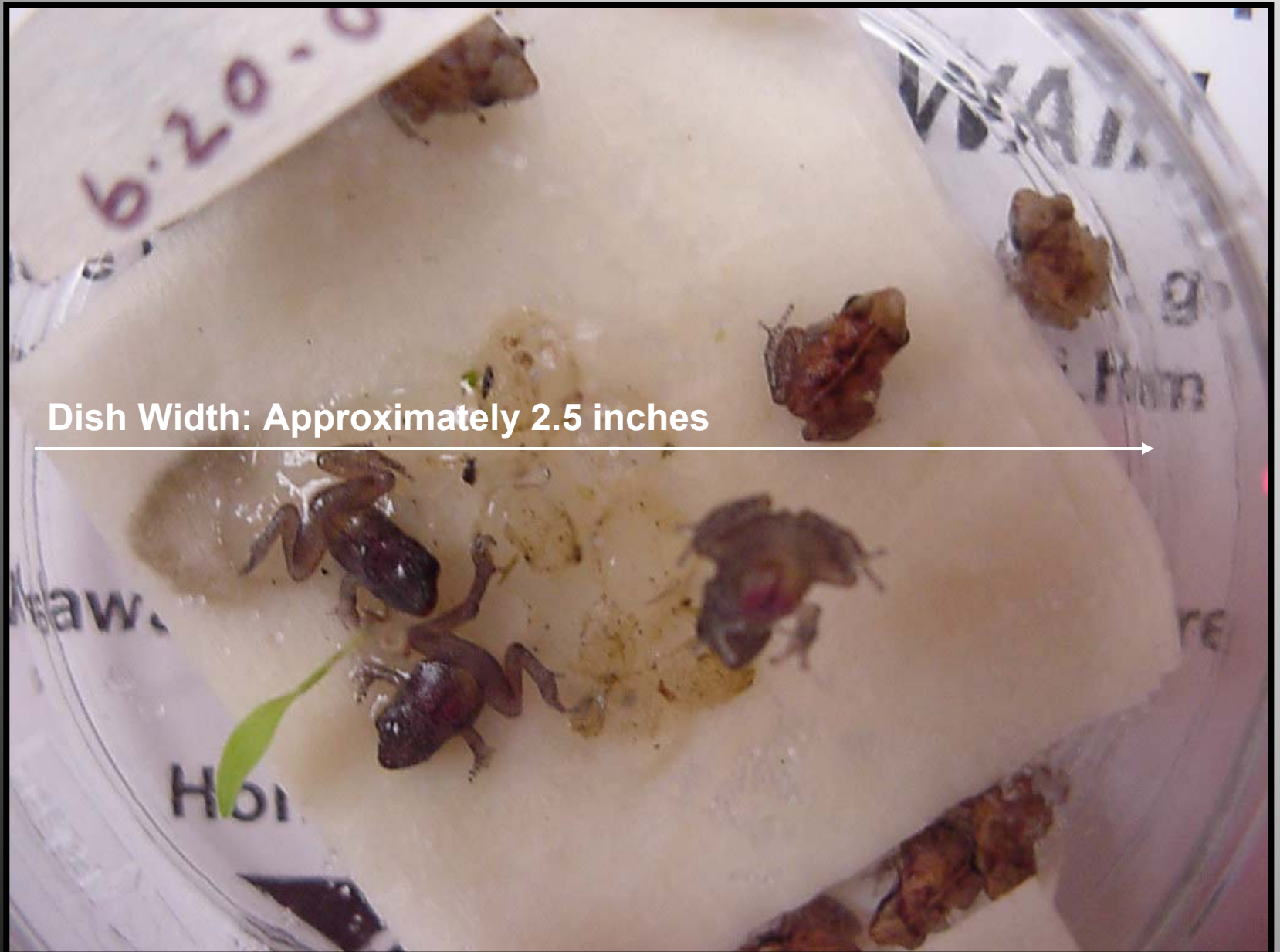
10 to 11 days



13 to 14 days old

Photo by S. Chun

Juvenile Coqui Recently Hatched



High Elevation Coqui FAQs

- Coqui prefer in warm, moist climates.
- Volcano area is generally too cold for them (they don't like it here, but they make the best of it).
- Prolonged cold weather (cool days, cold nights) keep them quiet.
- Prolonged drought keeps them quiet.
- They are most active in mid-summer when it's warm and rainy.
- Coqui prey on insects: crickets, spiders, hard-shelled crawlers.
