Species Recovery Plan for the Grand Cayman Blue Iguana, *Cyclura lewisi*

2009 - 2011

Formulated in a workshop held on 2nd to 5th December, 2008

Grand Cayman, Cayman Islands

OVERALL PROGRAMME GOAL

To restore a self-sustaining, free-roaming population of Grand Cayman Blue Iguanas in the wild

We envision a population of at least one thousand Grand Cayman Blue Iguanas, living freely within protected areas, reproducing naturally and continuing to evolve in step with their ever-changing natural environment.

Together with the iguanas, the native ecosystems in these protected areas will be managed over the long term, to control or maintain eradication of non-native species which threaten to disrupt natural processes, and to ensure that human activities do not conflict with the well-being of the iguanas and their natural environment.

The Blue Iguanas will be a flagship for the conservation of the ecosystems which they inhabit. As such, they will attract nature tourism and be the inspiration for a range of commercial products. Commercial activity linked to the Blue Iguanas and their habitat will generate sustainable revenue which will fund management of the Blue Iguana population and its associated protected areas, indefinitely.

Captive-reared mature male Grand Cayman Blue Iguana, living wild in the QEII Botanic Park, Grand Cayman

Released Blue Iguana concealing her closed nest burrow, after laying her eggs in the wild in the QE II Botanic Park, Grand Cayman

CONSERVATION STRATEGY

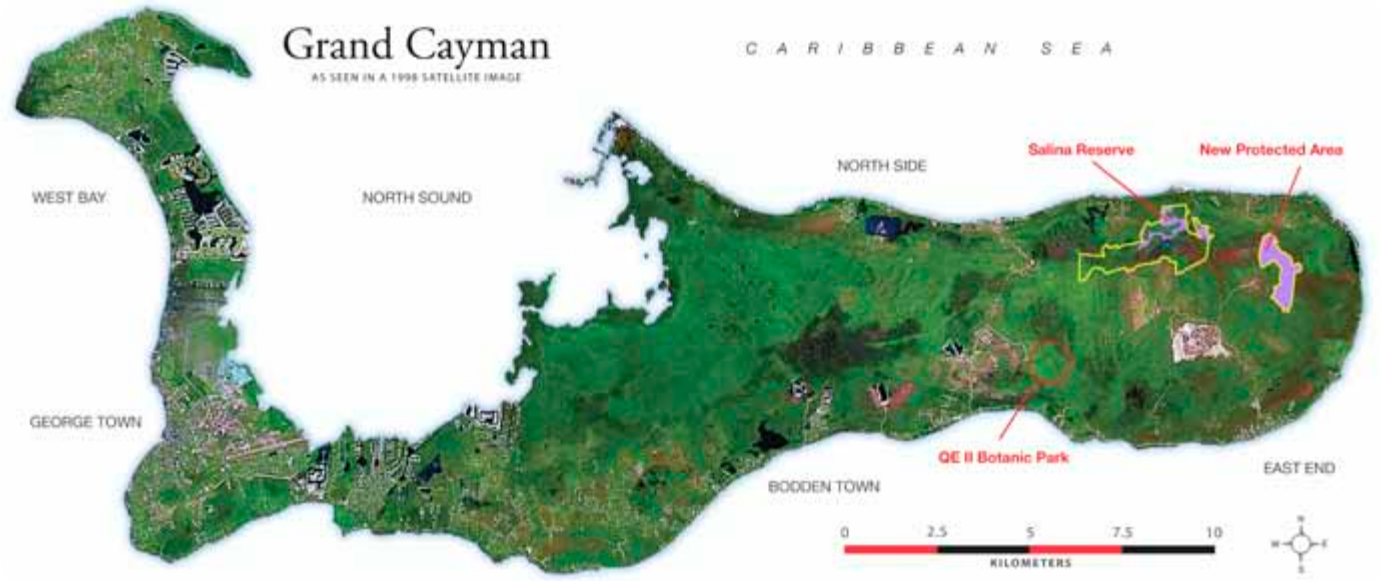
The original wild population of Grand Cayman Blue Iguanas has been reduced from a near island-wide distribution to a near-extinct remnant by the combined influences of habitat conversion, historic hunting, the introduction of non-native species, and road kill. By 2005, despite intensive monitoring, none of the young being born to the unmanaged wild population were known to be surviving to breeding age. The original wild population was functionally extinct.

Restoration efforts for the Blue Iguanas are now being implemented by the Blue Iguana Recovery Programme, operating under the auspices of the National Trust for the Cayman Islands, with local and international partners.

The conservation strategy involves generating large numbers of genetically diverse hatchlings in captivity, head-starting them to an age where the survival rate in the wild is high, and releasing them to rebuild a series of wild subpopulations in protected, managed natural areas. A rapid numerical increase from a maximum possible number of founders is sought, to minimize loss of genetic diversity from the population bottleneck.

As these restored wild subpopulations approach carrying capacity in their respective protected areas, release of head-started animals will be phased out and the sub-populations will be left to reproduce naturally. Guided by research and monitoring, control or eradication of non-native predators will be implemented to the degree necessary to allow young to survive to maturity in sufficient numbers to maintain these subpopulations.

Restored subpopulations are already present in two non-contiguous areas (the Salina Reserve, and the QE II Botanic Park) and additional subpopulations will be restored in one or more other areas. The overall population must number at least 1,000 individuals to maximize likelihood of long-term persistence in the wild. The subpopulations in disjunct protected areas are likely to remain genetically fragmented in the long term. To avoid loss of genetic variation in each subpopulation, individuals will be translocated between subpopulations to maintain overall genetic diversity, guided by ongoing genetic monitoring. Dispersal of iguanas into unprotected land outside the protected areas will build an even higher total wild population and allow for some gene flow between protected areas. However, this portion of the population must be regarded as potentially transient, since unprotected dry land is almost all expected to be converted to incompatible human uses in a matter of decades.



Landsat image of Grand Cayman, showing location of a new protected area designated in 2009 (Result 1.1). Purple colour fill indicates xerophytic shrubland (Blue Iguana habitat)

As a hedge against disaster striking the Blue Iguana population on Grand Cayman, the existing off-island captive population will be maintained at least until restored wild populations on Grand Cayman are securely established in three separate protected areas.

