2013 IUCN SSC Iguana Specialist Group Annual Meeting
Kingston, Jamaica

13 November 2013

7:00 - 10:00 pm Pre-meeting dinner for early attendees at Scotchie's famous Jamaican Jerk house. Walking distance from hotel, gather at Four Seasons lobby, departures in groups. Cash payable to vendor.

Day 1: 14 November 2013

8:30 am **Welcome by Dean of Faculty, University of West Indies, Mona Campus**
Self-introductions

9:10 am **Captive Reproduction of *Cyclura collei* at Zoo Miami**
Atteberry, Nicole*

9:30 am **Jamaican Iguana *Cyclura collei*, November 2013 Field Report**
van Veen, Rick* and Byron Wilson

9:50 am **Evolution of a Field Program - the Jamaican Iguana (*Cyclura collei*), a Volunteer's Perspective**
Fleuchaus, Dawn*

10:10 am **Assessing the Potential for Mitigation in Headstarting of the Jamaican Iguana, *Cyclura collei***
Rasberry, Armed*, Mark E. Welch, Tandora Grant, Rick Van Veen, Orlando Robinson, Byron Wilson and Dawn Fleuchaus

10:30 am coffee break

10:50 am **Conserving Hispaniola's Endangered Rock Iguanas, *Cyclura ricordii* and *C. cornuta*, through ecology and genetics**
Pasachnik, Stesha*, Rosanna Carreras De Leon and Glenn Gerber

11:10 am **Testing the Natal Homing Hypothesis in *Cyclura ricordii* populations from Pedernales Province, Dominican Republic**
Carreras De León, Rosanna*, Stesha Pasachnik, Glenn Gerber and Mark Welch

11:30 am **Supporting a Local Community in Creating a Municipal Protected Area for the Conservation of Ricord's Iguanas (*Cyclura ricordii*) in Anse-a-Pitres, Massif de la Selle Conservation Corridor, Haiti**
Accime, Masani* (presented by Stesha Pasachnik)

iguana specialist group

Day 1: 14 November 2013

11:50 am **The Mona Island Rock Iguana: Conservation Initiatives through a Headstart Program, Nesting Monitoring Efforts and Controlling Invasive Species**
Álvarez, Alberto, Cielo Figuerola* and Miguel García

12:10-2:00 pm lunch

2:00 pm **Long-term Studies of the Allen Cays Iguana in the Northern Bahamas - the Next 30 Years?**
Iverson, John* and Andrea Aplasca

2:20 pm **Diet assessment for Northern Bahamian Rock Iguanas (*Cyclura cychlura*) in the Exuma Islands of The Bahamas and Study of the Exotic Black Spiny-tailed Iguana (*Ctenosaura similis*) on Key Biscayne, Florida**
Hines, Kirsten*

2:40 pm **Inferring Long-term Population Persistence using Genetic Tools: the Tale of *C. carinata* on Little Water Cay**
Colosimo, Giuliano*, Jamen W. Berk, Glenn P. Gerber and Mark E. Welch

3:00 pm **Assessment for Fijian Iguanas (*Brachylophus* sp.) in the Lomaiviti and Northern Lau Islands, Fiji**
Harlow, Peter*, Robert Fisher, Maleli Biciloa, Joeli Vadada, Jone Niukula and Tuverea Tuamoto

3:20 pm – coffee break

3:50 pm **Population Genetic Analysis of the Lesser Antillean Iguana, *Iguana delicatissima*, in the Lesser Antilles**
Martin, Jessica*, Charles Knapp, Giuliano Colosimo, Glenn Gerber, Roger Thorpe and Mark Welch

4:10 pm **When Iguanas Meet: Hybridization, Introgression, and Cytonuclear Discordance in Contact Zones of the Mexican Black Iguana**
Zarza, Eugenia*, Víctor H. Reynoso and Brent Emerson

4:30 pm **Conservation Status of the Iguanas of Guatemala**
Ariano-Sánchez, Daniel*

Day 1: 14 November 2013

4:50 pm	**Habitat Utilization of the Roatan Spiny-tailed Iguana (*Ctenosaura oedirhina*)** Campbell, Ashley* and Stesha Pasachnik
5:15 pm	**ISG Group 20th Anniversary Celebratory Dinner in Port Royal** **Bus departs hotel as close to 5:15 as possible. Tour of Port Royal Marine Lab exhibits. Seafood dinner at Gloria's, followed by gathering at the historic Port Royal Women's Prison. 1st bus returns at 9-9:30 pm, 2nd bus returns at 11-11:30 pm.**

Day 2: 15 November 2013

8:30 am	**Acknowledgments** Stesha, Chuck, Tandora *et al*.
8:40 am	**Jamaican Iguana Workshop update/discussion of monograph in Caribbean Naturalist** Wilson *et al*.
9:00 am	**ISG CITES Permit – activity and challenges** Wagener
9:10 am	**Update from Iguana Taxonomic Working Group** Iverson *et al*.
9:20 am	**Update from Genetics working group** Stephen *et al*.
9:30 am	**Invasive Iguana Working Group (IIWG) White Paper Update** Harlow *et al*.
9:45 am	**Caribbean Landscape Conservation Cooperative** Brent Murry
10:15 am	**Caribbean Iguana Conservation Workshop** Gerber (Bruce, Kirsty)

10:30 am coffee break

iguana specialist group

Day 2: 15 November 2013

10:50 am **Iguanas of the World. Volume 3**
Group

11:35 am **Travel Award funding**
-Full funding: Ariano, Campbell, Carreras, Martinez, Martin, Pagni, Rasberry, van Veen
-Partial funding: de Jesus and Steinitz
-Martinez and Pagni not able to come
-Donation for future awards and Award amount

11:45 am **What needs to be done with iguanas that is not already happening?**

12:00 am **How can we be more visible as a group throughout the year?**
-What do members want to see from the group?
-Caribbean PARC chapter support
-DR and JA IUCN letters

12:20-2:00 pm Lunch

2:00 pm **Next meeting location**
-Coordinating with larger herp meeting
-Galapagos potential

2:15 pm **Red List Update**
Website update and content needs (Tandora)
-Overview of website content and usage
-Species Pages and Reference Library contributions
-Newsletter and Wikipedia
-Discussion of advocacy: letters, petition
-Additional volunteer opportunities that can be added to the website

3:15 pm – coffee break

3:30 pm Time available to discuss Red List assessment progress (Tandora & assessors)
3:30 pm **Poster Session** (In alphabetical order by submitter's last name)

The Andros Rock Iguanas: Conserving an Island Endemic in a Fragmented Landscape
Colosimo, Giuliano*, Charles Knapp, Lisa Wallace and Mark Welch

Natural History, Demography, Range, and Threats of the Oaxacan Spiny-tailed Iguana (*Ctenosaura oaxacana*)
Corneil, Jeffrey*, Victor Hugo Reynoso Rosales and Chad Montgomery

Day 2: 15 November 2013

Poster Session Continued

Sourcing the Green Invaders: Identification of Source Populations of *Iguana iguana* in Puerto Rico
De Jesús, Christina*, Wilfredo Falcón and Riccardo Papa

A Cryptic Species of Galápagos Marine Iguana on the Brink of Extinction?
MacLeod, Amy*, Carolina García-Parra, Fritz Trillmich and Sebastian Steinfartz

Local Knowledge and Use of the Valle de Aguán Spiny-tailed Iguanas, *Ctenosaura melanosterna*, in Honduras.
Pasachnik, Stesha A.*, James A. Danoff-Burg, Edoardo E. Antúnez and Jeffrey P. Corneil

Determining Variations in Foraging Ecology among Populations of the Allen Cays Rock Iguana (*Cyclura cychlura inornata*) - a Stable Isotope Approach
Richardson, Kristen*, John Iverson and Carolyn Kurle

The Use of Stable Isotope Analysis to Decipher Food Webs of Wild Rock Iguanas (*Cyclura* spp.) in the Dominican Republic
Steinitz, Ronnie*, Stesha Pasachnik and Carolyn Kurle

Resultados Preliminares sobre el Monitoreo de las Densidades de Iguana (*Cyclura nubila nubila*) en Áreas Protegidas del Sur de Cuba
Rossell, Amnerys González, Vicente Berovides Álvarez, Dorka Cobián Rojas, José Luis Linares Rodríguez, Leonardo Espinosa Pantoja, Julio Milián Amigo, Evelin Marichal Arbona, Gretel Abad Cambas, Manuel Alonso Tabet, Manuel López Salcedo, Yairen Alonso Giménez and José M. Corona Galindo

