

IACUC-Approved Policies and Current Operating Procedures

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(I) Research Procedures

(1) Collection and Acquisition

(a) Field collection: Not applicable because our research facility is not involved in any collecting or capturing of wild animals.

(b) Record Keeping: Information will be gathered about animals when handled and obtained. Records will be collected regarding total number of animals, cage tag no., sex and age of all species, acquisition and deposition, death, breeding, and reproduction, health etc. Records of all animals are maintained in both paper and electric forms.

(c) Commercial acquisition: Study animals are acquired through reptile dealers who acquire their specimens through trade, or captive breeding. Upon receipt of commercial specimens, and prior to introduction to any existing laboratory colonies, commercial specimens should be subjected to careful inspection for potential health problems or known pathogens. All new arrivals are subject to a 2-month quarantine period.

(2) Restraint, handling, and anesthesia

(a) General Principles: All geckos are handled with the upmost respect and care.

(b) Chemical Restraint: Many chemicals used for restraint or immobilization of amphibians or reptiles are controlled by the Federal Bureau of Narcotics and Drugs. Permits are generally required for purchase or use of these chemicals.

(c) Non-invasive procedures: The only types of procedures that will be performed at our facility are non-invasive imaging procedures such as physical examination, spectral absorption readings, and measurements.

(d) Biological Samples: No blood or tissue sampling will be experimentally performed on living reptiles. The only samples to be taken will be for diagnostic purposes in accordance with a vet if illness is suspected. Biological samples may be taken from deceased animals for diagnosing disease or for biological studies.

(e) Surgical procedures: Not applicable because no minor or major surgical procedures will be undertaken to reach the aims of our research.

(f) Animal Marking and Telemetry: Not applicable because the geckos are polymorphic and easily identified by photographs and individual markings. The following identification methods will not be used: PIT tags, toe clipping, scale clipping, scale branding, tattoos, banding, radio transmitters.

(g) Euthanasia: Euthanasia is the act of bringing about death in the most humane way as possible. The AVMA Panel on Euthanasia (AVMA, 2001) was expanded over the previous report to include poikilothermic vertebrates. Additional information on euthanasia of amphibians and reptiles can be found elsewhere (Cooper et al., 1989). Under no circumstances will reptiles be euthanized for any studies; however, euthanasia will be considered only in instances where it is in the best interest of the animal (i.e., to end suffering from a fatal injury).

(h) Museum Specimens: Any animals that die during the course of study will be preserved as specimens and will be fixed and preserved according to accepted methods to assure the maximum utility of each animal.

(II) Housing and Maintenance

(1) General Considerations

Our research facility is solely dedicated to studying and breeding New Caledonia geckos, and we are currently working with six species across three genera: (1) *Bavayia cyclura*, (2) *Correlophus ciliatus*, (3) *Correlophus sarasinorum*, (4) *Mniarogekko chahoua*, (5) *Rhacodactylus auriculatus*, (6) *Rhacodactylus leachianus*. The conservation status of each of our New Caledonia species is listed below in Table 1, note that none of these species are regulated or protected in the United States because they are not CITES-listed species, nor are they blacklisted by the Lacey Act. Species-specific ecological information is presented in Table 2.

Table 1: New Caledonia Gecko Conservation Status and Evolutionary History

Species	Divergence Est. (mya)	IUCN Status	Population Status	Pop. #	Gene Flow
<i>Bavayia cyclura</i>	8.7-13.6	E (2017), DD (2011)	Declining	5	Continuous
<i>Correlophus ciliatus</i>	7.1-10.4	V (2011 & 2017), EE (1919)	Declining	10	Severely Fragmented
<i>Correlophus sarasinorum</i>	8.7-12.8	V (2011 & 2017)	Declining	9	Severely Fragmented
<i>Mniarogekko chahoua</i>	3.1-5.3	V (2011 & 2017)	Declining	6	Severely Fragmented
<i>Rhacodactylus auriculatus</i>	10.2-14.5	LC (2011 & 2017)	Declining (Est= 10k)	10	Continuous
<i>Rhacodactylus leachianus</i>	12.2-17	LC (2011 & 2017)	Declining, locally stable	DD	Fragmented

(DD=Data Deficient, LC=Least Concern, V=Vulnerable, E=Endangered, EE=Presumed Extinct)

Table 2: New Caledonia Gecko Habitats

Species	Activity	Habitat *Preferred habitat	Habitat Elevation (m)	Spatial Type	Spatial Use (m)
<i>Bavayia cyclura</i>	Nocturnal	CF, Mq [Ultramafic]	0 to 900	Terrestrial/Semi-Arboreal	1-2
<i>Correlophus ciliatus</i>	Nocturnal	HF*, MF, CF [Ultramafic]	150 to 1000	Arboreal (low canopy)	3-30
<i>Correlophus sarasinorum</i>	Nocturnal	Mq*, HF [Ultramafic]	0 to 900	Arboreal (mid canopy)	10-30

<i>Mniarogekko chahoua</i>	Mostly Nocturnal	RF*, HF[Non-Ultramafic]	0 to 500	Arboreal (mid canopy)	6-25
<i>Rhacodactylus auriculatus</i>	Nocturnal	Mq*, HF, MF, CF [Ultramafic]	0 to 1100	Terrestrial/Semi-Arboreal	1-2
<i>Rhacodactylus leachianus</i>	Nocturnal	MF*, RF*, CF*, HF [Ultramafic and Non-Ultramafic]	0 to 1100+	Arboreal (low to mid canopy)	10-30

Mq= Maquis/Scrubland, HF= Humid Forest, MF= Montane Forest, CF= Coastal Forest/Mangrove, RF= Rainforest

Our husbandry practices are reflective of the natural New Caledonia climate and tailored to meet the specific needs of each species, an overview of the monthly husbandry parameters can be found below in Table 3.

Table 3: New Caledonia Gecko Captive Climate displaying monthly enclosure parameters with respect to temperature, precipitation, humidity, and daylight hours.

