

RISK ASSESSMENT FOR AUSTRALIA – Fishing Cat (*Prionailurus viverrinus*) (Bennett, 1833)

Class - Mammalia, Order - Carnivora, Family - Felidae (Fischer, 1817), Genus - *Prionailurus* (Severtzov, 1858); (Wilson and Reeder 1993, Nowak 1999)



Department of
Agriculture and Food



Score Sheet

<p>SPECIES: Fishing Cat (<i>Prionailurus viverrinus</i>)</p> <p>Synonyms: <i>Felis viverrina</i> (Nowak 1999)</p>	<p>Species Description</p> <p>Medium sized cat, body length 750-860 mm; tail length 255-330 mm; shoulder height 380-406 mm; weight 7.7-14.0 kg. Grey in colour, sometimes tinged with brown, with elongate dark brown spots arranged in longitudinal rows. Fur is short and rather coarse. The claw sheaths are too small to allow the claws to retract completely (Gurung and Singh 1996, Nowak 1999).</p> <p>Status</p> <p>Classed as “vulnerable” on IUCN Red List of Threatened Species (Cat Specialist Group 2002).</p>
<p>DATE OF ASSESSMENT: 15/10/2007</p> <p>Bird and Mammal Model used (Bomford 2008) using PC CLIMATE (Brown et al 2006, Bureau of Rural Sciences 2006)</p>	<p>The Risk Assessment Model</p> <p>Models for assessing the risk that exotic vertebrates could establish in Australia have been developed for mammals, birds (Bomford 2003, 2006, 2008), reptiles and amphibians (Bomford et al 2005, Bomford 2006, 2008). Developed by Dr Mary Bomford of the Bureau of Rural Sciences (BRS), the model uses criteria that have been demonstrated to have significant correlation between a risk factor and the establishment of populations of exotic species and the pest potential of those species that do establish. For example, a risk factor for establishment is similarity in climate (temperature and rainfall) within the species’ distribution overseas and Australia. For pest potential, the species’ overseas pest status is a risk factor. The model was originally published in ‘Risk Assessment for the Import and Keeping of Exotic Vertebrates in Australia’ (Bomford 2003) available online http://www.daff.gov.au/brs/land/feral-animals/management/risk . This model used the Apple Mac application CLIMATE (Pheloung 1996) for climate matching.</p> <p>The risk assessment model was revised and recalibrated ‘Risk Assessment for the Establishment of Exotic Vertebrates in Australia: Recalibrated and Refinement of Models’(Bomford 2006) and the climate application changed to PC CLIMATE software (Bureau of Rural Sciences 2006), available online at http://affashop.gov.au/product.asp?prodid=13506. The most recent publication (Bomford 2008) includes updated instructions for using the exotic vertebrate risk assessment models and an additional model for freshwater fish. A bird and mammal model for New Zealand has also been included.</p> <p>Which models are being used for the assessments:</p> <p>Birds and mammals have been assessed using the Australian Bird and Mammal Model (Bomford 2008), pp 16-28, including both versions of stage B, models 1 (4 factors) and 2 (7 factors). All reptiles and amphibians were assessed using three models; the Australian Bird and Mammal Model (Bomford 2008), including Model A, using 3 factors from stage B (pp 54-55), and Model B, using 7 factors from stage B (pp 20), and the Australian Reptile and Amphibian Model (Bomford 2008), p 51-53. The rationale for using additional models for reptiles and amphibians is to compare establishment risk ranks of the three models for a precautionary approach. If the models produce different outcomes for the establishment potential of any reptile or amphibian, the highest ranked outcome should be used (Bomford 2008).</p> <p>Climate Matching Using PC CLIMATE</p> <p>Sixteen climate parameters (variables) of temperature and rainfall are used to estimate the extent of similarity between data from meteorological stations located in the species’ world distribution and in Australia. Worldwide, data (source; worlddata_all.txt CLIMATE database) from approximately 8000</p>

