



Lucky in Love:

the Reproductive Success
of the Southern Cassowary
at the Virginia Zoo, Norfolk,
VA, USA

AZA Mid-year 2014, Memphis, TN

Alex Zelazo-Kessler, Lead Bird Keeper
alexandra.zelazo-kessler@norfolk.gov

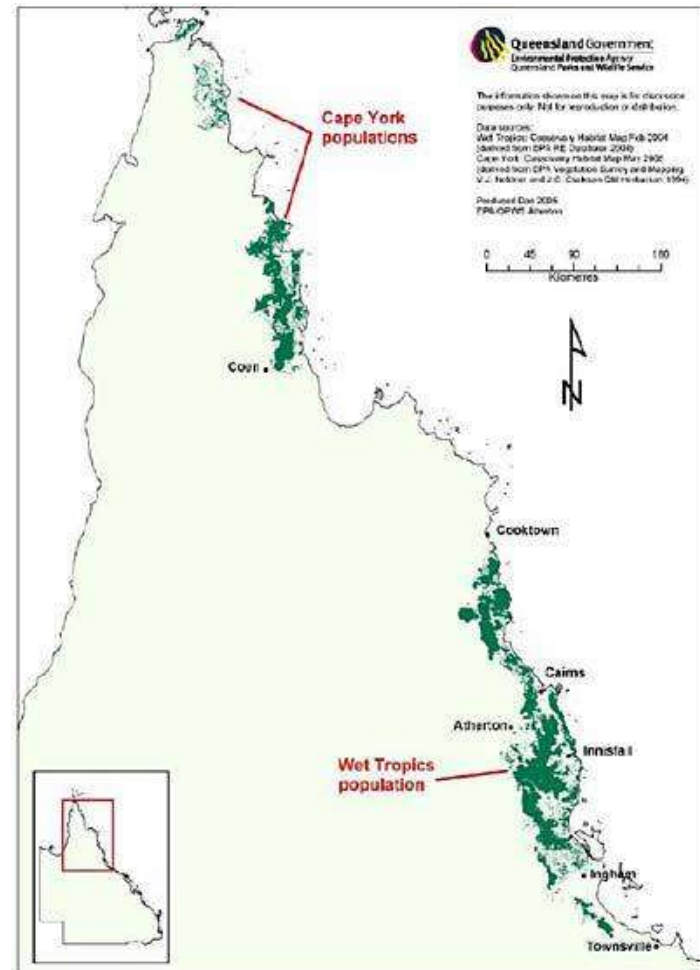
Cassowary Natural History

- Three extant species recognized
- Females are larger than males
- Require fleshy fruit year-round
 - Dense tropical rain forests
- Polyandrous
- Solitary except during courtship and egg laying
- Breeding occurs in Southern hemisphere late winter to spring (June to October)
- Typical clutch size is 4 eggs, incubation averages 47 to 54 days
- Male incubates eggs and raises chicks



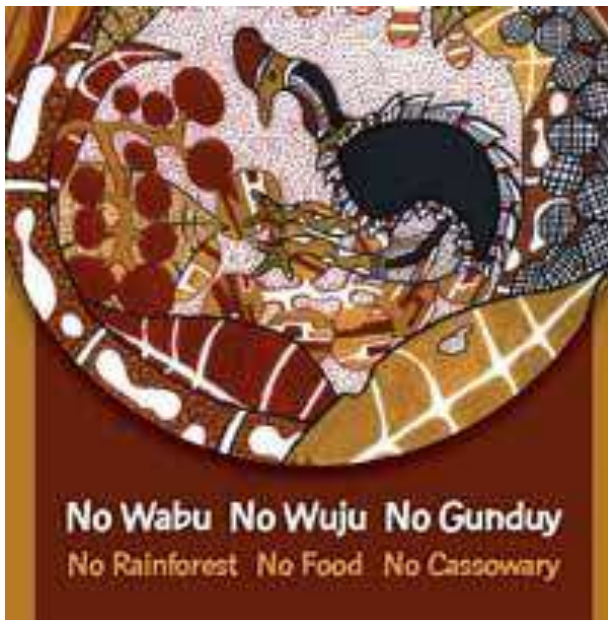
Wild Population

- Estimated to be 1500-2000 individuals in Australia
- Australian legislation considers Southern Cassowary to be a threatened species, State of Queensland considers the population endangered
- Listed as endangered under the 1999 EPBC Act
- Vulnerable on the IUCN Red List
- Not included in CITES



Why Cassowaries Are Important

- Keystone species
- Cultural icon
- They're AWESOME!