6:00 pm **Dinner on our own**

Day 3: 16 November 2013

7:30 am All-day field trip to Manatee Bay, Hellshire. Explore the beach and croc ponds, or hike to South Camp for a chance to see Jamaican Iguanas. Be prepared with sunscreen, sturdy shoes, bug repellent, and water shoes for the likelihood of a wet landing. Depart from and return (~6 pm) to Four Seasons Hotel.
For more details: http://www.iucn-isg.org/registration-fee-and-field-trip-details/

IUCN SSC Iguana Specialist Group Annual Meeting
Kingston, Jamaica
14-16 November 2013

ORAL PRESENTATION ABSTRACTS
In alphabetical order by submitter's last name, presenter denoted by *

Supporting a Local Community in Creating a Municipal Protected Area for the Conservation of Ricord's Iguanas (*Cyclura ricordii*) in Anse-a-Pitres, Massif de la Selle Conservation Corridor, Haiti

Masani Accimé

International Iguana Foundation (IIF)

The Ricord's Iguana (*Cyclura ricordii*), which is ranked Critically Endangered by the IUCN, is known only to exist in south-central Hispaniola, and has an extremely limited distribution composed of four disjunct subpopulations. Three subpopulations are in the Dominican Republic, but only one subpopulation is known to exist in Haiti. Since the discovery of the subpopulation in Haiti, much has been done to alert the local and national authorities to the alarming status of this species, and to involve the local community. Each year since 2007, only about a dozen nests are identified in the dry forests of Anse-a-Pitres, which are disturbed to varying degrees by activities such as charcoal production and wildlife poaching. The Rhinoceros Iguana (*Cyclura cornuta*), which is ranked Vulnerable by the IUCN, lives sympatrically with *C. ricordii*, and is known to exist throughout the island of Hispaniola, and exists in Anse-a-Pitres. After years of investigation, we've documented several important other species of fauna and flora. The Solenodon (*Solenodon paradoxus*), ranked Critically Endangered, was previously only known to exist in the Tiburon peninsula in Haiti, was found to exist in Anse-a-Pitres in 2012. These findings, along with the fragile state of *C. ricordii* in Haiti, has strengthened our appeal to the local and national authorities. Three thousand hectares (30km^2) of southeast Haiti's dry forests have been proposed as a Municipal Reserve in Anse-a-Pitres, which would be the first protected area of its kind in Haiti. This project is a result of concerted efforts between IIF and other key partners, including Grupo Jaragua, Sociedad Ornitologica de la Hispaniola, and the Haitian Commission in Cooperation with UNESCO.

The Mona Island Rock Iguana: Conservation Initiatives through a Headstart Program, Nesting Monitoring Efforts and Controlling Invasive Species

Álvarez, Alberto[1], Cielo Figuerola*[2] and Miguel García[1,3]

[1]Department of Natural and Environmental Resources, Puerto Rico; [2]University of Puerto Rico, San Juan, Puerto Rico; [3]Center for Applied Tropical Ecology and Conservation, University of Puerto Rico

The Mona Island Rock Iguana (*Cyclura stejnegeri*) has faced several challenges as an endangered endemic species restricted to the Mona Island Natural Reserve due to the introduction of biota and habitat modification. A headstart program was initiated in 1999 as one of several initiatives, to cope with the apparent low recruitment of young individuals into the wild population. Here, we present the major accomplishments of the program with emphasis on the 2013 headstart season. Since 2002, more than 250 captive reared iguana juveniles have been released into the wild. Recaptures have shown consistent survivability, growth, and breeding from released females. Therefore, headstart iguanas have adapted well to their natural environment. Attention should be given towards efforts to increase the recapture sample, assessing juvenile detection, and into obtaining an actual population estimate for this population. Systematic nesting surveys have been conducted for several years to monitor and record changes in habitat preferences, number of nests, egg morphometrics, temperatures, and nesting ecology. New nesting sites have been discovered and data have been collected providing crucial information to conduct comparisons between areas. Lastly, since feral mammals, particularly cats and pigs are the main threat to the Mona Island Iguana survival, a feasibility study to eradicate these invasive fauna is almost complete. Preliminary analyses estimate $3.2 million required to complete this critical task. Although headstart programs have been a beneficial conservation action for *Cycluras* in the short term, they should be envisioned only as a prelude to the actual eradication program of the species that have cause the endangerment.

Conservation Status of the Iguanas of Guatemala

Ariano-Sánchez, Daniel*

Universidad del Valle de Guatemala

Guatemala has six species belonging to Iguanidae: *Cachryx defensor, Ctenosaura acanthura, Ctenosaura flavidorsalis, Ctenosaura palearis , Ctenosaura similis* and *Iguana iguana*. Of these species, *C. defensor, C. similis,* and *I. iguana* have stable wild populations. The whole distribution of *C. defensor* is very well protected, within the Mirador-Río Azul National Park at the North of Guatemala. The other species are highly threatened due to harvesting for bushmeat and loss of habitat. There are no current specific actions for conservation of *C. flavidorsalis* or *C. acanthura* and the status of their wild populations in Guatemala remain unknown. The most threatened iguana of Guatemala is *C. palearis*. In the past three years, a new set of private nature reserves has been established within the Motagua valley in eastern Guatemala as a way to ensure habitat preservation of this inhabitant of seasonally dry topical

forest. A total of 16 private reserves exist to date, covering around 2,000 ha. A national strategy for conservation of *C. palearis* has also been developed with the involvement of governmental and non-governmental agencies, local authorities, and scientists.

Captive Reproduction of *Cyclura collei* at Zoo Miami

Atteberry, Nicole*

Zoo Miami, Florida, USA

Zoo Miami first acquired adult Jamaican Iguanas in 2004. Due to our ability to house animals outside year round (and a climate that is similar to that of Jamaica), we have been provided with one male and three females for breeding. Last year, Zoo Miami was only the second U.S. institution to successfully breed *Cyclura collei* and our efforts resulted in six offspring. This year, we hatched a lone offspring from an unrepresented female, which hatched on August 5th. A second clutch of nine eggs laid by the female that reproduced in 2012 hatched from August 25th – August 30th. Zoo Miami is the only U.S. institution to breed this species successfully for two years in a row.

Habitat Utilization of the Roatan Spiny-tailed Iguana (*Ctenosaura oedirhina*)

Campbell, Ashley*[1] and Stesha Pasachnik[2]

[1]Florida Atlantic University, Florida; [2]San Diego Zoo Institute for Conservation Research, California, USA

The Roatan Spiny-tailed Iguana (*Ctenosaura oedirhina*) is found in several small pockets of protected habitat on the island of Roatan, Honduras. A habitat use/availability study was conducted to determine which habitats sustained the largest populations and densities of iguanas. Habitat usage did not differ statistically from availability at survey locations where iguanas were seen, although there were preferences for certain habitat types. However, there are survey locations with comparable available habitat that have no iguanas. The difference between the locations that have iguanas and those that do not is the level of grassroots protection provided. At protected locations, iguanas occur in such high densities that they must make use of all available habitats. Even inside of the protected areas, adult mortality is high. Less than 20% of marked individuals are ever sighted again after initial capture, and only 1% of those are seen after three years. Since there are many opportunities to observe this species within the protected areas, this suggests harvesting pressure is still a driving factor in the demography of these protected populations. The protection of habitat, even urban or anthropogenically-altered habitats, from hunting is potentially a more useful conservation strategy than trying to protect specific habitat types.

Testing the Natal Homing Hypothesis in *Cyclura ricordii* populations from Pedernales Province, Dominican Republic

Carreras De León, Rosanna*[1,3], Stesha Pasachnik[2], Glenn Gerber[2] and Mark Welch[1]

[1]Mississippi State University, Missouri, USA; [2]San Diego Zoo Institute for Conservation Research, California, USA; [3]Grupo Jaragua, Santo Domingo, Dominican Republic

Cyclura ricordii is endemic to the Dominican Republic (Hispaniola). This species survives in only four natural populations and is hence listed as Critically Endangered in the IUCN Red List. Additional threats are represented by introduced mammals, agricultural pressure, and hunting. Nesting site fidelity exists in most of *Cyclura* species and preliminary observations suggest a similar behavior for Ricord's Iguanas. Assessing nesting site fidelity and preserving nesting areas are critical for the conservation of the species. In the present study we focus on the two largest active nesting sites (Tierra and Malagueta) to test the hypothesis of natal homing. The correlation between geographic and genetic distance will be assessed using polymorphic microsatellites. Monitoring and sampling took place during the 2012 and 2013 nesting seasons. Sampling was implemented with trapping, noosing, and the use of fences to capture the hatchlings. Here I report preliminary data on the level of relatedness and the amount of genetic variability present in the nesting areas across 30 nests.

