2015 IUCN SSC Iguana Specialist Group Annual Meeting
Guana Tolomato Matanzas National Estuarine Research Reserve (GTM NERR),
Vilano Beach, Florida, USA

9 November 2015

5:30 – 9:30 pm Pre-meeting Ice Breaker at GTM NERR patio

10 November 2015

8:00 am **Welcome and self-introductions** – Co-Chairs (Chuck Knapp and Stesha Pasachnik)

8:15 am **Information** about venue, surrounding area, and GTM NERR (Joe Burgess)

8:30 am **Long-term Studies of the Allen Cays Iguana (*Cyclura cychlura inornata*) in the Exuma Islands**
Iverson, John

8:50 am **Conservation Update on the Sandy Cay Iguana**
Buckner, Sandra D.*, William K. Hayes, John B. Iverson, Jill M. Jollay, Phillip S. Weech, Steve Smith, Pat Hayes, Sheila Iverson, and James Traverse

9:10 am **Conserving Hispaniola's Endangered Rock Iguanas, *Cyclura ricordii* and *C. cornuta*, Ecology, Genetics, and Outreach**
Pasachnik, Stesha*, Ernst Rupp, Rosanna Carreras De Leon, and Glenn Gerber

9:30 am **Influences on Hematology, Plasma Biochemistry, and Plasma Protein Electrophoresis in Grand Cayman Iguanas (*Cyclura lewisi*)**
Rainwater, Kimberly*, Paul Calle, Catherine McClave, Bonnie Raphael, Carolyn Cray, and Frederic Burton

9:50 am **Spatial Ecology of the Grand Cayman Blue Iguana (*Cyclura lewisi*): a Comparative Study after 10 Years of Re-stocking and Recovery in the Salina Reserve**
Mougey, Krista*, and Frederic J. Burton

10:10 am ***BREAK***

10:30 am **Field Update on Sister Isles Rock Iguana (*Cyclura nubila caymanensis*) Nesting Ecology Project on Little Cayman**
Moss, Jeanette*, Mark Welch, Glenn Gerber, Matthias Goetz, and Jessica Harvey

10:50 am **A Camera Trap Approach to Understand Invasive Species Impacts and Behavioral Patterns during the Nesting Season of the Mona Island Iguana**
Figuerola, Cielo*, Jan P. Zegarra, and Miguel A. García

11:10 am **Status of the Stout Iguana (*Cyclura pinguis*) on Guana Island, British Virgin Islands**
Mougey, Krista*, Gad Perry, and Douglas Bell

11:30 am **Growing in a Crowded Neighborhood: Competition's Role in the Expression of Inbreeding Depression in *Cyclura carinata***
Colosimo, Giuliano*, Glenn Gerber, and Mark Welch

11:50 am **The Potential Genetic Value of Captive *Cyclura collei* to Population Maintenance in the Hellshire Hills**
Welch, Mark E.*, Armed Rasberry, Tandora Grant, Rick Van Veen, Orlando Robinson, Dawn Fleuchaus, and Byron Wilson

12:10 pm **Latest Updates of the Major Ongoing Studies of *Iguana delicatissima* in the French Territories Guadeloupe and Martinique. Perspectives for Next Year in the Context of the End of the French National Action Plan**
Elisa Curot-Lodéon

12:30 pm ***LUNCH***

2:00 pm **Investigating the Genetics of *Iguana delicatissima* on St. Eustatius**
van den Burg, Thijs*, Hannah Madden, and Mark Welch

2:20 pm **Population Viability of the Roatán Spiny-tailed Iguana (*Ctenosaura oedirhina*)**
Campbell, Ashley B.*, Stesha A. Pasachnik, and Terry L. Maple

2:40 pm **Conservation Assessment of the Critically Endangered Oaxacan Spiny-tailed Iguana (*Ctenosaura oaxacana*)**
Corneil, Jeffrey*, Victor Hugo Reynoso, and Chad Montgomery

3:00 pm **Social Network Structure in the Spiny-tailed Iguana, *Ctenosaura similis*: Preliminary Results and Next Steps – the Encounternet System**
Nash, Ann-Elizabeth*, Stephen P. Mackessy, and Mitchell McGlaughlin

3:20 pm ***BREAK***

3:40 pm **Biogeography and Conservation Systematics of Pacific Iguanas (*Brachylophus* sp.)**
Fisher, Robert*, Jone Niukula, Heidi Davis, and Peter Harlow

4:00 pm **Conservation Status and Priority Actions Needed for Fijian Iguanas (*Brachylophus* sp.)**
Harlow, Peter*, Jone Niukula, and Robert Fisher

4:20 pm **A Species Survival Plan Program for Fijian Banded Iguana (*Brachylophus bulabula*), a Case Study for Conservation of Fijian Iguanas Through Collaboration, Building of Relationships, and Investing in Conservation Initiatives**
Lovich, Kim* and Kira Mileham

4:40 pm **Conservation of Fijian Crested Iguanas (*Brachylophus vitiensis*) on Monuriki Island**
Niukula, Jone*, Sialesi Rasalato, Robert Fisher, Ramesh Chand, and Peter Harlow

5:00 pm **Background and Summary Updates from the International Iguana Foundation**
Rick Hudson

5:15 pm **Social Media, the International Iguana Foundation, and the ISG – Help Us Help You!**
Hedrick, David

5:30 pm **Drinks and Snacks at the Poster Session with Presenter Introductions**
(In alphabetical order by last name)

***Amblyomma* and *Rickettsia*, Covert Hitchhikers on *Cyclura cychlura* Iguanas**
Colosimo, Giuliano*, Amanda Benton, Charles Knapp, and Mark Welch

The Mona Island Iguana: Conservation Efforts to Protect an Endemic Reptile from Invasive Species
Figuerola, Cielo*, Alberto Álvarez, and Miguel A. García

Protecting Caribbean Iguanas
Figuerola, Cielo*, Sally Esposito, Wes Jolley, Jose Luis Herrera, and Kirsty Swinnerton

Algunos resultados sobre la morfometría de poblaciones de *Cyclura nubila nubila* en Cuba. *Translation:* Some Results about Morphometry in Populations of *Cyclura nubila nubila* in Cuba
González Rossell, Amnerys*, Vicente Berovides, et al.

A Study of the Reproductive and Dispersal Behavior of the Critically Endangered Utila Spiny-tailed Iguana *Ctenosaura bakeri* on the Island of Utila, Honduras
Maryon, Daisy

Phylogeography of Desert Iguanas (Genus: *Dipsosaurus*)
Packer, Michael, Jesse Breinholt, Robert Murphy, and Catherine Stephen*

An Evaluation of the Diet of *Cyclura* Iguanas in the Dominican Republic
Pasachnik, Stesha* and Victor Martin Velez

11 November 2015

9:00 am **Daily agenda review**
Chuck Knapp, Stesha Pasachnik, Tandora Grant, Joe Burgess

9:10 am **Taxonomic Revision and Conservation Reassessment of Madagascan Iguanas (Opluridae)**
Welt, Rachel*, and Christopher Raxworthy

9:30 am **Control Tactics Developed Against the Argentine Cactus Moth, *Cactoblastis cactorum*, a Threat to North American Native Prickly Pear Cactus, *Opuntia* spp.**
Stephen Hight

9:50 am **Genetic Population Structure and Origin of the Invasive Green Iguana (*Iguana iguana*) in Puerto Rico**
De Jesús-Villanueva, Christina*, Cristina Rivera, Xímena Vélez-Zuazo, Wilfredo Falcón, Riccardo Papa, and Catherine Stephen

10:10 am **Eight Years of Managing an Invasive Iguana, *Iguana iguana*, at Cabezas de San Juan Nature Reserve Fajardo, Puerto Rico**
Rodríguez–Gómez, Carlos Andrés

10:30 am **Monitoring, Modeling, and Management: Controlling Green Iguana Overabundance**
Haakonsson*, Jane Ebert, Jessica Harvey, and Frank F. Rivera-Milán

10:50 am **BREAK**

11:10 am **Invasive iguana discussion including position statement, recent eradication projects and protocols**
Pete Harlow & Rick Van Veen (Fiji), Rick Van Veen, Jane Haakonsson & Jessica Harvey (Caymans), Joe Wasilewski (Bahamas), Stesha Pasachnik & Peter Harlow (position statement), All

12:30 pm ***LUNCH***

2:00 pm **International Trade in *Cyclura* Iguanas: An Overview**
Weissgold, Bruce

2:20 pm **Iguana Smuggling Discussion**
Evert Henningheim, Stesha Pasachnik, Sandra Buckner, Bruce Weissgold, All

3:00 pm **CISC Update**
Bruce Weissgold

3:10 pm **Travel Awardees Update** (Stesha Pasachnik)

3:20 pm **Update on IUCN SSC Leaders' Meeting in Abu Dhabi** (Stesha Pasachnik, Chuck Knapp, Tandora Grant)

3:35 pm **CaribPARC Update**
Stesha Pasachnik

3:40 pm **Update on iguana monograph in *Herpetological Conservation and Biology***
Stesha Pasachnik, Chuck Knapp, Tandora Grant, John Iverson

3:50 pm **Taxonomic Working Group Update**
John Iverson, Stesha Pasachnik

4:00 pm **Genetics Working Group and IUCN Conservation Genetics Specialist Group Updates**
Catherine Stephen, Stesha Pasachnik

4:10 pm **BREAK**

4:30 pm **Iguana Introduction Updates from Anegada, and to Puerto Rico**
Glenn Gerber, Allison Alberts, Miguel García

4:40 pm **Newsletter update**
Chuck Knapp, Stesha Pasachnik, Tandora Grant

4:50 pm **ISG Year in Review**
Tandora Grant

5:10 pm **Next meeting location**
Stesha Pasachnik, Chuck Knapp, Tandora Grant, All
Invitations from: Amnerys González Rossell (Cuba), Robert Fisher (Fiji), and Miguel García (Mona, Puerto Rico)

5:30 pm **Steering Committee Meeting**
Closed: Alberts, Gerber, Grant, Harlow, Hudson, Iverson, Knapp, Pasachnik, Stephen

12 November 2015
Working Day

9:00 am **Red List Assessments – Video and Training Review**
Tandora Grant, All

10:00 am – End of Day

Red List Assessment Working Groups (leaders noted, others welcomed)

***Iguana iguana*: Catherine Stephen, Chuck Knapp, & Skype: Brian Bock**
***Ctenosaura oaxacana*: Jeffrey Corneil & Thijs van den Burg**
***Ctenosaura oedirhina*: Ashley Campbell, Stesha Pasachnik, & Daisy Maryon**
***Cyclura carinata*: Giuliano Colosimo, Jen Moss, & Glenn Gerber**
***Cyclura collei*: Byron Wilson & Tandora Grant (5-year update)**
***Cyclura cychlura inornata/nuchalis*: John Iverson & Sandy Buckner**
***Cyclura nubila*: Amnerys González Rossell, Miguel Garcia, & Cielo Figuerola**
***Cyclura rileyi*: John Iverson & Sandy Buckner**
***Cyclura stejnegeri*: Miguel Garcia, Cielo Figuerola, & Tom Wiewandt**
***Sauromalus* sp.: Chad Montgomery & Michael Kartje**

Edit Invasive Iguana Position Statement to incorporate current discussion/direction
Carlos Rodríguez–Gómez, Christina De Jesús Villanueva, All

Revising the Recovery Plan for Fijian Iguanas
Robert Fisher, Kim Lovich, Peter Harlow, Steve Anstey & Jone Niukula

Compile and complete the meeting minutes
Rachel Welt & Daisy Maryon

IUCN SSC Iguana Specialist Group Annual Meeting
Guana Tolomato Matanzas National Estuarine Research Reserve,
Vilano Beach, Florida, USA
10-12 November 2015

ORAL PRESENTATION ABSTRACTS

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

Conservation Update on the Sandy Cay Iguana

Buckner, Sandra D.*[1], William K. Hayes[2], John B. Iverson[3], Jill M. Jollay[4], Phillip S. Weech[5], Steve Smith[1], Pat Hayes[6], Sheila Iverson[7], and James Traverse[8]

[1]Bahamas National Trust, Nassau, The Bahamas; [2]Loma Linda University, Loma Linda, California, USA; [3]Earlham College, Richmond, Indiana, USA; [4]Tucson, Arizona, USA; [5]Bahamas Environment Science & Technology Commission, Nassau, The Bahamas; [6]Loma Linda, California, USA; [7]Richmond, Indiana, USA; [8]Ardastra Gardens Zoo & Conservation Centre, Nassau, The Bahamas

Cyclura rileyi is one of three species of Rock Iguana endemic to the Bahamas archipelago. All species of *Cyclura* in The Bahamas are protected under the Wild Animals Protection Act 1968 and the Wildlife Conservation and Trade Act 2004, and are listed on the IUCN Red List of Threatened Species as Endangered or Critically Endangered and are CITES Appendix I.

On 3 February 2014, 13 Rock Iguanas (*Cyclura rileyi* sp.*)* were discovered at London Heathrow Airport by officers of the United Kingdom Border Force smuggled in the luggage of two Romanian women arriving from The Bahamas on a British Airways flight. Twelve of the Rock Iguanas were alive and one was dead.

First reported to be "San Salvador" Rock Iguanas, investigations and the presence of PIT tags confirmed the iguanas were *Cyclura rileyi cristata* from the Exumas. The 12 Rock Iguanas were repatriated on 9 July 2014. Three of the repatriated iguanas died within 24 hours of arrival back in The Bahamas. The surviving nine Rock Iguanas were quarantined, and then on 13 September 2014 were released into the wild on a selected cay within a National Park free of an existing iguana population and approximately 20 km from the source cay in the Exumas. On 24-26 March 2015, with the permission and support of the Bahamas Government (Bahamas Environment Science and Technology Commission) and the Bahamas National Trust, 27 *Cyclura rileyi cristata* were selected from the source cay and released on to the cay that was now home to the repatriated Rock Iguanas. This translocation brought the number of Rock Iguanas in that

sub-population to 36, thus establishing a second sub-population of this subspecies previously restricted to one unprotected cay. Monitoring of and research into these two sub-populations of *Cyclura rileyi cristata* will be ongoing.