		<p>locations are available for analysis. The number of locations used in an analysis will vary according to the size of the species' distribution. Data from approximately 762 Australian locations is used for analysis.</p> <p>To represent the climate match visually, the map of Australia has been divided into 2875 grid squares, each measured in 0.5 degrees in both longitude and latitude.</p> <p>CLIMATE calculates a match for each Australian grid by comparing it with all of the meteorological stations within the species' distribution (excluding any populations in Australia) and allocating a score ranging from ten for the highest level match to zero for the poorest match. These levels of climate match are used in the risk assessment for questions B1 (scores are summed to give a cumulative score), C6, and C8. For a grid square on the Australian map to score highly, it must match closely all 16 climatic variables of at least one meteorological station in the species' distribution for each level of climate match. [The score for each grid is based on the minimum Euclidian distance in the 16- dimensional variable space between it and all stations in the species' distribution. Each variable is normalized by dividing it by its worldwide standard deviation.]</p>
LITERATURE SEARCH TYPE AND DATE: NCBI, CAB Direct, MEDLINE, Science Direct, Web of Knowledge (Zoological Records, Biological Abstracts), SCIRUS, Google Search & Google Scholar 11/10/2007		
FACTOR	SCORE	
STAGE A: RISKS POSED BY CAPTIVE OR RELEASED INDIVIDUALS		
<p>A1. Risk to people from individual escapees (0–2)</p> <p>Assess the risk that individuals of the species could harm people. (NB, this question only relates to aggressive behaviour shown by escaped or released individual animals. Question C11 addresses the risk of harm from aggressive behaviour if the species establishes a wild population).</p> <p>Aggressive behaviour, size, plus the possession of organs capable of inflicting harm, such as sharp teeth, claws, spines, a sharp bill, or toxin-delivering apparatus may enable individual animals to harm people. Any known history of the species attacking, injuring or killing people should also be taken into account. Assume the individual is not protecting nest or young. Choose one:</p>	1	<p><i>Animal that is unlikely to make unprovoked attacks but which can cause serious injury (requiring hospitalisation) or fatality if cornered or handled</i></p> <p>A stocky cat, up to 14.0 kg in weight, possessing claws, and capable of killing an animal the size of a leopard, fishing cats could cause serious injury to people (Anon 1991) cited in (Cat Survival Trust 2002), (Blanford 1888) cited in (Lekagul and McNeelly 1988), (Finn 1929, Nowak 1999).</p> <p>The reference to fishing cats killing leopards originates from a 1929 reference (Finn 1929). Finn reports on a captive fishing cat breaking through a dividing wall into the next cage containing a tame, young female leopard, twice the size of the fishing cat, and killing it.</p> <p>Fishing cats kept in captivity that have not been hand-raised remain very aggressive towards keepers and in some instances, each other (pers. comm. Perth Zoo, 2007), (Lekagul and McNeelly 1988, Humphrey and Bain 1990, Sunquist and Sunquist 2002).</p>
<p>A2. Risk to public safety from individual captive animals (0–2)</p> <p>Assess the risk that irresponsible use of products obtained from captive individuals of the species (such as toxins) pose a public safety risk (excluding the safety of anyone entering the animals' cage/enclosure or otherwise coming within reach of the captive animals)</p>	0	<i>Nil or low risk (highly unlikely or not possible)</i>
STAGE A. PUBLIC SAFETY RISK SCORE	1	
SUM A1 TO A2 (0–4)		
STAGE B: PROBABILITY ESCAPED OR RELEASED INDIVIDUALS WILL ESTABLISH FREE-LIVING POPULATION		
Model 1: Four-factor model for birds and mammals (BOMFORD 2008)		
B1. Degree of climate match between species overseas range and Australia (1–6)	4	<p><i>High climate match with Australia - Climate Match Score = 1434</i></p> <p>Climate data from 522 locations (see species' worldwide distribution map) were used to calculate the CMS.</p>