New Caledonia Gecko Captive Climate												
Captivity Month:	January (USA)	February (USA)	March (USA)	April (USA)	May (USA)	June (USA)	July (USA)	August (USA)	September (USA)	October (USA)	November (USA)	December (USA)
Based on:	July (NC)	August (NC)	September (NC)	October (NC)	November (NC)	December (NC)	January (NC)	February (NC)	March (NC)	April (NC)	May (NC)	June (NC)
Temperature												
Daily High (F):	73.8	74.0	75.7	78.25	80.7	82.8	84.5	85	83.5	81.3	78.5	75.5
Nightly Low (F):	64.3	64.3	65.3	68	71.0	73.5	75.8	76	75.3	72.5	69.3	66.5
Average (F):	68.6	68.9	70.5	73.4	76.3	78.7	80.6	80.8	79.4	76.7	73.5	70.6
Daily High (C):	23.2	23.3	24.3	25.7	27.0	28.2	29.2	29.4	28.6	27.4	25.8	24.2
Nightly Low (C):	17.9	17.9	18.5	20.0	21.7	23.1	24.3	24.4	24.0	22.5	20.7	19.2
Average (C):	20.3	20.5	21.4	23.0	24.6	25.9	27.0	27.1	26.4	24.8	23.1	21.4
Precipitation (mm):												
	72	67	42	50	54	76	111	117	136	108	89	119
Rainy Days:	9	9	7	4	5	7	10	9	12	10	10	10
Humidity:												
	73%	72%	71%	70%	71%	73%	76%	78%	80%	78%	77%	76%
Daylight Hours:												
	10.9	11.4	12	12.6	13.2	13.5	13.3	12.8	12.2	11.6	11.1	10.8
Sunshine Hours:												
	6	6	7	8.1	8.3	8.4	8	7.5	6.5	7	6	5
Sunrise:												
	6:33 AM	6:17 AM	5:49 AM	5:21 AM	5:03 AM	5:04 AM	5:22 AM	5:43 AM	5:56 AM	6:07 AM	6:19 AM	6:31 AM
Sunset:												
	5:27 PM	5:39 PM	5:48 PM	5:58 PM	6:15 PM	6:34 PM	6:43 PM	6:32 PM	6:08 PM	5:40 PM	5:21 PM	5:18 PM

(2) Short-term and temporary housing

In many cases, animals will be held for short periods while they are marked and measured. Housing during these short periods of captivity can focus specifically on minimal requirements for short-term survival, including temperature, moisture, and light conditions. Specifically, these three parameters should be maintained within ranges that facilitate the short-term comfort and well-being of the species in question.

(a) Temporary Housing: Geckos will be held in deli-cups or similar containers for temporary holding during routine maintenance, cleaning, and health examinations.

(b) Short-Term Housing: Quarantine enclosures are designed to maintain a sterile environment; thus they will have paper towel as substrate and fewer cage decorations.

(3) Transportation

During transportation geckos will be contained in individual temporary enclosures in a temperature-controlled environment.

(4) Long-Term and Colony Housing

(a) Caging and Maintenance:

New Caledonian geckos come in a variety of sizes: ranging from the tiny *Bavayia* which weigh just a couple grams, to the largest gecko species in the world *Rhacodactylus leachianus* which can reach over 400 grams. The specific caging requirements are different for each species and life stage, but adult enclosure sizes are listed below in Table 4. Our preferred enclosure material is PVC expanded foam for its superior abilities to retain heat and humidity, ease of cleaning, and customizable nature. Alternatively, modified plastic tote containers make good enclosures for similar reasons. Hatchling geckos will be placed in a 6 to 12 qt shoebox style tote upon hatching and then will be upgraded to larger enclosure sizes as they grow. By implementing a bioactive approach to reptile husbandry we are able to cut down on daily maintenance because organic waste will be broken down by the microfauna (springtails and isopods) and recycled by the plants. The bioactive setup is maintained through regular watering and semiannual supplementation of substrate. Leftover food and waste that is too large to be broken down by vivarium microfauna will be manually removed and disposed of. Food-bowls are cleaned after every feeding with soap and then disinfected with F10SC veterinary disinfectant. Furthermore, waste and food stains within the enclosures will be cleaned with a vinegar mixture as needed for aesthetic purposes.

Table 4: New Caledonia Gecko Enclosure Guidelines

Species	Mass (g)	SVL (mm)	Min. Enclosure Size (Single) [w x d x h]	Min. Enclosure Size (Pair) [w x d x h]
<i>Bavayia cyclura</i>	7.8	46-72	12" x 12" x 12"	12" x 12" x 12"
<i>Correlophus ciliatus</i>	35-50	95-115	12" x 12" x 18"	12" x 18" x 18"
<i>Correlophus sarasinorum</i>	60-90	120-140	12" x 18" x 18"	18" x 18" x 18"
<i>Mniarogekko chahoua</i>	45-90	115-145	12" x 18" x 18"	18" x 18" x 24"
<i>Rhacodactylus auriculatus</i>	45-90	110-130	12" x 18" x 18"	18" x 18" x 18"
<i>Rhacodactylus leachianus</i>	180-420	150-300	18" x 18" x 24"	24" x 24" x 24"

(b) Environmental Enrichment

Opportunities to express species-typical postures for resting, sleeping, feeding, exploration and play: multiple perches such as sticks and wooden branches will be placed throughout the enclosure to allow for geckos to choose between vertical and horizontal postures, hiding spots will be provided with cork tubes and cork flats, opportunities for thermoregulation, varied dietary options, and all female geckos will be given several inches of substrate to dig and lay their eggs in.

Opportunities to express species-typical locomotion: wood products and foliage will be used to create a 3D environment within the enclosure to maximize available space for exploration and activity.

Opportunities to make social adjustments for breeding pairs of geckos: cohabitating geckos require visual barriers throughout the enclosure, multiple feeding spots, and extra hides to prevent aggression.

(c) Thermal Requirements:

The climate of New Caledonia can be described as semi-tropical with two temperature seasons: a summer (November through April) with average temperatures ranging from 74.8 F to 81.9 F, and a winter (May through October) with average temperatures between 68.1 F to 75.6 F [Figure 1]. Temperatures fluctuate by around 13 degrees Fahrenheit daily, rising after sunrise and reaching a daily high in the afternoon and then falling after sunset reaching a daily low by dawn.

