



Cheetah Conservation Fund (CCF)

- CCF, founded in 1990, is an International NGO with headquarters in Namibia since 1991.
- In Namibia CCF is a Section 21 company.
- CCF has formal organizational partners in:
 - Australia, Canada, France, Germany, Italy, Japan, United Kingdom, & United States.

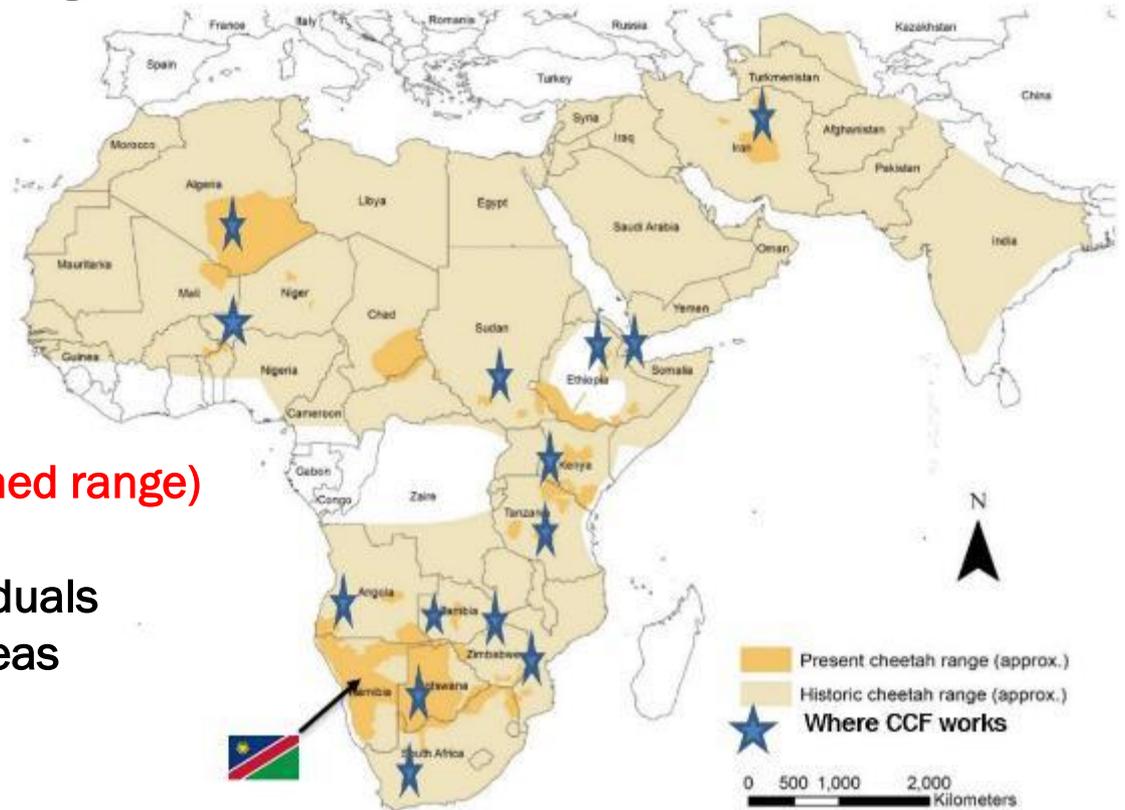
CCF International Scope

- CCF has assisted the establishment of local cheetah conservation organizations in:
 - Kenya, Botswana, South Africa, Iran, Zimbabwe.
- CCF consults with colleagues and government agencies in other cheetah range countries including: Zambia, India, Algeria, Ethiopia, Angola, Mozambique, Southern Sudan and Niger.
- CCF is a core member of the IUCN Cat Specialist Group helping develop regional strategies for cheetahs throughout their range.
- Contributes to international biomedical databases and maintains a Genome Recourse Bank.
- Networks extensively and promotes common methodology.

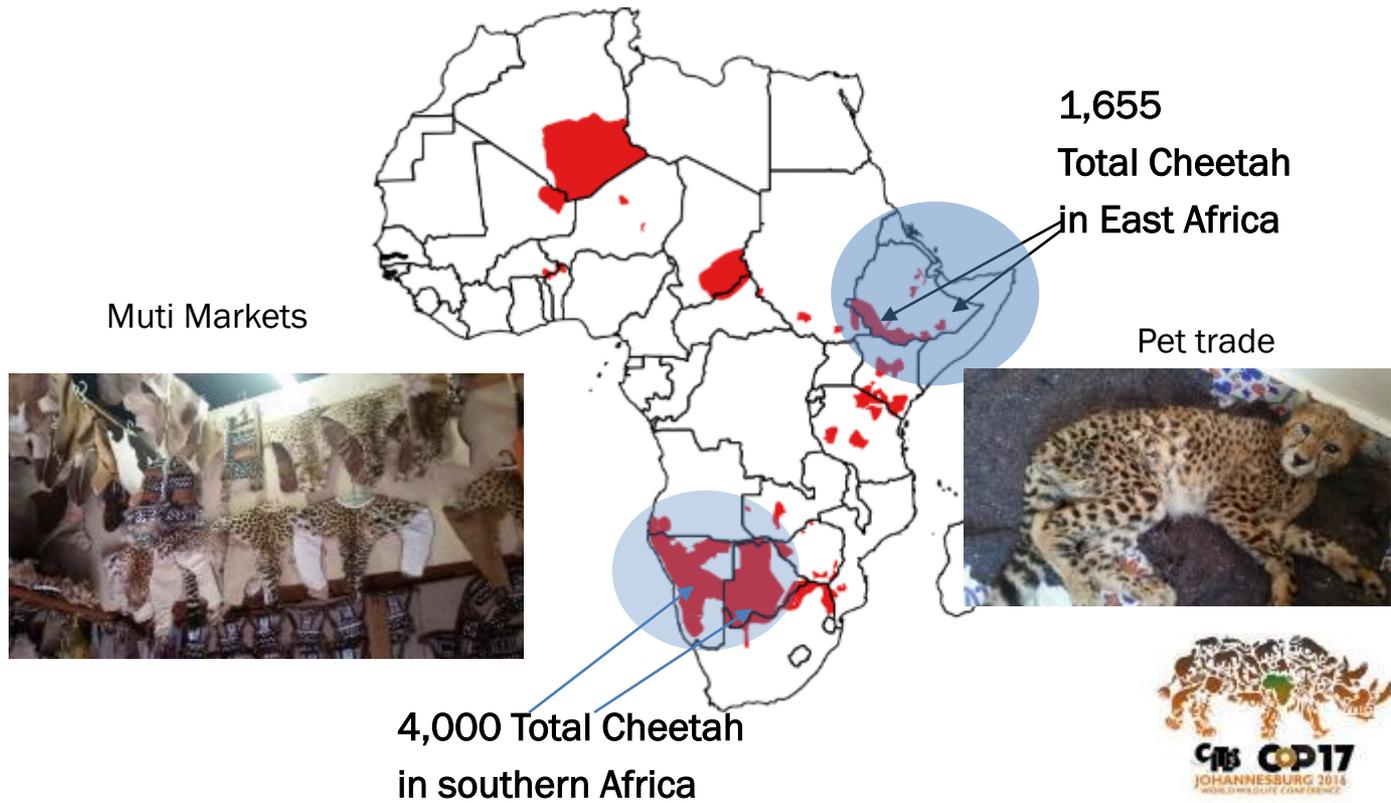
Cheetah Distribution

Only 26% of their former range

- **< 7,500 adult cheetahs (confirmed range)**
- 31 populations – 23 countries
- 20 populations are < 100 individuals
- 77% are outside of protected areas
- 50% are in southern Africa