		Overseas distribution is limited and discontinuous throughout parts of southeast Asia (see B7 for details).
B2. Exotic population established overseas (0–4)	4	<p>Exotic population established on island larger than 50 000 km²</p> <p>Occurrence on Java (126,520 km²) likely the result of introduction during the Middle Ages when invasion from India to Sumatra, Java and Bali occurred for religious and cultural reasons (Van Bree and Kahn 1992).</p>
<p>B3. Overseas range size score (0–2)</p> <p>< 1 = 0; 1 – 70 = 1; >70 = 2</p>	1	<p>Overseas range size between 1-70 million km² estimated at 4.4 million km². Includes current and past 1000 years, natural and introduced range.</p> <ul style="list-style-type: none"> ▪ In Pakistan, mainly along the lower reaches of the Indus River (Nowell and Jackson 1996, Nowak 1999, Sunquist and Sunquist 2002) ▪ North east India, in the valleys of Ganga and Brahmaputra rivers, along upper part of east coast and possibly along the southwest coast; also on Sri Lanka (Lekagul and McNeelly 1988, Gurung and Singh 1996, Nowell and Jackson 1996, Nowak 1999, Sunquist and Sunquist 2002) ▪ The Himalayan foothill region of India, Nepal and Assam (Nowell and Jackson 1996, Nowak 1999, Sunquist and Sunquist 2002) ▪ Nepal to Bhutan and Bangladesh, through to Burma, Thailand and Indochina (Lekagul and McNeelly 1988, Gurung and Singh 1996, Nowell and Jackson 1996, Nowak 1999) ▪ Records from Peninsular Malaysia – possible first record (paw print and inconclusive photo from camera trap) of fishing cats in the wild; if the species occurs it does so at an extremely low density (Kawanishi 2005) ▪ Small fragmented populations occur in coastal wetlands on Java (Melisch et al 1996, Nowell and Jackson 1996, Nowak 1999, Sunquist and Sunquist 2002) ▪ Although some references refer to the species being present in Peninsular Malaysia, Bali and Taiwan, these reports are either incorrect or inconclusive (United Nations Monitoring Programme 2004, Inar Rosmayati Natus 2005) and have not been included in the distribution. ▪ Said to occur on Sumatra but no museum specimens known from that island (Van Bree and Kahn 1992). Some references include Sumatra in the range of the fishing cat, e.g. (Lekagul and McNeelly 1988, Corbet and Hill 1992, Nowak 1999); other references do not report the fishing cat as being present on Sumatra (Finn 1929, Gurung and Singh 1996, Inar Rosmayati Natus 2005). The fishing cat was not recorded as part of a fauna survey of the Bukit Barisan Selatan National Park, the third largest protected area on Sumatra; survey methods included direct sightings and indirect evidence (tracks, faeces, soil disturbance) (O'Brien and Kinnaird 1996). Another study suggests fishing cats may exist on the island, reportedly sighting one cat and faeces within the Asiatic Persada oil palm concession in Jambi Province on Sumatra (Maddox et al 2007). Because of this conflicting information, Sumatra has not been included in the distribution. ▪ Occur up to 1500 m elevation (Gurung and Singh 1996, Nowell and Jackson 1996).
B4. Taxonomic Class (0–1)	1	Mammal (Nowak 1999).
B. ESTABLISHMENT RISK SCORE	10	
SUM OF B1-4 (1–13)		
Model 2: Seven-factor model for birds and mammals (BOMFORD 2008)		
B5. Diet (0–1)	1	<p>Generalist with a broad diet of many food types</p> <p>Diet consists mainly of fish (the paw is used as a scoop); and also includes crustaceans, molluscs, frogs,</p>