Maintenance of Blue Iguanas in the wild will require active management into the indefinite future. To sustain this activity, a range of commercial activities will generate the sustained funding required, while an ongoing education and awareness effort will ensure continued involvement and support by the local community.

Aerial view of north-eastern Grand Cayman.

CURRENT ASSESSMENT

• **Taxonomy.** The Grand Cayman Blue Iguana, *Cyclura lewisi* Grant, is endemic to the island of Grand Cayman. Its closest relatives are *Cyclura nubila* on Cuba, Cayman Brac and Little Cayman, and *Cyclura cychlura* in the Bahamas, all three having apparently diverged from a common ancestor at some stage during the last 3 million years.

• **Status.** The Blue Iguana is Critically Endangered according to the current IUCN Red List. The population is restricted to the east interior of Grand Cayman, where it was reduced to a critically low density prior to the first survey in 1938. The range has contracted significantly over the last 25 years, with many sites populated in the early 1990's now showing no signs of wild iguanas. The most recent comprehensive survey in 2002 indicated a total population in the range 10-25 individuals. By 2005 the unmanaged wild population was considered to be functionally extinct. The species is now the most endangered iguana on Earth.

However, restored free-roaming subpopulations in the QE II Botanic Park and the Salina Reserve now number approximately 290 individuals in total, after a series of releases of captive reared young which began in 1996. The restored subpopulation on the QE II Botanic Park has been breeding since 2001, and the subpopulation in the Salina Reserve began breeding in 2006.

• **Natural history.** While it is likely that the original population included many animals living in coastal environments, the Blue Iguana now only occurs inland, in natural xerophytic shrubland, and along the interfaces between farm clearings, roads and gardens, and closed canopy dry forest or shrubland. The iguanas occupy rock hole and tree cavity retreats, and as adults are primarily terrestrial. Younger individuals tend to be more arboreal.

Like all *Cyclura* species the Blue Iguana is primarily herbivorous, consuming leaves, flowers and fruits from over 100 different plant species. This diet is very rarely supplemented with insect larvae, crabs, slugs, dead birds and fungi.

Mating occurs primarily in April - May, and eggs are usually laid in June, in nests excavated in sun-exposed pockets of earth. Individuals are aggressively territorial from the age of about 3 months. Females occupy partially overlapping usage areas of the order of 740m^2, while males may occupy larger and more extensively overlapping usage areas, as they age and grow.

Hatchlings are preyed upon by the native snake *Alsophis cantherigerus.* The adults have no natural predators. The age of sexual maturity is typically 3 years. Natural longevity in the wild is unknown, but is presumed to be many decades.

"Godzilla", a male Grand Cayman Blue Iguana who died as a captive in the USA, at an estimated age of 69 years

• **Causes of decline.** Habitat destruction is the main long-term factor that has caused population decline and is threatening imminent extinction for this iguana. Land clearance within remnant habitat is occurring for agricultural purposes, road construction and for real estate development and speculation. Conversion of traditional croplands to cattle pasture is also eliminating secondary Blue Iguana habitat.

Invasive mammalian predators are placing severe pressure on the remaining wild population. Free-roaming dogs kill adult iguanas, feral and semi-domestic cats hunt hatchlings and sub-adults, and rats injure and kill hatchings, and may occasionally invade nests. Road kills are an increasing cause of mortality. Trapping and shooting is a comparatively minor concern, but occasional trapping continues despite legal protection and sustained efforts in public awareness.

The common iguana, *Iguana iguana*, has become naturalized in Grand Cayman and now far outnumbers the endemic Blue Iguana. No direct negative consequences affecting the Blue Iguana are yet confirmed, but the situation confuses public attitudes and understanding, and may negatively influence human attitudes to all iguana species, hampering conservation efforts.

Attacks by feral and free-roaming domestic dog packs have resulted in deaths of free-roaming released Blue Iguanas in the QE II Botanic Park

STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS

December, 2008

Strengths

a) High level of success in captive breeding sustained over years
b) Substantial captive breeding / head-starting facility in place, with experienced and competent staffing
c) Restocking in the QE II Botanic Park and Salina Reserve now well advanced, with wild breeding occurring
d) Information and experience available from 18 years of field research, habitat restocking and monitoring efforts to date (diet, territorial ranges, habitat requirements, nesting ecology, etc)
e) Closely comparable data available from detailed study of *C. nubila caymanensis* on Little Cayman
f) High level of international interest leading to substantial funding and technical support
g) Stable local partnership managing project as a long term, integrated programme including research, captive breeding, restocking, habitat protection and public awareness
h) Legal protection for the iguana is in place
i) Legal mechanisms for protection of environmentally significant land exist in National Trust Law
j) The Blue Iguana is a widely recognized and popular conservation symbol in the Cayman Islands, with power as a flagship species to protect habitat
k) The success to the date of the programme is a success story for reptile conservation recognized throughout the world.

Weaknesses

a) Absence of cost-effective techniques for eradication or continuous high-level control of introduced predators
b) Severe impacts on iguana populations can result from extremely small numbers of free roaming dogs, meaning a very high standard of predator exclusion is required
c) Private ownership, limited availability and high cost of land affecting habitat protection initiatives
d) Time frame for land protection is short, due to accelerating and irreversible conversion of natural habitats for human use
e) Options for large areas of contiguous dry shrubland available for protection are limited and decreasing
f) Limited human resources available for management of captive population and wild habitats
g) Difficulty accessing sustainable financing for essential human resources
h) Public interest and concern fades easily and requires constant effort in education and awareness
i) Public attitudes are being confused by proliferation and consumption of introduced common iguanas (*Iguana iguana*) in populated areas.
j) Insufficient awareness of the Blue Iguana among government decision-makers
k) Habitat restoration and conversion for iguanas is expensive, and to date largely untried
l) Captive facility is relatively distant from main schools and most volunteers
m) Much of the field research to date remains unpublished