Population Viability of the Roatán Spiny-tailed Iguana (*Ctenosaura oedirhina*)

Campbell, Ashley B.*[1], Stesha A. Pasachnik[2], and Terry L. Maple[3]

[1]Florida Atlantic University, Boca Raton, Florida, USA; [2]San Diego Zoo Institute for Conservation Research, Escondido, California, USA
[3]Wilkes Honors College, Florida Atlantic University, Jupiter, Florida, USA

The Roatán Spiny-tailed Iguana is an endangered, endemic lizard found only on one 156 km^2 island and its surrounding islets. This species is heavily hunted for consumption and the pet trade. Even though it is a habitat generalist and omnivore, it is restricted to less than 1% of its historic range by hunting pressure. Among these other threats, evolving on and being geographically limited to an island makes a species more susceptible to stochastic events, such as disease or severe weather, and anthropogenic threats like introduced exotic and domestic animals. There are five high-density populations that are isolated genetically and geographically across the island. Over the past four years of the study, population density has fluctuated, but in general has shown a downward trend. The density directly relates to the total population, which has been decreasing ~10.5% each year. Data on population size and structure, reproduction, habitat usage, and genetics was collected and obtained from collaborators to conduct a population viability analysis. This analysis estimates the persistence of the wild population and can elucidate the effect of known and perceived threats. An analysis of the data indicates a continued decline in the wild population is likely unless major management changes take place. This decline could easily result in extirpation of the smaller, less productive populations, or at worst extinction of this species in the wild within the next decade. Recommendations for conserving the species include ceasing illegal hunting, enforcing wildlife laws, and investigating the possibility of a captive breeding program.

An Update on the Status of Utila's Spiny-tailed Iguanas (*Ctenosaura bakeri*) with a New Approach to Protect this Species, and Introduction to Kanahau Research Station

Clayson, Steven*[1] and Andrea Martinez[1]

[1]Kanahau Utila Research and Conservation Facility, Utila, Honduras

Though *Ctenosaura bakeri* was once the focus of much attention both locally and internationally (e.g., Pasachnik et al. 2012 and the Utila Iguana Research and Breeding Station) there has been a recent decrease in these efforts. All the while the environmental pressures facing this species have increased noticeably. This presentation will update the group on the species, highlighting the many challenges facing this species and its habitat, and calling attention to the severity of the situation and what my organization is doing to combat this. Kanahau is a new privately

funded research station that was started in direct response to the founder's experience working for the Iguana Research and Breeding Station and with other local NGOs. We at Kanahau plan to continue and expand on the work of Pasachnik et al. to assess the current population status of the species and examine reproductive behavior in collaboration with outside researchers. Kanahau also plans to purchase our first tract of land and create Utila's first guarded private nature reserve within the next year. By doing so we hope to raise awareness both locally and internationally of the growing need to protect not only *C. bakeri* but the flora and fauna that make up its ecosystem. Given the political situation in Honduras, and on Utila specifically, we feel that land purchasing is the only way to ensure the survival of this Critically Endangered species.

Growing in a Crowded Neighborhood: Competition's Role in the Expression of Inbreeding Depression in *Cyclura carinata*

Colosimo, Giuliano[*1], Glenn Gerber[2], and Mark Welch[1]
[1]Mississippi State University, Mississippi State, Mississippi, USA; [2]San Diego Zoo Institute for Conservation Research, Escondido, California, USA

The study of ecological and genetic dynamics in wild populations is of primary importance in taxa threatened with extinction. Given their isolation, and the presence of multiple populations with different demographic histories, iguanas in the genus *Cyclura* offer fertile ground for testing specific evolutionary hypotheses. A recent study showed that heterozygosity increases significantly with age class, indicating strong intensity of selection (50%-63%) associated with inbreeding depression in a small population of *C. carinata* on Little Water Cay (LWC) in the Turks and Caicos Islands. More heterozygous adults were also significantly larger, suggesting enhanced social dominance and higher fecundity. Because of the population's high density, we hypothesized that inbreeding depression on LWC is density dependent, resulting from competition. To test this hypothesis we compared the individual growth rate on LWC with that observed in two populations recently established by translocation of iguanas from LWC. Our analyses suggest that hatchlings in the translocated populations grew up to three times faster, supporting the hypothesis that resource availability limits growth rate on LWC. Completing an analysis of heterozygosity fitness correlations in the translocated populations will allow the proportions of inbreeding depression that are density dependent and density independent to be quantified.

Conservation Assessment of the Critically Endangered Oaxacan Spiny-tailed Iguana (*Ctenosaura oaxacana*)

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

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

Ctenosaura oaxacana, Oaxacan Spiny-tailed Iguana, is Critically Endangered and endemic to coastal Oaxaca, México. This species was only recently described (Kohler and Hasbún 2001) and remains understudied. *Ctenosaura oaxacana* is critically endangered due to fragmentation of populations, habitat modification and loss, feral animals, and harvesting by humans for food and the pet trade. Utilizing mark-recapture transects, radio-telemetry, and random searches we have gained useful natural history, demography, range, and threat information regarding *C. oaxacana*. The data is being analyzed to understand the spatial requirements and distribution of *C. oaxacana.* We have extended the known range of the species and are preparing to make revised estimates of the number of individuals remaining. The results of this study are being utilized to construct a species-specific management plan with landowners and stakeholders from within the range of *C. oaxacana* and to update the IUCN Red List Assessment of the species. Conservation and in-country educational outreach have been and continue to be implemented and emphasized by the project.

Latest Updates of the Major Ongoing Studies of *Iguana delicatissima* in the French Territories Guadeloupe and Martinique. Perspectives for Next Year in the Context of the end of the French National Action Plan

Curot-Lodéon, Elisa*[1]

[1]French National Hunting and Wildlife Agency (ONCFS)

In 2015, three major types of field studies were conducted on *delicatissima*. 1) The population surveys on Chancel Islet (Martinique), la Désirade, and Petite Terre (Guadeloupe) were realized as in previous years (capture-recapture method) and the morphometric and genetic data cumulated over the five past years is currently analyzed. 2) We surveyed the area of North Martinique for the presence of *delicatissima* and attempted to capture and measure as many iguanas as possible. Previously unstudied, this area has a dense humid forest with tall trees from which the iguanas rarely come down. Over three sessions of three days each, we obtained a few blood samples and mapped the nesting areas we found. From our observations, we did not see morphological evidence of hybridization with Green Iguana. We intend to confirm this with genetic analysis, as well as conduct further studies. 3) A juvenile radiotracking study began in September in La Désirade and Chancel Islet, and the first results will be presented. The French National Action Plan for *I. delicatissima*, that has been funding actions since 2010, is ending by December 2015. Prospectives for future years will be discussed.

Genetic Population Structure and Origin of the Invasive Green Iguana (*Iguana iguana*) in Puerto Rico

De Jesús-Villanueva, Christina*[1], Cristina Rivera[1], Xímena Vélez-Zuazo[2], Wilfredo Falcón[3], Riccardo Papa[1], and Catherine Stephen[4].

[1]Universidad de Puerto Rico, Río Piedras, San Juan, Puerto Rico; [2]Smithsonian Conservation Biology Institute, National Zoological Park, Lima, Perú; [3]University of Zurich, Switzerland; [4]Utah Valley University, Orem, Utah, USA

Invasive species are widely viewed by biologists as a major threat to biodiversity across the globe. One such invasive, the Green Iguana (*Iguana iguana*), has extended far beyond its native range of Central and South America, into Florida, and islands of the Pacific and Caribbean. On the island of Puerto Rico, the Green Iguana has been reported for over thirty years and has become a widespread nuisance due to economic loss in agriculture and degradation of road infrastructure. Although their presence is conspicuous, little is known about their genetic population structure or origin. In this study, we determine the level of genetic diversity of *I. iguana* across the island as well as their geographical origin. To do so, we sampled individuals from 10 localities representing separate geographic regions and distinct habitat types. To test for population structure, we investigated how genetic diversity is partitioned among and between Puerto Rican populations of *I. iguana* using DNA sequence data from three loci and allelic data at 10 microsatellite makers. To determine the origin of Puerto Rico's invasive populations, we compared previously published, native range haplotype data with recovered haplotypes from Puerto Rico using phylogenetic inference. Preliminary mitochondrial and nuclear marker data shows multiple haplotypes dispersed throughout the island suggesting multiple introduction events and highly diverse populations. Additionally, parsimony inference using these markers suggests Puerto Rican iguanas share more recent common ancestry with El Salvadoran and Colombian iguana populations - the two countries that export vast quantities of iguanas into the pet trade. Moreover, preliminary microsatellite data provides further support of multiple introduction events with separate geographic regions sharing the same genetic cluster. We expect to successfully determine the level of genetic diversity and gene flow, and provide information for effective management practices.

A Camera Trap Approach to Understand Invasive Species Impacts and Behavioral Patterns during the Nesting Season of the Mona Island Iguana

Figuerola, Cielo*[1], Jan P. Zegarra[2], and Miguel A. García[3,4]

[1]University of Puerto Rico, Río Piedras, San Juan, Puerto Rico; [2]US Fish and Wildlife Service, Boquerón, Puerto Rico; [3]Department of Natural and Environmental Resources of Puerto Rico, Río Piedras, Puerto Rico; [4]Center for Applied Tropical Ecology and Conservation, University of Puerto Rico, Río Piedras, Puerto Rico

The Mona Island Iguana (*Cyclura stejnegeri*) is endemic to Mona Island, a 55 km^2 dry forest plateau between Puerto Rico and Hispaniola. This iguana species is being threatened by invasive

mammals introduced on the island. Feral pigs and cats destroy their nests and predate their hatchlings, respectively, lowering recruitment rates in the population. In order to address these negative pressures, several conservation efforts have been conducted, with monitoring of the main nesting sites on the island being one of the most important. One method to achieve constant monitoring of areas in remote and difficult to access locations is through the use of camera traps. Camera traps are increasingly being used to study wildlife behavior and site disturbance impacts (Rovera et al. 2013). In 2015, as a pioneer initiative, we located 14 camera traps in major nesting areas on Mona, with three main objectives: 1) to record predation and disturbance impacts to nests and nesting areas from invasive species, 2) to record all stages and aspects of the nest construction process, and 3) to record behavioral interactions between individuals during the nesting season. In preliminary results, we video-recorded several nest predation events from pigs and indirect trampling impacts from goats. In addition, we recorded iguanas actively nesting during the night (i.e., 11 pm and 2 am), a first record for this species on Mona. These efforts support the need to implement an eradication program on site to ensure the protection and survival of the species in the long term as we continue to understand its behavior on Mona Island.

Biogeography and Conservation Systematics of Pacific Iguanas (*Brachylophus* sp.)

Fisher, Robert[1], Jone Niukula[2], Heidi Davis[3], and Peter Harlow[4]

[1]US Geological Survey, San Diego, California, USA; [2]The National Trust of Fiji, Suva, Fiji; [3]San Diego Zoo Institute for Conservation Research, San Diego, California, USA;
[4]Taronga Conservation Society Australia, NSW, Australia

Pacific Iguanas (genus *Brachylophus*) are an enigmatic element of Fijian and Tongan biodiversity and have a long history in the region. At least two species have become extinct, and now iguanas are rare or absent from many islands. There are three living species in the genus as currently described. Over the last decade we have surveyed for iguana populations on many of the islands in Fiji and collected genetic and morphological samples from many of these relict populations. Analysis of these data indicate that there is a much greater diversity of iguanas still extant in Fiji. Many of these are apparently now single island endemics, probably due to extirpations of nearby populations, and most or all would be considered critically endangered. Overall, these data support that there was a much greater distribution and species diversity in the genus in the recent past and continued investigation of unsampled islands is a critical priority. This information is vitally important to setting conservation goals and strategies, as the conservation focus from 1980–2015 was primarily on Fijian Crested Iguanas, whereas assumptions about “banded” iguanas was that their extinction risks were relatively low. Description of this new diversity is currently underway, but risks to this diversity remain great.

Monitoring, Modeling, and Management: Controlling Green Iguana Overabundance

Haakonsson*[1], Jane Ebert[1], Jessica Harvey[1], and Frank F. Rivera-Milán[2]

[1]Department of Environment, Grand Cayman, Cayman Islands; [2]United States Fish and Wildlife Service, Division of Migratory Bird Management, Laurel, Maryland, USA.

Green Iguana (*Iguana iguana*) overabundance is a rising concern to resource managers throughout the Caribbean. Overabundance of this highly invasive species can have significant adverse economic and environmental effects such as damage to buildings, crops, and gardens, pose increasing health and safety hazards (e.g., zoonotic diseases), as well as risks to species of conservation concern through competition, depredation, and defoliation of native vegetation. In this presentation, we provide information about Green Iguana surveys conducted on Grand Cayman in August 2014 and 2015. Estimates of abundance (density and population size) and population rate of change ($R_t = N_{t+1}/N_t$) of adult and subadult iguanas were obtained using distance sampling and repeated counts at 165−212 points across the island, accounting for detection probability (detectability and availability components). With the abundance estimates derived from these surveys, we conducted a model-based assessment of population response to sustained removal effort. Although the Green Iguana is exposed to human-induced mortality (e.g., hunting at private property, depredation by feral cats and dogs, and road kills), the population is increasing at an annual rate of 59.8% (95% CI = 27.1% to 101.8%), and abundance is predicted to be 300,061 subadult and adult Green Iguanas (95% CI = 156,315 to be 448,462) in August 2016. We used harvest theory and decision analysis to integrate monitoring and modeling, and inform Green Iguana control management.