Inferring Long-term Population Persistence using Genetic Tools: the Tale of *C. carinata* on Little Water Cay

Colosimo, Giuliano*[1], Jamen W. Berk[1], Glenn P. Gerber[2] and Mark E. Welch[1]

[1]Mississippi State University, Missouri; [2]San Diego Zoo Institute for Conservation Research, California, USA

The study of inbreeding and its evolutionary consequences is of primary importance for small isolated populations, especially for taxa threatened with extinction. Iguanas in the genus *Cyclura* not only offer fertile ground for testing specific evolutionary hypotheses, but also would benefit from the immediate application of the results to fostering more informed conservation programs. In a recent study it was found that inbreeding depression may be responsible for a significant percentage of attrition (50%-63%) in a small insular population of *C. carinata.* In other words, hatchling recruitment and survivorship is tightly linked to heterozygosity. Further, heterozygosity is positively correlated with morphological fitness proxies (r^2=0.07, $p<0.01$) among adults, indicating that the further fitness benefits of heterozygosity may include social dominance and fecundity of adults. The current study is designed to test the hypothesis that inbreeding depression in this species reflects intense competition in a population at or near its carrying capacity. The alternative hypothesis is that the genetic load maintained by this population is high, and mean viability is low. If the latter is true, then this species persistence is

precarious. To distinguish between these hypotheses, heterozygosity fitness correlations (HFCs) in populations at carrying capacity will be compared to that in population that are still expanding, that is when competition is weak. If competition is responsible for exposing inbreeding depression, then there should be a weaker HFC in the expanding populations. If true, than we could infer that small, isolated populations are relatively robust and not in imminent risk of extinction. In contrast, if inbreeding depression reflects the expression of lethal genotypes than small populations may be ephemeral.

Evolution of a Field Program - the Jamaican Iguana (*Cyclura collei*), a Volunteer's Perspective

Dawn Fleuchaus*

Milwaukee County Zoo, Wisconsin, USA

Cyclura collei is considered to be one of the most endangered reptiles in the world. It inhabits a small, disturbed forest within miles of the island's capital. Kingston, Jamaica, bustles with over one million people. Despite its proximity to such a vast urban area, the Jamaica Iguana field site is extremely inaccessible. Most often penetrated by charcoal burners, pig hunters, crabbers, and local fishermen, Hellshire is nothing if not a rough place. My experiences in the Hellshire Hills began in 2002. At that time, the field site was Maincamp and it was accessed via an eight-mile hike. Maincamp consisted of a rice sack tent with stick beds and hammocks. The floor was karst and the roof was leaky. The upper and lower nestsites had been rediscovered 12 years earlier. These sites were monitored throughout the nesting season. When possible, iguanas were captured for identification and collection of physiological data. Hatchlings were collected for processing and taken to Hope Zoo for headstarting. Dr. Byron Wilson was conducting a predator removal experiment, comparing abundance of reptile species in trapped versus un-trapped areas. In the past 11 years, it is interesting to see how much has changed and how much hasn't.

Assessment for Fijian Iguanas (*Brachylophus* sp.) in the Lomaiviti and Northern Lau Islands, Fiji

Harlow, Peter*[1], Robert Fisher[2], Maleli Biciloa[3], Joeli Vadada[3], Jone Niukula[3] and Tuverea Tuamoto[4]

[1]Taronga Conservation Society Australia, New South Wales, Australia; [2]U.S. Geological Survey, California, USA; [3]The National Trust of Fiji, Suva, Fiji; [4]NatureFiji-MareqetiViti, Suva, Fiji

Recent genetic and morphological research on Fijian iguanas (genus *Brachylophus*) has shown that there are three living species in the genus. We are aware of large sampling gaps across the 300 islands in Fiji, suggesting that more incipient species may occur and remain unrecognized and unprotected. With forest habitat transitions to grasslands continuing on many islands, iguana populations continue to decline and the risk of local extirpations and extinctions is increased. We recently prioritised and surveyed nine inhabited islands with forest remnants in the Lomaiviti/Lau islands of eastern Fiji; for some of these islands the most recent records of iguanas are over 90 years old, and many have never been surveyed/assessed. We recorded the

two species of banded iguanas (*B. bulabula* and *B. fasciatus*) on seven of the nine islands, but only on one island were iguanas abundant. Iguanas have been extirpated on two of these islands, and probably no longer exist on many other islands in these groups that we did not survey due to the lack of any forest remnants. We collected extensive morphological data and molecular samples from each population, which we will utilize in an already developed microsatellite library to better characterize these populations. We know that the population on the large mountainous island of Gau (140 km^2) is genetically as distinct from the three described species as these species are from each other. During this survey we collected the first morphological data on Gau iguanas that confirms this population is a new species, which we will be describing. We are uncertain as to whether the iguana species on the nearby island of Nairai represents this same new species or *B. bulabula*, but we can resolve this with further morphological and genetic analysis. With the completion of these surveys we fill in the middle range for iguana distribution in Fiji.

Study of the Exotic Black Spiny-tailed Iguana (*Ctenosaura similis*) on Key Biscayne, Florida

Hines, Kirsten*

Kirsten Nature Travel, Florida, USA

Non-native Black Spiny-tailed Iguanas (*Ctenosaura similis*) have maintained breeding populations in South Florida since the mid-1970s. They were first documented on Key Biscayne in 1996. On the Florida west coast, they have been reported to claim tortoise burrows and to have killed a native snake, suggesting potential effects on native reptiles. Their occurrence in parks on Key Biscayne presents a challenge for natural areas managers mandated with controlling populations of exotic species. I am evaluating distribution, diet, reproductive parameters, and potential management methods for the island. A baseline population survey for the island shows differential population density among parts of the island. Other aspects of the study will also be discussed.

Diet assessment for Northern Bahamian Rock Iguanas (*Cyclura cychlura*) in the Exuma Islands of The Bahamas

Hines, Kirsten*

Kirsten Nature Travel, Florida, USA

Two subspecies of Northern Bahamian Rock Iguanas (*Cyclura cychlura inornata*, *Cyclura cychlura figginsi*) occur in the Exumas of The Bahamas, where they are artificially fed at various sites. I have previously reported on human influenced diet and behavior and on potential affects. Colleagues and I (Knapp *et al.* in press) have completed a study of physiological aspects of artificial feeding. Gaining a full understanding of their natural diet is critical for the long-term management of this species, given their increased popularity as a tourist attraction. To date, there has been no comprehensive reporting of their native diet. My study documents the

natural diet of these two subspecies across their ranges. I am evaluating dietary data collected from areas not affected by artificial feeding on 15 islands in the Exumas across six years and from varying seasons. Their diet is primarily but not entirely herbivorous. Four species of plants dominate the diet. The iguanas appear to be opportunistic foragers with over 40 species of plants represented in their diet. Although considered to be almost entirely herbivorous, nearly 10% of samples contained some animal remnants.

Long-term Studies of the Allen Cays Iguana in the Northern Bahamas - the Next 30 Years?

Iverson, John*[1] and Andrea Aplasca[2]

[1]Earlham College, Indiana, USA; [2]Fordham University, New York, USA

The Allen Cays Iguana (*Cyclura cychlura inornata*) occurs primarily on only three small islands in the Allen Cays (Leaf, U, and Allen Cay) in the Exuma Islands of The Bahamas, and these populations have been under study since 1980. Although the total numbers of this taxon have more than tripled since then, new threats have emerged (mainly, unauthorized translocations, poaching, and the introduction of invasive species). In addition, recent microsatellite studies reveal significant genetic divergence between the two largest populations on Leaf and U Cays. Unfortunately, recent human activities have resulted in the movement of individuals between islands, threatening to eliminate the previous genetic structure among these populations. Because 1) visitation to these islands by people is expected to increase, 2) direct and indirect human impact on these populations will certainly increase, and 3) sea level rise will soon interfere with nesting on U Cay, the overarching question is how to best manage (or attempt to manage) these iguanas into the future?