Cheetah Trafficking areas in the Horn of Africa and southern Africa

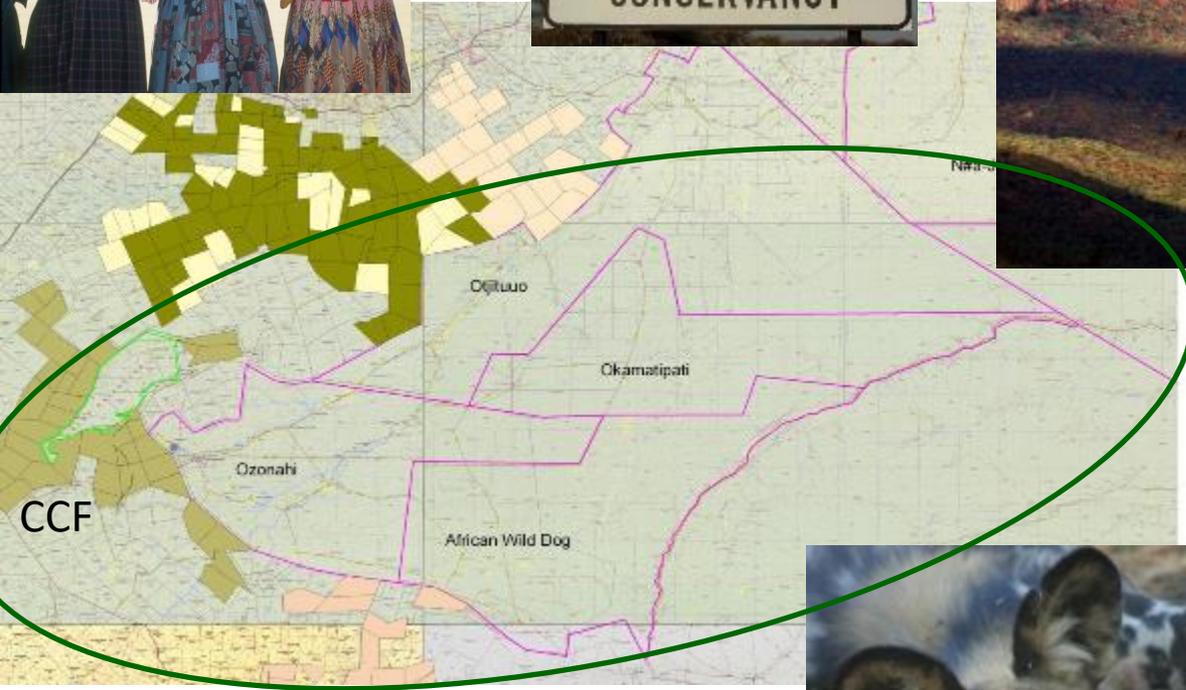


Mission

To be the internationally recognized centre of excellence in the conservation of cheetahs and their ecosystems.

CCF works with all stakeholders to develop best practices in research, education, and land use to benefit all species, including people.

Greater Waterberg Complex



CCF Namibia Research Centre



Collaborators

- NUST
- University of Namibia
- Cornell University
- The National Museum of Namibia
- The State University of New York College of Environmental Science and Forestry
- The Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev
- VTT Technical Research Centre of Finland
- Smithsonian Institution

2018 International Population

Total :

1841 (931.907.3) cheetahs

279 facilities

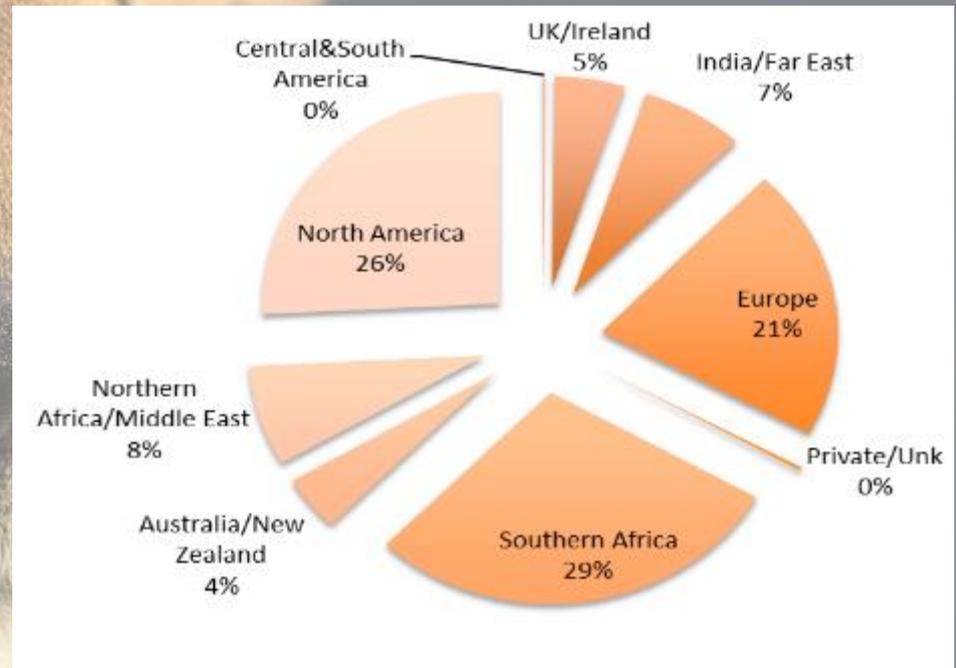
Births:

65 litters at 40 facilities

229 (106.89.35) cubs

Deaths:

182 (73.76.33)



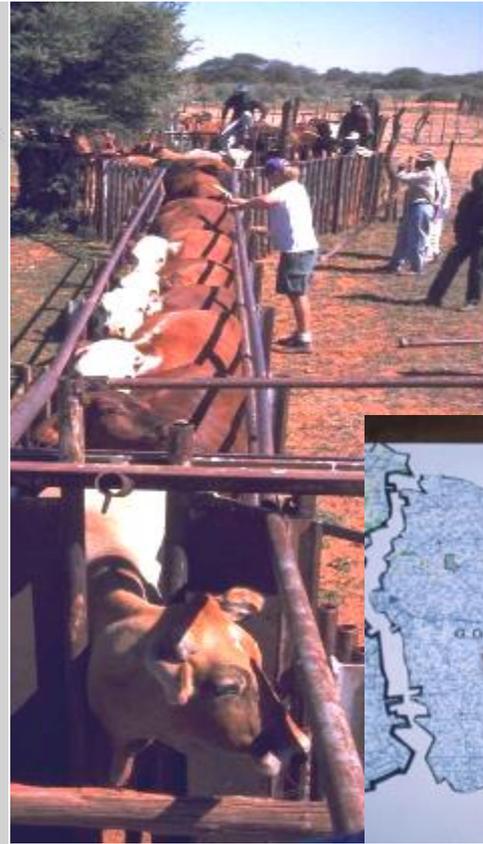
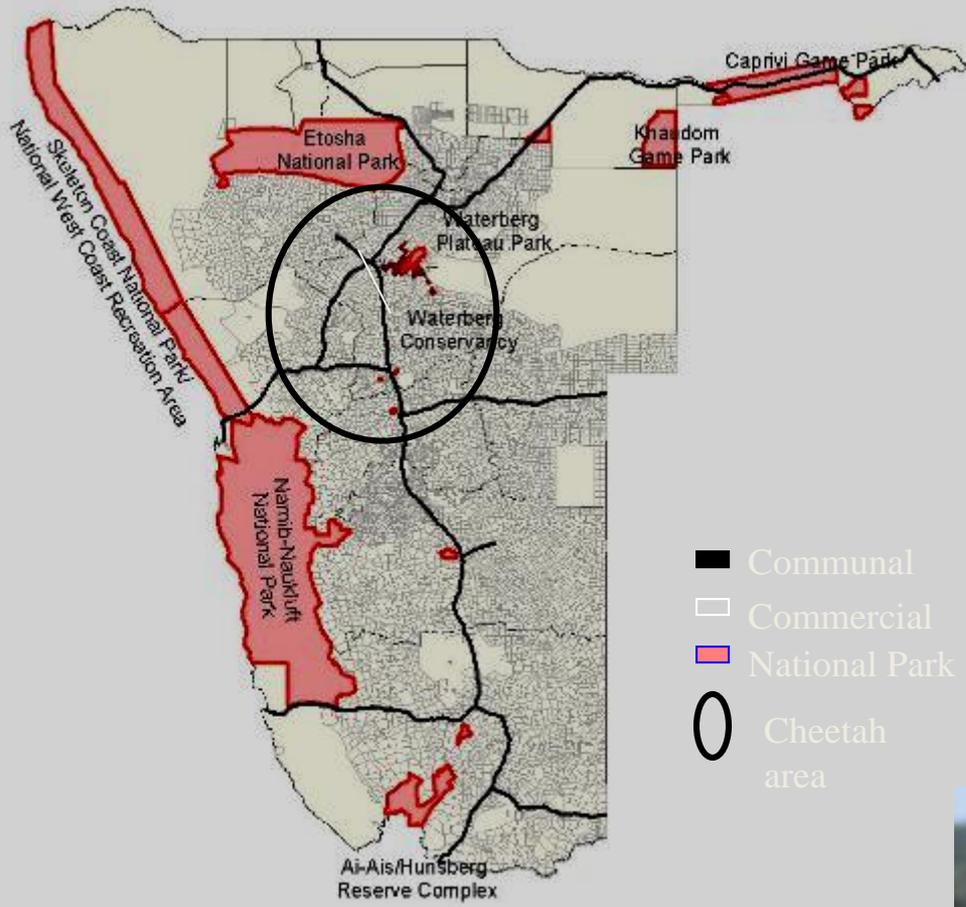
International Studbook

CCF Facilities and Impact



- CCF Open to the Public Field Research Centre (~13,000 visitors per yr) is a part of the Waterberg Conservancy, the Greater Waterberg Complex and borders the Waterberg Plateau Park.
- CCF operates a Model Farm to train, test and refine integrated livestock and wildlife management programmes and is an active member of CANAM.
- CCF operates CCF Bush, PTY LTD to encourage sustainable utilization of the encroaching thornbush and produces BushBlok.
- CCF creates employment for ~ 130 people - 2009 economic impact assessment by U Neb. = ~ \$30 million impact to the country.