Conservation Status and Priority Actions Needed for the Fijian Iguanas (*Brachylophus* sp.)

Harlow, Peter*[1], Jone Niukula[2], and Robert Fisher[3]

[1]Taronga Conservation Society Australia, NSW, Australia; [2]The National Trust of Fiji, Suva, Fiji; [3]US Geological Survey, San Diego, California, USA

The three described species of extant Pacific iguanas (genus *Brachylophus*) are unevenly scattered across the 300 islands of Fiji. Over the past decade we have surveyed over 80 islands for presence / absence, plus we have recent reliable reports for additional islands. Our estimate is that iguanas survive on perhaps eight uninhabited and 28 inhabited islands today, but with the exception of three islands, all populations are declining. Our total population estimates for many islands are less than 100 individuals. National parks are few in Fiji, and almost all iguana populations survive on communally owned land which is mostly outside the control of central government legislation. Future Pacific Iguana conservation efforts have to be aimed at ways to: 1) maintain the current forest cover on these islands, and 2) stop the introduction of exotic predators, including cats but especially the mongoose which is slowly spreading across the Fijian archipelago. On most inhabited and many uninhabited islands, fires and clearing continue to turn forests into grasslands, and we know that iguana populations cannot survive the

introduction of mongoose. All inhabited islands have cats, and although iguanas appear to survive with feral cats on larger islands, they are soon eradicated by cats on small islands.

Social Media, the International Iguana Foundation, and the ISG – Help Us Help You!

Hedrick, David

International Iguana Foundation and Chattanooga Zoo, Chattanooga, Tennessee, USA

The past year has seen a large increase in the number of people reached by the "Iguana Conservation Message" via the International Iguana Foundation. Operating primarily on the social media platforms of Facebook, Twitter, and Instagram, we currently get content in front of over 20,000 people per week. This exposes people with a passion for reptiles and conservation, to the real work being done with iguanas. Additionally it shows them how they can contribute to these efforts. Providing engaging content depends upon beginning with plentiful raw material, stories, photographs, and videos. Range country engagement can be grown with information on local businesses, NGOs, and focused posts, crafted for those audiences. Working together, the IUCN SSC Iguana Specialist Group and the International Iguana Foundation can produce a wealth of material to share on social media, grow our audience and supporters, educate enthusiasts and in-range stakeholders, and ultimately, secure greater funding with which to support more research and conservation efforts.

Control Tactics Developed Against the Argentine Cactus Moth, *Cactoblastis cactorum*, a Threat to North American Native Prickly Pear Cactus, *Opuntia* spp.

Hight, Stephen D.*[1], James E. Carpenter[2], and Angela S. Galette[1]

[1]USDA-ARS, Center for Medical, Agricultural, and Veterinary Entomology, Tallahassee, Florida, USA; [2]USDA-ARS, Crop Protection Management Research Unit, Tifton, Georgia, USA

The Argentine Cactus Moth, *Cactoblastis cactorum*, is celebrated as a classical biological control agent of non-native prickly pear cactus, *Opuntia* spp. However, after the intentional introduction of this moth to a Caribbean island in the 1950s, *C. cactorum* eventually made its way to Florida and now represents an economical and ecological threat to native prickly pears in USA and Mexico. A variety of tools and tactics were developed to study and control *C. cactorum*. A survey tool based on the female sex pheromone was developed to identify moth presence. To address the advancement of *C. cactorum*, control tactics including the Sterile Insect Technique (SIT) were developed, validated, and implemented. In support of the SIT, studies were conducted on mass rearing, radiation biology, overflooding ratios, transport-cold storage-release techniques, and host plant sanitation efforts. Implementation of the SIT and sanitation efforts reduced the pest's westward USA advance and eradicated the moth from Mexico and several barrier islands along the USA coast. Unfortunately, funding levels were inadequate to sustain the area-wide program to stop the moth's spread and the focus shifted to the development of more sustainable management options that would minimize long term impacts of the moth on

native desert ecosystems and commercial cactus production areas. The primary tactics currently under development are biological control and the disruption of pheromone communication systems. A potentially host-specific parasitoid was identified in Argentina and imported into a USA quarantine. Initial field host range studies on cactophagous Lepidoptera in Argentina and quarantine trials on non-target species promise to confirm the host-specificity of this parasitoid. Pheromone-based mating disruption, deploying synthetic sex pheromone at a rate sufficient to interfere with mate-finding and mating behavior, has been an effective management tactic used against several lepidopteran pests. Initial mating disruption trials look promising for protecting cactus in plantation settings.

Long-term Studies of the Allen Cays Iguana (*Cyclura cychlura inornata*) in the Exuma Islands

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The Allen Cays Iguana (IUCN Red Listed as Endangered) has been under study in The Bahamas since 1980. We have now marked over 1,945 individuals and made over 5,650 recaptures of them on the two islands with natural populations (Leaf and U Cays), and another 160 individuals on seven other islands (with waif or translocated populations). In addition to quantifying natural history (including reproductive) parameters, over the last 35 years we have documented: 1) a transition from male-dominated to female-dominated sex ratios on Leaf and U Cays; 2) population increases to carrying capacity on Leaf and U Cays (from a total population of ca. 300 in the early 1980s to over 1500 today); 3) significant genetic divergence between Leaf and U Cay iguanas (now eroding due to unauthorized introductions); 4) significant effects of supplemental feeding by tourists on behavior, growth, body size, parasite loads, and blood chemistry; 5) a decrease in maximum body size (particularly in males) due at least in part to removals by humans; and 6) the probable basis of iguana gigantism on Allen Cay (allochthonous nitrogen supplementation of the terrestrial food chain by shearwaters). Future work will focus on: 1) finishing our study on the effects of density on life history traits (with Kirsten Hines); 2) further monitoring of the effects of supplemental feeding of these iguanas by people (with Susannah French and Chuck Knapp); and 3) the morphological and genetic distinctions between *C. cychlura inornata* and *C. cychlura figginsi* (with Chuck Knapp and Mark Welch).

A Species Survival Plan Program for Fijian Banded Iguana (*Brachylophus bulabula*), a Case Study for Conservation of Fijian Iguanas Through Collaboration, Building of Relationships, and Investing in Conservation Initiatives

[1]Lovich, Kim and [2]Kira Mileham

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The San Diego Zoo has maintained Fijian Iguanas in captivity since 1976. These animals are maintained in a program referred to as a Species Survival Program (SSP) where breeding

recommendations are made based on best available genetic information and intended to support long term sustainability of captive populations. Here we will discuss how San Diego Zoo Global has recently begun supporting various conservation initiatives for Fijian Iguanas within Fiji as an expansion of this SSP Program, and how we are growing our partnership with the IUCN SSC Iguana Specialist Group to help increase awareness and positively impact iguana conservation worldwide. The SSP is now focusing on fundraising for *Brachylophus* species through the newly established Fijian Iguana Conservation Fund managed at the San Diego Zoo. We will provide an overview of a few of the ways we have been fundraising and collaboratively working with other organizations both locally, within Fiji, and globally, and discuss ways we hope to expand the connections between the international zoo community and these local level conservation efforts.

Field Update on Sister Isles Rock Iguana (*Cyclura nubila caymanensis*) Nesting Ecology Project on Little Cayman

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The summer of 2015 represented the first phase of a multi-year project on the population dynamics and habitat use of the Sister Isles Rock Iguana (SIRI), a Critically Endangered taxon occurring exclusively on Little Cayman and Cayman Brac. Of critical importance to future conservation planning for SIRI is an understanding of its reproductive behavior, habitat usage, and nesting ecology. Our goal in this first season was to gain a better understanding of nesting ecology. Hence, between May and June 2015 special attention was placed on locating nests on Little Cayman's west end and collecting data and blood samples from females following nesting. In addition to nesting females, many more adults (137 total) were captured and tagged for long-term identification. Eight nest sites were visited on daily surveys (including Preston Bay, the largest known communal site on the island) and a total of 78 nests were identified. Thirty of these nests were excavated, and 10 egg chambers were successfully located. A return trip (currently underway) will follow up on these survey efforts by evaluating hatching success at marked nests and tagging hatchlings for long-term data on growth and dispersal. This study builds upon research conducted by the Durrell Wildlife Conservation Trust from 2007-10, during which island-wide nest surveys were conducted to identify critical sites for protection. New data generated is expected to reveal such species-specific properties as timing of egg deposition, nest tunnel dimensions, guarding behaviors, average clutch and egg size in relation to maternal size, length of incubation, and hatching success rates. Blood samples from all animals captured are also being maintained in an effort to investigate population genetic structure and inbreeding depression, which will supplement ecological insights into the status of the population. With these combined data, new recommendations can be put forward to protect critical nesting habitat and eliminate threats to recruitment.

Spatial Ecology of Captive Released Blue Iguanas (*Cyclura lewisi*) in Occupied Habitats

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Just over a decade ago, the Blue Iguana (*Cyclura lewisi*) was reputed to be the most endangered lizard in the world. Captive breeding, head-starting, and reintroduction efforts have brought *C. lewisi* back from the brink. The first reintroduction effort occurred in 2004, when 23 individuals were released into the 260 hectare Salina Reserve. The 23 iguanas were radio-tracked for several months, and telemetry data were used to evaluate seasonal home range, retreat fidelity, and daily displacement. All 23 individuals remained near their original release locations and exhibited high retreat-site fidelity. Average seasonal home range was approximately 513 ± 329 m^2 for females and 484 ± 409 for males ($F = 0.027$; $p = 0.871$). Activity peaked between 12:00 and 14:00 with individuals an average of 2.2 m from their active retreats. Between 2004 and 2014, an additional 450 iguanas were repatriated to the Salina, but given the limited size of the reserve, eventually it was no longer possible to release in unoccupied areas. A follow-up study in 2014 utilized 10 individuals released in the same locations as the original 23 animals. Individuals released in 2014 exhibited average daily movements over 10 times greater than those in 2004. They displayed low site fidelity, and a tendency toward unidirectional movements away from release locations. Space use averaged 6,167 ± 1,360 m^2 for females and 7,720 ± 2,506 m^2 for males ($F = 0.148$; $p = 0.710$), but trajectory analyses indicated that within the duration of the study, the individuals had not established home ranges and were still dispersing away from the core release area. As development increases in the surrounding matrix, understanding what is happening to both the established population and the newly released individuals is imperative to determining if release efforts are still efficacious within the spatial scale of existing protected areas.

Status of the Stout Iguana (*Cyclura pinguis*) on Guana Island, British Virgin Islands

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The Stout Iguana (*Cyclura pinguis*) is one of nine species of West Indian Iguana that collectively are recognized as the single most endangered group of lizards in the world. Fossil records indicate that the species was once found throughout the Greater Puerto Rican Bank, but currently survives exclusively in the British Virgin Islands, with the only remaining natural population occurring on Anegada. Between 1984 and 1986, eight adult *C. pinguis* were translocated from Anegada to Guana to found a conservation insurance population on an island with fewer introduced mammalian species and significantly lower development pressure. Despite concerns that *C. pinguis* would not thrive in such disparate habitat, the species was successfully established, and offspring have been observed every year since 1987. Between

2003 and 2014, a long-term marking and monitoring study was conducted to document the expansion of the Guana population. In 2014, we captured 169 individuals and recorded over 800 sight and resight records of both marked and unmarked individuals within the core research area. An additional 154 iguana sightings were recorded during distance sampling protocols conducted in the outlying portions of the island. Based on these findings, abundance estimates for the Guana *C. pinguis* population continue to increase island-wide, although density remains low in areas with high feral sheep abundance. Current efforts to cull feral sheep may have dramatic impacts on the iguana population. The adult *C. pinguis* sex ratio is near 1:1, and the population age structure is healthy, with ample representation in all age classes. As conservation concerns within the British Virgin Islands continue to increase, insurance populations, such as the one on Guana, may play a critical role in the long-term conservation of the species.

Social Network Structure in the Spiny-tailed Iguana, *Ctenosaura similis*: Preliminary Results and Next Steps: the Encounternet System

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Understanding social organization in non-cooperative animals is crucial for questions in behavioral ecology. Association with conspecifics may be based on characteristics including sex, personality, refugia location, and genetic relatedness. Cohorts may influence mate choice, foraging, predator avoidance, and disease transmission. I evaluate the effect of genetic relatedness and personality on the social structure of a group of Spiny-tailed Iguanas, *Ctenosaura similis*, at Palo Verde National Park, Costa Rica. Lizard physical proximity interactions were recorded via focal sampling to construct the social network structure of this group of animals. Network matrices were constructed of pairwise relatedness between iguanas. I use multiple regression quadratic assignment procedures (MRQAP) to model the influence of genetic relatedness on the structure of association networks. Analyses show no effect of kinship on organization patterns, which, while not uncommon in reptiles, is inconsistent with many socio-ecological models. I use Exponential Random Graph modeling (ERG) to examine how the social structure changes from breeding to nonbreeding seasons and what network features drive the alterations (reciprocity, transitivity, homophily, etc.). Strong ERG models produce networks isomorphically similar to the observed network using few parameters. Weak ERG models bear little semblance to the observed network. Behavioral syndromes in *Ctenosaura similis* were determined running field assays of personality (flight initiation distance, novel object, and open-field testing). I present preliminary results from these assays. I also outline how the Encounternet wireless system will be used to gather future network data for these studies. This is the first large-scale study to look at behavioral type and social network structure in an egg laying, neotropical lizard. Because other *Ctenosaura* species are listed on the IUCN Red List as Near Threatened to Critically Endangered, information gathered about this “proxy species” can provide a model for understanding what characteristics may support a self-perpetuating population of endangered iguanas.