At our facility we try to mimic natural seasonal and daily temperature trends within our gecko enclosures, because we assume that these temperatures represent the species-specific physiological thermal optimums and that temporal variations will promote seasonal breeding behavior. Since our facility is located in the Northern Hemisphere, we switch the timing of these two seasons to coincide with local climate, so instead the summer season takes place from May through October and the winter season from November through April [Figure 2]. Thus, all enclosures are equipped with a heat source (heat tape, radiant heat panel, or lighting) controlled by a programmed Spyder Electronics Thermostat. The thermostats are programmed once per month to maintain seasonality, and daily fluctuations in temperature associated with solar intensity are maintained by cycling through four daily temperature periods.

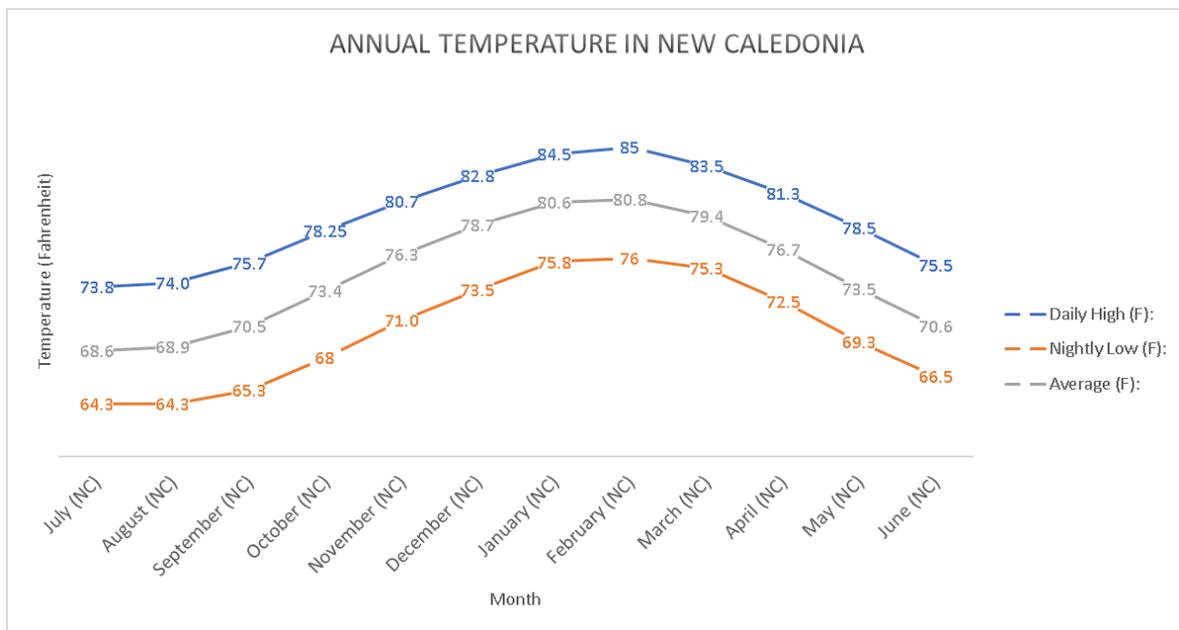


Figure 1: Graph displaying the Average, Maximum, and Minimum daily temperature (Fahrenheit) in New Caledonia by month

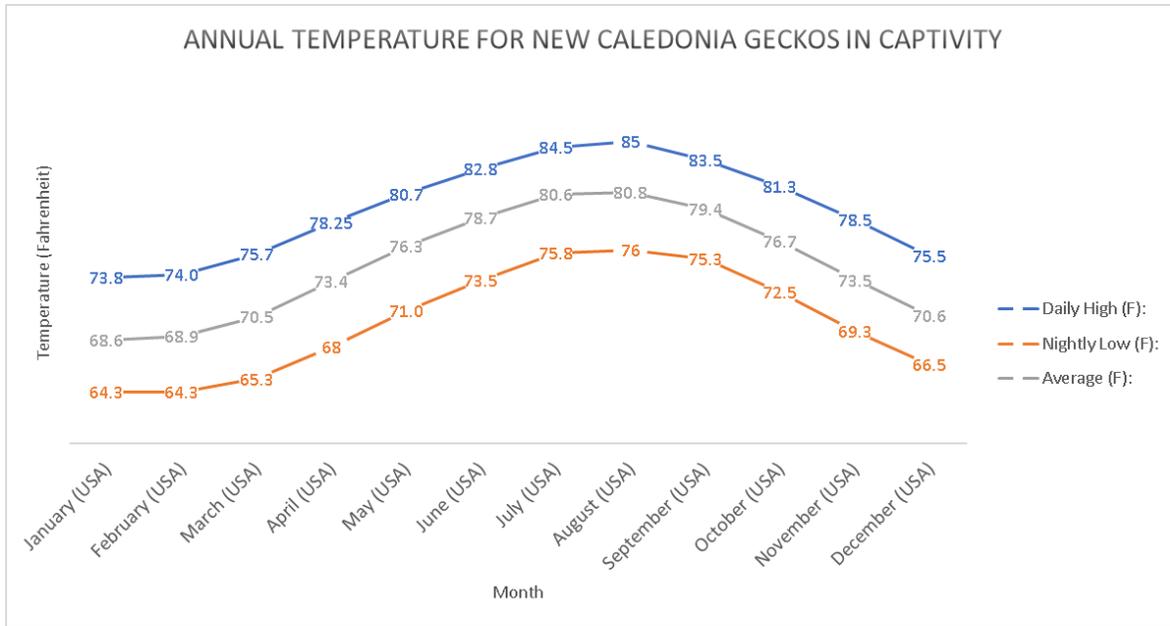


Figure 2: Graph displaying the Average, Maximum, and Minimum daily temperature (Fahrenheit) for New Caledonia geckos in captivity by month

(d) Lighting: New Caledonia remains sunny year-round, with 13.5 hours of daily sunlight at the height of summer and 10.8 hours of daily sunlight during the darkest months of the winter. In captivity we replicate these photoperiods for our New Caledonia geckos to promote a healthy circadian rhythm [Figure 3]. All of our geckos are nocturnal species so UV full spectrum lighting is not required, so instead seasonally appropriate light cycles are maintained with timed LED lighting [Figure 4].