Farming Supports 70% of Namibians



Supports 90% of the cheetahs

Core Programs

Better understanding of the Cheetah's challenges

- Biomedical Research
- Genetic Research
- Scat Detection Dogs
- Ecological Research
- Economic evaluation
- Rewilding

Education / HWC mitigation

- Future Farmers Program
- International courses
- Education Outreach
- Work in other countries
- Guard dogs / swing gates

Alternative livelihoods

- Bush harvesting / alternative energy
- Model Farm
 - Dairy
- Eco tourism

CCF Conservation Research Programmes

- CCF has developed models for mitigating human wildlife conflict, including the use of livestock guarding dogs and farmer's training.
- CCF investigates and applies carnivore census technology including radio-telemetry, camera trapping, and genetic DNA analysis.
- CCF shares its findings in both peer reviewed and other publications and lectures internationally.
- CCF responds to farmer and MET requests regarding “problem” cheetah or improperly housed captive animals working with LCMAN.

Understanding cheetah biology & ecology

- Long-term health studies – over 900 individuals



Investigating prey preferences



Used scat analysis and feeding trials

- Determined prey preferences
- Look at proportion of livestock in diet



Quantifying prey preferences of free-ranging Namibian cheetahs

L.L. Marker^{1,2*}, J.R. Muntifering¹, A.J. Dickman^{1,2},
M.G.L. Mills³ & D.W. Macdonald²

¹Cheetah Conservation Fund, P.O. Box 1755, Otjivero, Namibia

²Wildlife Conservation Research Unit, Department of Zoology, University of Oxford, South Parks Road, Oxford, U.K.

³South African National Parks and Endangered Wildlife Trust, Private Bag X402, Skukuza 1350, South Africa

Received 3 September 2012; Accepted 25 March 2013

Reasons for live capture of cheetahs



Available online at www.sciencedirect.com

ScienceDirect

Biological Conservation 114 (2008) 401–412

BIOLOGICAL
CONSERVATION

www.elsevier.com/locate/bioco

Aspects of the management of cheetahs, *Acinonyx jubatus jubatus*, trapped on Namibian farmlands

L.L. Marker^{a,b}, A.J. Dickman^{a,b}, M.G.L. Mills^a, D.W. Macdonald^b

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Received 10 April 2007; received in revised form 5 February 2008; accepted 6 February 2008



MORPHOLOGY, PHYSICAL CONDITION, AND GROWTH OF THE CHEETAH (*ACINONYX JUBATUS JUBATUS*)

LAURIE L. MARKER* AND AMY J. DICKMAN

Cheetah Conservation Fund, P.O. Box 1755, Otjiwarongo, Namibia
Wildlife Conservation Research Unit, Department of Zoology, 30 South Parks Road,
Oxford OX1 3PS, United Kingdom

DENTAL ANOMALIES AND INCIDENCE OF PALATAL EROSION IN NAMIBIAN CHEETAHS (*ACINONYX JUBATUS JUBATUS*)

LAURIE L. MARKER* AND AMY J. DICKMAN

Cheetah Conservation Fund, P.O. Box 1755, Otjiwarongo, Namibia (LLM)
Wildlife Conservation Research Unit, Department of Zoology, South Parks Road, Oxford OX1 3PS, United Kingdom (AJD)

Morphometrics

- Examined incidence of morphological abnormalities
- Focal Palatine Erosion (FPE) – in wild cheetahs as well as captive ones
- Found evidence of kinked tails & crowded lower incisors – linked to genetics?



Biology - disease

SEROSURVEY OF VIRAL INFECTIONS IN FREE-RANGING NAMIBIAN CHEETAHS (*ACINONYX JUBATUS*)

Linda Munson,¹ Laurie Marker,² Edward Dubovi,³ Jennifer A. Spencer,^{4,7}
James F. Evermann,⁵ and Stephen J. O'Brien⁶

¹ Department of Pathology, Microbiology, and Immunology, School of Veterinary Medicine, University of California, Davis, California 95616, USA

² Cheetah Conservation Fund, Otjiwarango, Namibia

Virus

Proportion of wild cheetahs exposed

FCoV (FIP)

21/72 (29%)

FHV (herpes)

9/74 (12%)

FPV (CPV) (panlukopenia)

24/50 (48%)

FCV (calesis)

32/49 (65%)

CDV (canine distemper)

17/70 (24 %)

FeLV (feline leukemia)

0/69 (0%)

**FIV (feline immune deficiency
virus)**

0/39 (0%)

EXTRINSIC FACTORS SIGNIFICANTLY AFFECT PATTERNS OF DISEASE IN FREE-RANGING AND CAPTIVE CHEETAH (*ACINONYX JUBATUS*) POPULATIONS

Linda Munson,^{1*} Karen A. Terio,¹ Michael Worley,² Mark Jago,² Arthur Bagot-Smith,⁴ and Laurie Marker¹

¹ Department of Veterinary Pathology, Microbiology, and Immunology, University of California, Davis, California 95616, USA

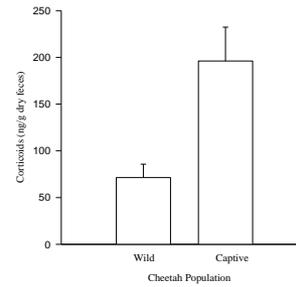
² Center for Reproduction of Endangered Species, Zoological Society of San Diego, San Diego, California 92115, USA

³ Otjiverango Veterinary Clinic, Otjiverango, Namibia

⁴ Cheetah Conservation Fund, Otjiverango, Namibia

* Corresponding author (email: lmunson@ucdavis.edu)

Biology & Disease



Coronavirus outbreak in cheetahs: Lessons for SARS

Allison J. Pearks Wilkerson, Emma C. Teeling, Jennifer L. Troyer, Gila Kahila Bar-Gal, Melody Roelke, Laurie Marker, Jill Pecon-Slattry and Stephen J. O'Brien¹

JOURNAL OF CLINICAL MICROBIOLOGY, Jan. 2005, p. 229-234
0095-1137/05/\$08.00+0 doi:10.1128/JCM.43.1.229-234.2005
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Vol. 43, No. 1

Comparison of *Helicobacter* spp. in Cheetahs (*Acinonyx jubatus*) with and without Gastritis

K. A. Terio,^{1*} L. Munson,¹ L. Marker,² B. M. Aldridge,¹ and J. V. Solnick³

Department of Pathology, Microbiology and Immunology, School of Veterinary Medicine,¹ and Departments of Internal Medicine and Medical Microbiology and Immunology, Center for Comparative Medicine, School of Medicine,² University of California, Davis, California, and Cheetah Conservation Fund,³

CCF Reproductive Research & Genome Resource Bank (GRB)

- >185 cheetah sperm samples cryopreserved in the CCF GRB
- Improved field-friendly cheetah cryopreservation



CSIRO PUBLISHING

Reproduction, Fertility and Development, 2007, 19, 370–382

www.publish.csiro.au/journals/rfd

Ejaculate traits in the Namibian cheetah (*Acinonyx jubatus*): influence of age, season and captivity

Adrienne E. Crosler^{A,B,C}, Laurie Marker^B, JoGayle Howard^A,
Budhan S. Pukazhenthi^A, Josephine N. Hengahl^B and David E. Wildt^A