Threats to the Wild Population



- Introduced predator species
- Cars
- Land Clearing
- Humans
- Cyclones (climate change)



Captive Population

- Red SSP
- 49 birds in AZA population
- 12 founders, 3 potential founders
- 3 year target is 55 birds
- 8 females recommended to breed

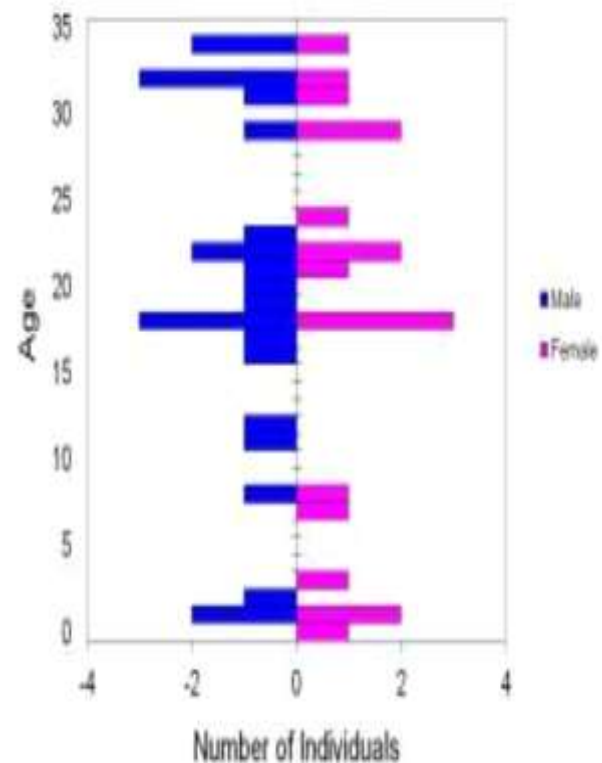
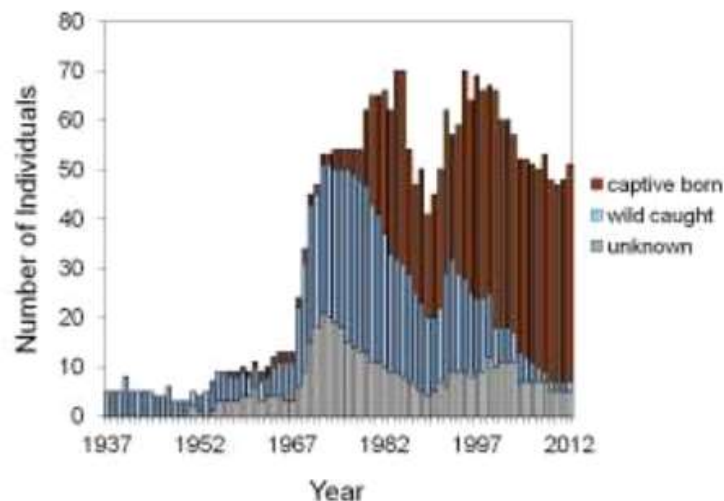


Figure 3. Age distribution of the formally managed population of double-wattled cassowaries. The population currently includes 26 males, 20 females, and 3 birds of unknown sex.