- Coqui typically don't prey on mosquitoes (or other flying insects).
- They won't be calling into the wind.



Coqui Prevention & Control

- It's EASY to catch a frog! (most of the time)



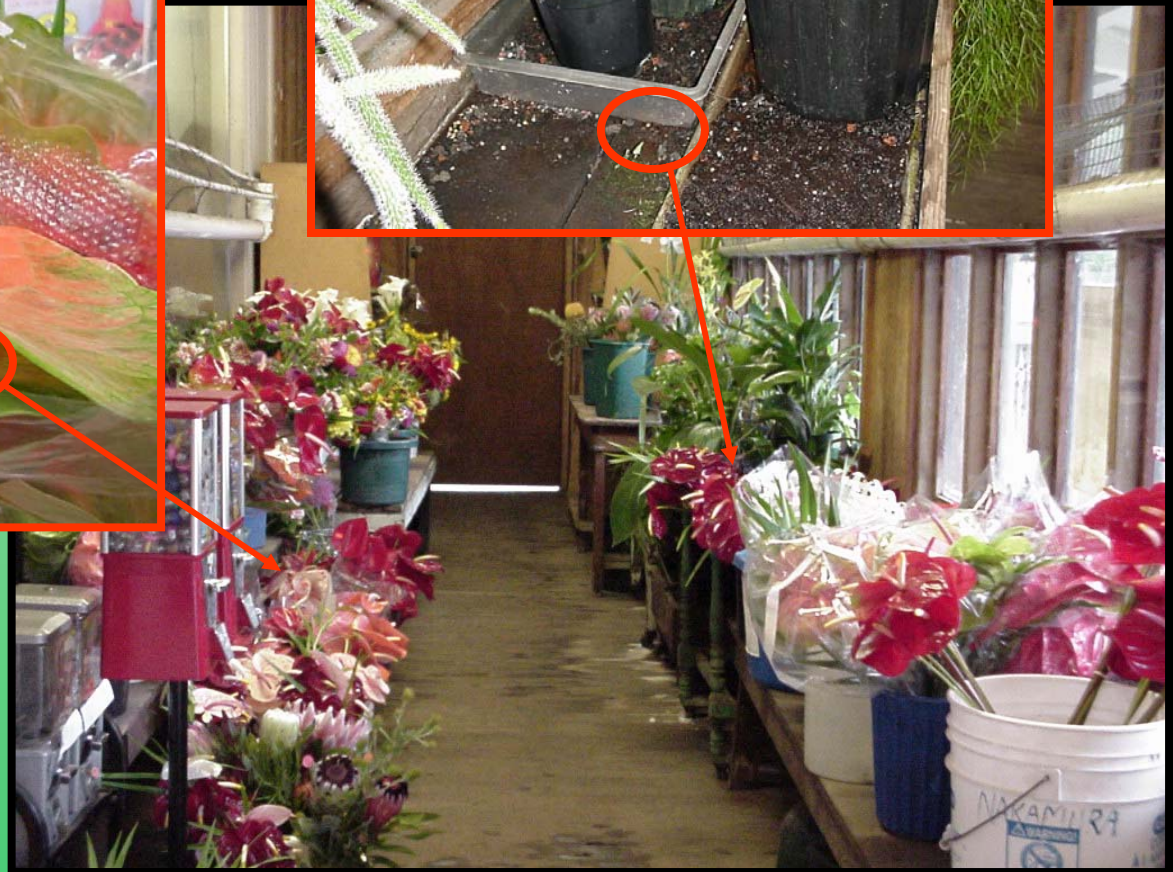
Prevent Coqui from Breeding

- Inspect all plants, plant materials, building materials and other goods for Coqui adults, juveniles and eggs before putting them in your car or truck.
 - Home improvement materials
 - Gardening supplies and plants
 - Vehicles, equipment, machinery from infested areas
 - Plants pulled from the wild to take home