		snakes, birds and small mammals (Nowell and Jackson 1996, Nowak 1999); also carrion, livestock and insects (Gurung and Singh 1996). Mammal prey includes rats, civets, fawns, wild pigs, goats, calves and dogs; lizards, skinks and snails also taken (Humphrey and Bain 1990, Melisch et al 1996, Nowell and Jackson 1996, Sunquist and Sunquist 2002, Massicot 2006). The fishing cat's teeth are suited for killing any mammal, bird or reptile it can catch (Sunquist and Sunquist 2002).
B6. Lives in disturbed habitat (0–1)	1	<p><i>Can live in human-disturbed habitats</i></p> <p>Found in marshy thickets, mangrove swamps, and densely vegetated areas along creeks (Nowak 1999). Also found in dense forest up to 1500 m elevation, scrub, grassland, near water, tidal creeks, mangroves and backwaters (Gurung and Singh 1996). Reportedly common around villages in wetland areas where disturbance is minimal (e.g. outskirts of Calcutta); irrigated forms of cultivation are less suitable (e.g. rice paddies) (Cat Specialist Group 1996). Other reports suggest it does not adapt well to cultivated habitats (Nowak 1999).</p>
B7. Non-migratory behaviour (0–1)	1	<p><i>Non-migratory or facultative migrant in its native range</i></p> <p>Fishing cats are non-migratory (Nowak 1999). They are primarily nocturnal (Sunquist and Sunquist 2002). Females have home ranges of 4 to 8 km², while males have larger home ranges, up to 22 km² (D. Smith <i>in litt.</i> 1993) cited in (Nowell and Jackson 1996), (Nowak 1999).</p>
B. ESTABLISHMENT RISK SCORE SUM OF B1-7 (1–16)	13	
STAGE C: PROBABILITY AN ESTABLISHED SPECIES WILL BECOME A PEST		
C1. Taxonomic group (0–4)	2	<p><i>Mammal in one of the orders that have been demonstrated to have detrimental affects on prey abundance</i></p> <p>Order Carnivora, Family Felidae (Nowak 1999).</p>
C2. Overseas range size including current and past 1000 years, natural and introduced range (0–2)	0	<p><i>Overseas geographical range less than 10 million km². Estimated at 4.4 million km².</i></p> <p>Overseas distribution is limited and discontinuous throughout parts of southeast Asia (see B7 for details).</p>
C3. Diet and feeding (0–3)	2	<p><i>Mammal that is a strict carnivore but not arboreal</i></p> <p>Reported to climb trees to dive into water (Cat Survival Trust 2002) however, no reports of hunting or feeding up in trees.</p>
C4. Competition with native fauna for tree hollows (0–2)	2	<p><i>Can nest or shelter in tree hollows</i></p> <p>Den can be in a hole in a tree or the ground (Gurung and Singh 1996). In the wild fishing cats are believed to rear their young in tree hollows (Humphrey and Bain 1990).</p>
C5. Overseas environmental pest status (0–3)	0	<p><i>This species has never been reported as an environmental pest in any country or region.</i></p> <p>Fish are the main food source. No information regarding the species of fish, and whether the fishing cat could have a negative impact feeding on particular species (Haque and Vijayan 1993) cited in (Hamlin and Myers 2004).</p>
C6. Climate match to areas with susceptible native species or communities (0–5)	5	<p><i>The species has 30 - 100 grid squares within the highest four climate match classes that overlap the distribution of susceptible species or communities AND</i></p> <p><i>One or more susceptible native species or ecological communities that are listed as vulnerable or endangered under the Australian Government Environment Protection and Biodiversity Conservation Act 1999 has a restricted geographical range that lies with the mapped area of the highest six climate match</i></p>

classes for the exotic species being assessed.

Reference for all vulnerable or endangered species (status noted in bold)(Dept of the Environment Water Heritage and the Arts 2007, 2008). Susceptible Australian native species or natural communities that could be threatened include:

Freshwater fish: Australian Lungfish (*Neoceratodus forsteri*) (**vulnerable**), Edgbaston Goby (*Chlamydogobius squamigenus*) (**vulnerable**), Banded Grunter (*Amniataba percoids*), Banded Rainbowfish (*Melanotaenia trifasciata*), Eastern Gambusia (*Gambusia holbrooki*), Flat-tail Mullet (*Liza argentea*), Fly-specked Hardyhead (*Craterocephalus stercusmuscarum*), Gulf Saratoga (*Scleropages jardinii*), Freshwater Sawfish (*Pristis microdon*) (**vulnerable**), Honey Blue-eye (*Pseudomugil mellis*) (**vulnerable**), Jungle Perch (*Kuhlia rupestris*), Pacific Blue Eye (*Pseudomugil signifier*), Smooth-scaled Gudgeon (*Odonteleotris macrodon*) (Australian Museum Online 2006).