1.1 Southern Cassowaries at the Virginia Zoo

- Boris
 - Originally from private individual
 - Came to VA Zoo in 2010 from Dallas
 - Sensitive to noise emitted by certain machines
- Earline
 - Captive hatch in 1991
 - Came to VA Zoo in 2012 from NZP
 - Had not previously been with a male
 - History of egg breaking

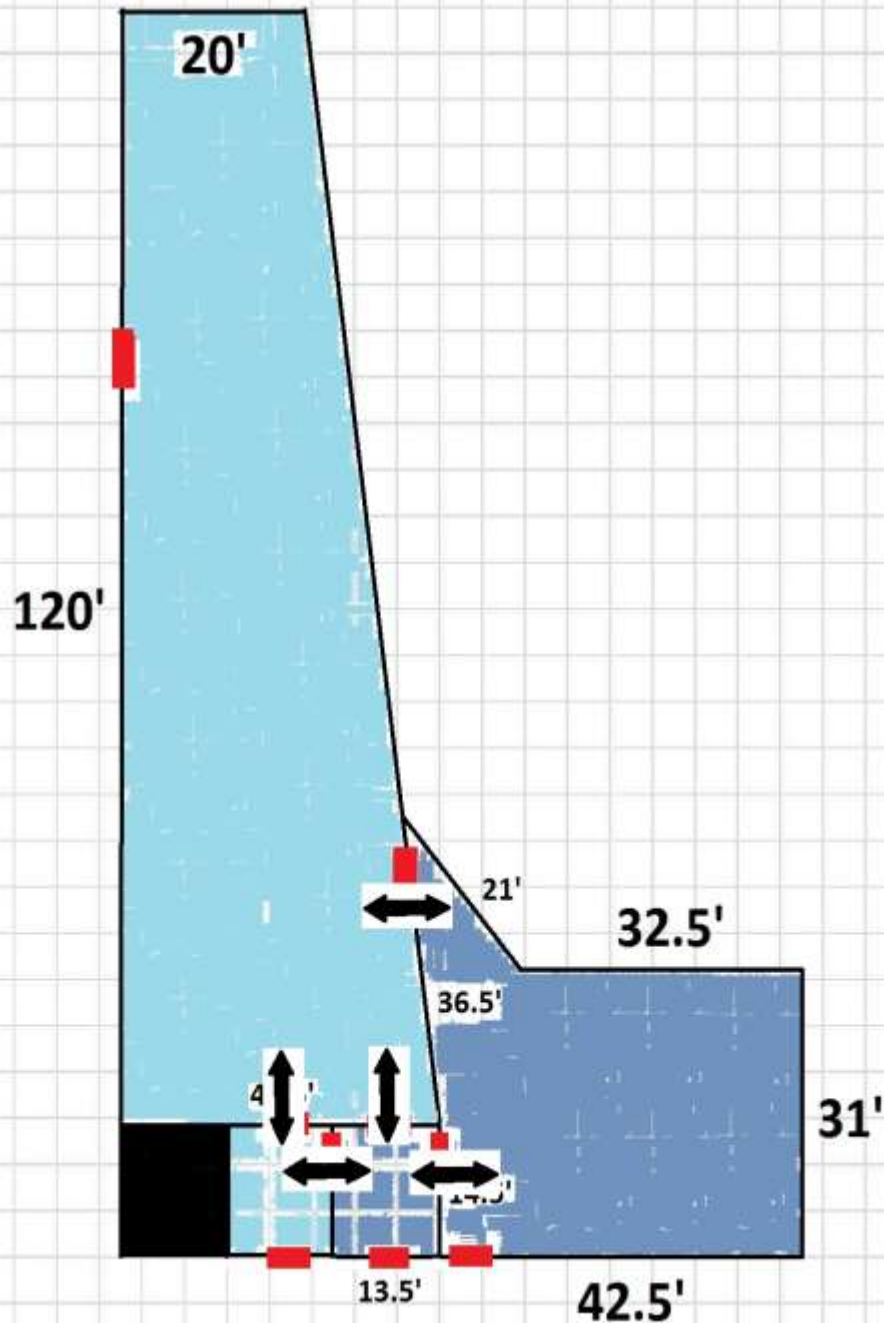


Enclosure



- 2 stalls that allow for separation inside
- Each stall is attached to an outside yard





Off-Exhibit Southern Cassowary Enclosure

Why Off-exhibit?