Some Coqui Hide-Outs

- Cut flowers & potted plants may harbor frogs & eggs



Volcano Coquistadores!

- **Prevent Coqui noise from dominating peaceful Volcano**
- **Get Involved - Learn how you can help, it's easy.**
- **Check your stuff! Don't let them HITCH a ride on your car.**
 - Be aware of the areas where you park your car
 - Park far away from shrubs and trees
- **Learn “tree tagging”... discovering which square-yard of space your target frog**

Coqui Calling Months are May-November.
whenever possible.

Best time: 6:30 pm to 9:30 pm

Call 606-1023... Please don't use

Coqui Hunting:

"I hear it but I don't know where to start looking."

- Directions to the Calling Frog Location
 - **Stand outside**, away from running motors, tv's or radios, **then listen without talking for a few minutes.**
 - Hint: Our hearing is directional. We hear better in front of us than behind. If you don't hear frogs right away,
 - **Turn to another direction and listen again.** Coqui are likely to be in the direction that sounds the loudest.
 - Repeat this exercise nightly, bring a friend.
 - If it's been there for a few weeks, there could already be eggs somewhere too. Now it's time for citric acid....



Coqui Hunting:

“Okay, I kind-of know where it is now, but now what?”

- Close In on the Sound **ACTION HINTS:**
 - Walk quickly towards the sound (before it stops).
 - If it stops, STOP, and wait. If no sound for 10 minutes or so,
 - Take a few steps back, and wait again
 - If it calls, you have just stepped out of his space.
 - TAG THE SPOT
- Coqui Habits - **HINTS:**
 - Coqui whistle a few times, then they rest.
 - They often take turns if there's more than one
 - They sometimes stop calling if you get too close (and then you will know you are closing in on it).
 - Narrow your search down to a specific tree or area. Stay at least 5 or 6 feet back from where you think the frog is (or he'll probably stop calling).
 - Coqui are territorial.
 - They have a “favorite tree” for calling.
 - If you find the tree but not the frog, you're half way there.
 - If you don't find it the first time, mark the spot.
 - Tie flagging to the place where you think it is.
 - The frog is likely to be in the same place night after night, till it's caught or disturbed.



Coqui Hunting:

“Hmph! I know he’s RIGHT HERE somewhere, help!”



- Find the Frog
 - You’ve found the tree or clump of trees you think it’s at. Now reposition yourself to the opposite side of the tree/clump, and listen again.
 - Sometimes you’ll find it’s still farther away.
 - Sometimes you’ll be in the right spot.
 - Now determine the elevation of the frog. Is it calling from above or below your ears?
 - Squat down, or climb up a ladder, and listen again. Do not move branches or leaves around. Look on the surface of things first.
 - The louder it gets, the closer you are. When your ears are about level with the calling frog, you will know. If you’ve looked at all surfaces and still don’t see the frog, it’s probably got a leaf on its back, or it’s still higher up.

Coqui Hunting:

*“I’m supposed to see it by now,
it’s piercing call is ringing my eardrums!”*

- The call is loud and piercing, you know it’s really close, but where?
 - The frog is still calling and you have a good idea where he is, narrowed down to the space of a square foot or two.
 - You’ve looked on all the surfaces without moving things around, but haven’t been able to see it yet. Time to start gently moving the leaves to get a look inside a bit deeper.



Coqui Hunting:

“FOUND! Hiding out, Sitting on Eggs!”