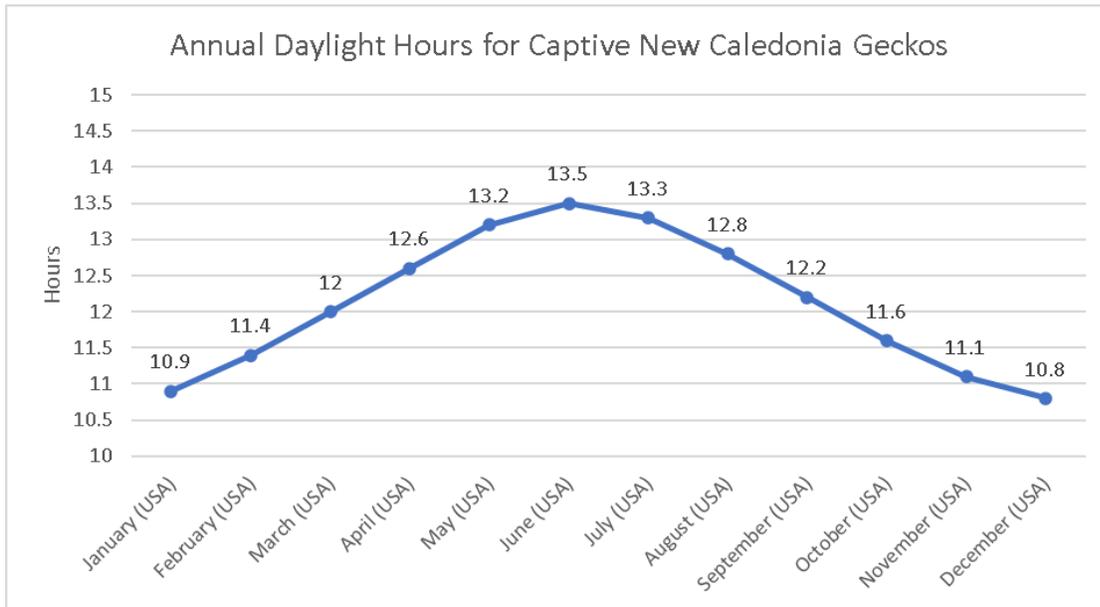


Figure 3: Graph displaying the average daylight hours by month for captive New Caledonia geckos in the Northern Hemisphere

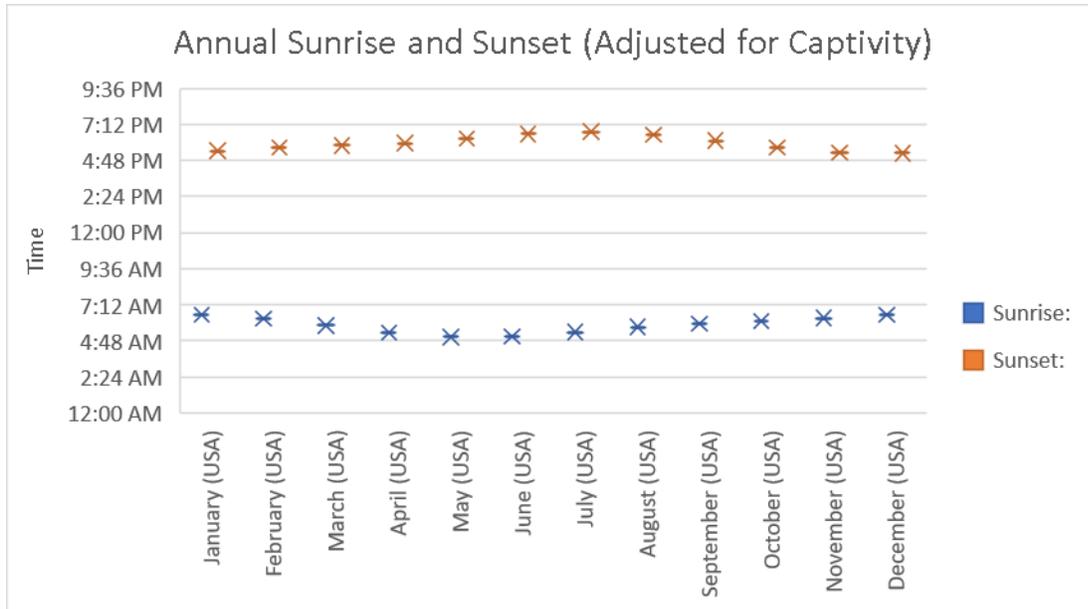


Figure 4: Graph displaying the monthly sunrise and sunset settings for captive New Caledonia geckos in the Northern Hemisphere

(e) Air Changes and Humidity:

New Caledonia maintains high humidity throughout the year (70% to 80%), but there are seasonal differences in humidity associated with the wet and dry seasons. The wet season lasts from January to June and the dry season lasts from July to December [Figure 5]. A typical month during the wet season will experience 89 to 135 millimeters of rainfall over 9 to 12 days, whereas a month during the dry season will only receive 42 to 76 millimeters of rainfall over 4 to 9 days. However, it is important to note that the mountainous geography of New Caledonia creates micro-climates throughout the region due to the uneven distribution of rainfall, with the East coast receiving two to four times more rainfall than the West coast.