Non-Breeding Season Behavior

- Birds are typically aggressive toward one another
- Some pairs that have been “raised” together can tolerate one another throughout the year



- Boris and Earline showed no signs of aggression toward nor any interest in one another

Timing is Everything

- Earline had previously laid eggs in mid-March
- Looking for
 - Less aggression (N/A)
 - Birds spending more time at adjoining fence lines
 - Increase in vocalizations, or displays



Captive Breeding Season

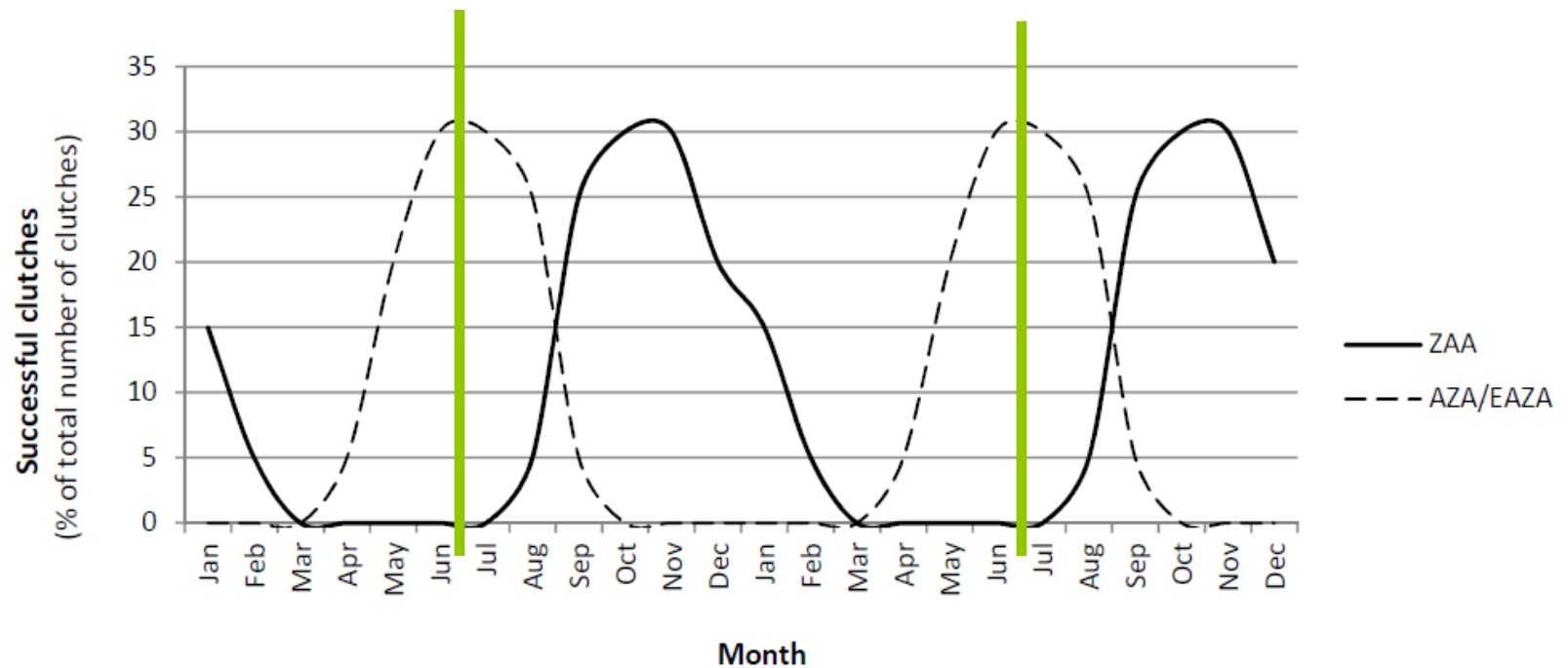


Figure 12.1 - Regional breeding season curve (24 months), smoothed data.