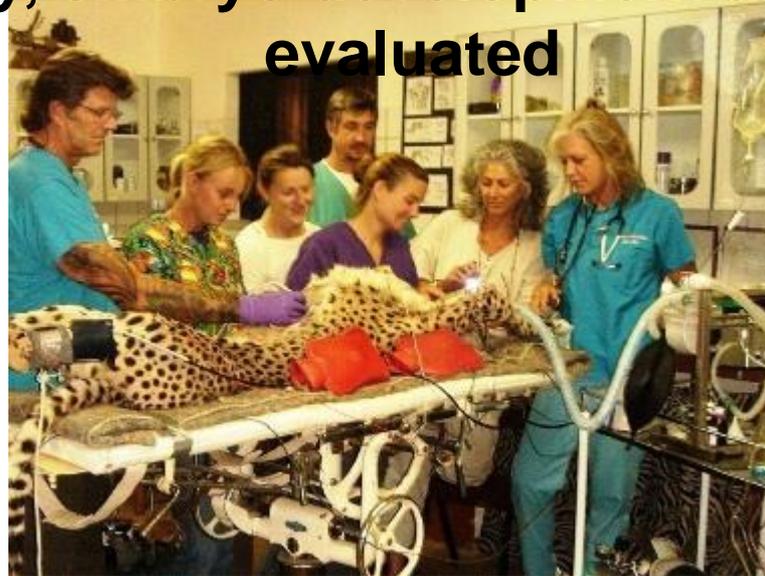
^ADepartment of Reproductive Sciences, Smithsonian's National Zoological Park, Conservation and Research Center, 1500 Remount Road, Front Royal, VA 22630, USA.

^BThe Cheetah Conservation Fund, PO Box 1755, Otjivarongo, Namibia.

^CCorresponding author. Email: crosiera@si.edu

Artificial reproductive techniques

Oestrous cyclicity assessed using faecal hormones
Oocyte quality, embryo development and uterine health
evaluated

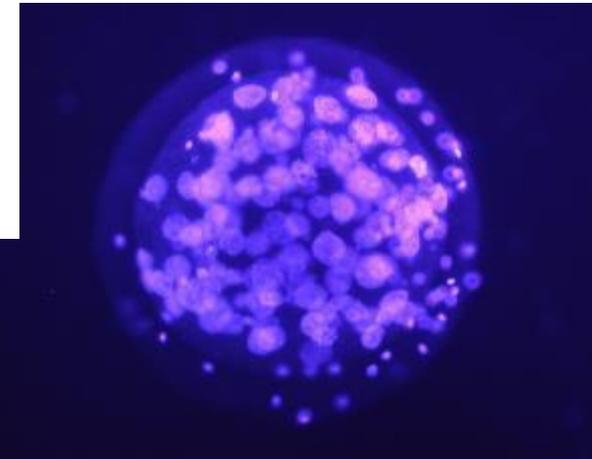


The 1st
frozen
embryo

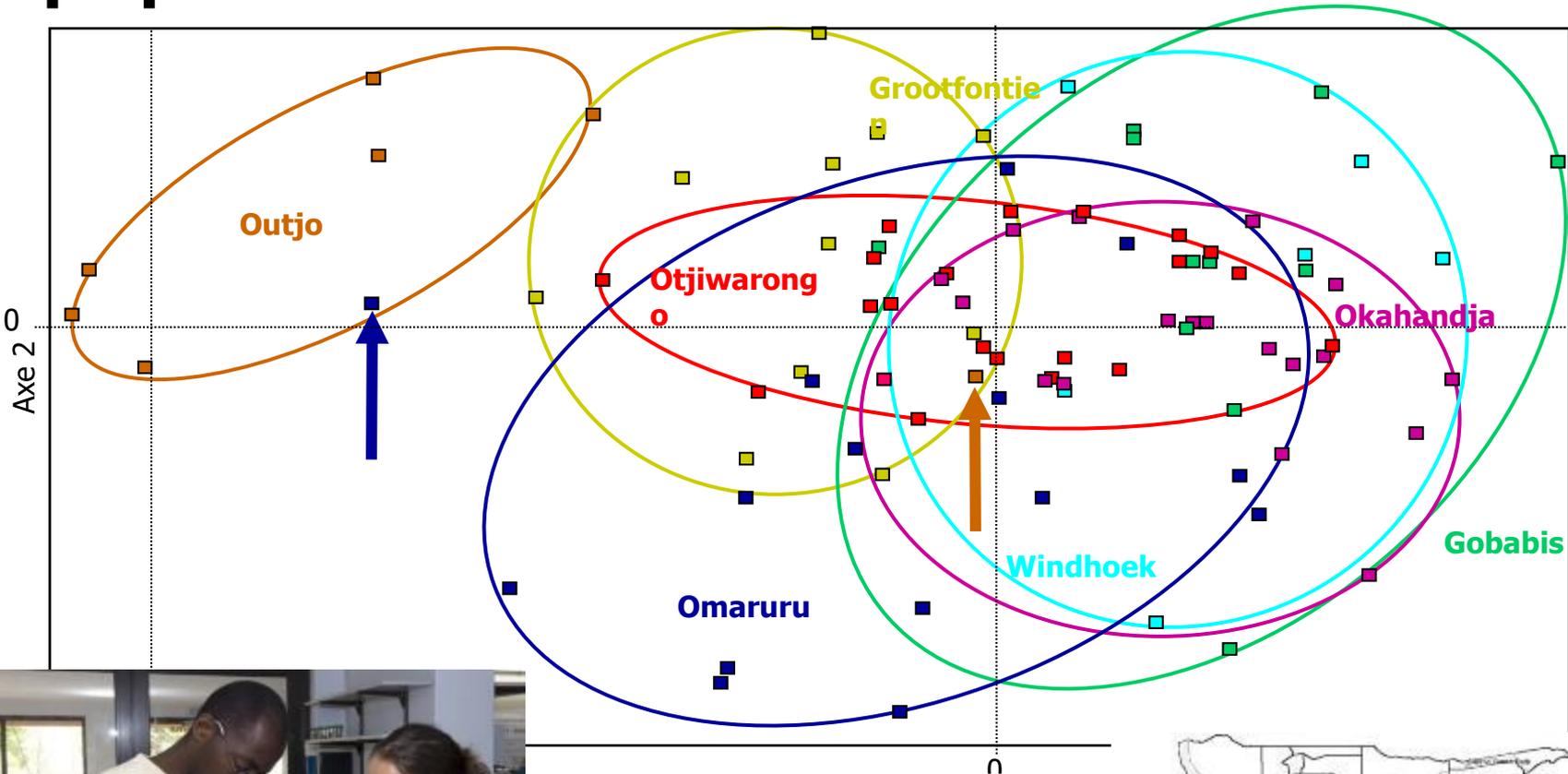
Ovarian and Follicular Metrics are Useful for Predicting Oocyte Quality in the Cheetah (*Acinonyx jubatus*)

Adrienne E. Crosier¹, David E. Wildt¹, Tom Baker², Autumn Davidson², JoGayle Howard¹, Laurie L. Murker² and Pierre Comazzoli³

¹Smithsonian's National Zoological Park, Conservation & Research Center, Washington, DC and Front Royal, VA, USA; ²Cheetah Conservation Fund, Otjiwarongo, Namibia; ³School of Veterinary Medicine, University of California-Davis, Davis, CA, USA.



Understanding cheetah biology & ecology: population structure



Journal of Heredity 128(11):1-11
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Molecular Genetic Insights on Cheetah (*Acinonyx jubatus*) Ecology and Conservation in Namibia

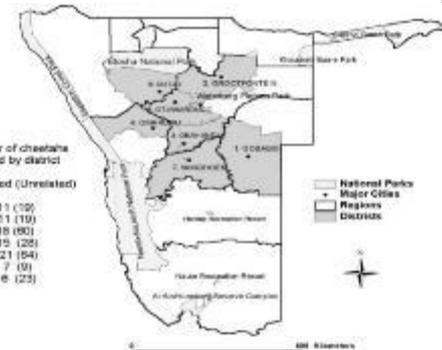
LAURE L. MAHER, AUSTIN J. POWIS, WOODROCK, RONALD J. SERRIO, JANEZ MARTENSON, GERHART BIRNBAUMER-WÜSTNER, STEFAN J. O'BRIEN, AND WILHELM E. JOHNSON

From the Cheetah Conservation Fund, PO Box 1730, Otjiwarong, Namibia (Maher and Woodrook); the Wildlife Conservation Research Unit, Department of Zoology, Oxford University, South Parks Road, Oxford OX1 3PS, UK (Maher); the Laboratory of Genetic Diversity, National Cancer Institute, Frederick, MD 21702-1201 (Serrio, Martenson, O'Brien, and Johnson); and the ICRAR, Thuzubasse 31, CH 1074 Mari H. Bern, Switzerland (Birnbaum-Wüster)