Mammals: Northern quoll (*Dasyurus hallucatus*) (**endangered**), Spotted-tailed Quoll or Yarri (North Queensland subspecies) (*Dasyurus maculatus gracilis*) (**endangered**), Northern Dribbler (*Parantechinus bilarni*), Ningbing Pseudantechinus (*Pseudantechinus ningbing*), Yellow-footed Antechinus (*Antechinus flavipes*), Fawn Antechinus (*A. bellus*), Atherton Antechinus (*A. godmani*), Cinnamon Antechinus (*A. leo*), Long-tailed Planigale (*Planigale ingrami*), Common Planigale (*P. maculata*), dunnarts (*Sminthopsis* spp.) including Julia Creek Dunnart (*S. douglasi*) (**endangered**), Northern Brown Bandicoot (*Isodon macrourus*), Golden Bandicoot (*I. auratus*) (**vulnerable**), Southern Brown Bandicoot (*I. obesulus*), Long-nosed Bandicoot (*Perameles nasuta*), Rufous Spiny Bandicoot (*Echymipera rufescens*), Rufous Bettong (*Aepyprymnus rufescens*), Northern Bettong (*Bettongia tropica*) (**endangered**), tree kangaroos (*Dendrolagus* spp.), Spectacled Hare-wallaby (*Lagorchestes conspicillatus*), Mala (*L. hirsutus*) (**endangered**), Proserpine Rock-wallaby (*Petrogale persephone*) (**endangered**), native rodents (*Leggadina* spp., *Notomys* spp., *Pseudomys* spp., *Zyomys* spp., *Melomys* spp., *Uromys* spp., *Rattus* spp.) (Central Rock-rat *Zyomys pedunculatus*, Carpenterian Rock-rat *Z. palatalis* – **endangered**), Water-rat (*Hydromys chrysogaster*), False Water-rat (*Xeromys myoides*) (Strahan 1995).

Birds: Australia Brush-turkey (*Alectura lathamii*), Orange-footed Scrubfowl (*Megapodius reinwardt*), quails (*Coturnix* spp.), Magpie Goose (*Anseranas semipalmata*), whistling-ducks *Dendrocygna* spp., Black Swan (*Cygnus atratus*), Radjah Shelduck (*Tadorna radjah*), Australian Wood Duck (*Chenonetta jubata*), pygmy geese (*Nettapus* spp.), other water fowl, Australian Bustard (*Ardeotis australis*), button quails (*Turnix* spp.) including Buff-breasted Button-quail (*T. olivii*) (**endangered**), Marsh Sandpiper (*Tringa stagnatilis*), Common Greenshank (*T. nebularia*), Wood Sandpiper (*T. glareola*), Common Sandpiper (*Actitis hypoleucos*), Sharp-tailed Sandpiper (*Calidris acuminata*), Comb-crested Jacana (*Irediparra ganninacea*), Bush Stone-curlew (*Burhinus grallarius*), Black-winged Stilt (*Himantopus himantopus*), Red-capped Plover (*Charadrius ruficapillus*), Oriental Plover (*Charadrius veredus*), Black-fronted Dotterel (*Eiseyornis melanops*), Red-kneed Dotterel (*Erythrogonys cinctus*), Masked Lapwing (*Vanellus miles*), Oriental Pratincole (*Glareola maldivarum*), Australian Pratincole (*Stiltia isabella*), Hooded Parrot (*Psephotus dissimilis*), Golden-shouldered Parrot (*Psephotus chrysopterygius*), Purple-crowned Fairy-wren (*Malurus coronatus*) (**vulnerable**), Variegated Fairy-wren (*M. lamberti*), Lovely Fairy-Wren (*M. amabilis*), Red-backed Fairy-Wren (*M. melanocephalus*), grasswrens (*Amytornis* spp.), scrubwrens (*Sericornis* spp.), Clamorous Reed-Warbler (*Acrocephalus stentoreus*), Tawny Grassbird (*Megalurus timoriensis*), Little-Grassbird (*M. gramineus*), Spinifexbird (*Eremiornis carteri*), Gouldian Finch (*Erythrura gouldiae*) (**endangered**), Night Parrot (*Pezoporus occidentalis*) (**endangered**) (Pizzey and Knight 1997, Barrett et al 2003).