Food Consumption Changes

- Females generally lose weight during egg-laying
 - Earline is an exception
- Males will lose weight while incubating

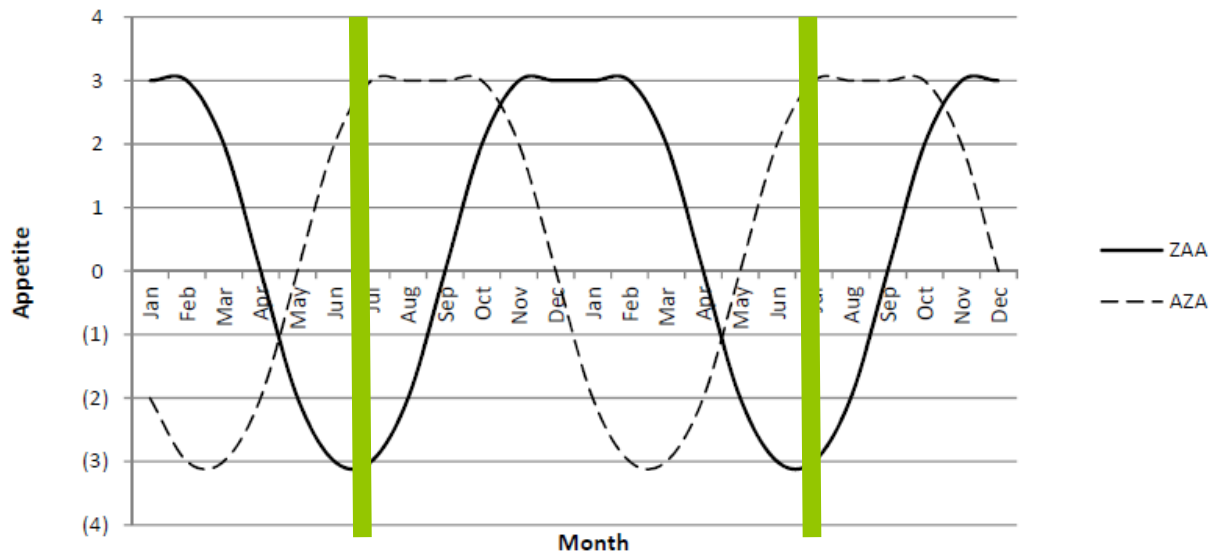


Figure 9.1 - Seasonal appetite of captive cassowaries in ZAA & AZA regions (2 year projection).



Breeding Diet

- Added oyster shell
- Increased diet of both birds
 - Increased female's produce 25% (from 2240g to 2800g), made pellet free choice
 - Increased male's produce 20% (from 1360g to 1650g), made pellet free choice
 - Added protein sources (small mice, worms, crickets)

Male

Apple (cut)					150 g
Sweet Potato (cooked)					150 g
Carrot (cooked)					150 g
Banana (cut)					150 g
Grapes					150 g
Misc. fruit					300 g
Scenic Jungle			10 c		630 g

Female

Scenic Jungle				15 c	945 g
Sweet Potato					450 g
Carrots					450 g
Bananas (cut)					350 g
Grapes					400 g
Misc. fruit					700 g
Apple (cut)					450 g