Opportunities

a) The Blue Iguana's dry shrubland habitat is rich in native biodiversity
b) High tourist appeal involving passive interactions which appear harmless to iguanas, is beginning to generate income to support iguana conservation
c) EU EDF9 grant positions programme to access Crown land and build a visitor centre in East Interior shrublands
d) Protection of Blue Iguanas and protected areas are called for in existing government policy documents, including the National Tourism Management Policy
e) The restocked population is becoming large enough to permit quantitative scientific studies, to answer questions relevant to the conservation programme
f) Large population of *C. n. caymanensis* on Little Cayman offers opportunities for comparative (and "surrogate") studies to elucidate problems with *lewisi*
g) International support for *Cyclura* conservation (zoos, conservation foundations, etc) seems likely to be sustained for the near future at least
h) New environmental legislation may soon provide stronger legal protection of the iguana and additional mechanisms or habitat protection
i) Environmental Protection Fees collected by the Cayman Islands Government may become available for habitat protection

Threats

a) Road kills – both on public highways and within managed habitats, increasing as the road network and traffic levels increase
b) Feral and semi-domesticated predators (rats, cats, dogs)
c) Ongoing habitat loss stemming from urbanization and associated movement of agricultural land into previously undisturbed areas
d) Conversion of crop lands to cattle pasture on range of wild iguanas
e) Quarrying proposal near known wild iguana habitat
f) Death of wild founders which are difficult to locate and may thus be lost to the gene pool
g) Deliberate capture to protect crops, and for illegal trade including international smuggling
h) Widening of common iguana consumption by human immigrants, to Blue Iguana consumption (this is a threat which has not yet been realized)
i) Potential for epidemic disease introduction via introduced species such as common iguanas and feral poultry
j) Illegal capture of released iguanas dispersing from protected areas
k) Newly gazetted road corridors through eastern districts including existing protected areas
l) Land value escalation
m) Redirection of environmental protection fees to other national priorities

KEY TO ABBREVIATIONS:

BIRP – Blue Iguana Recovery Programme
CTC – Central Tenders Committee, Cayman Islands Government
DOA – Department of Agriculture, Cayman Islands Government
DofE – Department of Environment, Cayman Islands Government
DOT – Department of Tourism, Cayman Islands Government
DWCT – Durrell Wildlife Conservation Trust
HMP Northward – Her Majesty's Prison, Northward
IRCF – International Reptile Conservation Foundation
MRCU – Mosquito Research & Control Unit, Cayman Islands Government
NTCI – National Trust for the Cayman Islands
PAPT – Protected Area Planning Team
QEIIBP – Queen Elizabeth II Botanic Park
RHB – Rutkowski Houghton Baxter, Cayman Islands
SDZ – San Diego Zoo's Institute for Conservation Research
SSP – Species Survival Plan for West Indian Rock Iguanas, American Zoo Association
TAB – Tourism Advisory Board, Cayman Islands Government
UCCI – University College of the Cayman Islands
WCS – Wildlife Conservation Society

Health-screening captive reared Blue Iguanas before release

THREE-YEAR ACTION PLAN

1 OBJECTIVE 1: Protect and manage xerophytic shrubland in eastern Grand Cayman sufficient to support at least one thousand Blue Iguanas

New Blue Iguana Reserve

1.1

Result: Grant of Crown shrubland from Government – by May 2009

Step	Task description	Lead	Timeline
1.1.1	Use SRP meeting to bring the land issue back to government attention, via invitees to final session, and press conference	BIRP, NTCI, DofE	December 2008
1.1.2	Continue direct approaches to decision-makers, using EU grant, and tourism potential as key arguments	NTCI, DofE, BIRP	December 2008 through January 2009
1.1.3	Stimulate public pressure on legislators to take action on this issue. Action: DofE, NTCI, BIRP	DofE, NTCI, BIRP	December 2008 through March 2009

1.2

Result: Protected Area Management Plan complete and agreed by all stakeholders – within 1 year of land grant and associated purchases.

Step	Task description	Lead	Timeline
1.2.1	Form Protected Area Planning Team.	BIRP, DofE, NTCI, plus external advisors as needed	Within 1 month of land protection
1.2.2	Hold wider stakeholder meetings	PAPT	Within 6 months of land protection
1.2.3	Formulate Management Plan	PAPT	Within 1 yr of land protection
1.2.4	Adopt Management Plan	NTCI, DofE, EDF9 local steering committee	Within 1 yr of land protection

1.3

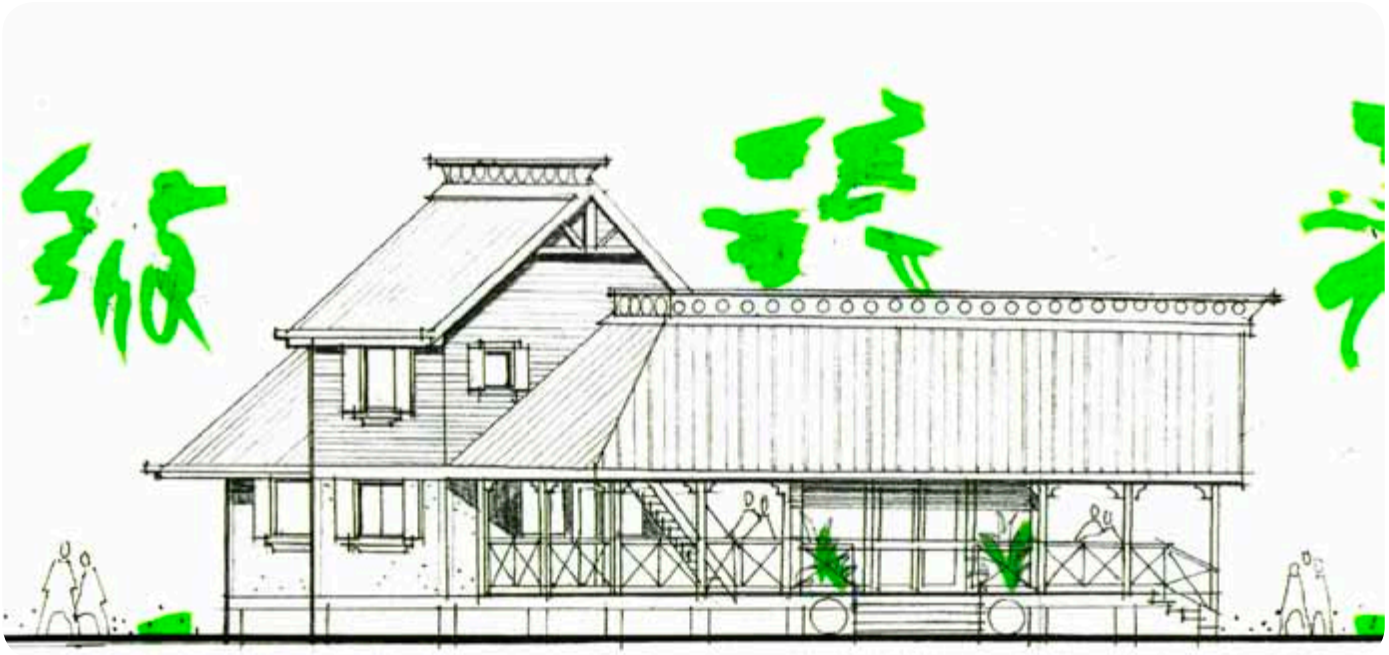
Result: New Visitor Centre completed and open – by 2011