Conservation of Fijian Crested Iguanas (*Brachylophus vitiensis*) on Monuriki Island

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We report on the short term success of the release of captive bred Fijian Crested Iguanas translocated to Monuriki Island during 2015. This action is consistent with the 2008 Crested Iguana Recovery Plan developed as an outcome of the 2004 IUCN SSC ISG meeting in Suva, Fiji. To accomplish this, a total of 10 pairs of wild adults were collected on Monuriki Island and taken to specially built enclosures at Kula Eco Park for captive breeding, and within a period of five years their offspring were ready to release. During this time, the island invasive mammal species (goats and rodents) were removed in a major eradication program. These events were only achieved following the unexpected approval and support from the landowners and local community, who have turned down conservation work proposed on this island over the past 20 years. As surviving island populations of Fijian Iguanas are continuously being identified, this conservation example could well be replicated as a model of conservation management across the Fiji Archipelago. The overall project was a major collaboration between zoological institutions, government agencies, action oriented NGOs, local governments, and the local communities, and serves as an exceptional example of community based conservation.

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

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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 highly threatened by habitat destruction, invasive species, harvesting, and trade. *Ctenosaura ricordii* is considered Critically Endangered by the IUCN. *Cyclura cornuta* is considered Vulnerable. In order to define the environmental factors that define the iguanas' distributions we evaluated various nest characteristics and hatchling dispersal, in sympatric and allopatric sites. We also assessed the diet of the species across our study sites. Our preliminary results elucidate important differences between the species and sites. In order to address the vast amount of trade in *C. cornuta* within the DR, we held our second annual iguanarios workshop bringing all the invested

parties together, along with experts in the field, and created a working group in order to address these issues. These data are vital in constructing proper management plans for both of these species throughout their respective ranges in both captive and natural settings.

Influences on Hematology, Plasma Biochemistry, and Plasma Protein Electrophoresis in Grand Cayman Iguanas (*Cyclura lewisi*)

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Annual health assessments have been conducted on Grand Cayman Blue Iguanas (*Cyclura lewisi*) since 2001 in conjunction with the very successful Blue Iguana Recovery Program. During these health assessments, blood was collected for hematology, plasma biochemistry, and plasma banking from a total of 915 cases including juveniles and adults at the captive breeding facility and free-ranging adults. Plasma protein electrophoresis was performed on banked plasma from a subset of iguanas (n = 122). Data from iguanas deemed healthy were analyzed using Kolmogorov-Smirnoff 2-sample and Mann-Whitney U tests to determine effects of the following variables on hematology, plasma biochemistry, and plasma protein electrophoresis parameters: age class (juveniles vs. adults), sex, location (captive vs. free-roaming), season (summer vs. winter), and year. Juveniles were defined as iguanas with snout-vent length (SVL) < 30cm while adults have SVL ≥ 30cm. Statistical significance was set at $p < 0.05$. Most blood parameters were significantly different between juveniles and adults. Few significant differences occurred between juvenile males and females, but several occurred between adult males and females including higher albumin, triglycerides, and bile acids in females compared to higher muscle enzymes in males. Winter samples were higher in beta globulins and heterophils, but lower in lymphocytes, monocytes, and bile acids compared to summer samples. Free-roaming adults exhibited lower potassium and heterophils as well as higher lymphocytes, monocytes, and basophils compared to captive adults. Sufficient data was only available in juveniles for two independent parameters (total solids and white blood cell count) to compare across years, and while some significant differences were seen between years, no long-term trend was evident. This information will be used to create reference intervals to assist in evaluating the health status of Grand Cayman Blue Iguanas in the future and may serve as a basis from which reference intervals are generated in other *Cyclura* species.

Eight Years of Managing an Invasive Iguana, *Iguana iguana*, at Cabezas de San Juan Nature Reserve Fajardo, Puerto Rico

Rodríguez–Gómez, Carlos Andrés

Para la Naturaleza, Inc., a Unit of the Puerto Rico Conservation Trust

Green Iguanas (*Iguana iguana*), are an invasive reptile introduced to Puerto Rico in the 1970s through the pet trade. *I. iguana* has reached high population densities throughout Puerto Rico's lowlands (< 500 m asl). Its success is due to high hatching success, predator release, abundance of food, and lack of competition. At Cabezas de San Juan Nature Reserve (CSJNR) iguanas have caused severe infrastructural damage to the road, native tree nursery, home garden, and the lighthouse premises. As a consequence ,the Green Iguana Control Project (GICP) was initiated in 2007. The goals of the GICP are to: 1) mitigate *I. iguana* population densities by harvesting eggs at nesting sites before the hatching season; 2) monitor population densities; 3) involve local communities through volunteer work; and 4) explore new alternatives to mitigate the effects of *I. iguana*. A total of 1,018 eggs were harvested during the first nesting season in 2008. In 2015, a total of 3,468 eggs were harvested, and in eight years a grand total of 13,957 eggs have been harvested. Population densities have decreased from a maximum of 120 individuals/ha in 2007 to a maximum of 91 individuals/ha on January 2015. Since 2013 we have involved volunteers from the community in the GICP with: 1) 87 volunteers, 337 volunteer hours, in 15 activities for 2013; 2) 337 volunteers, 1,365 volunteer hours, in 42 activities for 2014; and 4) 356 volunteers, 1,526 volunteer hours, in 46 activities until September 2015. This year (2015) we initiated a new facet of the project, which involves planting native shade trees to reduce *I. iguana* nest sites. Thus far we have planted 68 trees in eight nest sites. This project is a good example of long-term management of an invasive species while involving local communities.

Investigating the Genetics of *Iguana delicatissima* on St. Eustatius

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The Lesser Antillean Iguana (*Iguana delicatissima*) is a species endemic to the Lesser Antilles that is currently threatened by habitat loss, introduction of predators, and hybridization with the Green Iguana (*Iguana iguana*). As a seed disperser of the region's native flora, the Lesser Antillean Iguana's role in the ecosystem could be crucial. St. Eustatius is one of three islands with a potentially genetically pure population. Unfortunately, the population on St. Eustatius has decreased dramatically, and research is needed to develop future conservation strategies. This study uses molecular genetic techniques to estimate effective population size, genetic variability and structure, degree of inbreeding, and frequency of hybridization. These variables will be quantified using both nuclear microsatellite and mitochondrial sequence data. Estimated parameter values generated by this study will be used by local authorities to inform the

necessary conservation management decisions that should maximize the long-term persistence of *I. delicatissima* on St. Eustatius. For example, estimates of effective population size will determine whether or not headstarting is an appropriate strategy for short-term population management.

International Trade in *Cyclura* Iguanas: An Overview

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The Convention on International Trade in Endangered Species of Fauna and Flora (CITES) has regulated trade in *Cyclura* iguanas since 1977. Other true iguanas protected by CITES include: *Iguana iguana*, Fiji and Galapagos iguanas, and four spiny-tailed iguanas, *Ctenosaura bakeri, C. melanosterna, C. oedirhina*, and *C. palearis*). All *Cyclura* species were originally listed on Appendix II of the Convention, but in 1981 they were "uplisted" to Appendix I. Appendix I of the Convention restricts commercial trade in live animals, as well as parts, products, and derivatives, although trade in scientific and zoological specimens can be permitted. Most *Cyclura* species are also protected by the U.S. Endangered Species Act (excluding *C. cornuta, C. rileyi*, and the feral population of *C. nubila* on Puerto Rico). Additionally, almost all *Cyclura* range states protect their native species from harvest, commercialization, and international trade, although the protected status of terrestrial wildlife, including *C. carinata,* in the Turks and Caicos is unclear. The composition of the declared trade in *Cyclura* since 1977 will be discussed, as well as the ongoing, but sporadic, illegal pet trade in live animals. ISG meeting participants will be encouraged to participate in an open discussion of the illegal trade at the meeting, including its conservation impacts.

The Potential Genetic Value of Captive *Cyclura collei* to Population Maintenance in the Hellshire Hills

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Captive populations typically are not considered during conservation management planning. For many species, captive animals are naïve to their native environments, or worse, these populations may have adapted to captivity. Reintroduction of captive stock in these instances is unlikely to be successful. Further, captive populations are rarely large enough to significantly increase numbers in the wild especially when the probability of establishment is low. Some iguana species in the genus *Cyclura* represent rare cases where captive populations may have real conservation value. Headstart programs for four distinct species in the genus demonstrate

that captive reared animals can establish in the wild. Further, census sizes likely dropped below 50 animals prior to the release of headstarted animals for the only known populations of *Cyclura collei* and *Cyclura lewisi*. This suggests that even a few captive animals may carry a significant portion of these species' remaining genetic heritage. Here, we evaluate the relative likelihood of captive *Cyclura collei* individuals producing outcrossed progeny assuming they were released into the Hellshire Hills population. We also use relatedness indices to identify appropriate matches in the event captive breeding becomes a viable means of propagating this species.

Taxonomic Revision and Conservation Reassessment of Madagascan Iguanas (Opluridae)

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Opluridae are a family of Iguanidae (sensu lato) endemic to Madagascar and Grande Comoro comprising two genera, *Oplurus* and *Chalarodon*, and seven species. The origin of iguanas on Madagascar remains a biogeographic mystery, as extant iguanas are primarily found in the New World and the fossil record has yet to provide evidence of their historical distribution in neighboring Africa. One hypothesis predicts their presence on Madagascar to date back at least 100 mya when Madagascar drifted apart from other continental landmasses. Alternatively, oplurids diverged following migration from South America via land bridge connection through Antarctica (~80 mya) or long distance overwater dispersal (< 80 mya). Throughout their long history on Madagascar, oplurids are believed to have inhabited only arid and semi-arid environments and, as the current taxonomy stands, diversified relatively few times compared to other stunning radiations known from this island (e.g., lemurs, chameleons). The current taxonomy, though, is in need of revision. Recent molecular analyses have indicated high levels of genetic diversity within currently recognized species, suggesting the possibility of cryptic species. At present, all species within Opluridae are classified as Least Concern by the IUCN. However, the potential to uncover distinct lineages is believed to be high, and any description of new species would necessitate conservation reassessment. Furthermore, the arid forests to which oplurids are so well adapted are highly threatened primarily due to conversion for agriculture. Following a phylogenomic analysis, species limits will be defined for this family, after which an in-depth assessment of geography, ecology, and habitat health will likely be necessary in order to advise proper management of this remote iguana lineage.

POSTER PRESENTATION ABSTRACTS

In alphabetical order by submitter's last name

Amblyomma and *Rickettsia*, Covert Hitchhikers on *Cyclura cychlura* Iguanas

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The biogeographic history of the West Indian fauna has provided fertile ground for debate on the relative role of dispersal and vicariance in producing patterns of species distribution. Multi-taxa comparisons can help elucidate the mechanisms contributing to current West Indian biodiversity. Ecto-parasites like ticks are a promising system to investigate alternative biogeographic hypotheses because of their ecological constraints and association to certain hosts. Here we present some evidence based on comparative DNA network analyses that suggest a recent vicariance event is responsible for the current distributions of selected parasites and their hosts in The Bahamas. We contrasted genetic variability and distribution in a host-parasite-superparasite system, *Cyclura cychlura* iguanas, *Amblyomma* spp. ticks, and intracellular parasites, *Rickettsia* spp. We addressed two main questions: can *Cyclura* iguanas and their parasites be used as a valid system to investigate local patterns of multi-species distribution throughout the Caribbean? Is vicariance the main driver of biodiversity patterns in the Bahamian archipelago? We were able to isolate, for the first time, *Rickettsia* parasites from ticks collected on *Cyclura cychlura* iguanas, suggesting that other *Cyclura* iguanas and their tick parasites may function as *Rickettsia* spp. reservoirs, and hence be used in multi-taxa biogeographic investigations. We also show evidence of concordance in patterns of genetic diversity and distribution in the three investigated taxa. Our results, although based on a limited number of molecular markers, indicate that vertical transmission, in accordance with the vicariance hypothesis, is the most parsimonious explanation for the current patterns of distribution in this Bahamian group of taxa.

The Mona Island Iguana: Conservation Efforts to Protect an Endemic Reptile from Invasive Species

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The Mona Island Iguana (*Cyclura stejnegeri*) is endemic to Mona Island, a 55 km^2 plateau between Puerto Rico and Hispaniola. This iguana species is being threatened by invasive mammals introduced on the island. Feral pigs and cats destroy their nests and predate their hatchlings and juveniles, respectively, lowering recruitment rates in the population. In order to

address these negative pressures, several conservation efforts have been conducted to ensure the survival of the species and recovery. To date, these efforts include an invasive mammal control program for goats, pigs, and cats, building a fence to protect coastal nesting sites from feral pigs, a headstart program to improve population age structure and bolster recruitment, nest monitoring activities, and evaluating the feasibility of an invasive mammal eradication program. As a result of these actions, the population structure of *C. stejnegeri* has improved and all age classes are represented. However, full recovery of the species in the long term will require taking the next step to remove invasive mammals from Mona and continuous population monitoring.

Protecting Caribbean Iguanas

Figuerola, Cielo*, Sally Esposito, Wes Jolley, Jose Luis Herrera, and Kirsty Swinnerton

Island Conservation, Santa Cruz, California, USA

Cabritos Island is home to two species of iguana: the Critically Endangered Ricord's Iguana and Vulnerable Rhinoceros Iguana. Invasive species present on the island, including feral cats and burros, threaten iguana populations by eating their young, destroying iguana nests, and damaging critical habitat. The removal of these invasive species will protect the iguana populations from the threat of extinction, particularly the Ricord's Iguana, and provide the opportunity for the island's natural ecosystem to recover. The Dominican Republic's Ministry of Environment and Natural Resources, with support from Island Conservation and SOH Conservation, is leading an international effort to restore Cabritos Island by removing invasive species. To date, significant progress has been made, but complete removal of invasive species is necessary to protect native iguanas and to restore and maintain biodiversity on Cabritos Island. A campaign named "*Where the Real Wild Things Are*" where you can participate is taking place to help protect the Critically Endangered Ricord's Iguana and Vulnerable Rhinoceros Iguana on Cabritos Island, Dominican Republic. This is a web-based crowdsourced fundraising and friend campaign from October 2015 through January 2016 where you can recruit colleagues, friends, or family to support this project. Your contribution will help to safeguard and protect native iguana populations and allow the opportunity for the habitat to recover.