Address correspondence to W. E. Johnson at the address above, or e-mail: johnsonw@ncf.org

Number of cheetahs sampled by district

District	Unrelated (Unrelated)
1gob	11 (10)
2gro	51 (19)
3oka	18 (8)
4omr	15 (2)
5okh	21 (5)
6sou	7 (0)
7win	6 (2)



Ecological Research at CCF

- Cheetah ecology
- Evaluation of surveying techniques
- Prey and habitat studies



Radio telemetry

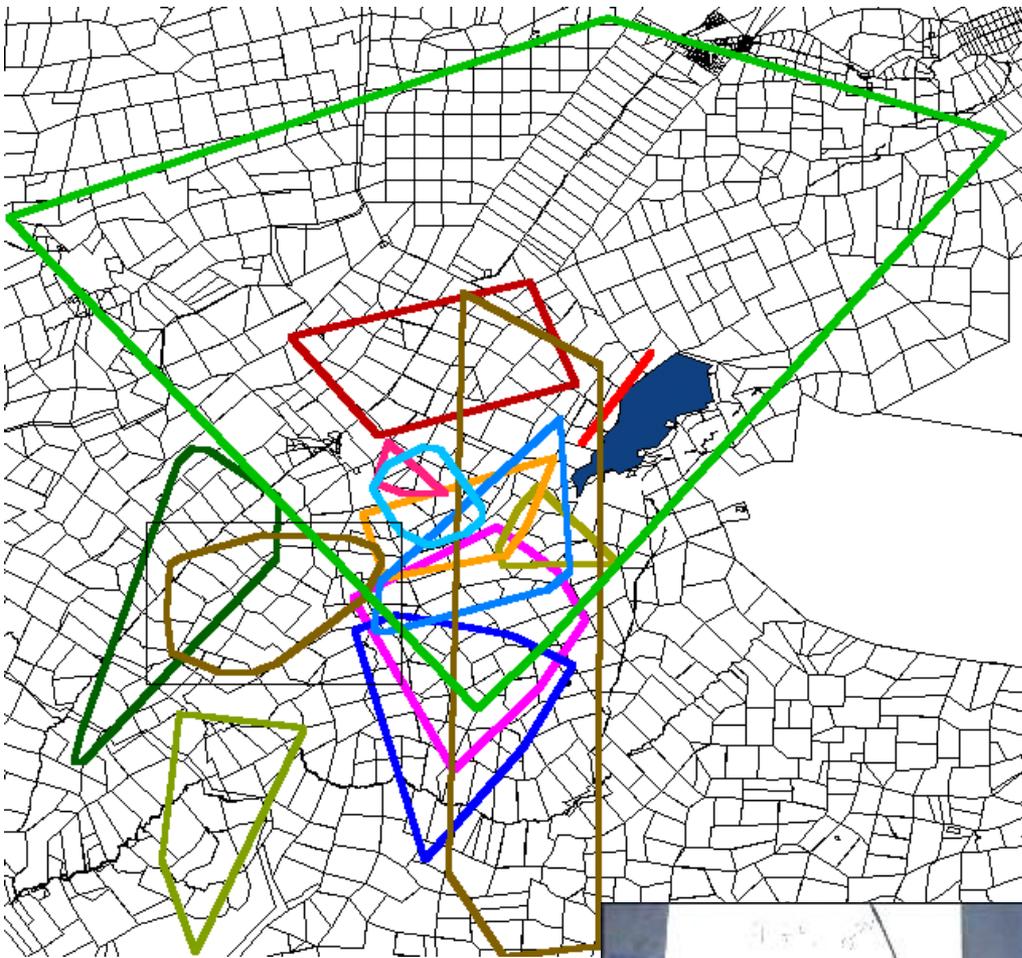


Spoor tracking



Camera trapping

Cheetah ecology affects human/predator conflict



- Home ranges larger than elsewhere $>1,650\text{km}^2$
- ~ 20 farms (5,000ha each)
- Greater overlap with related animals.
- Need large scale conservation plans that provide economic value for allowing cheetahs on their lands.

95% Minimum Convex Polygon

<600 released
back to the wild



Journal of Animal Ecology 2010, 79, 1024–1031

Spatial ecology of cheetahs on north-central Namibian farmlands

L. L. Walker^{1,2}, A. J. D'Okman^{1,2}, M. G. L. Mills^{3,4}, R. M. Jess^{1,2} & D. W. Meekins^{1,2}

¹Desert Conservation Fund, Otjozondjupa, Namibia

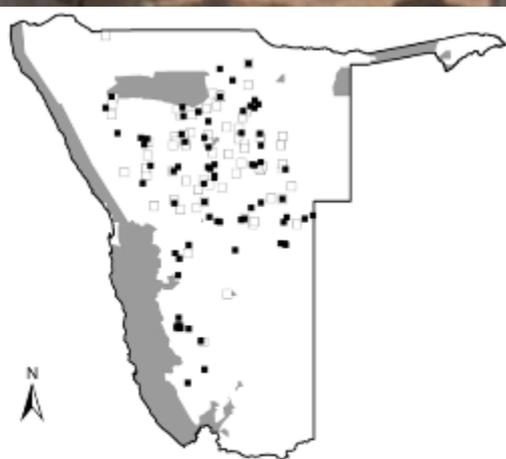
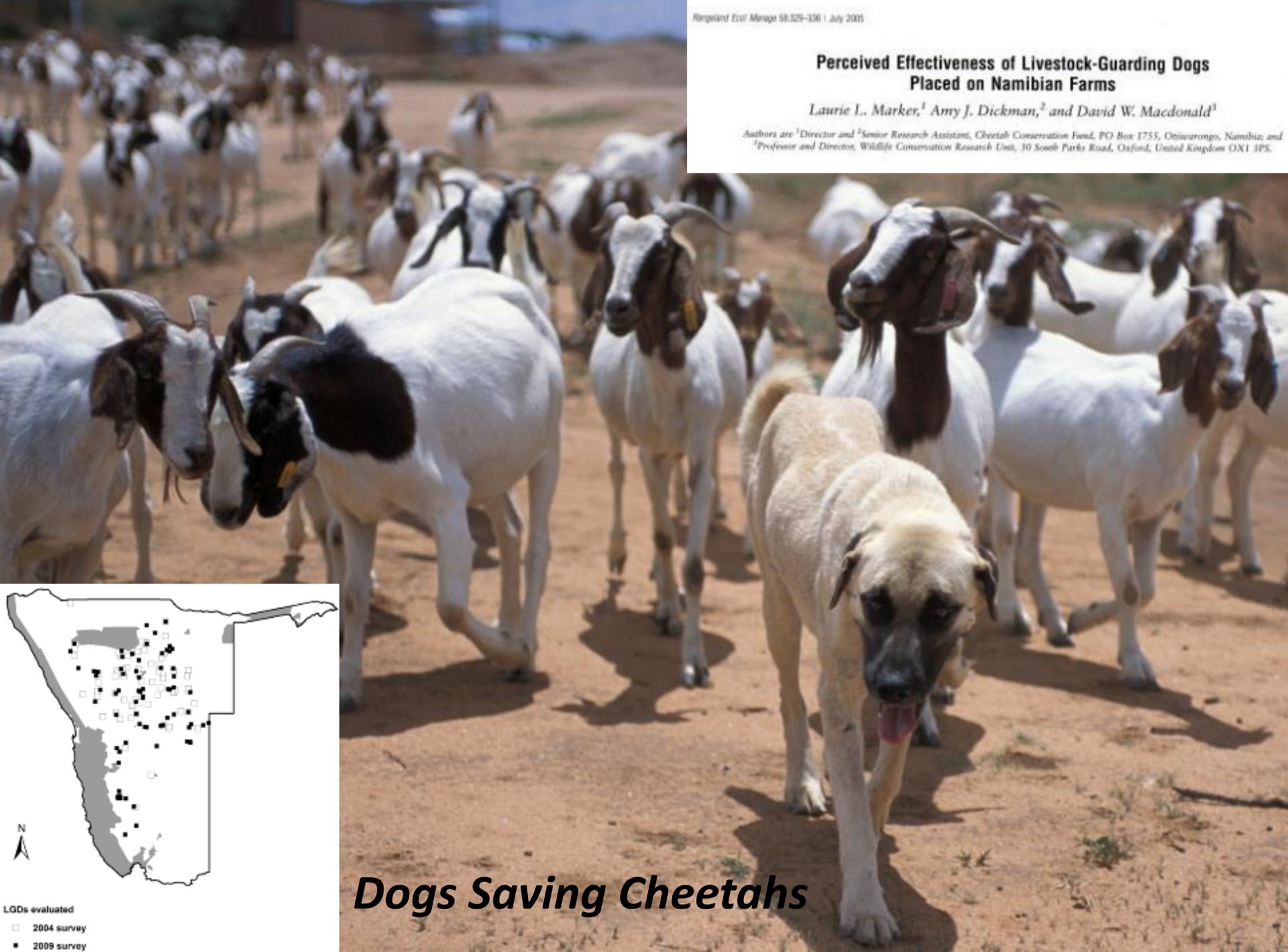
²Wildlife Conservation Research Unit, Department of Zoology, University of