Step	Task description	Lead	Timeline
1.3.1	Secure planning permission	RHB, Halcrow Yolles, BIRP	2009
1.3.2	Tender and select contractor(s), project manager	EDF9 local steering committee, CTC	2009
1.3.3	Build the centre and associated infrastructure	Contractor(s) and BIRP volunteers	2010-2011

1.4

Result: Head-starting operation relocated to new Protected Area – by 2011

Step	Task description	Lead	Timeline
1.4.1	Relocate head-start cages from QEIIBP to new protected area	BIRP	2011



Planned visitor centre for the new Blue Iguana Reserve

Salina Reserve

1.5

Result: Road corridors re-aligned or removed to avoid violation of Salina Reserve and proposed Blue Iguana Reserve area – by end of 2009

Step	Task description	Lead	Timeline
1.5.1	Survey, demarcate and sign the southern boundary of the Salina Reserve where new agricultural road is projected to approach	DofE, BIRP, NTCI	2009-2010
1.5.2	Continue policy pressure on Government to shift E-W corridor road alignment to pass clear of the Salina, and all road corridors clear of proposed Blue Iguana Reserve	DoE, NTCI, public at large	2009

1.6

Result: Wildfires prevented from spreading into Salina Reserve – immediate and ongoing.

Step	Task description	Lead	Timeline
1.6.1	Seek better enforcement of legislation prohibiting setting uncontrolled fires, both in Common Law, and in NTCI Law	DofE, NTCI with Fire Dept.	2009-2010
1.6.2	Individual outreach to neigbouring landowners	Fire Service informed by DofE	2009-2010
1.6.3	Maintain current availability of MRCU spray plane for occasional fire-fighting duty	MRCU (Also ref 1.20.2)	Immediate & ongoing
1.6.4	Fire emergency procedure plan in place	DofE, NTCI, BIRP, Fire Service, MRCU	By dry season 2009

1.7
Result: Maintain elimination of dogs and cats from iguana restoration areas – ongoing

Step	Task description	Lead	Timeline
1.7.1	Monitor for tracks and scat, and set traps in response	BIRP	Ongoing
1.7.2	Study remnants of cats stomachs, together with those captured in QEIIBP and Little Cayman, to develop a database of prey and frequency of iguana consumption	DOA, DofE, BIRP	2009-2011

1.8
Result: Block 65A Parcel 37 acquired to expand iguana habitat in the Salina Reserve and rationalize reserve boundary – by end of 2011

Step	Task description	Lead	Timeline
1.8.1	Establish contact with owners and beneficiaries, secure agreement to sell	NTCI	By February 2009
1.8.2	Obtain valuation	NTCI	2009
1.8.3	Purchase and merge with Salina Reserve	NTCI	2009-2010

1.9
Result: All boundaries adjacent to areas of development are clearly demarcated – immediate and ongoing

Step	Task description	Lead	Timeline
1.9.1	Maintain flagging on known boundaries	BIRP, NTCI	Ongoing
1.9.2	GPS survey and new flagging / signage where and when needed	BIRP, NTCI, DofE	Ongoing

QE II Botanic Park

1.10

Result: Captive facility fully fenced for security – by end of March 2009

Step	Task description	Lead	Timeline
1.10.1	Finalize installation contract	BIRP	January 2009
1.10.2	Complete installation of chain link sections	BIRP / Contractor	By March 2009
1.10.3	Complete wood picket segments	BIRP / Contractor	By March 2009

1.11

Result: Camera monitoring in place at captive facility, and functioning – by end of March 2009

Step	Task description	Lead	Timeline
1.11.1	Install conduits and cameras at facility	BIRP	By March 2009
1.11.2	Connect and commence local operation	HMP Northward, BIRP	By March 2009
1.11.3	Secure internet line and commence remote monitoring	BIRP	By April 2009
1.11.4	Expand system coverage to Park entrance gate area	BIRP, QEIIBP	By end of 2009
1.11.5	Terminate security guard contract	NTCI, QEIIBP	By April 2009

1.12

Result: QEIIBP enclosed by security fence sufficient to exclude human intruders, dogs, and cats – by 2011

Step	Task description	Lead	Timeline
1.12.1	Design fence routing to exclude gate and parking areas, such that public entry to secured area is via Visitors Centre	QEIIBP in consultation with BIRP and TAB.	By February 2009
1.12.2	Design interior fences and gates to reconcile dog and cat exclusion with the need for staff access during operating hours	QEIIBP, BIRP	By March 2009
1.12.3	Research local legislation concerning use of electric fences	DofE	By April 2009
1.12.4	Design structural specifications for fence, including specs to exclude cats and dogs	QEIIBP, BIRP	By June 2009
1.12.5	Budget and secure funding	QEIIBP / TAB, BIRP, DofE, NTCI	2010-2011
1.12.6	Build fence	Contractor	2010-2011
1.12.7	Design and implement a fence maintenance schedule	QEIIBP	2011

A security fence now protects the Blue Iguana captive facility in the QE II Botanic Park

1.13

Result: Maintain exclusion of dogs and a high level of control of cats in the QE II Botanic Park – ongoing