Algunos resultados sobre la morfometría de poblaciones de *Cyclura nubila nubila* en Cuba. Some Results about Morphometry in Populations of *Cyclura nubila nubila* in Cuba

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Sobre la morfometría de poblaciones de la iguana cubana (*Cyclura nubila nubila*) habitando en áreas naturales de Cuba, existen pocos estudios. Perera (1984) caracteriza morfológicamente y

estudia por primera vez las adaptaciones motoras en una población de esta subespecie, lo que brindó un punto de partida para futuras comparaciones con otras poblaciones de iguanas en el país. Otros autores han aportado datos, fundamentalmente de poblaciones de cayos (González et al. 2001; Berovides 2003; Beovides-Casas y Mancina 2006) comparándolos con los de otras poblaciones de iguanas estudiadas de forma aislada en Cuba, así como con otras especies del género. Sólo dos autores Pérez (2005) y Díaz (2007), comparan y diferencian algunas poblaciones desde el punto de vista morofométrico, merístico y proteico, respectivamente. Con el presente trabajo se estudian los valores medios de siete variables morfológicas: Longitud hocico-cloaca (Lh-c), largo de la cola (Lcola), largo y ancho de la cabeza (Lc y Ac), longitud del húmero (Lh) y longitud del fémur (Lf), en ambos sexos en nueve poblaciones de iguanas de ambas costas de Cuba, tanto de cayos como de la isla principal. También se analizan cinco cocientes morfológicos lineales relacionados funcionalmente con la condición física o robustez (Peso/Lh-c), capacidad de reptar (Lcola/Lh-c), de correr (Lf/Lh-c), de correr/reptar (Lh/Lf) y un índice cefálico (Lc/Lh-c) relativo al comportamiento intraespecífico (Perera 1984; Estrada y Silva 1984). Además se analizan tres caracteres merísitcos: escamas supralabiales, subdigitales y poros femorales en algunas poblaciones. Estos análisis permitirán incrementar el conocimiento sobre *C. n. nubila*, complementar estudios anteriores y comprobar si es posible identificar causas de estrés en las poblaciones, lo que contribuirá a promover manejos adecuados sobre las mismas.

Translation by Christina de Jesús Villanueva and Heidi Davis:
Few studies exist on the morphometry of populations of the Cuban Iguana (*Cyclura nubila nubila*) inhabiting natural areas in Cuba. Perera (1984) characterized the morphology and studied motor adaptations for the first time in a population of this subspecies, which set the starting point for future comparison among other iguana populations in the country. Other authors have provided data, fundamentally about the populations on cays (González et al. 2001; Berovides 2003; Beovides-Casas and Mancina 2006), comparing these with other populations studied separately in Cuba and with other species in the genus. Only two authors, Pérez (2005) and Díaz (2007) compare and differentiate some populations with respect to their morphometry, meristics, and proteins respectively. In the following work, we study the values of seven morphological variables: snout-vent-length (SVL), tail length (TL), length and width of the head (LHead and WH), length of the humerus (LH), and femur length (LF) in both sexes in nine populations of iguanas on both coasts of Cuba, its cays and main island. We also analyze five linear morphological coefficients functionally related to physical state and robustness (weight/SVL), capacity to crawl (TL/SVL), to run (LF/SVL), to run/crawl (LH/LF), and a cephalic index (WH/SVL) relative to intraspecific behavior (Perera 1984; Estrada and Silva 1984). Additionally, we analyze three meristic characters: supralabial scales, subdigits, and femoral pores in some populations. These analyses will allow us to increase our knowledge about *C. n. nubila,* add to previous studies, and test whether it is possible to identify the causes of stress in these populations, which will contribute to the promotion of proper management of the species.

A Study of the Reproductive and Dispersal Behavior of the Critically Endangered Utila Spiny-tailed Iguana *Ctenosaura bakeri* on the Island of Utila, Honduras

Maryon, Daisy

University of South Wales, Trefforest, South Glamorgan, Wales, UK

Ctenosaura bakeri is one of three spiny-tailed iguanas which inhabit the island of Utila off the Caribbean coast of Honduras. The species is listed as Critically Endangered and is endemic to Utila, inhabiting just 10km². The population trend is decreasing with the current population estimated at fewer than 5,000 individuals. The species inhabits brackish mangrove forest and nests on sandy beaches; both these habitats are prime real estate for hotel development thus habitat destruction and illegal hunting for meat and the pet trade explain the decreasing population. Within the current population there is a significant bias of males to females; this is thought to be due to gravid females being highly prized for human consumption.

Many aspects of the natural history of *C. bakeri* remain unknown, through this project we plan to collect important life history data. We will investigate and quantify the nesting ecology, reproductive and dispersal behavior, and population size. To gather this information we will record clutch sizes and natural hatchling success rates from nests in the wild, record the sex and take biometric measurements of hatchlings at monitored nests, determine the sex ratio of hatchlings to establish whether the lower number of females recorded in the population is from birth or develops post-hatching. We will capture, tag and radio-track individual iguanas to determine female and male movement across the island, gathering information on home ranges, and migration routes between breeding and nesting habitats. We will opportunistically tag iguanas to recognize individuals and employ a capture-mark-recapture method using line transects to provide an estimate of population size. The breeding season of *Ctenosaura bakeri* occurs from January to March, therefore field work is scheduled from January 2016. It is proposed to radio-collar thirty Iguanas from two differing locations on the island until the end of the hatching season.

Phylogeography of Desert Iguanas (Genus: *Dipsosaurus*)

Packer, Michael[1], Jesse Breinholt[2], Robert Murphy[3], and Catherine Stephen*[1]

[1]Utah Valley University, Orem, Utah, USA; [2]University of Florida, Gainesville, Florida, USA; [3]Royal Ontario Museum, Toronto, Ontario, Canada

Desert iguanas (genus: *Dipsosaurus*) are broadly distributed, across multiple phytogeographic regions of southwestern US, northern Mexico, the Baja California Peninsula, and many gulf islands. This region has a complex geologic history, with evidence of vicariance events impacting multiple, similarly distributed reptiles. As a comparison to these prior studies, DNA sequence data were collected from up to 100 individuals, spanning the range of the genus, at three independent molecular loci. We examine the variation within populations and levels of differentiation between populations (designated by both phytogeographic regions and a prior

genetic clustering). Genetic loci differed in rates of evolution: MLH3 (794bp, 31 haplotypes, 18 segregating sites), NT3 (476bp, 4 haplotypes, 4 segregating sites), ND4 (865bp, 54 haplotypes, 114 segregating sites). Haplotype networks were constructed for each locus to assess the distribution of variation in a phylogeographic context.

Historical barriers to gene flow (caused by marine incursions) and current barriers to gene flow (resulting from elevation and/or habitat constraints) have shaped the current distribution of genetic variation in this genus. Differentiation at the ND4 locus is significantly greater than zero for all pairwise comparisons (ranging from 0.17–0.91), and haplotype clusters in the networks of both ND4 and MLH3 suggest limited gene flow between several regions. Individuals sampled from the South Baja region share no alleles with individuals from any other population. Thus, it is highly differentiated (Fst = 0.61–0.94), warranting further study and possibly elevated conservation status. The South Baja population's distinctiveness from northern populations, with no obvious, current geophysical barriers, is consistent with results seen in multiple other studies of a range of taxa. Lastly, the Isla Catalina samples (*D. catalinensis*) show no genetic distinction from other individuals in the South Baja phytogeographic region.

An Evaluation of the Diet of *Cyclura* Iguanas in the Dominican Republic

Pasachnik, Stesha*[1] and Victor Martin Velez[2]

[1]San Diego Zoo Institute for Conservation Research, Escondido, California, USA; [2]Resource Ecology Group, Wageningen University and Research Centre, Wageningen, The Netherlands

We used scat analysis to evaluate the diet of two Rock Iguanas (*Cyclura cornuta* and *C. ricordii*) occurring in Dominican Republic. Important plant species for the tropical dry forest (*Consolea moniliformis*, *Stenocereus hystrix*, *Ximeniopsis horridus*, and *Capparis flexuosa*) were found in the diet of these iguanas and shaped the core diet of *Cyclura* in the study area. The diet can be characterized as mainly herbivorous, but with certain a degree of preference and containing animal matter. Diet did not change with the size of the individuals in terms of richness and diversity, but *Consolea moniliformis* appeared more often in the diets of larger individuals whereas arthropods was present more often in smaller individuals. As little was previously known concerning the diet of these species a variety of new items are reported for the diet of *C. cornuta* and *C. ricordii*. This information helps to further understand vital ecological characteristics of these threatened species, which are important in tropical dry forest maintenance, and thus, enhances the ability to properly manage these species and those that rely on them.

2015 IUCN SSC Iguana Specialist Group Annual Meeting

Guana Tolomato Matanzas National Estuarine Research Reserve (GTM NERR), Vilano Beach, Florida, USA

MINUTES

Day 1: 10 November 2015

8:00 Welcome – Co-Chairs (Chuck Knapp and Stesha Pasachnik)
8:15 Information about venue, surrounding area, and GTM NERR (Joe Burgess)

1. Long-term Studies of the Allen Cays Iguana (*Cyclura cychlura inornata*) in the Exuma Islands

Iverson, John

- Question (Robert Fisher): Are the mice on the island effecting Iguanas, how did mice impact nitrogen enrichment on island? Answer: Mice eradicated, mice may eat eggs but not sure.
- Question (Tandora Grant): How long ago did you build the nest site? Answer: 2012 on Allen Cay, lots of activity in nest sites seen, will go back to excavate it to see if there are hatched eggs. We hope to build more.

2. Conservation Update on the Sandy Cay Iguana

Buckner, Sandra D.*, William K. Hayes, John B. Iverson, Jill M. Jollay, Phillip S. Weech, Steve Smith, Pat Hayes, Sheila Iverson, and James Traverse

No questions

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

Pasachnik, Stesha*, Ernst Rupp, Rosanna Carreras De Leon, and Glenn Gerber

- Q (Chuck Knapp): How long where you able to track hatchings after they emerged? A: Radios worked for about 40 days, *ricordii* don't do complicated movements, but *cornuta* moves to difficult sites. Maximum distance was 6 km from nesting site (*cornuta*) and 1km for *ricordi.*
- Q (Ann-Elizabeth Nash): Are big dispersing distances made by male hatchlings? A: not sex dependent.
- Q (Tom Wiewandt): In sympatry, *cornuta* nests after *ricordi*. Do they dig up *ricordii* nests? A: Not much overlap. They tend to nest in different places.

- Q (Rick Van Veen): Was the feces you found with the hatchling's radio tag in it belong to a *cornuta*? A: Yes, most likely *cornuta* but they are sympatric species so difficult to tell where feces came from.
- Q (Carlos Rodriguez): How often do you find juveniles at night by hatchling sites? A: Haven't been out much at night to look.
- Q (Jessica Harvey): What would you change regarding tracking hatchlings with drones? A: Drones are not going to work out, tracking has to be done by foot. The technology is not right for small hatchlings. Satellite tags may be better.

4. Influences on Hematology, Plasma Biochemistry, and Plasma Protein Electrophoresis in Grand Cayman Iguanas (*Cyclura lewisi*)

Rainwater, Kimberly*, Paul Calle, Catherine McClave, Bonnie Raphael, Carolyn Cray, and Frederic Burton

- Q (Christopher Pellecchia): Are there any other physiological parameters you want to expand on in the future? A: We want to look at more iguanas, look more at the diets in the wild, but not looking to add more physiological parameters at the moment.
- Q (John Iverson): Interested in the data interaction of sex and seasons – for example, do populations skip a year in reproduction, or is there a chemical blood marker to indicate events such as these? Or can the start of the reproductive season be indicated? Or is there a marker to indicate sex? Can we make a reproductive marker? A: Triglycerides and cholesterol would be must useful likely, but we do not have great identifiers yet and needs more research.

5. Spatial Ecology of Captive Released Blue Iguanas (*Cyclura lewisi*) in Occupied Habitats

Mougey, Krista*, and Frederic J. Burton

- Q (Ann-E Nash): With increase in feral animals does this contribute to increased use of trees? What are the body conditions of the populations 2004 – 2015? A: The 2004 released group included a mix of all ages, while in 2014 we released all 2-year olds, and those measurements from 2004 [Krista] doesn't have.
- Q (Chuck Knapp): What are density estimates? A: Consistently ~40 animals despite introduction of more animals.
- Q (Mark Welch): If there are animals with established and normal sized territories, how much available habitat is left? A: Probably seeing a saturation in the reserves, and the juveniles are being pushed into sub-par habitat. As they grow in size, their home ranges increase in size. There is a ring of dominant individuals centred on higher-quality home territory.
- Q (Tandora Grant): Is there an assessment for the second release site in the Salina? A: [Krista] doesn't have the data but Fred is working on larger paper for spatial issues, wants to increase the trail system and survey in outlying areas.
- Q (Joe Wasilewski): Is there wild breeding? A: Yes, they see breeding and nesting but lack of survival of younger age classes.
- Q (Chuck Knapp): What is the predator control? A: Politically unpopular. There is discussion of installing fencing around the Botanic Park and reserves, but this is not popular among locals, politicians, and the Dept. of Agriculture.
- Comment (Jane Haakonsson): We are presently no longer releasing into the Salina.

