GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Chamaeleo jacksonii***

Chamaeleo jacksonii **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Reptilia	Squamata	Chamaeleonidae

Common name Jackson's chameleon (English), Dreihorn-Chamäleon (German)

Synonym
Chamaeleon jacksonii , Boulenger 1896: 376
Chamaeleo jacksonii , Bonetti 2002: 63
Trioceros jacksonii , Tilbury & Tolley 2009
Chamaeleo jacksonii jacksonii , Boulenger 1896
Chamaeleon jacksonii , var. *vauerescecae* Tornier 1904
Chamaeleo jacksonii jacksonii , Werner 1911: 26
Chamaeleo (Trioceros) jacksonii , Necas 1999: 165
Chamaeleo jacksonii merumontanus , Rand 1958
Chamaeleo jacksonii merumontanum , Van Hoof *et al*. 2006
Chamaeleo jacksonii xantholophus , Eason, Ferguson & Hebrard 1988
Chamaeleo jacksonii xantholophus , Van Hoof *et al*. 2006

Similar species

Summary

Chameleo jacksonii or Jackson's chameleon, is a generalist predator native to Kenya and Tanzania. It has been exported to various countries as a pet species. Jackson's chameleons were accidentally released on the island of Oahu in the 1970's, and have since established populations on all of the main Hawaiian Islands; a recent study has determined that predation on various endemic invertebrate species is occurring, including a 'Critically Endangered (CR)' Oahu tree snail (*Achatinella mustelina*). The Jackson's chameleon prefers wet tropical, high elevation habitat, also favored by native Hawaiian plants and animals.

view this species on IUCN Red List

Species Description
Three subspecies are recognised, *Chamaeleo jacksonii jacksonii* Boulenger 1896 (Mt. Kenya); *C. jacksonii merumontanus* Rand 1958 (Mt. Meru, Tanzania) and *C. jacksonii xantholophus* Eason, Ferguson & Hebrard 1988. *C. jacksonii xantholophus* adult males are light emerald green with vaguely defined yellow along the throat, shoulders, flanks, and crest scales; the head is darker green or turquoise (Waring, 1997), and adults of the species have the ability to rapidly and dramatically change color in response to other chameleons and/or the presence of perceived threat from predators. Males have three brownish annulated horns, consisting of two preocular horns and one rostral (the latter being longest) (Waring, 1997). Adult females of the Mt. Kenya subspecies typically have no horns; their body color (and that of immature males) varies, ranging from gray to reddish-brown to dark olive, often having light blotches on the darker background color (Eason *et al*. 1988; in Waring, 1997), but again under stress can alter color pattern and brightness. Males normally attain a length of 25-30 cm (SVL = ~15 cm), females are commonly 5 cm shorter (Fergeson et al. 1991; in Waring, 1997). The tail accounts for about half of the animal's length; it is prehensile and often curled in a laterally-flattened coil as the chameleon is perched motionless, in an ambush posture. The limbs are long and adroit (Waring, 1997). Sets of toes are fused medially such that there are two claw-tipped, opposable paddle-like toes on each foot; these grip the arboreal substrate steadfastly (Waring, 1997). \r\n
A solitary lifestyle was typical of C. jacksonii at all ages at Makawao, on the Hawaiian island of Maui (Waring, 1997) with smaller individuals generally avoiding larger ones. McKeown (1995) noted that adult males will challenge one another to horn-to-horn pushing duels in territorial attempts to drive away competitors, with the weaker, or more submissive male ultimately retreating. Waring (1997) noted that individuals were often found in the same tree or shrub day after day, nevertheless, they remained apart. Immature and adults coexisted in the same plant, but rarely did they get within 0.5 m of each other (Waring, 1997). As with other species of chameleons, juveniles tend to occupy forest understory and grassy habitat, in what is possibly an ontogenetic habitat shift and an adaptive behaviour to avoid cannibalism by adults (Rotem *et al*. 2006).

Notes
While once claimed to be the sole supply source of *Chameleo jacksonii* to the USA market, the export of feral *C. jacksonii* from Hawaii to mainland America is now illegal (Carpenter *et al*. 2004). The USA is also the largest market for *Chameleo* spp. accounting for 69 % of all imports with additional supply from captive breeding and extraction from feral populations further supplying the internal market and not being recorded (Carpenter *et al*. 2004).