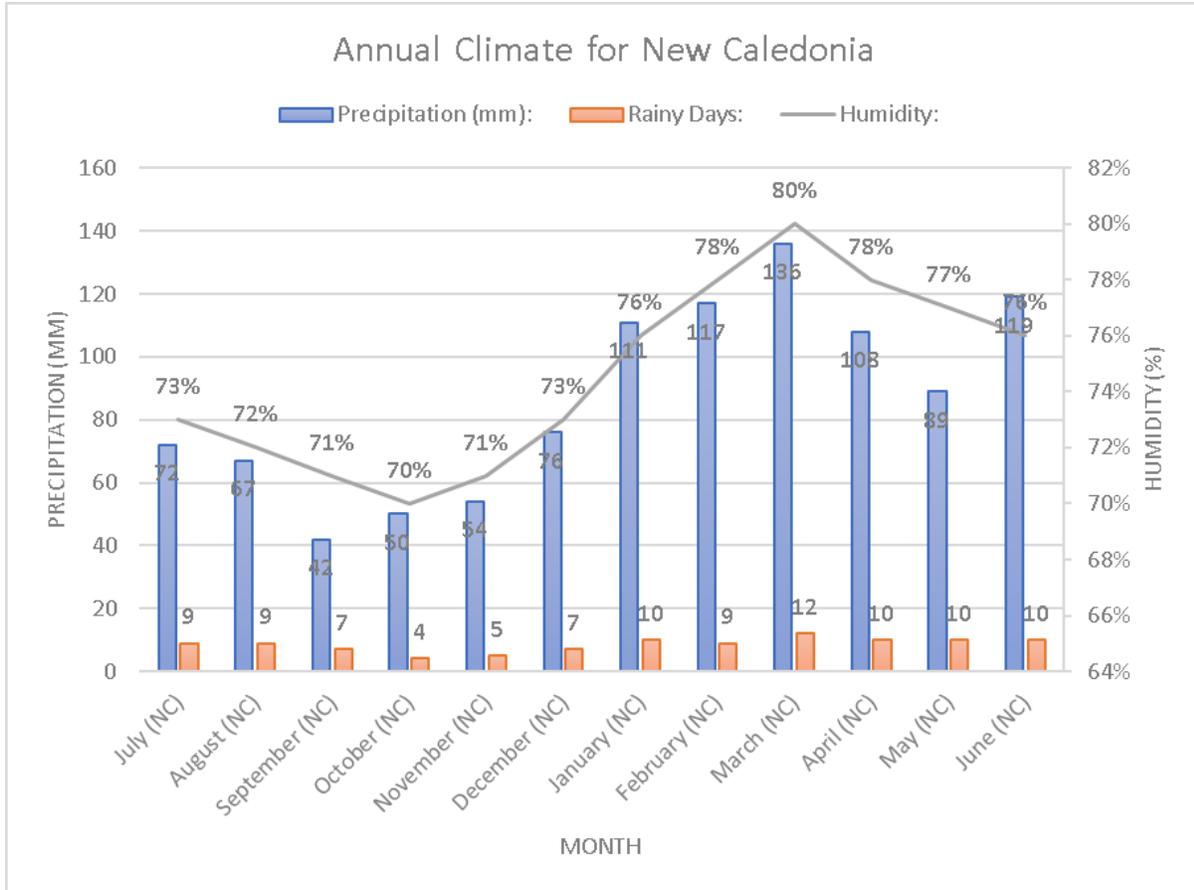


Figure 5: Graph displaying average precipitation, rainy days, and relative humidity level in New Caledonia by month

Here in the United States, we adjust the timing of the seasons so that the wet season is from July to December with a dry season from January to June [Figure 6]. During the wet season we maintain an average humidity between 76% to 80% by heavily watering the enclosures every 2-3 days. During the dry season we decrease the frequency of heavy watering to every 4-5 days during so that the humidity levels stay between 70% to 73%. The humidity levels are maintained with frequent misting, appropriate substrate, drainage layers, live plants, and in some enclosures through drip irrigation. This hydroperiod is appropriate for the more drought-tolerant New Caledonia species including *Bavayia cyclura*, *Correlophus ciliatus*, *Correlophus sarasinorum*, and *Rhacodactylus auriculatus*. However, two of our species (*Mniarogekko chahoua* and *Rhacodactylus leachianus*) are more commonly associated with wetter habitats so for them we maintain a slightly higher humidity and during the dry season they do not go more than 3 days without a heavy watering. Species-specific hydroperiods are shown in Table 5 below.

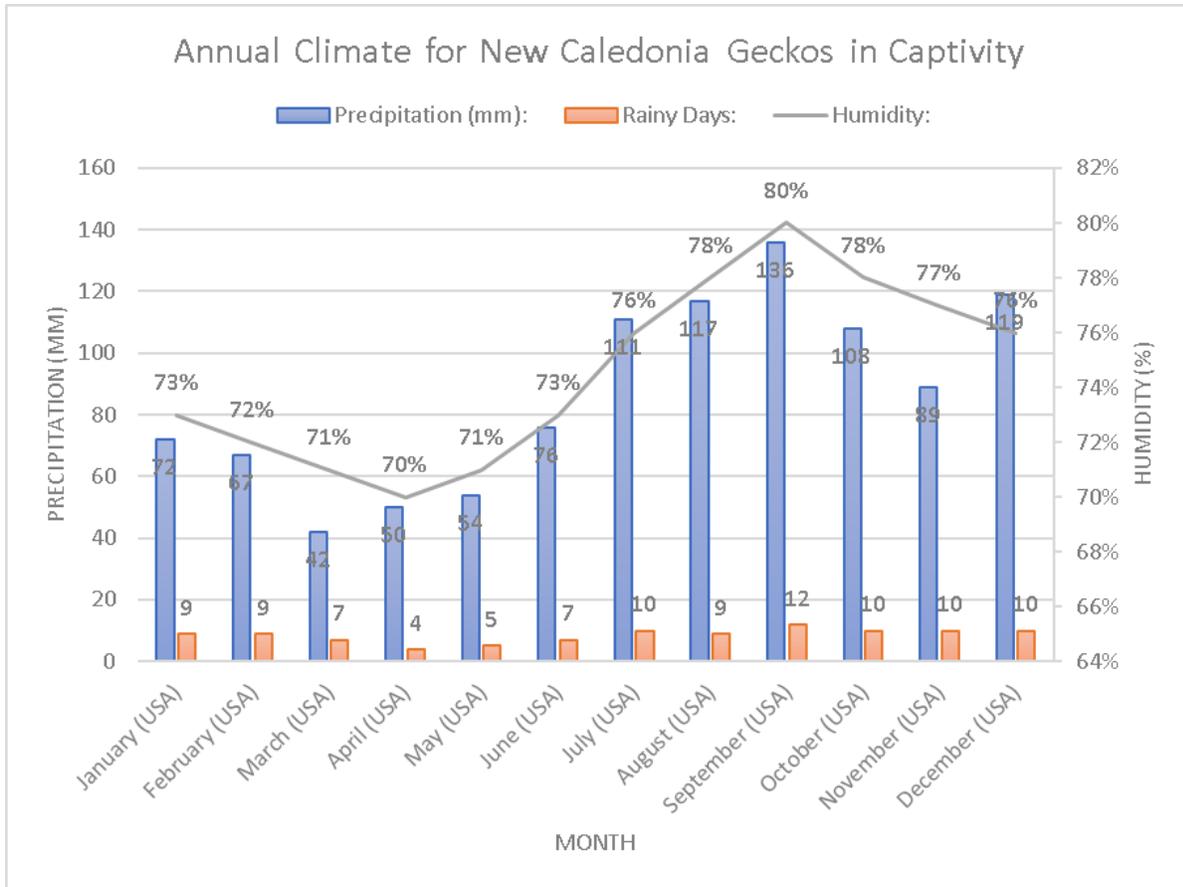


Figure 6: Graph displaying average precipitation, rainy days, and relative humidity level by month for captive New Caledonia geckos in the Northern Hemisphere.