Population Genetic Analysis of the Lesser Antillean Iguana, *Iguana delicatissima*, in the Lesser Antilles

Martin, Jessica*[1], Charles Knapp[2], Giuliano Colosimo[1], Glenn Gerber[3], Roger Thorpe[4] and Mark Welch[1]

[1]Mississippi State University, Missouri, USA; [2]John G. Shedd Aquarium, Illinois, USA; [3]San Diego Zoo Institute for Conservation Research, California, USA; [4]Bangor University, Wales, UK

Populations of *Iguana delicatissima* have been declining rapidly in recent years, and while populations on Dominica remain stable, other populations in the Lesser Antilles suffer habitat loss, hunting pressures, and competition with the invasive Green Iguana, *Iguana iguana*. As *Iguana delicatissima* is now Endangered, it is important to understand the population structure across the Lesser Antilles to aid conservation management in their decisions to conserve island habitat. On Dominica, some populations exhibited higher levels of heterozygosity and reproductive success at neutral microsatellite loci. These populations may serve as source populations for the island and are therefore critical to the survival of the species. Further microsatellite analysis on hatchlings from a communal nesting site on Dominica indicated that while nesting sites do not seem to be utilized by adults from across the entire island, they are

essential to local populations. It could be, however, that there is some more complex aspect of communal nesting in *I. delicatissima* that is not apparent in microsatellite analysis. Finally, the mitochondrial sequences of *Iguana delicatissima* individuals from different islands across the Lesser Antilles were compared. Individuals from Martinique all share a mitochondrial haplotype unique from the other islands, but all other individuals share the same haplotype. It seems that this 650-basepair mitochondrial sequence is generally conserved across the islands, indicating recent colonization or sufficiently high rates of dispersal to maintain low levels of gene flow between populations of *I. delicatissima*. The individuals that were morphologically hybrids of *Iguana iguana* and *Iguana delicatissima* all had unique haplotypes, and some individuals that were morphologically *Iguana delicatissima* shared an *Iguana iguana* mitochondrial haplotype, indicating hybridization events between the two species.

Conserving Hispaniola's Endangered Rock Iguanas, *Cyclura ricordii* and *C. cornuta*, through Ecology and Genetics

Pasachnik, Stesha*[1], Rosanna Carreras De Leon[2,3] and Glenn Gerber[1]

[1]San Diego Zoo Institute for Conservation Biology, California, USA; [2]Mississippi State University, USA; [3]Grupo Jaragua, Santo Domingo, Dominican Republic

Hispaniola is one of the largest and most diverse islands in the Caribbean. It is unique in being the only Caribbean island with two native rock iguana species, *Cyclura cornuta* and *C. ricordii.* This is thought to be the result of two paleoislands colliding, and each bringing with them one of the iguana species. These endemic iguanas are the largest native terrestrial vertebrates on Hispaniola and are dominant herbivores, however they are both highly threatened by habitat destruction and harvesting. *Ctenosaura ricordii* is considered Critically Endangered by the IUCN. *Cyclura cornuta* is considered Vulnerable, however our recent data supports an uplisting to Endangered. In order to assess the genetic health, and define the environmental factors that limit and define the iguanas' distributions, both on a large scale across the island and on a small scale in areas of sympatry between the species, we will use a combination of molecular and ecological techniques. Herein we present the preliminary results from the ecological portion of our work. We evaluated various nest characteristics and radio-tracked hatchlings of both species, in sympatric and allopatric sites. Our results demonstrate that the variation in hatchling dispersal and nest characteristics is determined by site, and not by species, as had been hypothesized. We will advance this work next by focusing on genetic patterns of diversity across sites, and natal homing behavior. These data are vital in constructing proper management plans for both of these species throughout their respective ranges.

Assessing the Potential for Mitigation in Headstarting of the Jamaican Iguana, *Cyclura collei*

Rasberry, Armed*[1], Mark E. Welch[1], Tandora Grant[2], Rick Van Veen[3], Orlando Robinson[4], Byron Wilson[3] and Dawn Fleuchaus[5]

[1]Mississippi State University, USA; [2]San Diego Zoo Institute for Conservation Research, California, USA; [3]University of the West Indies, Mona Campus, Kingston, Jamaica; [4]Hope Zoo, Kingston, Jamaica; [5]Milwaukee County Zoo, Wisconsin, USA

The Jamaican iguana, *Cyclura collei*, was thought extinct from 1948 until 1990 when a small population was discovered in the Hellshire Hills. Several factors including charcoal burners threatened the continued existence of this small population. A headstart program was initiated to rear young until they were large enough to fend for themselves. Under this program the number of breeding individuals in the Hellshire Hills is increasing. However, this study shows that recent cohorts of hatchlings have significantly less genetic variation in terms of heterozygosity relative to those collected before the release of headstarters. Hatchlings collected in the years before the release of headstart individuals showed a mean heterozygosity of 0.529, while those collected after the release of headstart individuals had a mean heterozygosity of 0.507 ($p = 0.01$). A hierarchical AMOVA also reveals that allele frequency differences between the pre-headstart and post-headstart cohorts of hatchlings are significant ($p < 0.01$, $F_{CT} = 0.05$). However, the loss of genetic variation appears far less substantial than preliminary work suggested based on fewer molecular markers (5% versus 13%). Further, the most recent cohorts of hatchlings reveal greater heterozygosity, suggesting that the earlier loss in genetic variation may be mitigated by current sampling strategies.

Jamaican Iguana *Cyclura collei*, November 2013 Field Report

van Veen, Rick* and Byron Wilson

University of the West Indies, Mona, Jamaica

Fieldwork was conducted during every week between November 2012 and October 2013. Periods of extended field activity were conducted from February to early April (pitfall trapping experiment), May/June (nesting season), and August/September (hatching season). Other projects (crocodile, sea turtle, and forest ecology) continue to bolster our presence in the field. In April 2013, a record 51 headstarted iguanas were repatriated back into Hellshire, bringing the total number of repatriated head-starters to 226. Due to increasing nesting activity, determining the number of nesting females has become increasingly difficult; however, our 2013 estimate was ~50 females nesting in the core monitored sites, up from an estimated eight in 1991 – a six-fold difference. As anticipated, the 2013 hatching season also produced a new record – 320 hatchlings enumerated, 42 of which were taken to the Hope Zoo for headstarting. Given that the previous record was 219, this represents a 50% increase. Daily trap removal efforts resulted in the removal of >100 mongooses, in addition to smaller numbers of feral cats, dogs, and pigs. Important new initiatives now in progress include 1) a major expansion of the existing invasive predator control programme, and 2) the construction of large artificial nesting areas to absorb

the increasing numbers of females using the core sites. On the whole, our biological interventions have yielded much success. Unfortunately, charcoal burning continues to threaten the remaining primary forests of Hellshire, and new development plans could see the destruction of the Goat Islands and surrounding habitats within the Portland Bight Protected Area.

When Iguanas Meet: Hybridization, Introgression, and Cytonuclear Discordance in Contact Zones of the Mexican Black Iguana

Zarza, Eugenia*[1], Víctor H. Reynoso[2] and Brent Emerson[3]

[1]Occidental College, California, USA; [2]Universidad Nacional Autónoma de México; [3]Island Ecology and Evolution Research Group, Canary Islands, Spain

Ctenosaura pectinata, an iguana endemic to Mexico, is composed of several highly divergent mtDNA lineages forming contact zones, and one of them overlapping with *C. hemilopha*. We assessed and compared the dynamics of gene flow at these inter- and intra- specific contact zones using mtDNA and microsatellite data. The mtDNA contact zone between *C. hemilopha* and *C. pectinata*, spans 12 km with no clear association with environmental change. F1 and backcross individuals were found in the area together with weak signals of prezygotic isolation and asymmetrical mtDNA introgression. To study intraspecific contact zones within *C. pectinata*, a transect across four overlapping mtDNA clades was sampled. Microsatellite data revealed only two nuclear gene pools, indicating that nuclear and mtDNA data do not follow concordant patterns within this region. The discordance can be explained in part by introgressive hybridization together with ongoing nuclear gene flow via male-biased dispersal. Overall, patterns of gene flow reflect the isolation time of the gene pools involved, with narrow and steep mtDNA and nuclear clines in the interspecific hybrid zone, in contrast to a wider area of overlap between intraspecific mtDNA lineages and extensive introgression. This is relevant for conservation strategies and for studies on speciation.