Step	Task description	Lead	Timeline
1.13.1	Enforce legislation placing responsibility for pets on owners	DOA	2009 ongoing
1.13.2	Trap any dogs or cats gaining entry to QEIIBP and hand them over to DOA	BIRP, QEIIBP, DOA	Ongoing
1.13.3	Set cat & dog traps at any weak points in Park perimeter fence	BIRP, QEIIBP	Ongoing
1.13.4	Seek understanding with Humane Society on need for lethal control as last resort	BIRP, NTCI, DofE	2009
1.13.5	Obtain Exemption Order and any other permits needed to allow authorized officers to shoot dogs and cats in the Park as last resort measure	DofE (also ref 1.14.2)	2009

1.14

Result: Exclude common iguanas from Botanic Park. Immediate & ongoing

Step	Task description	Lead	Timeline
1.14.1	Exclude common iguanas from Botanic Park	BIRP, QEIIBP	Ongoing
1.14.2	Obtain Exemption Order and any other necessary permits to allow authorized officers to shoot common iguanas which are impossible to capture alive	DofE (also ref 1.13.5)	2009
1.14.3	Excavate any nests observed, and destroy the eggs	BIRP, QEIIBP	Ongoing

1.15
Result: Increased understanding of potential impacts of common iguanas on GC Blue Iguanas – by 2011

Step	Task description	Lead	Timeline
1.15.1	Quantify risk of disease transmission from common iguanas to GC Blue Iguanas (see Result 1.17)	BIRP, WCS, DofE	2010
1.15.2	Record all observed behavioral interactions between the species, without relaxing efforts to eliminate common iguanas from GC Blue Iguana habitats (Result 1.14)	BIRP	2009 ongoing
1.15.3	Identify relevant knowledge gaps with a view to designing research project(s) as needed	BIRP, DofE	2010-2011

1.16
Result: Eliminate humans feeding/harassing iguanas – 2009 ongoing

Step	Task description	Lead	Timeline
1.16.1	Ongoing education of QEIIBP staff	QEIIBP, BIRP	Ongoing

Visitor and staff education are key to managing human interactions with released iguanas

1.17

Result: Complete a Risk Assessment for potential disease epidemics affecting captive and wild Blue Iguana populations on Grand Cayman – by 2011

Step	Task description	Lead	Timeline
1.17.1	Literature search & analysis	BIRP, DWCT, WCS	2009
1.17.2	Health-screening of common iguanas (as extension of annual iguana health-screening)	WCS	2010
1.17.3	Health-screening of feral chickens (as extension of annual iguana health-screening)	WCS	2010
1.17.4	Review history and current patterns of pet imports	DofE, DOA, BIRP	2009
1.17.5	Review results of Univ. Georgia health-screenings on turtles	DofE, BIRP	2009
1.17.6	Complete Risk Assessment	DofE, BIRP, plus external consultant if needed	2010-2011

1.18

Result: Develop a Crisis Management Plan for the Blue Iguana Captive Facility and surrounds

Step	Task description	Lead	Timeline
1.18.1	Create disaster crisis management plan (expanding on epidemic risk assessment to address response to this and other threats)	BIRP, DofE, NTCI	2011

1.19
Result: QEIIBP habitat optimized for free-roaming iguana population. Immediate and ongoing

Step	Task description	Lead	Timeline
1.19.1	Supply sufficient numbers and size ranges of artificial retreats to meet needs of free-roaming population	BIRP	2009-2011
1.19.2	Supply sufficient numbers of artificial nest mounds to meet needs of free-roaming population	BIRP	2009-2011

1.20
Result: Wildfires prevented from spreading into QEIIBP. Immediate and ongoing

Step	Task description	Lead	Timeline
1.20.1	Seek better enforcement of legislation prohibiting setting uncontrolled fires	BIRP, DofE, Fire Service	2009
1.20.2	Maintain current availability of MRCU spray plane for occasional fire-fighting duty. Action: MRCU	MRCU (also ref 1.6.3)	2010
1.20.3	Maintain clear corridors either side of the Park perimeter security fence, to serve as small fire breaks	QEIIBP, BIRP	2010
1.20.4	Relocate DofE ground fire fighting equipment to BIRP captive facility	DofE, BIRP	2009
1.20.5	Develop and maintain a volunteer fire response team	DofE	2009
1.20.6	Develop and maintain an evacuation plan (with supplies/equipment) in case of fire threatening the captive facility (see also existing hurricane preparedness procedures)	BIRP	2010-2011

2 OBJECTIVE 2: Restore, maintain and protect free roaming Blue Iguanas in natural habitats

New Blue Iguana Reserve

2.1
Result: Areas prepared for 2010 and 2011 releases

Step	Task description	Lead	Timeline
2.1.1	Develop and map work access trail network	BIRP, PAPT	2010 ongoing
2.1.2	Build and place retreats	BIRP	2010 ongoing

2.2
Result: New wild population established and breeding – by 2011

Step	Task description	Lead	Timeline
2.2.1	Release ca. 100 head-started iguanas	BIRP	2010, 2011
2.2.2	Adapt captive breeding and QEIIBP nest collection strategy to optimize genetics for second (2011) release	BIRP	2009 ongoing
2.2.3	Monitor for population change, dispersal and threats	BIRP	2010 ongoing

Salina Reserve

2.3
Result: Permanent artificial retreats deployed incrementally through core areas – 2009 and ongoing

Step	Task description	Lead	Timeline
2.3.1	Finalize mold production process	BIRP	2009
2.3.2	Cast 3 sizes in 2009 and additional sizes in subsequent years	BIRP	2009 ongoing
2.3.3	Deploy first in Central zone, and proceed only if monitoring confirms increase in population density	BIRP	2010 ongoing

2.4
Result: Genetic diversity of released population increased to at least 19 founder lines – by 2011

Step	Task description	Lead	Timeline
2.4.1	Release representatives of four currently unrepresented founders, and also from additional potential founders when they breed	BIRP	2009 ongoing

2.5
Result: Population density and dispersal under regular monitoring – annual ongoing

Step	Task description	Lead	Timeline
2.5.1	Annual population index using techniques established 2007-8	BIRP	2009 ongoing
2.5.2	Dispersal movements logging continued, and results analyzed periodically	BIRP	2009 ongoing
2.5.3	Publicize procedures for dispersed iguanas found by public, and manage on case-by-case basis	BIRP, NTCI, DofE	2009 ongoing