Table 5: New Caledonia Gecko Hydroperiods and Watering Frequency in Captivity

Species	Wet Season (July to December) Watering Frequency	Dry Season (January to June) Watering Frequency
<i>Bavayia cyclura</i>	2-3 days	4-5 days
<i>Correlophus ciliatus</i>	2-3 days	4-5 days
<i>Correlophus sarasinorum</i>	2-3 days	4-5 days
<i>Mniarogekko chahoua</i>	2 days	3 days
<i>Rhacodactylus auriculatus</i>	2-3 days	4-5 days
<i>Rhacodactylus leachianus</i>	2 days	3 days

(f) Food and Water:

Any water that comes in contact with our geckos is dechlorinated and treated for heavy metals with ReptiSafe water conditioner prior to use. Our geckos receive water multiple times throughout the week during cage misting’s [Table 5 above], if geckos seem thirsty then they are given as much additional water as they are willing to drink. However, the primary source of water for our geckos comes from their commercial gecko diets which we mix with water. Water bowls will be offered at times where supportive care is necessary, such as during and after oviposition, before and after transportation, illness or injury, and visible dehydration.

The diets of New Caledonia geckos are similar but there is some variation in predator behaviors between the species, the specific feeding regiment for each of our species is displayed below in Table 6.

Table 6: Feeding Regiments for New Caledonia Geckos in Captivity

Species	Fruit Diet	Insects	Pinky Mice
<i>Bavayia cyclura</i>	2-3x weekly	1x weekly	0
<i>Correlophus ciliatus</i>	2-3x weekly	1x weekly	0
<i>Correlophus sarasinorum</i>	2-3x weekly	1x weekly	0
<i>Mniarogekko chahoua</i>	2-3x weekly	2x weekly	0
<i>Rhacodactylus auriculatus</i>	2-3x weekly	2-3x weekly	0-4x per year
<i>Rhacodactylus leachianus</i>	2-3x weekly	2-3x weekly	2x per month

New Caledonia’s giant geckos are unique in that they are frugivorous, feeding mostly on fruit and other plant material such as flowers and sap. We support their frugivorous diet by providing a bowl of commercial gecko diet two to three times weekly, these fruit-containing diets come in powdered form and are mixed with water in a 2:3 ratio until a smoothie-like consistency is achieved. The size of the food portion depends on the size, age, and preferences of the individual geckos. For example, hatchling gargoyle geckos may only consume 0.05 oz of powdered diet in a feeding, whereas adults can consume over 1 oz of powdered diet in a feeding. We source our gecko diets from Repashy Ventures, Pangea Reptile, Leapin’ Leachies, and Black Panther Zoological Society [See Table 7 below for nutritional information and use]; these companies each offer multiple product lines with different flavor options. Every 7-10 days the commercial diets are supplemented with flowers (rose petal, hibiscus, marigold, chamomile, lavender) for dietary enrichment.

Table 7: Nutritional Information for Commercial Gecko Diets and Feeding Frequency

<u>Gecko Diet</u>	<u>Protein %</u>	<u>Fat %</u>	<u>Fiber %</u>	<u>Frequency</u>
Crested Gecko MRP Banana (Repashy)	23	6	8	Weekly
Crested Gecko MRP Classic (Repashy)	20	4.50	6	Weekly
Grubs 'N' Fruit (Repashy)	24	7	8	Weekly
BSF Larvae Meal (Repashy)	50	10	12	Weekly
Fruit w/ Insects (Pangea)	21	4.50	8	Weekly
Growth & Breeding (Pangea)	21	5.70	8	Weekly
Fig & Insects (Pangea)	22	5	8	Weekly
Melonistic (BPZ)	23	13	5	Weekly
Black Panther Diet (BPZ)	28	14.60	3.50	Weekly
ColorBomb (BPZ)	23	11.60	4.40	Weekly
Rhaco Risotto (Leapin' Leachies)	23	6	5	Weekly
Leachie Linguinie (Leapin' Leachies)	28	7	6	Weekly
Chewie Fettuccine (Leapin' Leachies)	28	7	6	Weekly
Gargoyle Gnocchi (Leapin' Leachies)	25	6.50	8	Weekly
Mulberry Madness (Repashy)	21	5.20	2.50	Weekly (Summer)
Cherry Bomb (Repashy)	20	5	3	Weekly (Summer)
Fig Frenzy (Repashy)	20	5	3	Seasonally (Summer)
Pineapple Express (Repashy)	20	5	3	Weekly (Winter)
Leachie Lasagna (Leapin' Leachies)	23	6	5	Seasonally (Winter)
Banana Cream Pie (Repashy)	10	3	2	Monthly
Crested Gecko Mango (Repashy)	20	5	10	Monthly
Apricot (Pangea)	21	5.70	8	Monthly
Watermelon (Pangea)	21	5.70	8	Monthly
Papaya (Pangea)	21	4.50	8	Monthly

However, the “frugivorous” label is misleading because they all consume arthropods in addition to fruit. Members of the genera *Bavayia*, *Correlophus*, *Mniarogekko*, and *Rhacodactylus* have all been documented consuming insects in the wild; and for the most part they all readily accept them in captivity. Recognizing that insects and other invertebrates appear to be a large part of their diet in the wild we try to copy this in captivity by supplementing the commercial gecko diets with black soldier fly larvae meal. Additionally, we breed orange-spotted roaches (*Blaptica dubia*) for gecko consumption, all roaches are gut-loaded with nutritious foods 24 to 48 hours prior to being dusted in a mineral supplement and then offered live to the geckos. Mineral supplements include: Repashy Superfoods Calcium Plus HyD, Repashy Superfoods Supercal NoD, Repashy Superfoods Supercal MeD, or Herptivite Multivitamins with Beta Carotene. We have also witnessed our geckos eat vivarium fauna such as isopods, springtails, slugs, and snails.