Uses
Chameleo spp. including *C. jacksonii* are popular in the global pet trade with 15, 148 *C. jacksonii* individuals transferred internationally between 1991 and 1996 (Carpenter *et al*. 2004). As of the date of publication of this profile, it is legal to buy and sell Jackson’s chameleons in the state of Hawaii.

Habitat Description
Chameleo jacksonii in the Hawaiian Islands are most abundant in wet, shady habitat between 100 m and 1000 m elevation (Holland et al. 2010) and where daytime temperatures range from 21-32 C° (70-90 F°), night time temperatures range from 10-20 C° (50-68 F°), and rainfall is moderate (McKeown 1995). On the Hawaiian island of Maui, *C. jacksonii* appeared to mainly utilize suburban and adjacent locations that have luxuriant conditions, usually occupying plants having a network of multiple branches. Nevertheless, they were sometimes found on isolated sparsely-foliated shrubs or trees as well (Waring, 1997). They have been observed on a variety of plants in the Makawao area of Maui, including avocado trees, silk oak, banana, Christmas berry, bottlebrush, guava, and papaya (Waring, 1997). They commonly positioned themselves >2 m above the ground; yet individuals in well-branched shrubs were seen 0.5 m above the ground (Waring, 1997). In their native habitat on Mt. Kenya, *C. jacksonii* inhabit moist, well-vegetated forests, not only in native arboreal canopies but also in fruit and coffee orchards as well as hedgerows (Ferguson *et al*. 1991; in Waring, 1997). The same pattern of habitat preference has been observed in the Hawaiian Islands (Holland, personal observation).

Reproduction
The species is ovoviviparous, after mating, the female internally retains the eggs and subsequently gives live birth after approximately three months, to 12-40 precocial, predatory young (Waring, 1997). Melrose (pers. comm.; in Waring, 1997) observed the birth of 13 young, each encased individually in a flexible sac; the infants freed themselves from the membranes. Postpartum parental care does not to occur (Waring, 1997; Holland, personal observation). Being a seasonal breeder in its native habitat, a female may produce broods every six months (Lin & Nelson 1981; in Waring, 1997), though in the tropical climate of Hawaii there does not appear to be any seasonality to their reproductive cycle (Holland, personal observation). At birth, the young are 52-55 mm long, with the tail accounting for 23-25 mm of the length, and the color is black, white and grey; they utilize their tongue to capture live prey from the day of birth (Waring, 1997). At the age of five months, juveniles reach a length of 8-10 cm (Schifter, 1975; in Waring, 1997). Juveniles attain sexual maturity at approximately two years (de Vosjoli, 1990; in Waring, 1997).

Nutrition
Chameleo jacksonii has a highly varied diet, and optimal foraging strategy seems to involve feeding on as many different types of prey as are available. Chameleons feed mainly on small invertebrates (e.g. insects, spiders, and snails) captured mainly with their rapidly extensible tongue, which can extend up to 1.5 body lengths (Waring, 1997). However they will also feed on vertebrates smaller than themselves, where prey size is evidently limited by gape size. When presented with large insects or snails, chameleons will tend to not use the tongue strike feeding strategy, but will instead directly approach and grab the prey with the mouth. The sticky tip of the tongue can reach the prey in 0.06 sec (Martin, 1992; in Waring, 1997). The foraging behaviour of *C. jacksonii* has been described as substantially different from the standard lizard foraging behavior, being somewhere between active predation and ambush or sit-and-wait predation (Hagey *et al*. 2010). The term \"cruise forager\" has been used to describe this behavior as follows: the chameleon is \"…a species that moves, stops, and merely scans the environment, then moves, stops, and scans, and so on'' (Regal, 1983; in Hagey *et al*. 2010). In captivity (and presumably also in the wild), daily water must be available in a way that resembles rain or dew drops on leaves (Waring, 1997). Chameleons will ingest the shiny droplets dangling from the leaf tips though they will rarely drink from a pool of water (Waring, 1997).

General Impacts
Holland *et al*. (2010) have recently provided the first conclusive evidence of ecological impact using stomach content analysis, recovering the remains of various endemic and native Hawaiian invertebrate species including the 'Critically Endangered (CR)' Oahu tree snail (*Achatinella mustelina* in IUCN Red List of Threatened Species).

Management Info
Preventative measures: *Chameleo jacksonii* is classified by the State of Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife as ''injurious wildlife'', and export as well as inter-island transport has been prohibited since 1997 (Hawaii Administrative Rule Section 13-124-3; in Holland *et al*. 2010). Prior to the recent documentation of predation on native Hawaiian invertebrates, there had been a widespread notion that chameleons have not caused any deleterious environmental impacts (McKeown, 1996).