2.6
Result: Nesting sites improvement options tested – by 2010

Step	Task description	Lead	Timeline
2.6.1	Area of soil in Central zone loosened to 35cm depth and monitored through subsequent nesting season to assess if preferentially used for nesting	BIRP	2009 ongoing
2.6.2	Extend nest site soil loosening if it proves to be beneficial	BIRP	2010 ongoing

2.7
Result: Understanding of any potential for bias in reproductive success within the Salina wild population – by end of 2011

Step	Task description	Lead	Timeline
2.7.1	Sample blood from at least 30 hatchlings in 2011	BIRP	2011
2.7.2	Relatedness analysis and parental analysis	DWCT	2011

QE II Botanic Park

2.8
Result: Annual census of iguanas active in QEIIBP - Ongoing

Step	Task description	Lead	Timeline
2.8.1	Tabulate iguana sightings by Wardens and others, cumulatively through the year	BIRP	2009 ongoing
2.8.2	Summarize and compare to previous years and to total released population to assess changes in genetic representation	BIRP, SDZ, DWCT	2009 ongoing

2.9
Result: Annual health assessment of free-roaming population as a sentinel for potential disease introductions

Step	Task description	Lead	Timeline
2.9.1	Sample a proportion of the free-roaming population as is already done for the captive population, and health-screen the same way	WCS	2009 ongoing

2.10
Result: Improved understanding of use by iguanas of land neighbouring QEIIBP

Step	Task description	Lead	Timeline
2.10.1	One or two MSc student studies radio-tracking marginal QEIIBP males to lead to 'satellite' individuals, with associated assessment of interactions with humans and man-modified environments	MSc course at DWCT, BIRP, DofE	2010, 2011

2.11
Result: Genetic diversity of free-roaming population optimized

Step	Task description	Lead	Timeline
2.11.1	Release representatives of additional founder lines (small numbers)	BIRP, SDZ	2009 ongoing
2.11.2	Sample random hatchlings in 2011 and look for biases in reproductive success	BIRP, DWCT, SDZ	2011

3 OBJECTIVE 3: Provide genetically optimal animals for reintroduction from the existing on-island captive breeding and head-starting facility

3.1
Result: Establish genetic signature of all founders and potential founders

Step	Task description	Lead	Timeline
3.1.1	Include as-yet unanalyzed founders and potential founders into micro-satellite matrix. Re-screen as necessary to establish authoritative reference	DWCT	2009
3.1.2	Test suspected hybrids, Cayman Islands and US animals to verify historic hybridization results, and to check for any potential additional founder lineages	DWCT, SDZ	2009
3.1.3	Identify Racksworthy *et al* sample origin	DWCT, SDZ	2009
3.1.4	Explore mtDNA of historic samples held in London, Kansas etc.	DWCT, SDZ, BIRP	2009
3.1.5	Test relatedness between all founders and potential founders	DWCT	2009

3.2
Result: Clarify aspects of genetics relevant to captive breeding and restoration to the wild – 2009 to 2010

Step	Task description	Lead	Timeline
3.2.1	Resolve Warren and Zadok cluster, & Elle Wood and Jessica	DWCT	2009
3.2.2	Paternity test for multiple sires: e.g. Yellow and Meteor (Dempster's 1995 clutch)	DWCT	2009
3.2.3	Resolve free-roaming park females, by collecting new samples	BIRP, DWCT	2009
3.2.4	Using existing data (plus new samples from unanalyzed parents) to search for reproductive bias and so refine future Salina releases	BIRP, DWCT, SDZ	2009
3.2.5	Pedigree analysis and breeding strategy	SDZ, BIRP	2009 ongoing

3.3
Result: Reconfirm status of *C. lewisi* as species in relation to *C. nubila* in Little Cayman and Cuba, and *C. cychlura* in the Bahamas.

Step	Task description	Lead	Timeline
3.3.1	Re-confirm LCM mtDNA cluster	DWCT	2009
3.3.2	Publish	DWCT, BIRP	2009

3.4
Result: Additional head-starting cages constructed sufficient to accommodate anticipated pre-release populations

Step	Task description	Lead	Timeline
3.4.1	Quantify cage needs by projecting egg collections vs. releases in 2009, 2010	BIRP	February 2009
3.4.2	Free area space after construction of security fence	BIRP	February 2009
3.4.3	Build cages	BIRP, local volunteers	August 2009

3.5
Result: Hormonal cycles compared between free roaming, captive reproductive and captive non-reproductive individuals to seek understanding of declining condition of larger males.

Step	Task description	Lead	Timeline
3.5.1	Test feasibility of faecal sample collections and refine study plan accordingly	BIRP, WCS	2009
3.5.2	Collect samples during breeding and non breeding seasons	BIRP	2009-2010
3.5.3	Analyze and draw conclusions	WCS, BIRP	2009-2010

3.6

Result: Annual weighing and measuring routine established to monitor growth of all captive iguanas – 2009 ongoing

Step	Task description	Lead	Timeline
3.6.1	Complete measurements for all individuals immediately preceding or following annual health-screening	BIRP	2009 ongoing

Periodic growth measurements on the captive reared iguanas provides an indication of the standard of diet and their general health

4 OBJECTIVE 4: Safeguard against catastrophic loss of Grand Cayman Blue Iguana populations, by maintaining the off-island captive population

4.1
Result: Existing founder lines maintained *ex-situ* until Blue Iguana populations are securely established in at least 3 protected areas on Grand Cayman – 2009 ongoing

Step	Task description	Lead	Timeline
4.1.1	Maintain SSP and AZA partnering zoo involvement to maintain current genetic diversity ex-situ	SSP, partnering Zoos	2009, 2010
4.1.2	Evaluate and renew commitment of the 12 AZA facilities currently involved, seeking both to maximize standards of care, and establish / renew connections to the in-situ conservation effort (e.g. as in 4.2.2)	BIRP, SSP, partnering Zoos	2009, 2010