Some of the New Caledonia species seem particularly specialized to a prey-heavy diet, notably *Rhacodactylus auriculatus* and *Rhacodactylus leachianus*. *R. auriculatus* is semi-terrestrial/semi-arboreal and has been documented hunting and eating both skinks and *Bavayia* sp. in the wild, and when given the opportunity all ages will engage in cannibalism. Their dentition appears to be adapted for taking down vertebrate prey with elongate slender pointed teeth that have been described elsewhere as “elongate fanglike structures”. On the other hand, *R. leachianus* has been documented consuming birds (*Glyciphila incana*) in the wild, and one locality is even reported to consume crabs. We support the high protein requirements of these two species by making sure they are fed insects on a weekly basis, and we offer frozen-thawed pinky mice and rats to *R. leachianus* twice per month and to *R. auriculatus* every several months.

(g) Substrates:

We keep our geckos in bioactive enclosures, so the substrate is a dirt mixture topped with leaf litter. The bioactive substrate keeps the environment clean while simultaneously allowing the geckos to engage in reproductive behavior and enrichment activities. The bioactive substrate is also good at maintaining the high humidity levels needed for New Caledonia species.

(h) Social Requirements and Breeding:

All of our geckos will be kept isolated in single enclosures because New Caledonia geckos are solitary species and should not be kept together due to risk of cannibalism and injury. The only exception to this rule is for breeding purposes, during which time geckos may be housed in opposite-sex pairs on a permanent, short-term (seasonal), or intermittent basis (males rotated between multiple females). Alternatively, some species can be housed in trios with one male and two females for a temporary period. The ultimate determination of cohabitation depends on the individual geckos and their personality, geckos that form strong pair bonds will be kept together permanently or for the duration of the breeding season (February to August). Pair incompatibility is identified by aggressive behavior, excessive noise (fighting), lacerations and bite wounds, persistent weight loss or anorexia (indicative of stress), and other signs of stress.

Table 8: Social Requirements for New Caledonia Geckos

Species	Social Needs	Single Housing	Cohabitation (Adults)
<i>Bavayia cyclura</i>	Social	Yes	Yes (C, P)
<i>Correlophus ciliatus</i>	Solitary	Yes	Yes (P, S, I, T)
<i>Correlophus sarasinorum</i>	Solitary	Yes	Yes (P, S, I)
<i>Mniarogekko chahoua</i>	Solitary	Yes	Yes (P, S, I)
<i>Rhacodactylus auriculatus</i>	Solitary and cannibalistic	Yes	Yes (P, S, I, T)
<i>Rhacodactylus leachianus</i>	Solitary except for monogamous adults	Yes	Yes (P)

C= Colony housing, P= Permanent opposite sex pairs, S=Short-Term opposite sex pairs, I=Intermittent opposite sex pairs, T= Temporary trios (2 f:1 m)

Sexually mature geckos will typically breed during the end of Winter and throughout the Spring, but females can retain sperm for delayed fertilization so they will continue laying eggs until the Summer or Fall. We search for eggs several times per week during the breeding season and incubate them within the thermally viable temperature range (65 to 85 degrees Fahrenheit). The reproductive information for each of our species can be found below in Table 9.

Table 9: Reproductive Information for New Caledonia Geckos

Species	Reproduction	Sexual Maturity	Avg. Clutch Size	Annual clutches	Sex Determination
<i>Bavayia cyclura</i>	Oviparous	DD	2	DD but multi-clutching	DD
<i>Correlophus ciliatus</i>	Oviparous	1-2 years	2	3-10	GSD (ZZ/ZW), and TSD 1 (FM)
<i>Correlophus sarasinorum</i>	Oviparous	2-3 years	2	DD-several times per year	GSD and TSD 1 (MF)
<i>Mniarogekko chahoua</i>	Oviparous	3-4 years	2	2-3	DD, possibly GSD
<i>Rhacodactylus auriculatus</i>	Oviparous	2-3 years	1-2	3-8	GSD and TSD suspected
<i>Rhacodactylus leachianus</i>	Oviparous	3-5 years	2	3-8	GSD and TSD 1 (FM)

DD= Data Deficient, GSD= Genetic Sex Determination, TSD 1= Temperature Sex Determination w/ 1 pivotal temperature, TSD 2 = Temperature Sex Determination w/ 2 pivotal temperatures

(III) Program of veterinary care

(1) Vaccinations are not applicable for geckos, but parasite control for internal and external parasites may be applicable within our collection. Basic first aid may be used by staff for treatment of minor injuries (ie: small lacerations). A list of approved medications for use within our facility is shown below in Table 10. Our facility is not adequate for serious injuries, surgeries, or emergencies. In the event of an emergency, we will bring the geckos to a qualified veterinarian.

(2) Capture and restraint methods: All geckos are captured by gently picking them up, and geckos can be restrained for examination and minor first aid by firmly holding them.

(3) Euthanasia will be carried out by a veterinarian if applicable.

(4) Quarantine procedures and conditions to prevent zoonotic disease: new animals are quarantined for at least two months prior to introduction to the rest of the collection. New and sick animals will be weighed often to track appetite. All shared surfaces (such as scales and other tools) that geckos may come in contact with are disinfected with F10SC to prevent cross-contamination.

(5) Pest control: Fly paper will be placed around the research facility to trap pest flies that are attracted to gecko food and substrate. In the event that a pest insect infests an enclosure then diatomaceous earth powder will be applied because this is non-toxic to reptiles.

(6) Routine Health Monitoring: daily observation of behavior, health, anatomy to assess health and wellbeing of animals. Daily monitoring includes making sure the environment is safe and adequate for the species and season. In addition to daily health monitoring, we perform semiannual health examinations for which we will record mass, SVL, BMI, sex, etc. Furthermore, the administration of any medical treatments will be recorded.