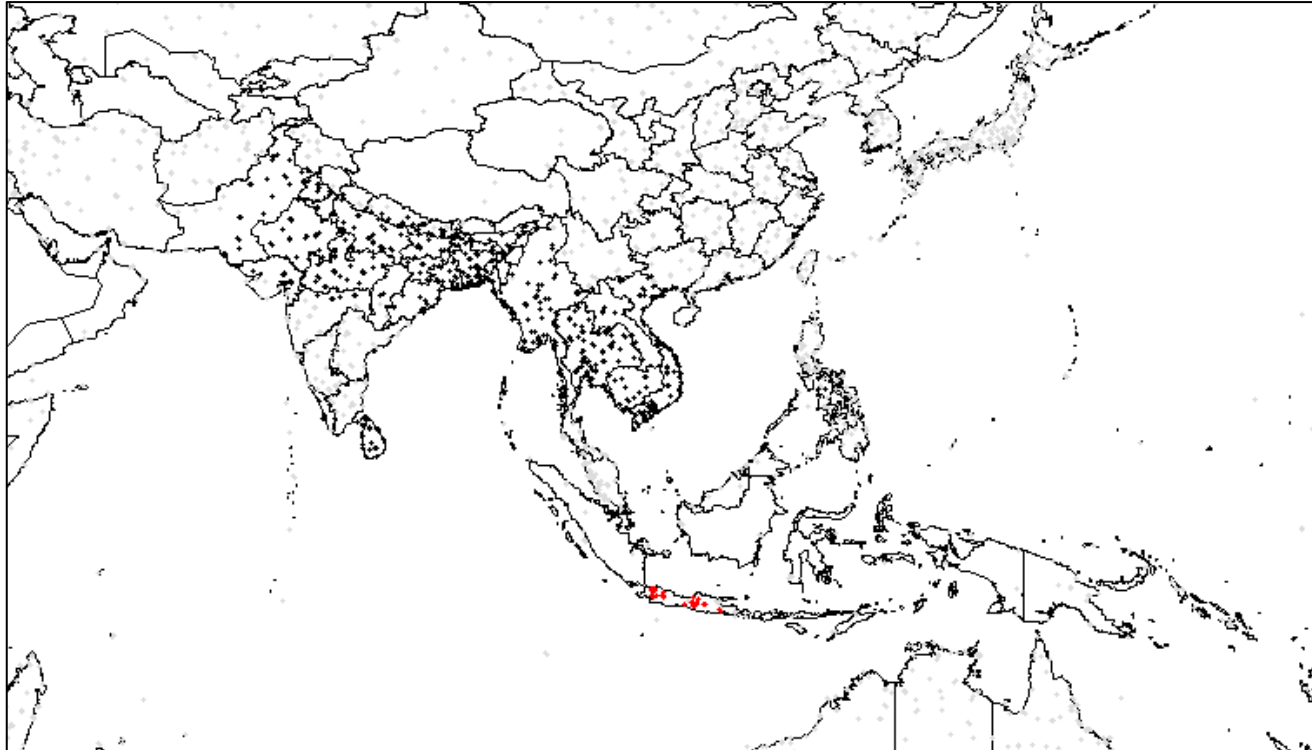
Frogs: Krombit Tinker Frog (*Taudactylus pleione*) (**vulnerable**), *Crinia* spp., *Limnodynastes* spp., *Neobatrachus aquilonius*, *Notaden melanoscaphus*, *N. nicholli*, *Pseudophryne major*, *Uperoleia* spp., *Cyclorana* spp., *Litoria* spp. including Armoured Mistfrog (*L. lorica*) (**critically endangered**), Mountain Mistfrog (*L. nyakalensis*) (**endangered**) Common Mistfrog (*L. reoccola*) (**endangered**), Waterfall Frog (*L. nannotus*), *Cophixalus* spp. (many of these have very small distributions), *Spenophryne* spp., *Rana daemeli*