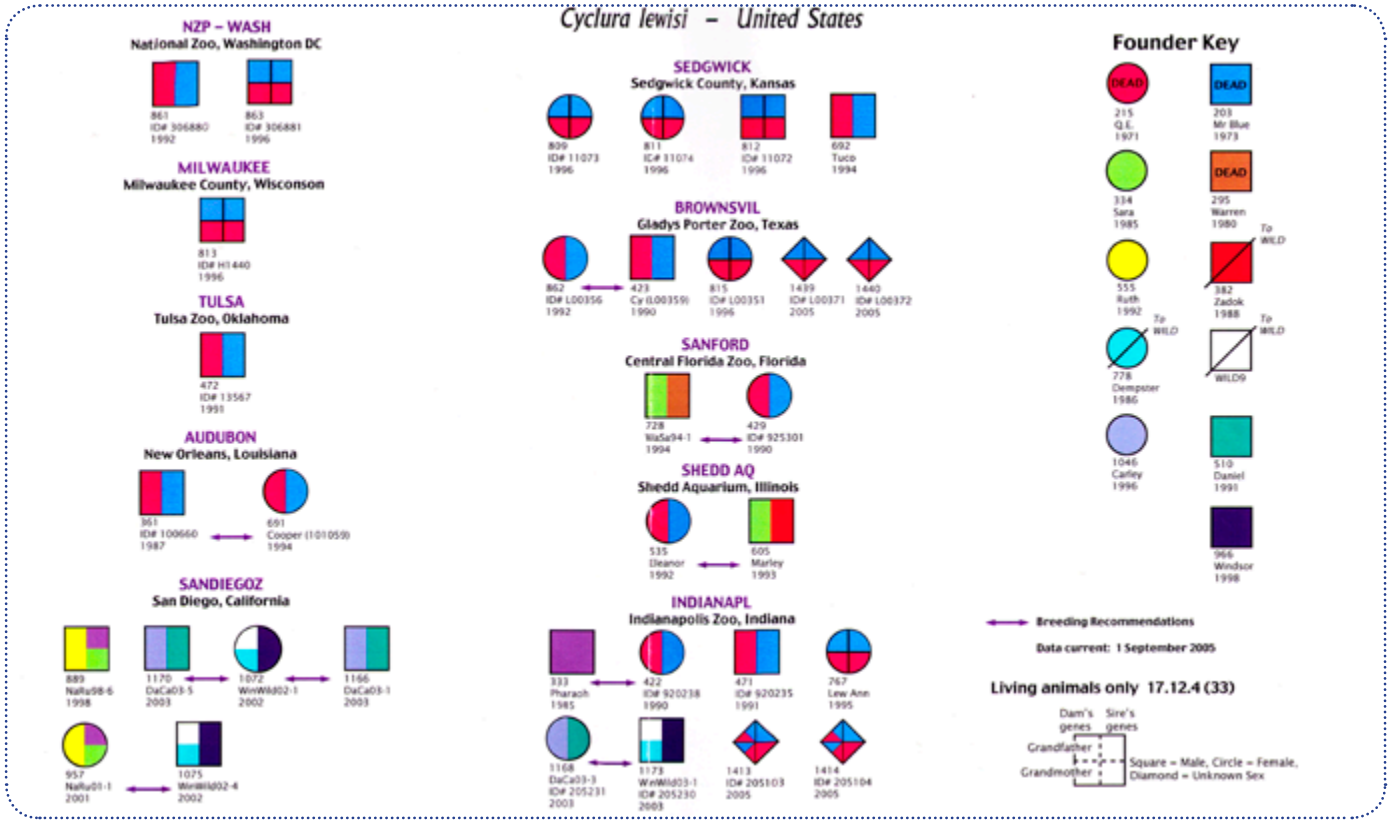
4.2
Result: Maximize value of ex-situ population to the conservation programme on Grand Cayman – 2009 ongoing

Step	Task description	Lead	Timeline
4.2.1	Foster and seek to improve education and awareness materials in association with Blue Iguanas on exhibit in zoos	BIRP, SSP, partnering Zoos, IRCF	2009 ongoing
4.2.2	Encourage direct BIRP funding and human resource assistance links with individual zoos holding Blue Iguanas	BIRP, SSP, partnering Zoos	2009 ongoing

4.3

Result: Establish a policy and strategy for GC Blue Iguanas in ex-situ facilities, in event the ex-situ population ceases to be a conservation priority

Step	Task description	Lead	Timeline
4.3.1	BIRP and DofE to meet with SSP representative(s) and veterinary specialist to discuss options and agree policy, including 4.3.2. and 4.3.3	BIRP, DofE, SSP	2010 subject to progress towards Results 1.1 & 2.1
4.3.2	Seek to establish legal ownership of ex-situ Blue Iguanas as property of the Cayman Islands Government	DofE, SSP, BIRP	2010-2011
4.3.3	Ensure no further *C. lewisi* in custody of US zoos are allowed to enter the private pet trade	SSP	2009 ongoing



A 2005 diagram from the international West Indian Rock Iguana Studbook, showing genetic makeup of Grand Cayman Blue Iguanas in US zoos at that time.

5 OBJECTIVE 5: Ensure sustained support for the conservation of the Blue Iguana through targeted education and awareness programmes

5.1
Result: Teachers guide "True Blue" content expanded for all schools age groups

Step	Task description	Lead	Timeline
5.1.1	Develop and distribute content for High School level	BIRP, NTCI	2009, 2010
5.1.2	Distribute Kindergarten module	BIRP, NTCI	2009
5.1.3	Complete and distribute Resource Box	BIRP, NTCI	2009
5.1.4	Place all informational content as downloadable files on NTCI and BIRP web sites	BIRP, NTCI, IRCF	2009, 2010

5.2
Result: Blue Iguana educational resources placed with UCCI

Step	Task description	Lead	Timeline
5.2.1	Define scope and nature of resources needed	BIRP, UCCI	2009-2010
5.2.2	Write / develop and produce resources	BIRP, UCCI	2010

5.3
Result: New protected area optimized for educational uses

Step	Task description	Lead	Timeline
5.3.1	Design educational resources for Blue Iguana Reserve Visitor Centre (see Result 1.3)	BIRP, NTCI, DofE, with consultant(s)	2011
5.3.2	Secure funding	BIRP, NTCI, DofE	2011
5.3.3	Develop and emplace resources	Selected suppliers / contractors	2011 and beyond
5.3.4	Commence educational programmes	BIRP, NTCI	2011 onwards