Table 10: Medications for use at our Facility

Medication	Type	Administration Route	Dosage
Metronidazole (concentration: 100 mg/ml)	Anti-parasitic (Protozoan)	Oral	25-50 mg/kg every 3 days for Flagellates], 100 mg/kg for Protozoan [every 2 weeks]
Panacur 10% (concentration: 100 mg/ml)	Anti-parasitic (Pinworms)	Oral	100 mg/kg every 1 week for worms
Toltrazuril 2.5% (concentration: 25 mg/ml)	Anti-parasitic (Flagellate)	Oral	20 mg/kg every 7 days for Flagellates
Ivermectin	Anti-parasitic (external)	Oral	Per manufacturer instructions
Provent-a-Mite (Permethrin)	Anti-parasitic (mites)	Aerosol	Per manufacturer instructions
Triple Antibiotic Ointment (Bacitracin Zinc, Neomycin Sulfate, Polymyxin B Sulfate)	Antibiotic	Topical (skin)	Per manufacturer instructions
Terramycin (Oxytetracycline Hydrochloride and Polymyxin B Sulfate Ophthalmic Ointment)	Antibiotic	Topical (eye)	Per manufacturer instructions
Neosporin without pain relief	Antibiotic	Topical	Per manufacturer instructions
Honey	Hemipenal Proplapse	Topical (hemipenes)	Dab applied with Qtip to prolapse
2% Lidocaine Hydrochloride	Analgesic	Topical	Per manufacturer instructions
Kwik Stop Styptic Powder	Antiseptic Clotting Agent	Topical	Per manufacturer instructions
Ophthalmic Solution Eyewash	Irrigation	Topical (eye)	Per manufacturer instructions
Saline Solution	Irrigation	Topical	Per manufacturer instructions
2% to 4% Chlorhexidine gluconate	Antiseptic	Topical	Per manufacturer instructions
1% Ketoconazole	Antiseptic	Topical	Per manufacturer instructions
10% Povidone Iodine	Antiseptic	Topical	Per manufacturer instructions
Colloidal Silver (30 ppm)	Antiseptic	Topical	Per manufacturer instructions
Acidophilus Digestive Tract Conditioner	Probiotic	Oral	Administered with antibiotic therapy
NutriBAC ^{df}	Probiotic	Oral	Administered with antibiotic therapy

(IV) Disposition of ill or dead animals during the course of the study

(1) Diagnosis

Diagnosis of specific health problems should be attempted whenever a research animal shows signs of illness. A laboratory animal veterinarian or clinician with experience in amphibian and reptile medicine should be consulted. The American Association of Reptilian and Amphibian Veterinarians is a professional organization having members with this experience and interest (see: <http://www.arav.org/>). Diagnostic techniques include blood evaluations (complete blood counts and plasma biochemical evaluations), imaging (radiology, CAT Scan, MRI, ultrasound), endoscopy/laparoscopy, microbial cultures, fecal examinations, and histologic examination of biopsy specimens.

(2) Treatment

Specific treatment will depend upon diagnostic findings and/or overall assessment by the clinician. A veterinary clinician or laboratory animal veterinarian should be consulted for recommendations. Treatment is both an art and a science. The art is selection of a treatment regime prior to having all diagnostic test results. This will be dependent upon past experiences of the clinician. The science entails selecting the most appropriate diagnostic tests and then either persisting with or changing the current treatment regime. Treatment may entail local, oral and perenteral antimicrobials, parasiticides, fluid administration, and use of drugs to relieve pain. The immune system of reptiles appears to be temperature dependent so maintaining the ill animal at an ideal temperature is imperative. More detailed information on various treatments can be found elsewhere (Klingenberg, 1966; Jacobson, 1999; Wright and Whitaker, 2001a).

(3) Necropsy

Scientifically valuable specimens should be preserved for museum donation, and necropsy may destroy the utility of a specimen. Necropsy, however, may be indispensable for assessing cause of death when such information is critical. Necropsy guides for amphibians (Nichols, 2001) and reptiles (Jacobson, 1978) are available. Necropsies start on the outside and move internally in a methodical manner. The exterior of the animal should be thoroughly examined, describing all gross abnormalities. Drawings of the animal, both dorsally and ventrally, should be used to indicate location of lesions. Wounds to the integument should be noted. Any other changes such as swellings to joint spaces of long bones and cutaneous or subcutaneous masses are recorded. Samples of all significant lesions should be collected for histopathology. Samples are placed in neutral buffered 10% formalin (NBF). NBF will only penetrate 6 mm in 24 hr, so make sure tissues are thin enough to allow adequate fixation. The NBF to tissue volume ratio should be 10:1. If hard tissue such as long bone is collected, it should be fixed in a container separate from the soft tissues to allow adequate penetration and fixation.

(V) Disposition of living healthy animals following study

(1) General Considerations

All of our animals are valued for intrinsic and instrumental purposes, so after completion of a study the study animals will be held in our collection for use in another study or educational purposes, otherwise excess animals will be adopted out to qualified individuals and zoological institutions. Euthanasia is not in accordance with our values, so there will be no sacrifice of living animals upon completion of a study. Furthermore, study animals will not be released into the wild because not only is this illegal but would also risk introduction of pathogens to wild populations. Captive amphibians and reptiles can harbor pathogens that were acquired in captivity and may serve as a vector for infecting wild populations. Relatively few infectious diseases have been studied in wild amphibians and reptiles and the exact origin of these pathogens is unknown.

(2) Transfer to other studies

In many cases, at the completion of studies, animals retain value for continued research. The IACUC should be receptive to the transfer of healthy valuable organisms both within and between institutions for the purposes of continued study. This is especially important from the standpoint of reducing the need to collect animals from the wild. Such transfers should be accompanied by full documentation and should adhere to applicable local, State and National laws governing possession and transfer of reptiles and amphibians. Appropriate quarantines should be applied (Jacobson, 1993; Woodford, 2001).

(3) Adoption

In many cases, healthy animals retain significant educational value and can be constructively donated for adoption by zoos, museums, and even private individuals that support educational or captive breeding programs. Geckos are available for purchase on our website and on our Morph Market page. Profits from gecko sales are used to support research activities and to cover our operating and maintenance expenses.