POSTER PRESENTATION ABSTRACTS

In alphabetical order by submitter's last name

The Andros Rock Iguanas: Conserving an Island Endemic in a Fragmented Landscape

Colosimo, Giuliano*[1], Charles Knapp[2], Lisa Wallace[1] and Mark Welch[1]

[1]Mississippi State University, Missouri; [2]Center for Conservation and Research Shedd Aquarium, Illinois, USA

Cyclura cychlura cychlura is the largest endemic terrestrial vertebrate on Andros Island. It is the only iguana in The Bahamas that is not presently confined to small cays (Knapp 2005), and thus faces intense pressures including illegal hunting, anthropogenic habitat loss, and the lingering effects of historic large scale logging (Knapp and Owens 2005). Current conservation planning (Knapp and Pagni 2011) was informed mainly by a long-term ecological study of the species. While ecological and demographic data are fundamental for the immediate rescue of any endangered species, the absence of information describing population boundaries and distinctiveness at a molecular level could result in suboptimal and potentially dangerous species management plans (Hedrick *et al*. 1996, Schwartz *et al*. 2007). In the present study we expand on the ecological investigations to better understand how species ecology and associated landscape can influence the genetic structure of the Andros Rock Iguana. Although Andros is considered to be the largest island of the Bahamas archipelago, it is composed of four large landmasses, North Andros, Mangrove Cay, Alcorine Cay, and South Andros, separated by saline tidal channels called bights. It was hypothesized that, because their documented ability to cross narrow water channels, *C. c. cychlura* individuals would present limited genetic structure. If true, individuals sampled across Andros should be characterized by non-significant differences in allele frequencies at neutral molecular markers.

Natural History, Demography, Range, and Threats of the Oaxacan Spiny-tailed Iguana (*Ctenosaura oaxacana*)

Corneil, Jeffrey*[1], Victor Hugo Reynoso Rosales[2] and Chad Montgomery[3]

[1]Truman State University, Missouri, USA; [2]Universidad Nacional Autónoma de México; [3]Truman State University, Missouri, USA

Most species (11 of 18) of spiny-tailed iguanas, *Ctenosaura*, are of conservation concern due to rapid decreases in habitat, overexploitation for food, and the pet trade. However, the genus *Ctenosaura* has generally been overlooked and understudied by conservationists and the scientific community. The Oaxacan Spiny-tailed Iguana (*C. oaxacana*) is a prime example of a relatively understudied, Critically Endangered Ctenosaur. *Ctenosaura oaxacana* was only recently split from *C. quinquecarinata* (Gray 1842), using morphological (Kohler and Hasbún 2001) and genetic (Hasbún *et al*. 2005) data. This species is a large bodied Ctenosaur (maximum SVL 170mm in males and 124mm in females (Kohler and Hasbún 2001)) that is distributed within

Oaxaca, Mexico on the Pacific side of the Isthmus of Tehuantepec (Kohler and Hasbún 2001). *Ctenosaura oaxacana* faces a number of potential threats throughout its range. Fragmented populations in a fairly narrow range represent isolated populations separated by inhospitable habitat. The objectives of this research are to elucidate the natural history, demography, range, and threats faced by *C. oaxacana*. This study will combine mark-recapture, transects, and radio-telemetry methods to gain a more substantial understanding of the species. The projected results include the actual range of the species, the number of existing populations, a population size estimate, an assessment of the demography, and examine home range, habitat use, and activity periods of the species. The collected data will then be used to develop a conservation management plan and an updated IUCN Redlist assessment to establish effective methods for conserving and protecting the species.

Sourcing the Green Invaders: Identification of Source Populations of *Iguana iguana* in Puerto Rico

De Jesús, Christina*[1], Wilfredo Falcón[2] and Riccardo Papa[1]

[1]University of Puerto Rico at Rio Piedras, San Juan, Puerto Rico; [2]Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Switzerland

Green Iguanas (*Iguana iguana*) have become established in many places outside their native range thanks to human-mediated dispersal, and in particular to the pet trade. For example, over three million Green Iguanas were imported into the United States alone in a period of just four years. As a result of overexploitation to satisfy the local and international demand, and habitat destruction, green iguanas remain listed under the CITES Appendix II since 1977. Although still considered threatened in parts of its native range, in parts of their introduced range, iguanas have become an abundant and widespread invasive. In this project, our goal is to understand the mechanisms of introduction. We are starting with the invasive populations in Puerto Rico, with the aims to include other invasive populations in our analysis. We will use mitochondrial (*ND4*) and nuclear (*NT3, c-mos* and *PAC*) DNA sequences obtained from the invasive range, in combination with published data from the native range, to assess their origin. We expect to find the origins of the populations of iguanas in Puerto Rico and assess the implications of the introduction history and dynamics for the management and conservation of the species.

A Cryptic Species of Galápagos Marine Iguana on the Brink of Extinction?

MacLeod, Amy*[1,2], Carolina García-Parra[3], Fritz Trillmich[1] and Sebastian Steinfartz[1,2]

[1]University of Bielfeld, Germany; [2]Technische Universität Braunschweig, Germany; [3]Charles Darwin Research Station, Ecuador

The recent discovery of strong population structuring in the Galápagos Marine Iguana indicates the potential existence of a cryptic species, the Punta Pitt iguana, represented by a single small discrete population on San Cristobál Island. Though data from both mitochondrial sequences

and 13 microsatellite loci indicate this population to be highly distinct, the small number of sampled individuals had until recently severely limited analysis. During expeditions to San Cristobál in 2012 and 2013, we collected 350 new blood samples, many from previously unknown locations. Utilising 19 highly polymorphic microsatellite loci, we analysed population structure on the island, calculated levels of genetic differentiation, and estimated the effective population size (N_e) using three methods. Analysis using the STRUCTURE program supported the existence of two strongly divergent and reproductively isolated populations on San Cristóbal, separated by an F_{ST} of 0.15, the highest level of intra-island genetic distance found in this species. Though the geographical distance between the two populations is less than 12 km of coast, the level of genetic divergence is equal to that found between island populations separated by more than 140 km of ocean. We therefore suggest that the marine iguanas from Punta Pitt represent a currently undetected, i.e. cryptic, species of marine iguanas. Three separate methods estimated the N_e of the Punta Pitt population to be 50 or fewer, indicating that urgent conservation management may be required. In particular, predation by invasive feral cats is a serious concern that warrants further attention. Considering the small population size and the fact that all analyses to date indicate reproductive isolation and a deep split between this population and all others, we pose the question of whether Punta Pitt iguanas should now be considered a cryptic species on the brink of extinction.

Local Knowledge and Use of the Valle de Aguán Spiny-tailed Iguanas, *Ctenosaura melanosterna*, in Honduras.

Pasachnik, Stesha A.*[1,2], James A. Danoff-Burg[2], Edoardo E. Antúnez[3] and Jeffrey P. Corneil[4]

[1]University of Tennessee, USA; [2]San Diego Zoo Institute for Conservation Research, California, USA; [3]Universidad Nacional Autonoma de Honduras; [4]Truman State University, Missouri, USA

The harvesting of wildlife has had a devastating affect on global biodiversity. Here we investigate the perceived status of the Critically Endangered Valle de Aguán Spiny-tailed Iguanas, *Ctenosaura melanosterna*. We interviewed 132 residents of the Valle de Aguán, Honduras to 1) examine their knowledge of the range and habitat preference, 2) document the use and trade, and 3) understand the level of awareness and openness to protection of this species. Our results indicate that these iguanas are primarily used for food. Though they are a small component of the local diet, consumption is occurring with a preference for gravid females. There are significant gender and geographic differences in consumption. Though these harvesting actions contribute to the continuing decline of this species, our results demonstrate a local belief that these iguanas are in danger of extinction, that conservation action should occur, and that international involvement is welcome.