First Cassowary Introductions, February 5, 2013



Typical Chase



Display





Copulation

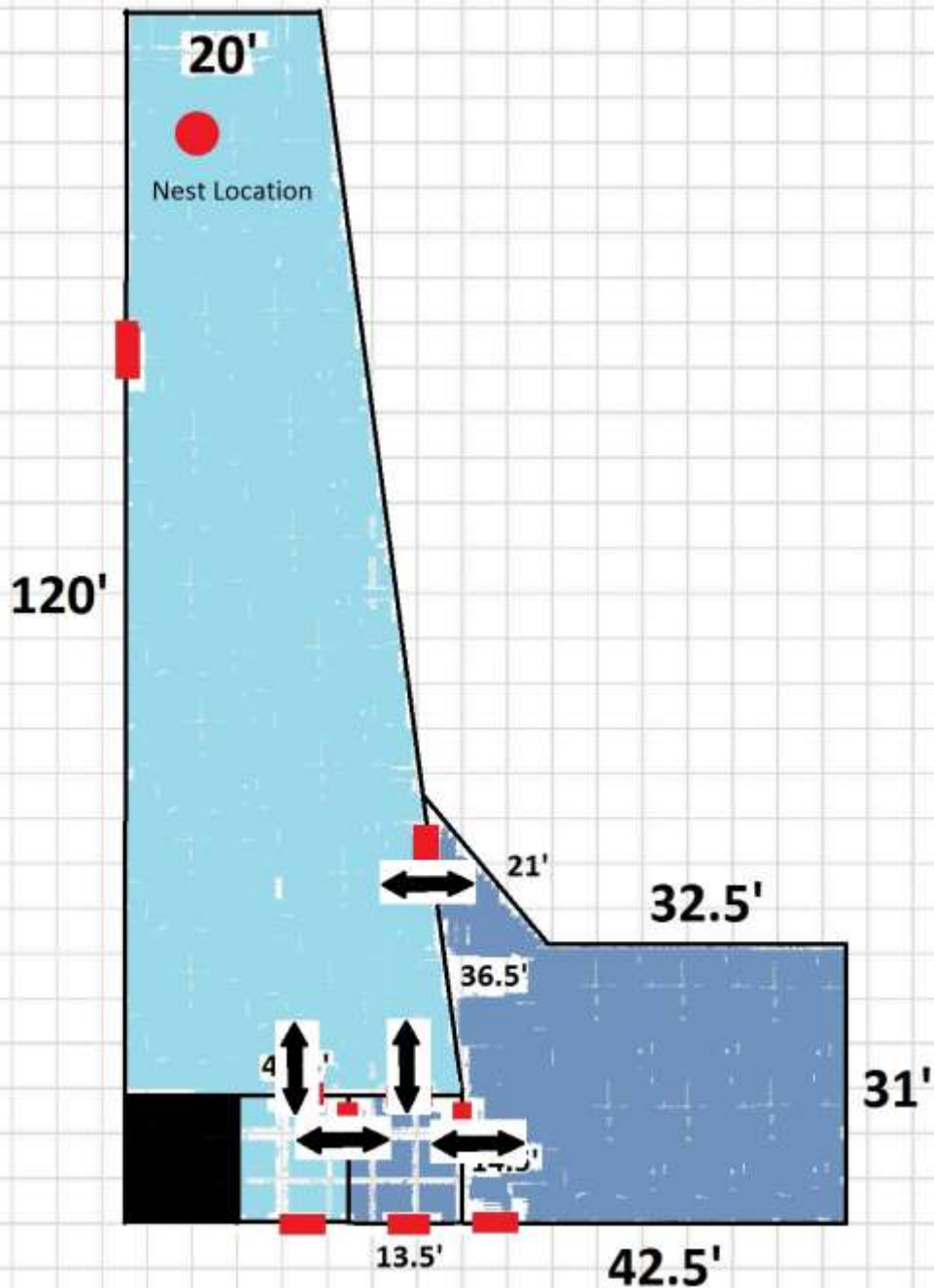


Observations

- Birds observed eating out of same food bowl on day 4
- After day 5 the pair spent most of their time away from one another
 - Only one or two brief chases and/or meetings observed
 - This continued for about two weeks
- After day 40 birds were observed to spend more time together
 - Circling (courtship) and male touching the female's back observed

A photograph of a cassowary, a large, dark, shaggy bird with a distinctive blue and white neck patch, standing in a dense, green, leafy environment. The bird is facing right, and its head is turned slightly towards the camera. The background is filled with lush green foliage.