³North Carolina State University, Raleigh, North Carolina, USA; ⁴Department of Biology, University of California, San Diego, La Jolla, California, USA

Perceived Effectiveness of Livestock-Guarding Dogs Placed on Namibian Farms

Laurie L. Marker,¹ Amy J. Dickman,² and David W. Macdonald³

Authors are ¹Director and ²Senior Research Assistant, Cheetah Conservation Fund, PO Box 1755, Otjiwarongo, Namibia; and ³Professor and Director, Wildlife Conservation Research Unit, 30 South Parks Road, Oxford, United Kingdom OX1 3PS.



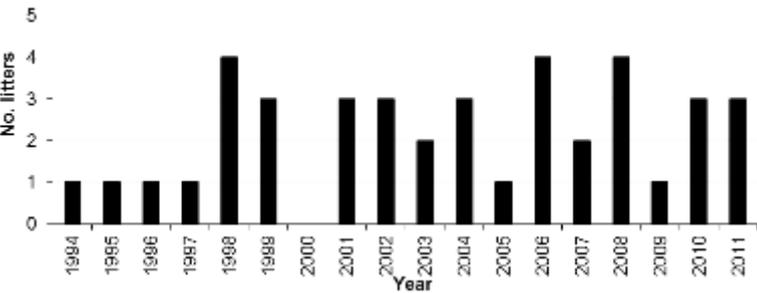
LGDs evaluated

□ 2004 survey

■ 2009 survey

Dogs Saving Cheetahs

Success of Livestock Guarding Dogs

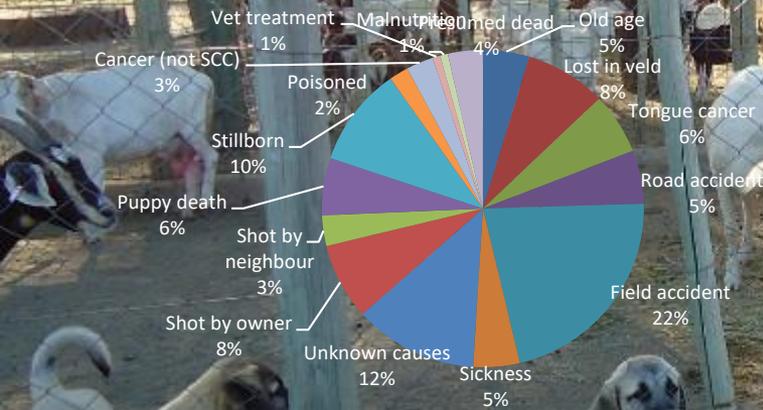


Rangeland Ecol Manage 58:337-343 | July 2005

Survivorship and Causes of Mortality for Livestock-Guarding Dogs on Namibian Rangeland

Laurie L. Marker,¹ Amy J. Dickman,² and David W. Macdonald³

Authors are ¹Director and ²Senior Research Assistant, Cheetah Conservation Fund, PO Box 1755, Otjiwaringo, Namibia; and ³Professor and Director, Wildlife Conservation Research Unit, 30 South Parks Road, Oxford, United Kingdom OX1 3PS.



CCF Goat Dairy



**Cheetah Conservation Fund
Goat Cheese**



Serving Suggestion: To allow full flavour, remove from refrigerator 1 hour before serving. Eat within 3 days of opening... 'what a fabulous excuse!'

Ingredients: Goats' Milk, Sea Salt, Selected Cheese Cultures, Rennet, Natural Flavouring.



FETA



www.cheetah.org
Cheetah Conservation Fund, PO Box 1755, Oijjwarongo, Namibia
Email: cheetah@iway.na Tel: + 264 (0)67 3D4806



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Conservation from Genes to Landscape