Determining Variations in Foraging Ecology among Populations of the Allen Cays Rock Iguana (*Cyclura cychlura inornata*) - a Stable Isotope Approach

Richardson, Kristen*[1], John Iverson[2] and Carolyn Kurle[1]

[1]University of California, San Diego, California; [2]Earlham College, Indiana, USA

A subspecies of the North Bahamian Rock Iguana, the Allen Cays Rock Iguana (*Cyclura cychlura inornata*) is listed by the IUCN as Endangered and found only on a few small cays in the Exuma Island chain of The Bahamas. Populations have been closely monitored over the last 30 years by Dr. John Iverson of Earlham College, who noticed drastic body size variation between populations. A population of translocated iguanas on Allen Cay had more than double the average body mass of populations on other cays. This vast size discrepancy is the potential result of foraging differences between the populations. A mouse invasion on Allen Cay attracted barn owls, which have left the cay littered with hundreds of shearwater carcasses. This unusual situation gave rise to the hypothesis that the Allen Cay individuals may have had a unique opportunity to deviate from their typical herbivorous diet and exploit more protein-rich food sources compared with the populations on other cays. Using samples collected from 2011 to 2013, we will use stable isotope analysis to determine if the vast size discrepancies between populations of *C. c. inornata* are due to foraging differences. The results will provide an understanding of foraging ecology differences between iguana populations and provide insight on the unexpected effects of an island mouse invasion on an Endangered, native iguana species to better inform future management strategies.

The Use of Stable Isotope Analysis to Decipher Food Webs of Wild Rock Iguanas (*Cyclura* spp.) in the Dominican Republic

Steinitz, Ronnie*[1], Stesha Pasachnik[2] and Carolyn Kurle[1]

[1]University of California, San Diego, California; [2]San Diego Zoo Institute for Conservation Research, California, USA

Rock iguanas (*Cyclura spp.)* in the Caribbean islands are collectively threatened by habitat destruction. The only two species that occur sympatrically, *Cyclura ricordii* and *C. cornuta*, are found in the Dominican Republic and their high degree of niche overlap may have caused them to partition their diets and consume abnormal items, possibly including young conspecifics. In order to better understand the interactions between these species and their potential niche overlap, I will use stable isotope analysis to estimate their foraging ecology, niche overlap, and the potential for depredation on *C. ricordii* by *C. cornuta*. In addition, to best model their diets in the wild, I will conduct a captive feeding experiment on *Cyclura* spp. at the San Diego Zoo Global facilities to determine stable isotope discrimination factors. The results of this study will help identify key environmental characteristics and interactions that are either vital or detrimental to *C. ricordii* and *C. cornuta*'s survival. They will shed light on the behavior of these IUCN listed species (Critically Endangered and Vulnerable, respectively), and will be shared with the scientific communities in order to guide future conservation and management measures.

Resultados Preliminares sobre el Monitoreo de las Densidades de Iguana (*Cyclura nubila nubila*) en Áreas Protegidas del Sur de Cuba

Rossell, Amnerys González[1], Vicente Berovides Álvarez[2], Dorka Cobián Rojas[3], José Luis Linares Rodríguez[3], Leonardo Espinosa Pantoja[4], Julio Milián Amigo[5], Evelin Marichal Arbona[6], Gretel Abad Cambas[7], Manuel Alonso Tabet[8], Manuel López Salcedo[8], Yairen Alonso Giménez[8] and José M. Corona Galindo[8]

[1]Centro Nacional de Áreas Protegidas; [2]Facultad de Biología, Universidad de La Habana; [3]Parque Nacional Guanahacabibes; [4]Parque Nacional Cayos de San Felipe, [5]Refugio de Fauna Cayos de Ana María; [6]Centro de Investigación de Ecosistemas Costeros; [7]Empresa para la Protección de la Flora y la Fauna, Camagüey; [8]Refugio de Fauna Delta del Cauto

La iguana Cubana (*Cyclura nubila nubila*), es relativamente abundante en las costas y cayos que rodean a la isla de Cuba (Schwartz y Carey 1977, Berovides *et al*. 1996, Alberts 1999, González *et al*. 2001, CBSG/UICN 2003). Sin embargo, se considera bajo categoría de amenaza como vulnerable (Berovides *et al*. 1996, UICN 2012, González *et al*. 2012) debido, entre otras causas, a la degradación de sus hábitat naturales. A pesar de su amplia distribución, existen pocos estudios publicados acerca de su abundancia (Perera 1985; González *et al*. 1995, 2001, 2004; Ávila y Berovides 2005; Morales *et al*. 2005; Alberts *et al*. 2001; González *et al*. 2007). En el marco del proyecto GEF/PNUD (CUB01G41) Aplicación de un enfoque regional al manejo de las áreas marino-costeras protegidas en la región Archipiélagos del Sur de Cuba, se implementa un programa de monitoreo sobre las poblaciones de *Cyclura n. nubila*. Al inicio del programa (2011), solamente tres áreas protegidas en la región del proyecto contaban con información publicada sobre la especie. En el resto de las áreas se desconocía el estado de las poblaciones. El monitoreo se realizó mediante conteo directo de individuos en bandas transectos fijas (Iverson 1979, Perera 1985, Hayes y Carter 1996, Berovides *et al*. 2005), que se repiten a lo largo del área, formación vegetal o hábitat homogéneo. El presente trabajo muestra los resultados preliminares del monitoreo realizado sobre cinco poblaciones de *Cyclura nubila nubila* del sur de Cuba, entre los años 2010 y 2012. En algunos casos se comparan los resultados con estimas realizadas en años anteriores. El objetivo específico fue estimar densidades (individuos/ha) para monitorear cambios poblacionales e identificar causas de decline. La comparación de los valores medios de estas estimas de densidad en el 2011, muestra como resultado que estas difieren entre sí significativamente, conformando tres grupos: de muy baja densidad, de mediana densidad y un tercero de alta densidad. Los valores de densidades variaron entre 2.2 y 27 individuos/ha. La aplicación del monitoreo de las poblaciones de *Cyclura n. nubila*, de forma simultánea y con un método homogéneo, en diferentes áreas protegidas del país, permite evaluar y comparar el estado de las poblaciones entre áreas, identificar causas de decline y conocer rangos de densidad natural, lo que puede resultar de valor para la conservación o manejo ex situ de la especie.

2013 IUCN SSC Iguana Specialist Group Annual Meeting

Four Seasons Hotel, Kingston, Jamaica
MINUTES

Day 1: 14 November 2013

9:05 Welcome by ISG chairs and self-introductions by the group
9:25 Welcome by Dean of Faculty, University of the West Indies, Mona Campus

9:35 Captive Reproduction of *Cyclura collei* at Zoo Miami
Atteberry, Nicole
General discussion & questions:

- Q: Is there is a possibility to expand the available space in the Zoo. A: They are in the process of building a new enclosure for hatchlings.
- Q: Is the shading managed in the winter to ensure that the iguanas have the necessary amount of sun? A: The zoo manages this in a way that there is also some sun in the enclosures.

9:45 Jamaican Iguana *Cyclura collei*, November 2013 Field Report
Van Veen, Rick, and Byron Wilson
General discussion & questions:

- Q: The trap rate is not increasing the capture of predators, is there another strategy to be more successful in this issue, like modifying the shape of the trap line? A: More traps are better for capturing predators. Also they have tried different arrangements and shapes of traps but what seems to have functioned best is to increase the trap number, which captures more predators.
  Suggestion was noted about increasing efficiency of the traps to diminish effort by the field team, will look into changing the shape of the trap line.

10:05 Evolution of a Field Program – the Jamaican Iguana (*Cyclura collei*), a Volunteer´s Perspective
Fleuchaus, Dawn
General discussion & questions:

- Q: Why would a volunteer come back? A: Because of the experience, the people and the animals. If volunteers have a good experience in the program, they will return.
- Comment: huge thanks to Dawn and other volunteers who make these projects possible.

10:20 Assessing the Potential for Mitigation in Headstarting of the Jamaican Iguana, *Cyclura collei*
Rasberry, Armed, Mark Welch, Tandora Grant, Rick van Veen, Orlando Robinson, Byron Wilson, and Dawn Fleuchaus
General discussion & questions:

- Q: Do blood samples come from the wild population or from the headstart program? A: Samples come both from the wild and from the headstart program.
- Q: If you are testing the genetics of clutches doesn't that introduce a bias as they be more related? A: No because they use communal nests where multiple females laid eggs, and catching is done so that clutch duplication is minimized. Headstart animals and wild animals are almost the same because they are all born in the same wild habitat, just headstarted to increase chance of youngster survival. Iguanas show a loss of heterozygosity near 1% so the population resembles the natural patterns.