First Egg Laid
April 12, 2013



Egg Laying and Incubation

- 3 to 5 days between egg laying
- Male brooded eggs after the second egg was laid (may have started incubation then)
- Separated pair one week after the fourth egg was laid
- Male was very protective of nest



Preparation for Hatch

- To Be Done Prior to June 3
 - Go over yard fence line and fill in/repair any gaps that a chick could get through
 - Order food and vitamins
 - Tomato, Papaya, Berries
 - Meal Worms, Crickets, Pinkies
 - Lentils, chickpeas, black beans
 - Nekton -S
 - Pedialyte



What to Watch For at Hatching

- Pip to hatch time
- Chicks typically do not eat for the first 2 to 3 days
- Chicks cannot regulate their own body heat so will continue to be brooded
- Watch chicks closely for signs of vitamin deficiencies or excess of protein



Star gazing, splayed legs, curled toes, etc.

Hatching

- First chick hatched June 11, 2013
 - ~53 day incubation (Male appeared to start incubating after second egg was laid, unsure as to which eggs were fertile)
- Second chick hatched June 14, 2013
 - Found dead just after hatch, unable to immediately remove body and determine cause of death



Parental Behavior

- The male will pick up food pieces and clack bill to encourage chicks to eat.



Chick Rearing Diet

- Much the same as parent's but chopped finely and with added vitamins and protein. Emu pellet may also be added if it is palatable to the chicks.
- Protein levels should be approximately 16 to 18% of diet.
- Preference for red and purple food items

Apple (cut)						600 g
Sweet Potato (cooked)						600 g
Carrot (cooked)						600 g
Grapes						300 g
Misc. fruit						600 g
Marion Jungle Mix				10 cups		630 g
Pinkie/Fuzzy mice				4		20 g

Chick Development

- July 24, 2013 Exam (43 days old)
 - Weight 2.45kg
 - WNV/EEE/Tetnus vaccine (booster August 29, 2013)
 - Feathers and blood taken for sexing
 - CBC, HCT, T protein all WNL

14.7.8 Growth

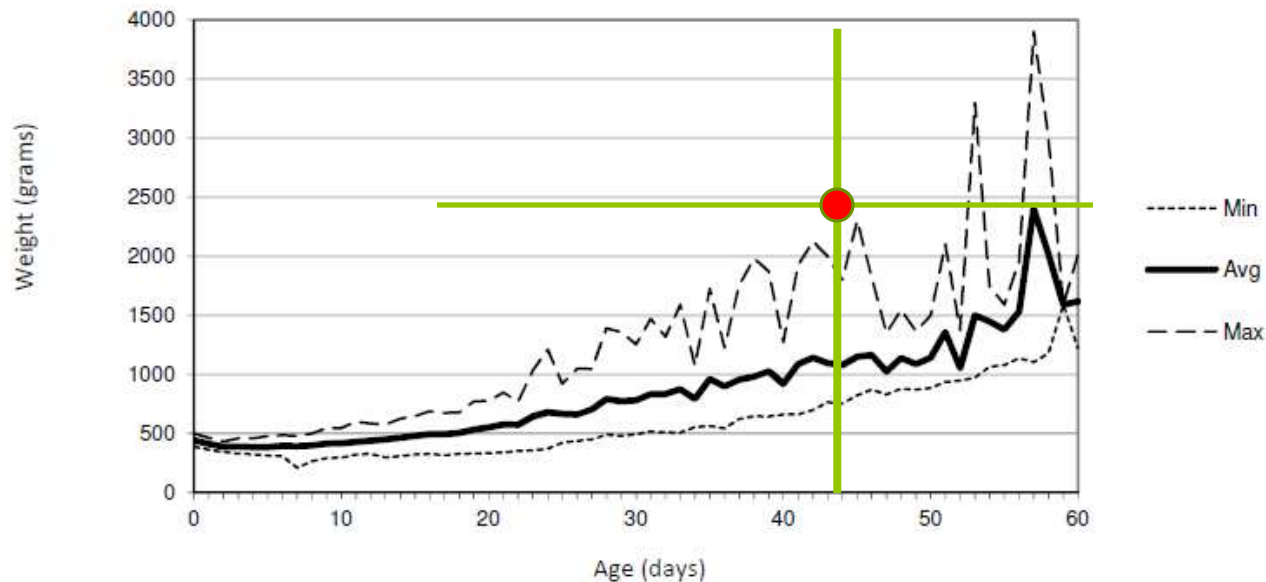


Figure 14.1 - Southern Cassowary Chick Growth Curve (n = 26). Source: Nicole LaGreco.