5.4
Result: Increased visibility of programme in tourism sector

Step	Task description	Lead	Timeline
5.4.1	Provide information / resources to DOT tour operator training	BIRP, NTCI, DOT	2009-2010
5.4.2	Offer on-site training to tour operators visiting QEIIBP or new Blue Iguana Reserve	BIRP	2010 ongoing
5.4.3	Develop and distribute informational materials for hotel and condominium rooms	BIRP, IRCF	2009, 2011
5.4.4	Present opportunity of new Blue Iguana Reserve to Tour Operators Association	BIRP	2010-2011
5.4.5	Seek tour promotional partnerships with rental car companies	BIRP, NTCI	2009-2010

5.5
Result: General population in Cayman Islands progressively more aware of distinctions between Blue Iguanas and the introduced common iguana

Step	Task description	Lead	Timeline
5.5.1	Include information in materials offered to visitors and tour operators	BIRP, IRCF, DOT, NTCI	2009 ongoing
5.5.2	Flood local media market with free-license images of Blue Iguanas	BIRP	2009-2010
5.5.3	Maintain distribution of Blue/Green posters	BIRP, NTCI, IRCF	ongoing
5.5.4	Maintain dialogue with Humane Society, Cayman Wildlife Rescue etc. on division of responsibility re welfare issues vs. conservation	NTCI, DofE, BIRP	ongoing

5.6
Result: BIRP activities maintained high profile in local media

Step	Task description	Lead	Timeline
5.6.1	Regular news updates to all local media	BIRP	ongoing
5.6.2	Develop local TV features	BIRP, Cayman27	2010

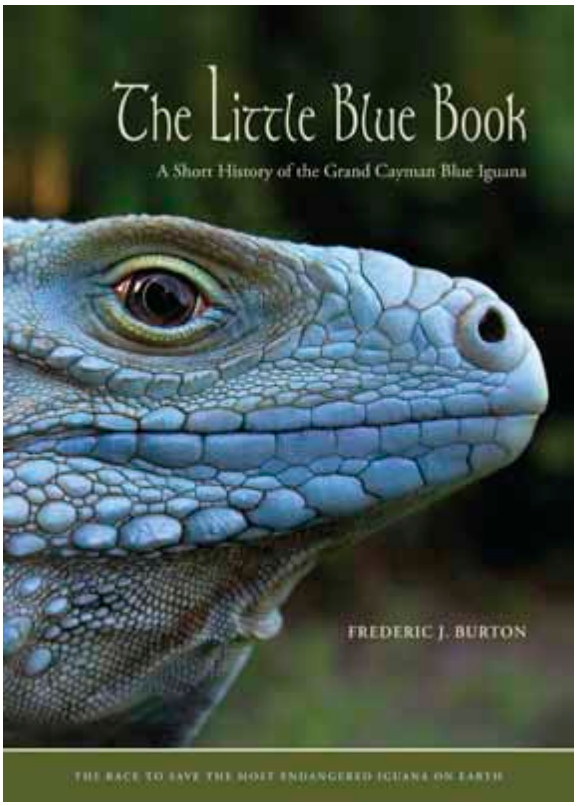
5.7
Result: Renewed programme web site

Step	Task description	Lead	Timeline
5.7.1	Create new web face	IRCF, BIRP	2009
5.7.2	Ensure weekly updates to blogs	BIRP	Ongoing
5.7.3	Develop new content, including tour arrangements, educational resources, SRP outline etc.	BIRP, IRCF	2009
5.7.4	Mirror the static and key news content on the site in other European languages (e.g. Spanish, German, French) – subject to volunteer translators availability	IRCF, BIRP	2010-2011

The Blue Iguana captive facility is a popular field trip excursion for school class groups

5.8
Result: Expanded merchandising with information content

Step	Task description	Lead	Timeline
5.8.1	Complete DVD "Too Blue to Lose"	BIRP, Wild Wings Vision	2009
5.8.2	Publish "Little Blue Book"	BIRP, IRCF	2009
5.8.3	Market elements from "True Blue" resource box	NTCI, BIRP	2009 ongoing
5.8.4	Increase range of BIRP products in QEIIBP gift shop	NTCI, BIRP, QEIIBP	2009 ongoing
5.8.5	Seek to expand number of retail outlets (e.g. Craft Market, Disney shops on board)	NTCI, BIRP	2010
5.8.6	Secure human resources to manage and expand iguana naming and sponsorships as a sustainable revenue source	BIRP, NTCI	2009 ongoing



Some past and future Blue Iguana retail items

6 OBJECTIVE 6: Secure sufficient financial, technical and human resources for the long-term sustainability of the Blue Iguana Recovery Programme – ongoing

6.1
Result: Sustainable institutional arrangements adopted

Step	Task description	Lead	Timeline
6.1.1	Formalize current role of the DofE in the BIRP	BIRP, NTCI, DofE	2009
6.1.2	Work towards new institutional arrangements that provide for sustainable funding of human resources	BIRP, NTCI, DofE	2009-2011
6.1.3	Market elements from "True Blue" resource box to generate sustainable revenue	NTCI, BIRP	2009 ongoing
6.1.4	Secure human resources to develop and maintain iguana naming and sponsorship income	NTCI, BIRP	2009 ongoing

6.2
Result: Maintain existing and new grant funding income sufficient to maintain programme momentum

Step	Task description	Lead	Timeline
6.2.1	Maintain financial and services support from current corporate sponsors	BIRP, NTCI, current corporate sponsors	2009-2011
6.2.2	Seek additional corporate sponsors	BIRP, NTCI, DofE	2009-2011
6.2.3	Seek additional international grants for specific project work	BIRP, DofE, IRCF, DWCT	2009 ongoing
6.2.4	Seek direct (bilateral) annual grant agreements with US zoos holding Blue Iguanas	SSP, BIRP	2009, 2010
6.2.5	Draw down and manage EU EDF9 grant funds for new Blue Iguana reserve and visitor centre	EDF9 local steering committee; NTCI	2009-2011

6.3

Result: Build tour operations to generate increasing proportion of warden salaries

Step	Task description	Lead	Timeline
6.3.1	Advertise and promote QEIIBP Blue Iguana Safari	BIRP, NTCI, IRCF	2009-2010
6.3.2	Transition and develop tours in new Blue Iguana Reserve	BIRP, NTCI	2011

A Blue Iguana Safari in progress

Local corporate donations are a major source of funding for the programme

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The third strategic planning session for the Grand Cayman Blue Iguana, in progress

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