11:00 Conserving Hispaniola's Endangered Rock Iguanas, *Cyclura ricordii* and *C. cornuta*, through Ecology and Genetics
Pasachnik, Stesha, Rosanna Carreras De Leon, and Glenn Gerber
General discussion & questions:

- Q: What is the purpose of the Iguanarios? A: They are mostly tourist attractions but the key thing is that they believe they are doing something for conservation of iguanas. Even though this is not really the case, they have the idea that they want to do something beneficial for the iguanas, which makes them a perfect avenue for community outreach.
- Q: Is there a poaching problem? A: It seems not to be a problem for *C. ricordii* but for *C. cornuta* there is a big poaching problem.
- Q: Is the poaching for pets or for consumption? A: Both, they are moved around as pets and for tourist attractions but people do eat them and make medicinal oil from them.
- Q: What is the reason that green iguanas are being introduced in the island? A: Mainly they are introduced as pets, especially from Puerto Rico.

11:20 Testing the Natal Homing Hypothesis in *Cyclura ricordii* Populations from Pedernales Province, Dominican Republic
Carreras De León, Rosanna, Stesha Pasachnik, Glenn Gerber, and Mark Welch
General discussion & questions:

- Q: Can we have an update on the situation in the Lago Sur region of the DR? A: Explained the situation being the destruction of protected land to give those displaced by the rising water level of the lake room for agriculture, and stated that more detail would be given the next day.

11:45 Supporting a Local Community in Creating a Municipal Protected Area for the Conservation of Ricord's Iguanas (*Cyclura ricordii*) in Anse-à-Pitres, Massif de La Selle Conservation Corridor, Haiti
Accime, Masani (Presented by Stesha Pasachnick)
General discussion & questions:

- Q: Could fences be placed around the nesting areas to keep the cattle out? A: It is possible though we do not want to draw attention to these areas because of poachers.

11:53 The Mona Island Rock Iguana: Conservation Initiatives through a Headstart Program, Nesting Monitoring Efforts and Controlling Invasive Species
Álvarez, Alberto, Cielo Figuerola, and Miguel García
General discussion & questions:

- Q: Is the hatchling release done near the nesting area or in other areas? A: The location is close to the collecting area but we are trying not to saturate the area. They are released in the surrounding area but not exactly in the nesting area.
- Q: How do you know that you are having success with the headstarting program? A: The population demography has changed. Many age classes are found together and they are consistently seeing more juvenile individuals. The habitat utilization is also wider now across the island. We have also documented nesting females coming from the headstart program.
- Q: Is the number of blind iguanas on Mona increasing? A: We have seen a few blind animals but not from viruses or parasites, mainly cornea damage from wild thorns.
- Q: Which species is the most socially difficult to eradicate? A: Goats, because with pigs and rats there is social support for the eradication program.

Break

14:04 Long-term Studies of the Allen Cays Iguana in the Northern Bahamas – the Next 30 Years?
Iverson, John, and Andrea Aplasca
General discussion & questions:

- Believe humans are illegally translocating the iguanas.
- Iguanas being fed bad food by tourists.
- Data shows there might not have been a bottleneck event in the past.
- Q: Do you have an idea of sea level rising on U Cay? A: Not really sure how much it will rise but even rainy weather can cause hatchlings to die from nest saturation.

14:20 Diet Assessment for Northern Bahamian Rock Iguanas (*Cyclura cychlura*) in the Exuma Islands of The Bahamas and Study of the Exotic Black Spiny-tailed Iguana (*Ctenosaura similis*) on Key Biscayne, Florida
Hines, Kirsten
General discussion & questions:

- Trying to document the current distribution of the iguanas in the Exuma Islands.
- Used islands that had a large population of iguanas.
- Organic soil found in iguana scat.
- Invasive iguanas in Florida, Green and Spiny-tailed Iguanas.
- Q: Does the west side of the park have more Green Iguanas, and what are the numbers? A: Yes, about 220 Spiny and 180 Green Iguanas.
- Q: Are plants native or invasive that are found in the *Cyclura* scats? A: Mostly native plants.

14:40 Inferring Long-term Population Persistence using Genetic Tools: the Tale of *C. carinata* on Little Water Cay

Colosimo, Giuliano, Jamen Berk, Glenn Gerber, and Mark Welch

General discussion & questions:

- High levels of inbreeding depression found in Little Water Cay iguanas.
- Heterozygosity can be a good fitness predictor of individuals.
- Most of the work was based on Jamen Berk's master's projects.

15:00 Assessment for Fijian Iguanas (*Brachylophus* sp.) in the Lomaiviti and Northern Lau Islands, Fiji

Harlow, Peter, Robert Fisher, Maleli Biciloa, Joeli Vadada, Jone Niukula, and Tuverea Tuamoto

General discussion & questions:

- Not really sure how the Fijian iguanas got on Fiji.
- Introduced predators on the islands to try and get rid of rats, but they also eat the iguanas.
    - Mongooses and cats mostly.
- Spend most of time in the trees, and that is the best place to find them at night when surveying.
- Many color variations going from island to island.
- No questions.

15:50 Population Genetic Analysis of the Lesser Antillean Iguana, *Iguana delicatissima*, in the Lesser Antilles

Martin, Jessica, Charles Knapp, Giuliano Colosimo, Glenn Gerber, Roger Thorpe, and Mark Welch

General discussion & questions:

- Species was listed as Endangered on IUCN Red List since 2010.
- Some populations show higher levels of heterozygosity than other populations, suggesting that they are source populations.
- Objective to evaluate genetic variation across islands.
    - Found that island populations are more similar than what was thought originally.
- Comment made about recent translocation to Horseshoe Islands and that eggs were found a few years later.

16:10 When Iguanas Meet: Hybridization, Introgression, and Cytonuclear Discordance in Contact Zones of the Mexican Black Iguana

Zarza, Eugenia, Victor H. Reynoso, and Brent Emerson

General discussion & questions:

- Attempt to evaluate sources of genetic variation and areas with unique genetic signatures.
- Found that there is a F_1 hybridization zone.
    - You can see the morphological similarities with both parent species and the F_1 generation.
    - They are producing viable and fertile offspring.
- Discordance suggests that males dispersing further than females.
- Q: So you have evidence for introgression but it looks like it is going from the north to the south, is that correct? A: Not entirely sure of the direction.

16:30 Conservation Status of the Iguanas of Guatemala
Ariano-Sanchez, Daniel
General discussion & questions:

- Five species of spiny iguanas found in Guatemala, distributed across the country, with little overlap between species.
- There is much evidence for habitat destruction.
    - Interoceanic corridor project is trying to build a road that will rival the Panama Canal. It was originally planned to go through a natural habitat of *C. palearis*, but plans have changed and it will just run along it instead of through it.
    - Zootropic was able to get the builders to move the highway so that it doesn't go through *C. palearis* reserve.
- Comments clarified exact zone of the new highway and that there are no protected areas within that zone.

4:50 Habitat Utilization of the Roatán Spiny-tailed Iguana (*Ctenosaura oedirhina*)
Campbell, Ashley, and Stesha Pasachnik
General discussion & questions:

- This species is endemic to Roatán, Honduras.
- They are facing many similar threats to other iguanas, including feral animals, habitat destruction, and poaching.
- Study sites are mainly focused on the protected areas because those are the main areas where you can find the iguanas. Protected areas are pretty small overall in terms of protected area on the island.
- Actions need to focus on preventing poaching as these iguanas seem to do okay in all habitat types.
- No questions.

Day 2: 15 November 2013

8:30 Acknowledgments
Stesha Pasachnik, Chuck Knapp, Tandora Grant, *et al.*

- Co-chairs thanked the working groups, Heidi Davis, George Waters, Byron Wilson, and Tandora Grant for work toward this meeting.
- Want to develop a Web-Ex technology for people who cannot attend meetings, hopefully by next year. George is working on it.

8:40 Jamaican Iguana Workshop and Monograph in Caribbean Naturalist update/discussion
Byron Wilson, *et al.*

- Symposium of work that has been done in Hellshire Hills
    - biology, geology, botany, etc.
    - An ode to the Woodley report (first surveys in area).

    - NEPA, C-CAM, UDC, and others discussed Hellshire Hills and the potential impacts of the new development project (Goat Islands and adjacent mainland area).
- Caribbean Naturalist journal will have a special edition for the workshop presentations, which will be published next year.
- NEPA agreed to fund the iguana project for a year.
    - Will hire Byron's team and David Reed (NEPA) will be project manager.
    - Longer-term funding is still needed.
    - NEPA says they are interested in long-term funding but the reality of that is unclear
- Charcoal burning is the number one problem in habitat (aside from the port).
    - It does not appear that there will be any significant action on charcoal burning.
- Some encouraging conversation but lots still to do.
- Lots of confusion about what actually is going to happen with the port.
    - Can we make this a global concern?
    - How do we bring more attention to it?
- The ISG is not against economic growth, other options need be considered and a full evaluation needs to be conducted.
- Scientific American article about the situation was published this morning as well as articles in the local newspaper.
- Other possible locations for this port are in the DR and Cuba, posing another similar situation of destroying a protected area.
    - Proposed location is in a national park, where there is an important *C. cornuta* population.