- Sometimes the frogs only make small chirps and don't come out of hiding.
- Often times that means they're guarding eggs.
- LOOK for quietly chirping frogs in dark, moist places
- After finding the frog, look around for the eggs too!



Capturing Takes the Males

- Coqui whistles are made by male frogs only. Hunting by sound removes the males, and occasionally a female is found and removed too.
- Females, if they are around, are usually within a few feet of the male frog, they generally don't climb as high.
- Juveniles are almost always close to the ground
- Look for eggs in dark places that always stay damp.
- They won't be in dry places, and they aren't usually in places exposed to direct sunlight.



Drench Treatments Catch All

- An alternative to hand capturing is a liquid drench
- Drenching can reach all frogs, male, female, young and eggs.
- In some cases, drenching is recommended even if the male frog is caught by hand.
 - If the male has been around for several months or more
 - If the site has more than one frog
 - If the site has had frogs before
- If you get near a frog but can't find it, or, if you grabbed it but fear there's still another, or that eggs could be there... then:
 - Mark the spot with flagging tape
 - Don't wait! Get a drench rig and soak that tree. In Volcano there are two options:
 - 55-gallon "Silent Night"
 - Runs off vehicle battery
 - 200-gallon "Big-Rig"
 - Qualify to tow & operate the rig, come to trainings



Citric Acid Drench



- Citric acid leaves no visual residue
- Citric acid will damage leaves of some plants
- Damage can be minimized by a cool water rinse, 45 minutes to an hour after treatment
- Citric acid is less hazardous than lime (for humans)

Other Tools & Treatments

- Hot Water
- Trapping
- Tent Fumigation
- Other chemicals or products



HOT WATER WORKS TOO!

Shower potted plants at 113°F
for 3 minutes, followed by
1 minute of cold water to cool the plant.

Hot Water Shower

CTAHR & DLNR-DOFAW

- Shower plants with hot water (113°F) to flush frogs from infested plants, and then hand collect the frogs.
- Potted plants can be showered with 113°F water for 3 minutes, followed by 1 minute of cold water to cool off the plant. This treatment will kill any frogs or eggs in the plant.
- Cooler water is not effective
- Water that is too hot might damage plants.
- 113°F feels hot but not scalding.
- A hot water heater set to “warm”, runs at about 120°F.



CTAHR PVC Trap Lines

- Trapping works in high frog density areas
- Trapping probably won't work for a single frog



a) Bamboo trap (arrow pointing to entry hole, both ends of bamboo are closed)



b) PVC pipe in Tee-formation



c) Frog and eggs inside Tee-formation PVC pipe

Hank's Tent Fumigation Test

- Hank Banquer heard coqui inside farm equipment.
- Volcano coqui hunters tried to get them out, and got some, but not all
- Frogs were able to hide in parts of the equipment that are not accessible to human eyes or hands.



Committed to a Coqui free Volcano

These pieces of equipment (water tanker and back hoe) were tented to kill off all the hitch hiking coqui frogs that came up from Hilo.

Tenting will kill all the fauna the gas comes in contact with.

After tenting we found 4 dead coqui on the ground and there were probably more inside the chassis etc.

Tenting also kills the females you cant hear and I believe the eggs are also killed as they have a permeable membrane cover (shell).

Report a Frog or Learn to Hunt, Contact:

- Kim Tavares
 - BIISC Coqui Hotline 443-4035
 - Email: kimtavares@yahoo.com
- JOIN Volcano “Coquistadores” Coqui Controllers
 - Keakealani Outdoor Edu Center on Haunani Rd.
 - 3rd Wednesday each month / 5pm
- Hear Coqui at Hawaii Volcanoes NP?
 - Call Rhonda at Resources Management AND
 - Kim (443-4035) or Wolfie (985-6022)

College of Tropical Ag & Human Resources



- <http://www.ctahr.hawaii.edu/coqui/control.asp>