6. Field Update on Sister Isles Rock Iguana (*Cyclura nubila caymanensis*) Nesting Ecology Project on Little Cayman

Moss, Jeanette*, Mark Welch, Glenn Gerber, Matthias Goetz, and Jessica Harvey

- Q (Carlos Rodriguez): Was there a population drop with the severe drought? A: Drought wasn't terribly severe, there was a lot more coconut palms shedding their leaves and making nesting sites unavailable.
- Q (Christopher Pellecchia): Do you see any differences due to anthropogenic change at some of the sites? How do other threats impact them at different sites based on human impact? Is there a shift in population of other animals? Has the snake population been impacted more or less? A: No qualitative results on this. Not sure about other animals, not currently looking at, and haven't observed many snakes.

7. A Camera Trap Approach to Understand Invasive Species Impacts and Behavioral Patterns during the Nesting Season of the Mona Island Iguana

Figuerola, Cielo*, Jan P. Zegarra, and Miguel A. Garcí

- Q (Tom Wiewandt): Is there a program to put enclosures around nesting areas? A: The fences in the depression forest are broken now and not working, but they did previously. Fencing is intact and working in the coastal plains.
- Q (Tom Wiewandt): What is the technique for eradicating pigs? A: aerial shooting, traps, and hunting dogs.
- Q (Jessica Harvey) Do you use the same camera traps for day and night recording and how often you visit them? A: Yes, cameras are visited once a month, but ideally every 2 weeks.
- Comment (Miguel Garcia): Hunting is happening (in depression forest).

8. Status of the Stout Iguana (*Cyclura pinguis*) on Guana Island, British Virgin Islands

Mougey, Krista*, Gad Perry, and Douglas Bell

- Q (Glenn Gerber): What is the overall population size do you think? A: ~300 post-hatch year animals on Guana. Necker has similar numbers despite being half the size.
- Q (Robert Fisher): Has there been an estimate of effective population size? A: Glenn would have that information and he'll discuss it later.
- Q (Chuck Knapp): What was the nest density and clutch size? A: [Krista] was only there in October so difficult to say, we know very little about where they are nesting. We had one satellite collar deployed a few years ago, but we know almost nothing about life history outside October.
- Q (Peter Tolson): Are there cats? A: Occasional report, but not a huge concern. There is an increase in rats and feral sheep on the island, but they are actively trying to fix that.

9. Growing in a Crowded Neighborhood: Competition's Role in the Expression of Inbreeding Depression in *Cyclura carinata*

Colosimo, Giuliano*, Glenn Gerber, and Mark Welch

- Q (Peter Tolson): Recalling an Alberts' experiment with Cuban Iguanas where larger males were temporarily removed, have you considered removing big dominant, males in translocated populations to increase breeding output of females? A: There

is a selection against inbreeding depression in a dense population, it's a healthy dynamic.

- Q (Ann-E Nash): On the island [you showed] with the reverse trend, were there any weather events that could have impacted the trend? A: No major weather events to explain this as the islands are very close together.

10. The Potential Genetic Value of Captive *Cyclura collei* to Population Maintenance in the Hellshire Hills

Welch, Mark E.*, Armed Rasberry, Tandora Grant, Rick Van Veen, Orlando Robinson, Dawn Fleuchaus, and Byron Wilson

- Q (Catherine Stephen): What is the number of alleles per locus? A: 12, 5, and 3. Given the lack of diversity, breeding values are very sensitive.
- Q (Catherine Stephen): Why are breeding values so different but genotype so similar? A: Hard to find microsatellite loci that are variable, some have only two or three alleles. There was a lack of diversity at most loci, so if you have one rare allele compared to your sibling then the breeding value goes way up.
- Q (Byron Wilson): Are the confiscated iguanas useful? A: Confiscated iguanas are no more likely to produce heterozygous offspring than the average already-released iguanas.

11. Latest Updates of the Major Ongoing Studies of *Iguana delicatissima* in the French Territories Guadeloupe and Martinique. Perspectives for Next Year in the Context of the End of the French National Action Plan

Elisa Curot-Lodéon

- Q (Tandora Grant): Is it possible for your agency to continue to be the coordinator of project? A: ONCFS Agency doesn't want to be coordinator anymore.
- Q (Carlos Rodriguez): Where Green Iguanas and *delicatissima* occur simultaneously, is there any competition in nesting? A: Not to their knowledge, but it is not studied.
- Q (Joe Burgess): When is the *delicatissima* nesting season? A: It depends on the island: May – June/July.
- Q (Joe Burgess): Is there any plan for surveying the northern coast of Martinique? A: Need to take action soon and it depends on people writing the new plan.

11. Investigating the Genetics of *Iguana delicatissima* on St. Eustatius

van den Burg, Thijs*, Hannah Madden, and Mark Welch

- Q (Chuck Knapp): Did you pit tag iguanas? Did you identify any nest sites? A: [Thijs] found four nest sites by the occurrence of old egg shells. The invasive Mexican Creeper Vine makes a lot of area unsuitable for nesting sites. Didn't have enough money for pit tags.
- Q (Noah Carl): Are they found in urban sites? A: Yes, found a lot in gardens, under cars, etc.
- Q (Cheryl, from GTM NMRR): [Cheryl] used to live on St. Eustatius and found them in the northern region, by the reserve which is by the dump, and old Kingswell hotel, where people feed them from hotel. A: Aware of this, and yes, some have died in cages there.
- Q (Mark Welch): Looks like you found very few in park areas. Are they in the trees in the park? A: Yes. They are an arboreal species but densities must be very low.

12. Population Viability of the Roatán Spiny-tailed Iguana (*Ctenosaura oedirhina*)
Campbell, Ashley B.*, Stesha A. Pasachnik, and Terry L. Maple

- Q (Damion Whyte): [Damion] used Vortex for Cyclura collei and had problems estimating juveniles. Did you put a hurricane frequency into the model and find a decrease? Did you find it difficult finding the data and assumptions to input for Vortex? A: Yes, and a potential population decrease is included but hurricanes didn't have any effect. However, storm damage on the island was observed and it did have a big effect on population in areas of Roatán, and the population has not recovered in those areas after 3 years. Captive iguanas live about 13 years; those captive populations give us some information and anything unknown was sensitivity tested.
- Q (Joe Burgess): Can you remove the *similis* and replace them with *oedirhina* on the cays? A: Possibly on Maya Cay which is basically a private zoo.
- Comment (Stesha Pasachnik): The Mayor is not keen on idea of getting rid of *similis* and it is a difficult situation. On the other cays, most don't have any *oedirhina*.
- Q (Adam Klaus): Has hunting intensified in last few years? Are people using this for protein more in the current economic climate? A: Hunting must have started ~600 ad, but suspects hunting has intensified due to the human population increase, and some people may be using this as their only protein source in economic climate. Hunting is also a tradition which is difficult to break.
- Q (Noah Carl): Is there a grassroots campaign? A: Stesha went to schools talking to students and the tourist park does some education. The cruise ports bring a lot of people, and they put up signs, posters, and distributed flyers around the cruise ports. It has been difficult to arrange committed plans with schools, but intends to keep trying to get into schools and churches for adults. Most people know it's illegal but the laws not enforced. It is important to get government and police more involved.

13. Conservation Assessment of the Critically Endangered Oaxacan Spiny-tailed Iguana (*Ctenosaura oaxacana*)
Corneil, Jeffrey*, Victor Hugo Reynoso, and Chad Montgomery

- Q (Joe Burgess): Can you paint my house if I promise to not eat Iguanas?! A: laughs.
- Q (Catherine Stephen): Did you explain to the owners that you want to paint their house with a logo? A: Yes, in Latin American people often have logos on their houses, so people are used to it.

14. Social Network Structure in the Spiny-tailed Iguana, *Ctenosaura similis*: Preliminary Results and Next Steps – the Encounternet System
Nash, Ann-Elizabeth*, Stephen P. Mackessy, and Mitchell McGlaughlin

- Q (Chuck Knapp): Are you planning on doing manipulation studies? A: Not any translocations since you can't do them in the study site in Costa Rica. Will look at invasive population in the U.S. and consider animal removals and see what will make it stronger and more persistent.

15. Biogeography and Conservation Systematics of Pacific Iguanas (*Brachylophus* sp.)
Fisher, Robert*, Jone Niukula, Heidi Davis, and Peter Harlow

- Q (Jessica Harvey): Are night-time surveys easier to capture *Iguana iguana* also? Do you have issues with danger to surveyors at night? A: *Iguana iguana* is harder to see

on Fiji at night as their bellies don't shine as much as *Brachylophus* at night. But yes, it is still easier to catch *Iguana iguana* at night too. Use a string to mark the trail for safety at night.

16. Conservation Status and Priority Actions Needed for Fijian Iguanas (*Brachylophus* sp.)
Harlow, Peter*, Jone Niukula, and Robert Fisher

- Q (Joe Burgess): Could you talk to clans on small islands about using fire? A: It takes a lot of organisation and money, but not impossible. Culturally iguanas don't have a value in Fiji.
- Q (Jeffery Corneil): Is sea level change impacting nesting? A: *Brachylophus* have a low reproductive rate, only 4 eggs per female with an 8-month incubation rate. But sea level rise is not a big problem as they are mostly high volcanic islands.

17. A Species Survival Plan Program for Fijian Banded Iguana (*Brachylophus bulabula*), a Case Study for Conservation of Fijian Iguanas Through Collaboration, Building of Relationships, and Investing in Conservation Initiatives
Lovich, Kim* and Kira Husher

No questions

18. Conservation of Fijian Crested Iguanas (*Brachylophus vitiensis*) on Monuriki Island
Niukula, Jone*, Sialesi Rasalato, Robert Fisher, Ramesh Chand, and Peter Harlow

No questions

19. Background and Summary Updates from the International Iguana Foundation
Rick Hudson

No questions

20. Social Media, the International Iguana Foundation, and the ISG – Help Us Help You!
Hedrick, David

- Q (Tandora Grant): Is it better to "Like" or "Share" a post on Facebook? A: Share, but everything helps. Also, please use Amazon Smile and select IIF when you shop.

Day 2: 11 November 2015

1. Taxonomic Revision and Conservation Reassessment of Madagascan Iguanas (Opluridae)
Welt, Rachel*, and Christopher Raxworthy

- Q (Joe Burgess): Are the rock dwelling species flattened? A: Yes flattened, for habitat adaptation.
- Q (Robert Fisher): Are you looking at fossils as well? A: There is a researcher at the [NYC] museum who is interested and want to look into that. More fossils will help for dating.
- Q (Catherine Stephen): Is conservation education and outreach still part of your research plan? A: Yes, planning to work with the museum education and training

program to develop modules for people in Madagascar to use: "what are the conservation plans for this group".

2. Control Tactics Developed Against the Argentine Cactus Moth, *Cactoblastis cactorum*, a Threat to North American Native Prickly Pear Cactus, *Opuntia* spp.

Stephen Hight

- Q (Joe Burgess): How successful was the research at GTM NERR? A: The Sterile Insect Technique program ended before being used in Alabama or Louisiana. At GTM they did a research project involving a protected area in which volunteers went through and removed insects, and compared to a 1 km control patch of habitat. It worked, but it is hard work to really keep these plants clean, and isn't possible without volunteers.
- Comment (Miguel García): Control conducted on Isla Contoy that is 500 m wide and 2-3 km long. Cactus was not everywhere, but scattered in large patches.
- Q (Rob Fisher): Like USDA, USGS changes focuses for funds. What does it take to refocus them? A (Joe Burgess): Probably cost a couple of million $ every year for a long time, done through Stephen's programs. Four people were employed to monitor *Cactoblastis*. They also worked on the Purple Loosestrife project, which is really bad in wetlands. Initially wildlife people were very interested and then a senator got involved and all the funding was lost. The concern in the west for this pest is not there yet.
- Q (Tom Wiewandt): About 25 years ago a guy form ISG was studying *Cactoblastis* in the Florida keys. [Tom] thought there is an *Opuntia* species that was going to go extinct, and has horticulture samples of that species if anyone needs it. A: There is someone working in the keys to remove insects (*O. corotilla*).
- Q (Tandora Grant): Since pheromone bracelets seem only practical for plantation-sized areas, could they be applied to smaller cays in The Bahamas? A: Could work there if the cays are small enough. Currently this is in testing phase, ~$1 per bracelet so it's really expensive, and may not be feasible across larger areas. This is a project that disrupts a generation, and not sure yet how long it lasts through future generations. Sometimes generations occur 3 times a year.

3. Genetic Population Structure and Origin of the Invasive Green Iguana (*Iguana iguana*) in Puerto Rico

De Jesús-Villanueva, Christina*, Cristina Rivera, Xímena Vélez-Zuazo, Wilfredo Falcón, Riccardo Papa, and Catherine Stephen

- Q (Pete Tolson): What was locality CAB? A: In the southwest.
- Q (Carlos Rodriguez): [Carlos] works with a population in the northeastern part. Is it possible they moved iguanas locally? A: In the 1990s, it was really popular to walk around with iguana pets, so they were probably moved around that way.
- Q (Carlos Rodriguez): Do you have any samples from the north part? A: No, but they can go on a road trip!
- Q (Elisa Curot-Lodeon): Have you gotten samples from St. Thomas? A: [someone in the audience] has those samples.