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Volume Editors

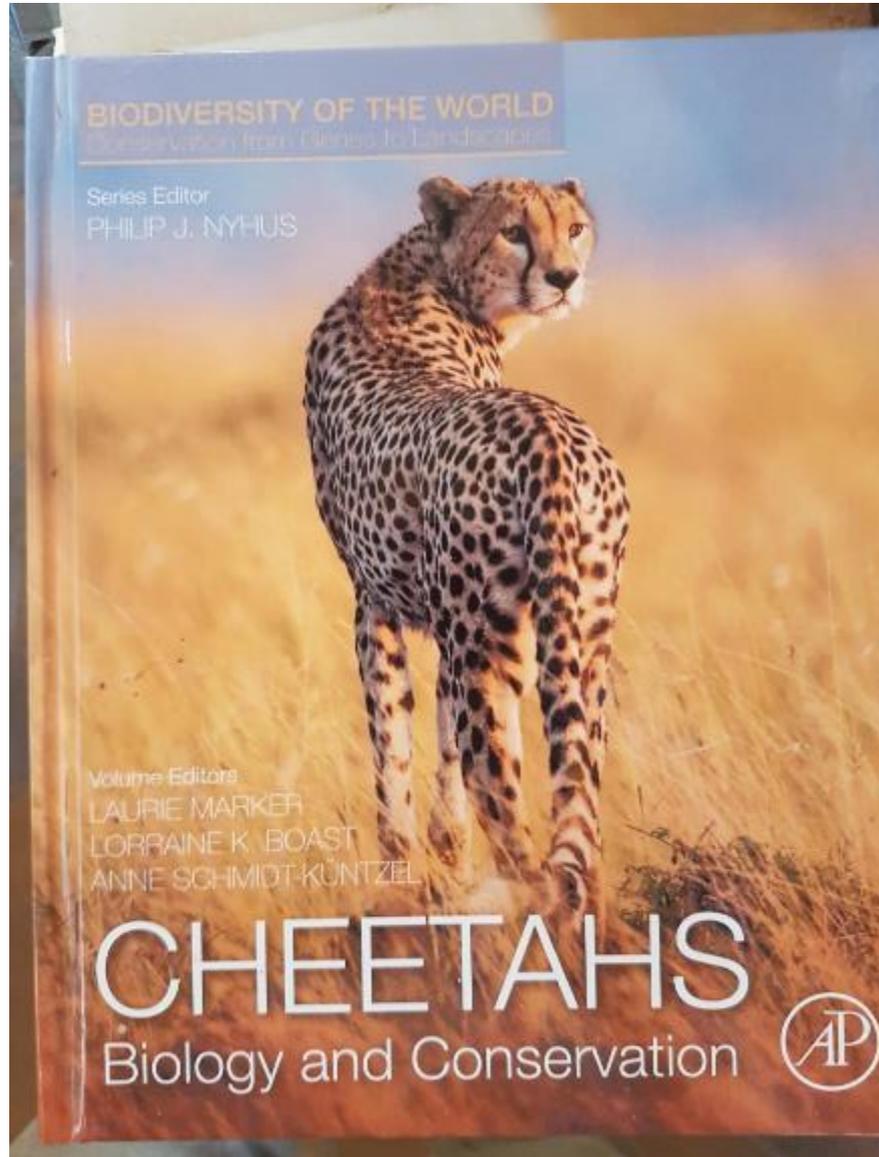
LAURIE MARKER

LORRAINE K. BOAST

ANNE SCHMIDT-KUNTZEL

CHEETAHS

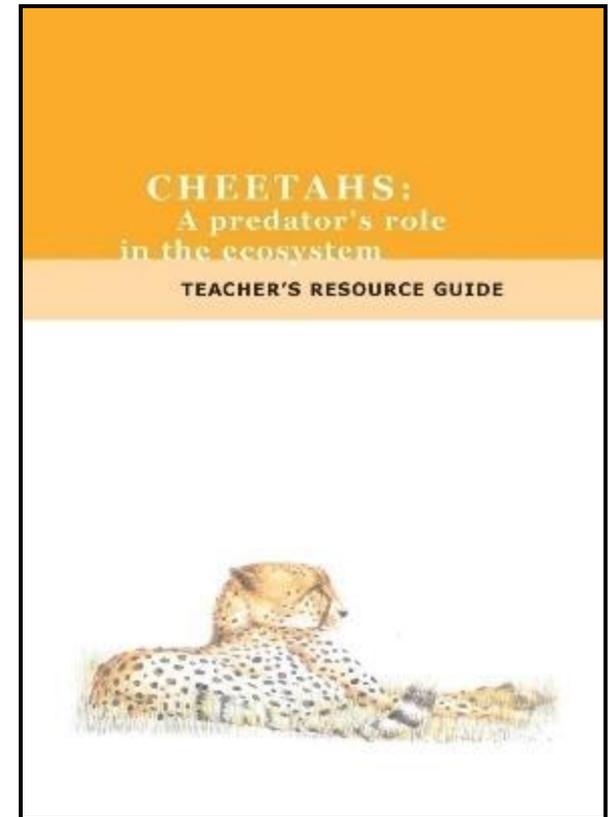
Biology and Conservation



CCF Education Programmes

- CCF emphasizes education and conducts programmes at CCF Centre and at schools throughout the country (> 20,000 students per yr).
- CCF conducts farmer and conservancy training.
- CCF conducts international training courses in Conservation Biology and Human Wildlife Conflict.
- CCF hosts NUST and UNAM interns and international university students.

Education is the key



Education Centre

Cheetah Museum and Education Classroom



Farmers' Training

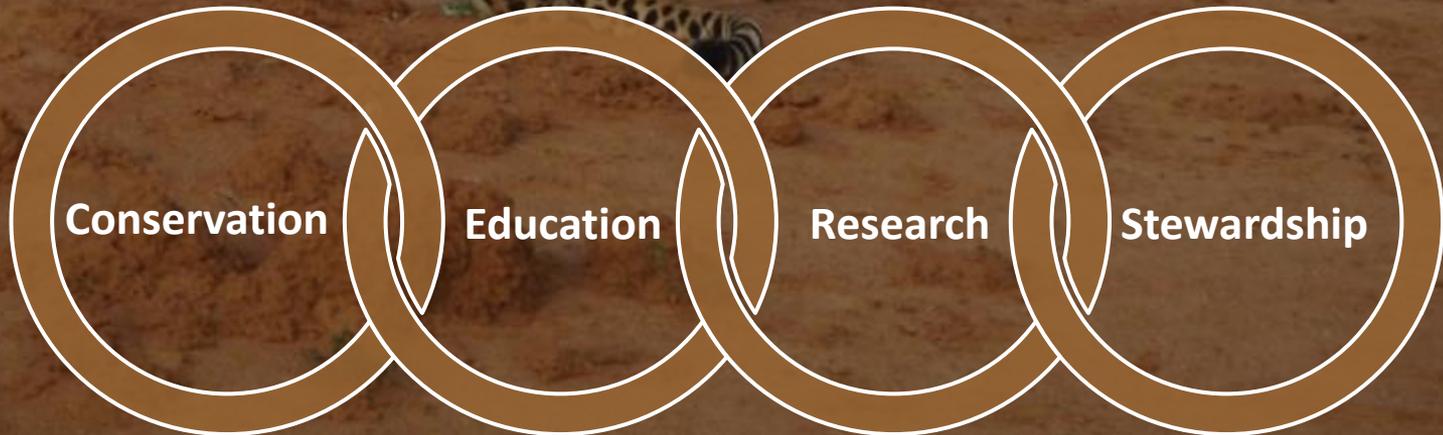




Train the Trainers



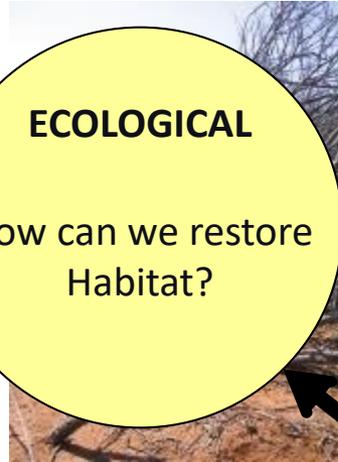
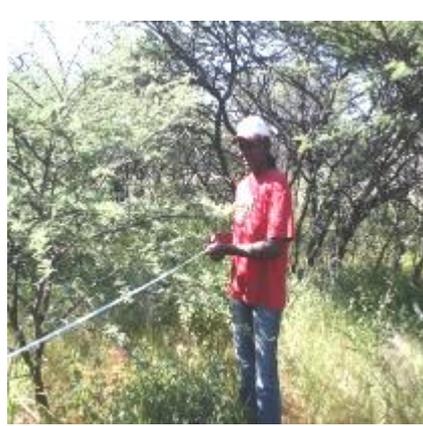
An Integrated Systems Approach



**Thinning bush = habitat restoration, job creation,
farmland economic growth.
All good for cheetah!**

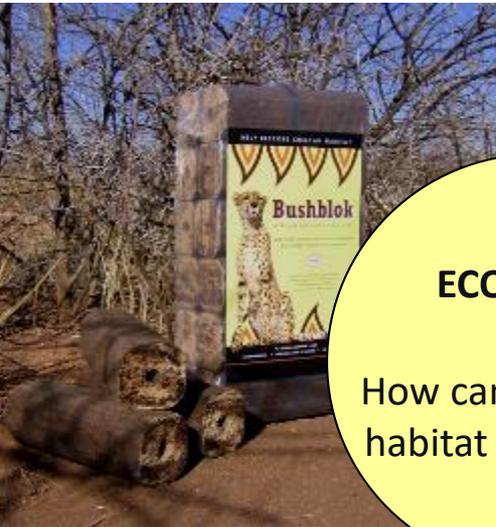


CCF's Habitat Restoration Program



ECOLOGICAL

How can we restore Habitat?



ECONOMIC

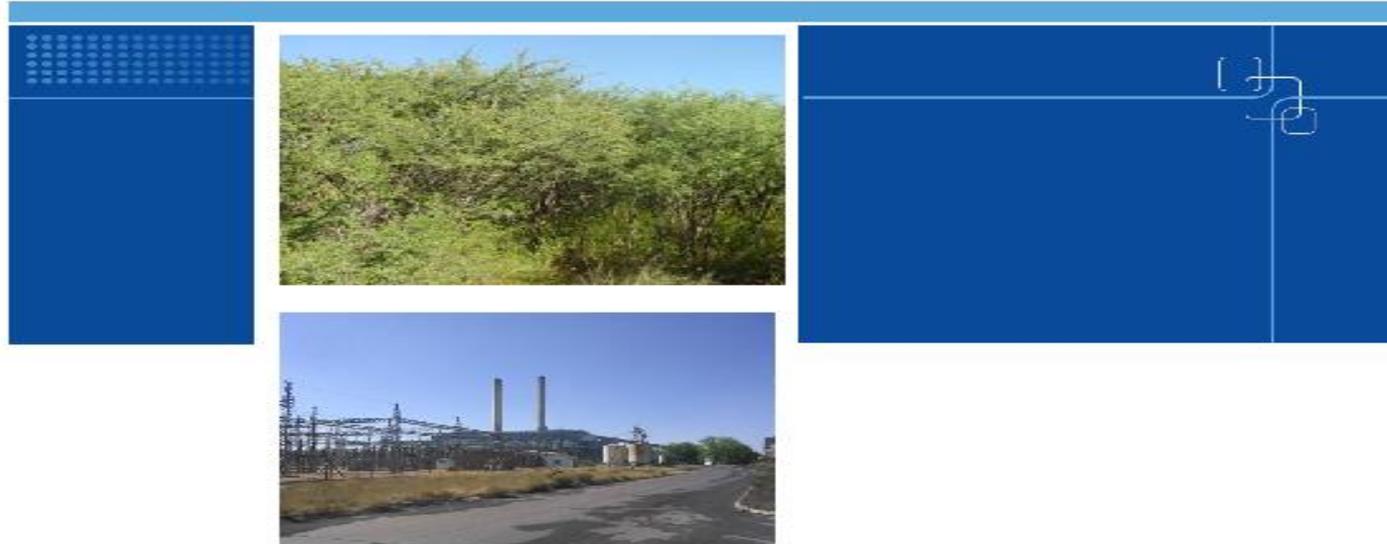
How can we pay for habitat restoration?



SOCIAL

How can the local community derive benefits from natural resources?