Pathway
Chameleo spp. including *C. jacksonii* are popular in the global pet trade with 15, 148 *C. jacksonii* individuals transferred internationally between 1991 and 1996 (Carpenter *et al.*, 2004), and still legally sold in the pet trade in the continental US as well as in the state of Hawaii.

Principal source: Holland, Brenden S., Steven L. Montgomery and Vincent Costello, 2010. A reptilian smoking gun: first record of invasive Jackson's chameleon (*Chamaeleo jacksonii*) predation on native Hawaiian species. Carpenter, Angus I.; J. Marcus Rowcliffe; Andrew R. Watkinson, 2004. The dynamics of the global trade in chameleons.
Waring, G. H. 1997. Preliminary study of the behavior and ecology of Jackson's chameleons of Maui, Hawaii. Report for USGS/BRD/PIERC Haleakala Field Station presented by Hawaii Ecosystems at Risk (HEAR) project.

Compiler: IUCN/SSC Invasive Species Specialist Group (ISSG)

Review: Dr. Brenden Holland, Assistant Researcher, Center for Conservation Research and Training, Pacific Biosciences Research Center at the University of Hawaii at Manoa. USA

Pubblication date: 2010-05-27

ALIEN RANGE

[1] UNITED STATES

Red List assessed species 1: CR = 1;

Achatinella mustelina **CR**

BIBLIOGRAPHY

11 references found for **Chamaeleo jacksonii**

Managment information

Carpenter, Angus I.; J. Marcus Rowcliffe; Andrew R. Watkinson, 2004. The dynamics of the global trade in chameleons. Biological Conservation 120 (2004) 291–301

Fred Kraus, F. and D. Preston., 2012. Diet of the invasive lizard *Chamaeleo jacksonii* (Squamata: Chamaelonidae) at a wet-forest site in Hawaii. Pacific Science 66(3):397-404. 2012

Kraus, Fred; Earl W. Campbell; Allen Allison and Thane Pratt, 1999. *Eleutherodactylus* Frog Introductions to Hawaii. Herpetological Review 30(1), 1999

Summary: Available from: http://www.hear.org/articles/pdfs/herp_review_frogs_1999v30n1.pdf [Accessed 27 May 2010]

General information

Hagey, Travis J., Jonathan B. Losos, and Luke J. Harmon, 2010. Cruise Foraging of Invasive Chameleon (*Chamaeleo jacksonii xantholophus*) In Hawai i. Breviora 519 :1-7. 2010

Summary: Available from: http://www.cnah.org/pdf_files/1454.pdf [Accessed 27 May 2010]

Holland, B. S., S. L. Montgomery and V. Costello, 2010. A reptilian smoking gun: first record of invasive Jackson–s chameleon (*Chamaeleo jacksonii*) predation on native Hawaiian species. Biodiversity and Conservation 19:1437–1441

Integrated Taxonomic Information System (ITIS), 2010. *Chamaeleo jacksonii* Boulenger, 1896

Keren-Rotem, T., A. Bouskila and E. Geffen. 2006 Ontogenetic habitat shift and risk of cannibalism in the common chameleon (*Chameleo chameleon*). Behavioral Ecology and Sociobiology 59: 723-731.

McKeown, S. 1991. Jackson s chameleons in Hawaii are the recently described Mt. Kenya subspecies, *Chamaeleo jacksonii xantholophus*. Bulletin of the Chicago Herpetological Society 26 (3):49.

McKeown, S. 1996. A Field Guide to Reptiles and Amphibians in the Hawaiian Islands. Diamond Head Publishing Inc, Los Osos, CA, USA.

Reptiles Database, 2010. *Trioceros jacksonii* Boulenger, 1896

Summary: Available from: http://reptile-database.reptarium.cz/species.php?genus=Trioceros&species=jacksonii [Accessed September 8 2010]

Waring, G. H. 1997. Preliminary study of the behavior and ecology of Jackson s chameleons of Maui, Hawaii. Report for USGS/BRD/PIERC Haleakala Field Station presented by Hawaii Ecosystems at Risk (HEAR) project.

Summary: Available from: http://www.hear.org/alienspeciesinhawaii/waringreports/chameleon.htm [Accessed 27 May 2010]