4. Eight Years of Managing an Invasive Iguana, *Iguana iguana*, at Cabezas de San Juan Nature Reserve Fajardo, Puerto Rico

Rodríguez–Gómez, Carlos Andrés

- Q (Joe Burgess): Do you need to have permits to kill the nesting females iguanas? A: Yes, P.R. Conservation Trust is managing the reserve, and they do not want to hunt them, but maybe in other areas it is possible.
- Q (Ann-E Nash): Has anyone ever tried to oversaturate areas? A: They have flooded areas at the airport and it has been effective.
- Q (Joe Wasilewski): Are you releasing juveniles marked from the nests? A: Yes, we sample them and re-release, unfortunately.
- Q (Rob Fisher): Are mongoose hunting juveniles? A: Haven't seen an increase in mongoose, or decrease in iguanas, but dogs and cats are impacting them.
- Q (Rob Fisher): Do you have pigs? A: No, not at the reserve.

5. Monitoring, Modeling, and Management: Controlling Green Iguana Overabundance

Haakonsson*, Jane Ebert, Jessica Harvey, and Frank F. Rivera-Milán

- Q (Jeff Corneil): With 2 years of observation, are there different people making these observations and was there a learning curve? A: It was Jane and Jess doing both of the surveys. Sometimes they had help from the local department and they used observer variance as a major covariate. They try to keep the teams the same, especially for the monitoring in August. If anything is different it will be in the pilot studies and not affecting major ones.
- Q (Rob Fisher): After 10 years of control and you're likely to get the population down to 50,000. What happens when you get there? Would you be happy with that number? A: They don't really know what will happen then, they just want to get down to that population size, then they still have a cost to maintain this. And yes, that is the big problem. They just want to make informed decisions, and see what they find when they get to that level.
- Q (Mark Welch): This is going to be hugely expensive. Is any money going into biosecurity on the Sister Islands? A: They are aware of that and a National Conservation Council has been established. The first subcommittee they formed was the Invasive Species Subcommittee and they're looking into biosecurity. They need to control vessels going back and forth between smaller islands and install iguana-proof fencing around the port.
- Q (Glenn Gerber): The model is projected over 10 years. Since you have to pay money to keep populations low, why not allow locals to hunt? A: Feasibility and manpower would make it difficult. It is not totally safe to have locals hunting because Greens are similar to the native species so we don't want to impact that population. Health and safety concerns for the disposal of hunted iguanas is a factor that needs to be considered.
- Q (Damion Whyte): Is it confusing to the public to keep the Blue Iguana and get rid of the Green Iguanas? A: There was an intentional slaughter of Blue Iguanas a few years back, but now locals are protective of them, and Green Iguanas are so invasive people don't like them.
- Comment (Carlos Rodriguez): Green Iguana meat sells for ~$40/lb. Puerto Rico would love to export it, but they are listed by CITES.

- Comment (Damion Whyte): You can do what they do with Queen Conch from Jamaica, which is also CITES Appendix II listed.
- Q (Rick Van Veen): What are the people's view of feral cats and dogs? A: The populations are increasing because the human population is increasing, it will be a problem.

DISCUSSION:

Invasive iguana discussion including position statement, recent eradication projects, and protocols

Pete Harlow & Rick Van Veen (Fiji), Rick Van Veen, Jane Haakonsson & Jessica Harvey (Caymans), Joe Wasilewski (Bahamas), Stesha Pasachnik & Peter Harlow (position statement), All

Joe Wasilewski – Joe has been removing iguanas from south Florida for over 20 years. He showed photos of some recent removal work on a private island. The island is no more than ~30 ha with an overabundance of Green Iguanas. Measurements of SVL, etc. were taken, documenting everything they do, and all were euthanized humanely. Methods of removal: snares are good, and traps are not good, except when iguanas go into rocks. Easiest to see iguanas at night. They used an extended pole (14 ft) to shake iguanas out of trees, and will be getting a new pole that's 21 feet. Carcasses were usually burned in a crematoria, and would like to hear other ways to remove them. Joe's team removed 4,500 iguanas. Together with a local resident using an air rifle who removed 1,500, a total of 6,000 on that small island have been removed. 10 years ago there were no iguanas on the island; thinks only a pair or two were introduced.

Peter Harlow – When iguanas first arrive somewhere you can't convince government wildlife people that they're a problem. In Fiji, a 2010 survey completed 8 years after the introduction, found about 300 adults adjacent to the initial release site. At one time, an eradication was possible, but now don't know the status update. No one seemed to realize in Fiji at the time that you can get rid of them with early detection, rapid response, and eradication. But nothing can be done for many of the Caribbean islands now except to prevent their spread to other islands. We need support to get rid of them as rapidly as possible when they show up on a new island.

Catherine Stephen – Once a feral iguana population gets bigger it also supports feral cats and mongoose. That info might get government people to respond faster, especially if pointed out in a position statement.

Joe Burgess – Exotics in Florida have led to the introduction of larger invasives. Need to kill them rather than spending time finding the method of invasion.

Paul Calle – Joe, what were your "acceptable humane euthanasia techniques"?

Joe Wasilewski – Not freezing (though a recent study shows it is humane in amphibians); decapitation was also not acceptable. Only method approved was head trauma (pithing).

Pete Harlow – Decapitation is acceptable, if it involves head trauma.

Ann-Elizabeth Nash – In the U.S. we love cats. Rapid response is so important because it stops the normalization of seeing the invasive animals and being opposed to eradicating it.

Joe Burgess – Once Greens are detected, it's too late.

Damion Whyte – in Jamaica many people have Greens as pets. What do you do with the iguanas that people already have?

Joe Burgess – Is it possible to include in our statement some recommendations for the pet trade?

Chuck Knapp – Read some of the position statement points. This is not just applicable to Green Iguanas, but all invasives such as other reptiles.

Pete Harlow – We discussed the pet trade in the position statement a few years ago, so that companies that wanted to import pets for trade would know our position, but it wasn't so much written for this audience.

Chuck Knapp – Does this group think the ISG should have a position statement on this?

Everyone – Yes

Chuck Knapp – Should we coordinate the position statement among other reptile specialist groups, or keep it within ISG?

Joe Burgess – We should have the Invasive Species SG draft it.

Allison Alberts – We should include ISSG.

Chuck Knapp – We spoke to ISSG about it, and they wanted us to give them information.

Glenn Gerber – Can we do both. start with an ISG position statement then involve others? Involving other groups may delay it. Also we should strengthen the wording. Worried about a future invasion in Turks & Caicos.

Stesha Pasachnik – To confirm, the group thinks we should just move forward on our own?

Sandy Buckner – We should contact ISSG first and let them review it before we publish it.

Catherine Stephen – John Iverson is in the Freshwater Turtle & Tortoise Specialist Group. If we include people who can communicate quickly between groups, that would be good.

Jeff Corneil – Is there any talk in IUCN to add another Red List status classification for highly invasive species like Green Iguanas?

Tandora Grant – The ISSG has a separate database that lists all species that are invasive and connects with the Red List. But Red List needs to keep the focus of what threats are for each species; some invasive species are threatened in their native ranges.

Elisa Curot-Lodeon – Is there a protocol for action before killing, and an assessment of what is a reachable aim, and what we can do in Martinique and Guadalupe? In Martinique they kill them but they don't know how it's impacting other things, and often it's not really humane.

AE Nash – It is difficult including the U.S. Humane Society for international issues. If we want the public to buy in, we shouldn't make the killing of species a fun/cute activity like cook-offs or round-ups; it should be undertaken somberly.

Paul Calle – Can we include a general list of humane methods or get a veterinary statement, i.e. "methods generally considered humane by the scientific community"?

Ty Park – [Ty] is no longer supplying Petco until they stop carrying Green Iguanas. As a group we should not alienate pet owners, because many of them are conservation supporters. We shouldn't state we use PETA-approved protocols because they have a bad reputation. We don't want to align with them and alienate people that don't like them.

Other – PETA follows American Veterinary Society statement on humane euthanasia.

Kim Lovich – Crocodile Specialist Group also has a statement on humane euthanasia of crocs, we could follow that, and list out options that are available to everyone.

Carlos Rodriguez – We don't alienate pet owners or other locals, if you explain why you do it and the correct ways to do it, usually the consumers understand this. It is Important to include information on the effect of invasives to any pet owners when they purchase them. In Puerto Rico the pet owners don't know the effects of releasing their pets. We should educate the public and don't underestimate how they might react. Explain how the invasive would impact a native species that people really like.

Chuck Knapp – Position statement does include info on effects. Do we move forward alone, or with IUCN groups, or ISSG?

Majority – Start with ISSG and move forward on our own before working with other IUCN groups.

Sandy Buckner – (looking at the ISSG database) The Invasive Species database includes Green Iguana but has very limited info – we should definitely expand on information for them.

Tandora Grant – That database went live about 2-3 years ago, and they asked us for contributions so it's up to us to help fill it out. Joe W., Carlos, Peter, Ann-Elizabeth, Christina, and Jane offered to update the ISSG and online database.

Pete Harlow – The effect of invasive iguanas is not publicly acknowledged in some places, such as pets in South East Asia. They're obviously there and Peter has seen them.

Pete Harlow – Just need to reference one line from AVA or AZA on euthanasia.

Paul Calle – The zoo/vet groups' statement would be more relevant, or a reptile amphibian veterinary group.

Rob Fisher – Position statement is a bit soft at the beginning, and we need to focus on social aspects of it, such as food security, coastal erosion issues, and climate change. May be able to calculate actual costs of loss.

Carlos Rodriguez – Has seen iguanas destroy home gardens in a day. Erosion is a major problem, destroys ground and ground cover, and killing mangroves, etc.

Chris Pellecchia – For *C. similis* in south Florida, erosion is the biggest concern impacting areas that make lots of money for ecotourism – focus on losing beaches, tourism money, and wildlife. They also destroy habitat for shorebirds, so we could get cooperation with international bird groups. The Barrier Islands are majorly affected by erosion.

Kim Rainwater – American Association of Zoo Veterinarians' (AAZV) euthanasia statement is all-encompassing of other important organizations.

Jess Harvey – In the Caymans, they have a lot of community support for controlling Green Iguanas, but really need to get point across regarding the monetary cost of the damage. That translates well to the public and politicians – getting politicians support leverages support by the public.

Carlos Rodriguez – In Puerto Rico, it has been hard to come up with monetary loss numbers, e.g., plane delays at the airport coming from taxpayer's money. General info on costs is needed, may be agricultural damage costs? We only have anecdotal costs, we need specific research.

Damion Whyte – Showing a video clip of the damage caused by invasive species on an in-country webpage would make a huge impact when people see it.

Joe Wasilewski – It is hard to tell people on an island to save the native species and get rid of the invasive. Need to educate people so they know which ones need protection.

Pete Harlow – in South East Asia and Africa it is normal practice to have people watch a village's crops 24 hours a day to protect them from native species. Invasive iguanas have a huge impact on food security, and this example could be their future.

Volunteers for helping to re-write position statement tomorrow: Catherine, Glenn, Carlos, Krista, Ty, Pete, Joe W, Allison, Elisa, Rick VV.

International Trade in *Cyclura* Iguanas: An Overview
Weissgold, Bruce (remotely via Google Hangout)

- Q (Catherine Stephen): Is there a genetic enforcement tool? An assay to identify to species, or would it be useful? A: Generally we don't need to ID specimens to that level. Hatchlings are more of a challenge to ID. Some iguana groups are harder to ID than others, and you would need voucher specimens to ID anything. Outside of the U.S. it might be more difficult assess ID.
- Q (Joe Burgess): Are you using reptile forums to get info on the pet trade? A: A lot more attention is being paid to passenger flight lists, and law enforcement agencies look at social media to get info on trading. Anyone known to be involved would be listed. There is variation in the degree to which different agencies pay attention to social media.
- Q (Chris Pellecchia): How can we use social media to help? What information would you need for us to help you (screen shots, etc.)? A: They have social media experts on staff at USFWS. [Bruce] is always happy to work with other agencies to promote ideas on social media.

DISCUSSION:
Iguana Smuggling Discussion
Evert Henningheim, Stesha Pasachnik, Sandra Buckner, Bruce Weissgold, All

Evert Henningheim – update *Censored*

Sandy Buckner – Bruce, can you fill us in on the international consortium for combatting wildlife crime (ICCWC)? The Bahamas are interested in following through on that.

Bruce Weissgold – ICCWC is a collaboration of Interpol, world customs offices, UN office of drugs and crime, CITES secretariat, and is funded by the World Bank. The principle tool developed for training is a "wildlife and forest crime analytical toolkit". Each country goes through a process to evaluate its enforcement capabilities, assess weaknesses/strengths, etc. The Bahamas requested that this toolkit be implemented there and CITES has the funding available to do it, but it is a new request so nothing would have happened yet. A Recommendation was adopted for all of the Caribbean, and funds are being raised to start working on this but it is still in the phase of communicating between countries. [Bruce] is optimistic that the workshop will happen in first half of 2016. Will likely start out small, with fewer islands involved, but hopefully will become larger. Overall, this is much more focused on more traditional crimes, so moving towards wildlife enforcement network.

Stesha Pasachnik – Bruce, can you talk about the U.S. Lacey Act and what the EU is doing to change its legislation?

Bruce Weissgold – The Lacey Act allows us to charge U.S. citizens and businesses not complying with wildlife protection laws enforced by other countries' laws. U.S. citizens can be charged in the U.S. with breaking international laws that other countries have (prohibits trade in wildlife illegally taken, possessed, transported, or sold). It is a difficult law to use, especially when working with under-developed countries, but it has been effective. In the

EU, Bruce has no idea what they're doing in terms of adopting a similar law for their member countries. Not aware of any concrete steps taken in that direction. The EU does have a wildlife trafficking plan out now, and final stages are being prepared. CITES is discussing these issues in subgroup with the EU – this group is considering how founder stock should be treated with CITES permitting. Pro Wildlife (an NGO) is pushing to have founder stock permits researched before allowing export of any offspring, but don't know any details about petition that they are circulating.