9:00 ISG CITES Permit – activity and challenges

Tarren Wagener

- Permit covers 11 *Cyclura* species.
- We are very lucky to have a blanket permit such as this.
- ISG is permit holder with 34 sub-permittees.
- Biggest challenge is that all paperwork must match.
- Each port operates independently and sometimes they have their own "rules".
- eDec can now be done online in advance of trip, and filled out when you get back, as long as it is before they receive all your documents.
- Remember to give yourself plenty of time and keep the coordinator in the loop.
- Renewal on a yearly basis. Current permit valid through 3/21/2014.
- New coordinator needed to replace Tarren. **Mark Welch has offered.**
- What about adding "whole or partial carcass" because skin and bone is not on the permit and rarely do you bring a full intact carcass.
    - Should we amend to state a different tissue type?
- Co-chairs believe we need to be more general on the permit, but CITES likes specific.
- Pursue change in permit by requesting one change a year and managing the permit well to keep a good track record.
- Addresses must be different, one must be from the US (importer) and one must be from country of origin (exporter). You cannot put the same address for both parties.

    - However, sometime that is what is asked of you. Lots of confusion from different inspectors wanting different things.
- One person could cause the whole permit to be revoked.
- Everyone has problems with the same FWS inspector, thus it was suggested that we write a formal letter of complaint?
    - Concerns about a trickle-down effect or retaliation.

9:10 Update from Iguana Taxonomic Working Group

John Iverson, *et al.*

- The draft is not ready yet, stay tuned.
- Everyone is in favor of listing regional common names for species to be informative across all countries.

9:20 Update from Genetics Working Group

Catherine Stephen, *et al.*

- Genetic report compiled so that there is minimal overlap, and to let everyone know what is going on.
- Want to be open with markers and methods.
- List of tissue needs so that everyone can help out when possible.
- Please update your summary and tissue needs in the report.
- Last year's report is on the website, the new one will be sent out soon.

9:30 Invasive Iguana Working Group (IIWG) White Paper update

Peter Harlow, *et al.*

- Position statement meant to help guide decision makers and summarize what we know so far for the general public.
    - Needs to be short and to the point, for non-scientists like government officials.
- Will be up on the ISG website.
- Q: Are there any good examples of invasive iguanas affecting native iguana species and biodiversity?
    - Many were included but most had not reviewed the document.
    - Paul Calle suggested that we should focus on documenting economic effects on agriculture, in order to get more political support.
    - Still not a lot of data for either concern.
    - Miguel Garcia brought up issues with iguanas in Puerto Rico, mainly economic issues with the airport and roads.
    - Kirsten Hines brought up issues with iguanas in Florida with canals and *Ctenosaurs* eating ground nesting birds and displacing Gopher Tortoises (which was already included).
    - Chloe Rodrigues brought up the destruction of structures because of egg laying in historical sites in the French West Indies.
- Daniel Ariano suggested including a "black list" for each country of reptiles to not import.
- There were many issues with the bullet point concerning being against the **legal** importation of iguanas.

- Point taken, draft needs work still, which is why it is a draft, and the authors were looking for input.
- They urge more people to get involved.

9:45 Caribbean Landscape Conservation Cooperative

Brent Murry

- US Dept. of Interior funded program to promote seamless landscape across geographies since most ecological decisions are made on a state basis.
- States must integrate within their groups to manage the landscape and conservation. Focused on the future, climate change, etc.
- Works with IITF.
- FWS program but has a steering committee with partner buy-in.
- Program develops information and objectives, facilitates communication between agencies and areas, monitors projects, and outcomes.
- Want to identify projects, scientific needs, and partnerships to further their objective themes.
- Trying to create a priority list that will be used as a backbone for grants and management decisions.
- Compiling spatially explicit GIS data sets and databases for research.
- Want to fund projects that "are smallest with a Big Bang".
- CaribbeanLCC.org.
- They have worked with many NGOs and do not want to reinvent the wheel in terms of data compiling and acquisition.

10:15 Caribbean Iguana Conservation Workshop

Glenn Gerber, Bruce Weissgold, and Kirsty Swinnerton

- The target audience is for local managers who are actively involved, who can affect regional efforts.
  - Purpose is networking opportunities between Caribbean nations.
- It is a three-day workshop focused on working groups and coming up with action plans with the production of a document during the meeting.
- The Lesser Antilles is included, along with 13 other countries.
- Notes will be taken at the meeting, as it was requested that information be immediately disseminated.
  - This information will be made available to the ISG asap.

Break

10:50 Iguanas of the World. Volume 3

Group discussion

- Show of hands indicates that there is interest and enough individuals with data to publish in such a resource.
- Tandora Grant, Stesha Pasachnik, and John Iverson volunteered as editors.
- Co-chairs will look into online journal options and get back to the group.

- Herpetological Conservation and Biology journal is one option.

11:35 Travel Award funding

- Full funding awarded to: Ariano, Campbell, Carreras, Martinez, Martin, Pagni, Rasberry, van Veen.
- Partial funding awarded to: de Jesus and Steinitz.
- Martinez and Pagni not able to come.
- Discussion on donation for future awards and award amount.
- Asked if anyone is interested in pledging donations for travel funds - they want to fund more attendance especially to students and underrepresented countries.
    - It was suggested to have a fund collected from ISG members.
    - There was also the idea to include it in the registration fee for the meeting.
    - There is also a room-sharing option.
    - Option to donate on the website (via IIF) was confirmed for the future.

11:45 What needs to be done with iguanas that is not already happening?

- We should revisit the prioritization of needs by species.
    - Rank needs for rapid use.
    - Those people working on the same species should have open discussion regarding priorities.
    - Co-chairs to set up survey monkey to send to the group and gather these data.
- Exploring the idea of a large scale grant covering multiple species.
    - There should be a focus on funding local people with a large scale grant.
    - These grant proposals need to be prepared now, before the call comes out.
    - Potential grant options: tourist feeding (Caribbean), invasive species control (Caribbean), regional meeting for Central America and Mexico to discuss capacity building options.

12:00 How can we be more visible as a group throughout the year?

- Caribbean PARC chapter support letter sent out.
- Dominican Republic and Jamaica IUCN letters to gov’ts sent out. DR letter particularly helpful in halting destructive actions in the Lago Sur region.
- What could we have done differently with the Jamaican Iguana?
    - How could we prevent what happened to the Jamaican Iguana when looking at species in other countries?
    - We need to take a look at actions and consequences.
- Look at the ecosystem tourism model.
- We also need local education movements to help bridge the gap between research, policy, and management.
- Marketing is also important.
- We could use an “International Iguana Day” for the public relations aspect, using posters, a Facebook page, keeping people updated on happenings and raising awareness and passion for iguanas.

Break

14:00 Next meeting location

- A vote showed the majority in favor of Galápagos as the 2014 meeting location.
- 2015 could be at the USFWS training facility in Virginia.

14:15 Red List and Program Officer Update

Tandora Grant

- All Red List assessment needs to be completed next year.
    - There are 19 hopeful assessments for 2014, and 17 have currently been completed.
- Potential for a video podcast (via IUCN) for a project occurring next year.
- "The conservation status of the world's reptiles" was published in Biological Conservation.
- There were some media additions, including an article in the Huffington Post, the IUCN Jamaican Iguana SRP was published through the IUCN portal, a Scientific American article was published, and there were petitions written about illegal charcoal burning and the Goat Islands.
    - Urge people to be involved and sign petitions.
- Website version 3 redesigned and is now online.
    - Species accounts are needed.
    - A Virtual Library has just now being launched (~1,160 refs so far).
    - There is a need to translate articles to other languages.
- (update given on behalf of Evert Henningheim): The Dutch Iguana Foundation has given $1,900 USD to Zootropic, two mini proposals for the Monuriki Island Crested Iguana ($1250 Euro) and the San Salvador Iguana ($1,000 Euro), and a Jamaican Iguana donation was given ($1,000 Euro). A Dutch illegal reptile trader and sentenced him to a year in prison.
- Tandora requested ideas from the group for how to use merchandise to raise money for travel awards, etc.