Sexing of Offspring

7.3.8.1 Sexing Methods

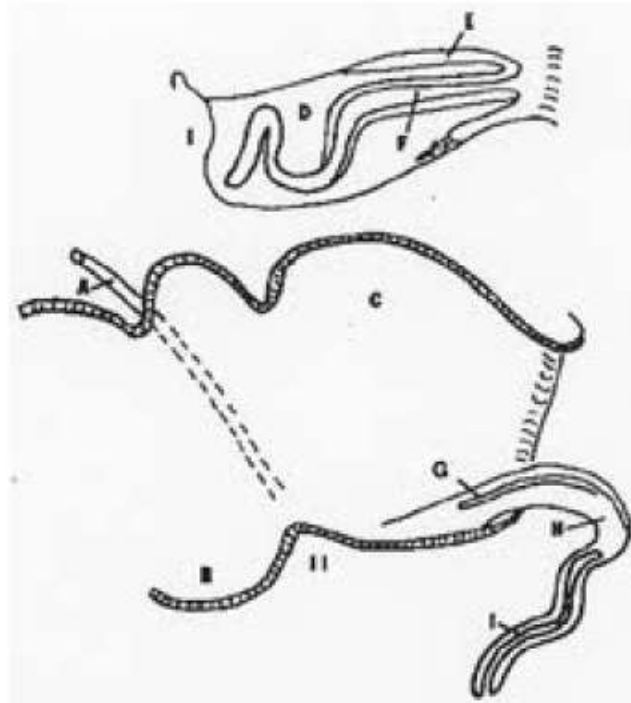


Figure 7.12 - Diagram of left lateral view of a retracted and erect phallus of a male emu or rhea. Note: The top drawing represents the phallus within the Pouch. A vas deferens, B. urodeum, C. proctodeum, D. pocket to contain phallus, E. erectile wall of phallus, F. inverted hollow tube of phallus, G. phallic sulcus, H. erectile tissue, and I. erect phallus with blind hollow tube. (Source : Fowler in Tully & Shane 1996).

Separation of Sire and Chick

- Males will chase chicks away anywhere from 7 to 18 months of age
- Separation when chick was 8 months old
 - To allow for another breeding season
- Juvenile diet created (slightly more than adult male's diet)

Apple (cut)						200 g
Sweet Potato (cooked)						200 g
Carrot (cooked)						200 g
Banana (cut)						50 g
Grapes						200 g
Misc. fruit						300 g
Marion Jungle Mix				10 cups		630 g



Challenges of Separation

- Pacing (not stereotypic but at times frantic)
 - Possible damage to feet
- No longer interested in eating from bowl

Easing the Transition





These are a few of his favorite things...

Current Status

- Pair was reintroduced February 13, 2014
- Attempted copulation observed February 24th
 - 12 days after introductions
 - Progression of behavior is much faster than that of the previous year



Keys To Success

- Institutional support
- Dedicated staff and time
- Proper enclosure
- Planning and preparation
Observations
- Pair compatibility
- Luck





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Questions?



References and Thanks

- Nicole LaGreco, San Diego Zoo
- Jo Gregson, Paignton Zoo
- Sara Hallager, Smithsonian Institution (National Zoo)
- Virginia Zoo staff and Volunteers
 - Jill Gohr
 - Roger Sweeney
 - Craig Pelkey
 - Jim Lotz
- Cassowary, Double-Wattled Studbook 2012
- Breeding and Transfer Plan Final Posting Cassowary, Double-wattled (Southern) - Red Program 2014 Final
- Original Edition Cassowary Husbandry Manual, 1997 Currumbin Sanctuary Ed. Liz Romer
 - 2013 Edition: Cairns Tropical Zoo Ed. James R. Biggs