Stesha Pasachnik – Don't have much more info, and will forward the email that is circulating. There is potential for EU to adopt something like the Lacey Act.

Bruce Weissgold – There is a similar effort by the tortoise group. In the EU they do not look at the origins of founder stock when they issue export permits. Say they don't have authority to do that and permits are based only on the individuals considered in the permit, not going back any generations.

Stesha Pasachnik – Bruce, can you give us an update from the Caribbean Iguana Group steering committee?

Bruce Weissgold – Unfortunately don't have the notes from discussion with Hannah Madden at the moment, who would like to be replaced as Chair. This steering committee came from the meeting in San Juan, PR, in 2013. Want to work cooperatively to help countries to implement recommendations from that workshop. Hannah needs a Co-chair. A successful co-chair would have access to resources, administrative support, and good telecommunications capability. Seeking people interested in helping Hannah – its always preferable to have a co-chair come from a government, but since she already represents that connection she would take anyone willing to help.

ISG CITES Permit

Chuck Knapp & Mark Welch – New CITES permit has been received with the new expiration date. Always speak to Mark first before using it. CITES people are all extremely helpful.

Elisa Curot-Lodeon – Who does the permit apply to? A: it is only for *Cyclura*, Appendix I.

Mark Welch – If you ever want to ship samples to the U.S., will need to fill it out a 3-177 form, and it helps to help customs agents in the exporting country fill it out their form properly by showing previous examples. A number of people are listed as sub-permittees on the permit, and they are the only people that can receive samples. It is only for CITES I; we don't have anything set up for CITES II.

Robert Fisher – Would like to add *Brachylophu*s to the *Cyclura* permit and wonders if that is too difficult. Rob received a *Brachylophus* one, but it took a long time, with Jone acting as exporter and Rob the importer.

Travel Awardees Update (Stesha Pasachnik)
Donations of $1,777 were received from 12 members this year. Travel awards were given to (and accepted by): Ashley Campbell, Giuliano Colosimo, Jeffrey Corneil, Amnerys Gonzalez Rossell, Daisy Maryon, Jen Moss, Thijs van den Burg, and Rachel Welt.

Update on IUCN SSC Leaders' Meeting in Abu Dhabi (Stesha Pasachnik, Chuck Knapp, Tandora Grant)

No questions

CaribPARC Update (Stesha Pasachnik)

Stesha Pasachnik – A U.S.-based organization. Southeast chapter wanted to branch out to form a Caribbean group. First meeting was in Santo Domingo in March. They asked the ISG to have an MOU with them that they would manage all *Cyclura* projects, and ISG would manage all other projects.

Miguel Garcia – Thought they seemed to be good partners.

Kim Lovich – They have two paid positions nested in U.S. agencies, one of them is a great contact if you need to work with an agency. Priya is their state agency coordinator. They have a joint steering committee. David also manages their Facebook page.
www.parcplace.org

Chris Pellachia- When's the next PARC meeting?

Stesha Pasachnik – They try to meet annually, but not sure, it may be on their website. Most people at meeting were from Puerto Rico or the Dominican Republic. Carlos Martinez from Philadelphia Zoo is running it.

Update on iguana monograph in *Herpetological Conservation and Biology*
Stesha Pasachnik, Chuck Knapp, Tandora Grant, John Iverson

Chuck Knapp – Wanted to publish a book 10 years after the last (second) Iguanas of the World volume. This will be electronic and open access.

John Iverson – All manuscripts were submitted this summer. We sent each manuscript out for peer-review, reviewed it ourselves, and thoroughly edited it, etc. Thinks all chapters have been accepted and believe they are in the copy-editing stage but don't have official confirmation or the exact status on publication date yet.

Taxonomic Working Group Update
John Iverson, Stesha Pasachnik

John Iverson – The updated checklist is completely done and one of the chapters in the monograph. Have added distribution maps of all species, and good photos of each taxa. Added common names, synonyms, and type localities.

Jeff Corneil – Define what the checklist is?

John Iverson – An example of the last version is on the ISG website. It is our taxonomic checklist of all iguanid lizards. Tells you the current state of taxonomy regarding any iguana.

Genetics Working Group and IUCN Conservation Genetics Specialist Group Updates
Catherine Stephen, Stesha Pasachnik

Stesha Pasachnik – Met the co-chairs of the new Conservation Genetics Specialist Group at IUCN Leaders' meeting, who were surprised by the number of genetics projects we have going on.

Catherine Stephen – There are lots of labs, with lots of students doing great work with iguanid genetics. The ISG has about 50 ongoing genetics projects, with all genera and most species under study. A few species are not really focused on, such as *C. rileyi* which gets stalled often – contact Bill Hayes if you have a student that may be interested in working on *rileyi*. Also *C. quinquecarinata* is in need of update because it is becoming more popular in the pet trade. Species with really small ranges may also soon get popular in the pet trade. Several species of *Sauromalus* and *Dipsosaurus* are in need of study. The Genetics Projects Summary List is on the ISG Website. Please update your project summary as often as possible. And always consult it so you avoid overlap in projects. Because conservation dollars are so limited, we should not be overlapping efforts but putting our research towards new issues. If you know people doing genetics but are not in the ISG, have them submit their project summaries too, so we can know what everyone's doing and work as collaboratively as possible.

Iguana Introduction Updates from Anegada, and to Puerto Rico
Glenn Gerber, Allison Alberts, Miguel García

Glenn Gerber – Historically, *Cyclura pinguis* has been restricted to Anegada that has a low limestone habitat. Late pleistocene fossils have been found from northen part of Puerto Rico, and remains on St. Thomas, USVI. Species has been listed as Critically Endangered for a while. James Lazell tranported eight individuals from Anegada to Guana Island (BVI), and also moved from there to Necker Island. Now, there are six introduced populations in the BVIs, that stem from those eight original transported animals. Allison and Glenn recently traveled with people from FWS to meet with government officials in BVI to discuss *pinguis* management. Long-term habiat restoration and feral mammal control on Anegada is key. Want to promote additional In-country translocations to increase the founding stock of the

satellite populations. Also trying to get permission from BVI to move some animals from Anegada to Puerto Rico. BVI government gave permission for in-country moves, but not to PR yet. Even today there lingers bad feelings regardng translocation, 30 years after the original eight were moved – a lot of people feel that it was done without their permission and our efforts today are paying the price for it. They had a good meeting, perhaps because FWS was there, and established a diplomatic relationship between FWS and BVI government. They also visited an island in Puerto Rico – Caicos Cay which is a low limestone island like Anegada, but there are rats, cats, and Green Iguanas present. Everyone agrees that they need to do restoration of the islands now so they are ready when they get the permission to move iguanas. There is another potential island that is limestone and dry forest and is higher elevation which is important for climate change.

In the BVI, they still need to secure permission from the private land owners to manage the wild populations, which are fairly inbred and need genetic input from Anegada. Changes aren't going to happen overnight, and will likely need many generations. Intend to increase cay diversity, then translocate them back to Anegada. Hopefully in the next year or so they might get to do the first (re-)translocation.

Tandora Grant – Have you considered using a restored island in Puerto Rico for a different species that is also Critically Endangered but has no local translocation possibilities, rather than introducing a historical species that isn't there now?

Miguel García – No.

Glenn Gerber – The only evidence from PR is from 1,500 years ago, but that doesn't mean it wasn't there more recently.

Pete Tolson and Miguel García – There is a historical account of their presence on PR from the 1700s.

Tandora Grant – We talked about this concept for species in the Galápagos – whether to re-create historical presence or used a restored island for a species in conservation need.

Joe Burgess – Why don't we bring Navassa into this discussion?

Chuck Knapp – Yes, Navassa has come up recently in discussion.

Glenn Gerber – The historical account from the 1700s is very ambiguous as it could refer to Green Iguanas, so should be researched more. Not sure if FWS funds would be available to use if *pinguis* isn't the species going back to PR.

Allison Alberts – Probably not, because then it would be considered an experimental population.

Tom Wiewandt – Bringing a new species to Puerto Rico could pose a problem if they move to other areas outside of the introduction island and may then impact other native species in PR. People may move them around or they might migrate on their own.

Tandora Grant – Wouldn't we have that same worry about putting *pinguis* there too? Species surrogates of tortoises have been introduced to other islands previously.

Tom Wiewandt – I propose keeping species closer to their natural geographic origin rather than moving them around.

Sandy Buckner & Miguel García – Cuban Iguana has been on an offshore PR island for decades and hasn't come to the mainland. There are too many threats on the mainland for introduced iguanas to establish there now.

Newsletter update
Chuck Knapp, Stesha Pasachnik, Tandora Grant

Chuck Knapp – How many people have seen the newsletter? Shedd Aquarium had a volunteer doing the layout work, which takes a long time. The newsletter is a great opportunity for graduate students or other researchers to get limited data out before a full publication is ready, and it is citable. We want to include some reports from the awardees of IIF grants. Trying to find a new volunteer copy editor, volunteers are welcomed.

Jeff Corneil – What kind of data are you looking for?

Chuck Knapp – A summary of your dissertation, or end-of-year reports to granting organization that you already have to prepare, are good examples needing low extra effort. You should take out any sensitive locality information. The newsletter gives your work a broader reach.

ISG Year in Review
Tandora Grant

Damion Whyte – Starting a PhD thesis with one aim to try to find a site to transfer the Jamaican Iguana population if Goat Islands are developed. Threatened because of mongoose, pigs, cats, and dogs on the mainland island. They have a headstart program but needs to release where there is safe habitat. Hellshire Hills has been really successful, but access roads are encroaching there. They don't have many offshore islands that would work for translocation because they have a lot of hurricanes and cays are low-lying. Goat Island is ideal. Phase I of development will allow expansion of wharf in Kingston Harbor to allow big ships in. Jamaica is kind of broke now and Jamaicans don't like lizards, so it is hard to get them to support creation of an iguana sanctuary instead of a transhipment port development. It's an election year so things may be different soon. People wonder how they can make money from iguana conservation. He is looking for alternatives for Goat Island.

Rick Hudson – Is saving Goat Islands still worth fighting for?

Damion Whyte – Yes, but people need to get something out of the deal. But maybe need to get developers and conservationist to talk about mitigation just in case.

Tom Wiewandt – That area has importance beyond iguanas. Why haven't you stressed the economic value of that area rather than focusing on an unpopular lizard?

Damion Whyte – Locals don't care about long-term. It is hard to communicate the importance of conservation to them.

Tandora Grant – The educational message we have stressed goes over things other than iguanas. JET has stressed other environmental impacts and pushing the acceptance of alternative sites.

Damion Whyte – We need to put a financial value to what they would be losing. Need a proposal for Goat Island if CHEC proposal doesn't work out.

Other Topics
All

Sauromalus:
Rick Hudson – The IIF received a proposal from Carmina (one of Victor Reynoso's students) for *Sauromalus hispidus* that they believe has gone extinct on Isla Angel de la Guarda in the Gulf of California, Baja, which is a large protected island. We need to put this on our radar. Requests someone to talk to Victor, and pass direction to the IIF for this.

Stesha Pasachnik – Victor has been working on this species, he just hasn't given an update yet.

Catherine Stephen – Recalls that a few years ago he presented on this and showed photos of mummified *hispidus*. Ian Recchio might also have recent information.

Robert Fisher – Recalls finding a lot of dead chuckwallas on the island in the past, but that doesn't mean the living ones aren't also there. The dynamic of finding dead ones has been there since the 1970s.

Photography:
Tom Wiewandt – Metadata of captions with photos, including accuracy and ownership is very important. Social media sites often strip the metadata when photos are uploaded. Controlledvocabulary.com is a group fighting for this standard for photographers. Disappointed to realize that the website ARKive also stripped metadata from photos, but hopefully they've changed that.

Tandora Grant – Doesn't think that the Red List strips metadata per se, but also knows they have fields where you enter that data into specific fields when you upload a photo, such as photographer, ID, locality, usage rights, etc. Asks that Tom check to see if the ISG pages have photo metadata stripped.

Next meeting location
Stesha Pasachnik, Chuck Knapp, Tandora Grant, All

We have received invitations to host the next meeting from a few locations: Fiji, Cuba, and Mona Island/Puerto Rico. We have asked the potential hosts to speak about their offer.

Robert Fisher (Fiji) – There is a need to do a revision of the recovery plan for all the iguana species. We could visit Monuriki to show the recent release site, maybe Monu, and the captive breeding facility at Kula Eco Park. Those trips would be before the meeting to be held in Suva. Wants to have it co-hosted by IUCN Oceania regional office, and perhaps some could join for more extended field trips (surveys) afterward. Cost would be $2500-$3000 per person depending on the airfare. ~40 people attended the meeting last time (2004).

Amnerys González Rossell (Cuba) – Meeting would be held on an offshore cay in north central Cuba that is only accessible by one bridge. There is an all-inclusive hotel (Ensenachos Iberostar) that can offer us lots of activities (scuba, sailing, etc.) and has many iguanas. The access bridge to the island was highly controversial because feral dogs can now get to island by the road, but they have been controlled on that cay. In 2010, the cost per person was ~$2,500, and 40-45 people came to that meeting. For Cubans, it is always promotional and helpful to have people from outside come to see internal conservation work.

Miguel García (Mona, Puerto Rico) – The research station on Mona Island would host us. There is a cook and visitors center, but only beds for ~35 people with a communal bathroom. There is plenty of room for camping tents. There is the possibility to have the meeting on Puerto Rico with a shorter stay in Mona. It would be cheaper than Fiji, but no estimate given depending if the meeting is partially on the mainland. Most of the expense would be to charter the plane to Mona. Hosting the meeting would help promote exotic invasive removal proposal, and there is a potential to visit other restoration sites.

Show of hands for who could possibly attend each location – Majority is able to likely attend all of the locations.