Project name

Feasibility study on electricity and pyrolysis oil production from wood chips in Namibia

Authors: Arvo Leinonen & Markku Orjala

Confidentiality: Public

Utilize small bushes





HELP RESTORE CHEETAH HABITAT



Bushblok

AFRICAN TURTLE SHELL TREE STOOD

MADE FROM ENVIRONMENTAL WASTE TO SUPPORT THE CHEETAH POPULATION OF THE WORLD

22 LAMINATED CORES
ECONOMICAL • DURABLE AND LONG • AND APPLICABLE

BUSHBLOK



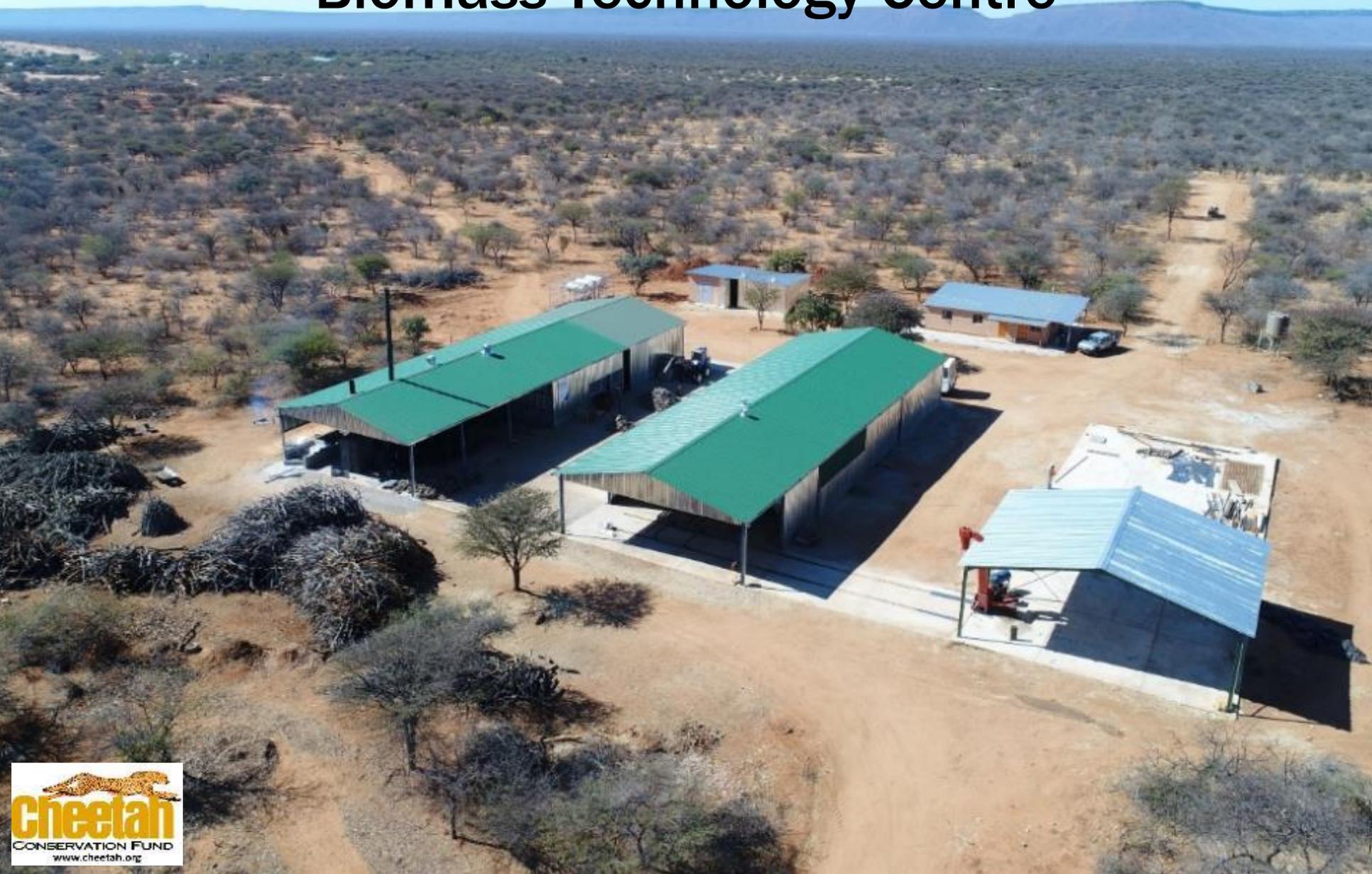
USAID
FROM THE AMERICAN PEOPLE

- LASTING • MINIMUM ASH & SMOKE

Bushblok
AFRICAN SUPER-HOT FUEL LOGS
WARM YOUR BODY AND SOUL! BURN BUSHBLOK LOGS
AND HELP RESTORE CHEETAH HABITAT



Biomass Technology Centre



Mechanical Harvest







4 SHIMADA extrusion press



Sustem





BTC Expansion



Classroom, labs, workshop

4 22kw biomass-fueled generators



ALL POWER LABS
Carbon Negative Power & Products

POWER PALLET - PP30



**RENEWABLE
ON-DEMAND
POWER**

The new Power Pallet PP30 22 kW genset is a renewable power solution that is a sensible answer to a critical need for distributed low-carbon energy. With standard grid-paralleling functionality, Combined Heat & Power, engine enclosure, and emissions control, the new PP30 meets the needs of modern, demanding power standards.

APL's unique patented multi-stage gasification architecture, in combination with our innovative gasifier-engine thermal integration, electronic control system and waste-heat recycling, gives the Power Pallet unprecedented biomass fuel flexibility and efficiency.

The Power Pallet uses agricultural and forestry waste materials that can be readily sourced very near the point of generation. It is compact and portable, easily transported to where the fuel is and where the power is needed. Unlike diesel fuel or gasoline, this fuel is often available at little or no cost, and most importantly, depending on feedstock selection and operational details, the Power Pallet is capable of carbon-negative operation.

FUEL COST COMPARISON (prices by region)

Diesel/LPG	\$0.25 - \$0.75/kWh
Gasoline	\$0.25 - \$0.75/kWh
Gasified Biomass	\$0.00 - \$0.05/kWh

PERFORMANCE

Electrical Power (Continuous)	22 kW/900 Hz / 22 kW/50 Hz
Electrical Power (On-Demand CHP)	27 kW/900 Hz / 27 kW/50 Hz
Sound Level (at 7m distance)	75 dBA
Biomass Consumption	1.0 kg/kWh (dry basis)
Run Time per Hopper Fill	5 kWh / 12 hrs
Approximate 250 gallon Fuel Density	10 kWh / 6 hrs 15 kWh / 4 hrs
Max. Continuous Operation	24 hours
Start Up Time	10-15 minutes

COMBINED HEAT & POWER (CHP)

Electrical Efficiency	>20% (waste biomass, LHV) >20% (waste)
Electrical/Thermal Efficiency	>65% (biomass) >50% (waste) (1 step)
CHP Heat Output	1 stage: 2.0 kWh per 1 kWh 2 stage: 3.5 kWh per 1 kWh
Engine Coolant	Water/Glycol Temperature Range: 70-95°C (160-205°F)
Customer-able CHP Load Temp.	70-90°C (160-195°F)
Max. Flow Rate @ 90 W/m ²	7.2 m ³ /hr (2.5 GPM)
Minimum Fuel Delivery	0.5 gals (1.9 liter) minimum fuel flow
Minimum Cooling	1.5 inch sanitary fitting

GRID TIE / PARALLELING

Controller: DeepSee DSR610 M10

OPERATING CONDITIONS

Ambient Temperature	5-40°C/40-100°F
Ambient Relative Humidity	5-95%
Installed Footprint	1.78 x 1.42 x 2.04 meters 75 x 55 x 88 inches

Site Requirements: Outdoor
1.75 m Overhead Clearance
Well-ventilated, Level Pad,
Covered from Sun and Direct Sun
Fixed Downstream Fluid Over Flow

Estimate Fuel/Generator

SHIPPING	
Dimensions	Main Unit: 185 x 145 x 140 cm / 73 x 57 x 55 in Hopper Unit: 83 x 83 x 114 cm / 33 x 33 x 45 in
Weight	Main Unit: 1130 kg / 2500 lbs. Hopper Unit: 40 kg / 88 lbs.

GAS FILTRATION

Dry Filtration System	Cyclone-Separation Stage, Glycol Phase Shaker/Separator Pre-wash Tank and Oil Separation
Oil Trap Control	
Gas Cooling Pre-Filtration	Engine Coolant Filtration to 80-100°C 100 Micron Cleanable

APL reserves the right to change without notice.



Cheetahs and Namibian Biomass

Brucebrewer@Bushblok.com