		<p>(Cogger 2000).</p> <p>Reptiles:</p> <p>Small lizards – <i>Diplodactylus</i> spp., <i>Crenadactylus ocellatus</i>, <i>C. louisianensis</i>, Chameleon Gecko (<i>Carpodactylus laevis</i>), <i>Gehyra</i> spp., <i>Heteronotia</i>, spp., <i>Lepidodactylus lugubris</i>, <i>Nephurus asper</i>, <i>N. levis</i>, <i>Oedura</i> spp., <i>Phyllurus cornutus</i>, <i>Pseudothecadactylus australis</i>, <i>P. lindneri</i>, Atherton Delma (<i>Delma mitella</i>) (vulnerable), Striped-tailed Delma (<i>D. labialis</i>) (vulnerable), <i>Lialis burtonis</i>, <i>Pygopus nigriceps</i>, <i>Amphibolurus nobbi</i>, <i>Chelosania brunnea</i>, <i>Chlamydosaurus kingii</i>, <i>Ctenophorus</i> spp., <i>Diporiphora</i> spp., <i>Hypsilurus boydii</i>, <i>Lophognathus</i> spp., <i>Physignathus lesueurii</i>, <i>Varanus</i> spp., (Cogger 2000).</p> <p>Skinks – <i>Carlia</i> spp., <i>Coeranoscincus fontalis</i>, <i>Cryptoblepharus</i> spp., <i>Ctenotus</i> spp., <i>Egernia</i> spp. Including <i>E. obiri</i> – (endangered), <i>Emoia</i> spp., <i>Eremiascincus</i> spp., <i>Eugongylus albofasciolatus</i>, <i>E. rufescens</i>, <i>Eulamprus</i> spp., <i>Glaphyromorphus</i> spp., <i>Lerista</i> spp., <i>Lygisaiius</i> spp., <i>Menetia</i> spp., <i>Morethia</i> spp., <i>Proablephaius</i> spp., <i>Saproscincus</i> spp., <i>Tiliqua scincoides</i> (Cogger 2000).</p> <p>Snakes – blind snakes (<i>Ramphotyphlops</i> spp.), Black-headed Python (<i>Aspidites melanocephalus</i>), Green python (<i>Chondropython viridis</i>), <i>Liasis</i> spp., <i>Morelia</i> spp., <i>Acrochordus</i> spp., Brown Tree Snake (<i>Boiga irregularis</i>), <i>Cerberus rynchops</i>, Keelback or Freshwater Snake (<i>Tropidonophis mairii</i>), Slaty-grey Snake (<i>Stegonotus cucullatus</i>), <i>Demansia</i> spp., <i>Furina</i> spp., <i>Oxyuranus</i> spp., <i>Pseudechis</i> spp., <i>Pseudonaja</i> spp., <i>Rhinoplocephalus</i> spp., <i>Simosleaps</i> spp., <i>Suta</i> spp., <i>Vermicella</i> spp. (Cogger 2000).</p> <p>Freshwater turtles - New Guinea Long-necked Turtle (<i>Chelodina novaeguineae</i>), Northern Long-necked Turtle (<i>C. rugosa</i>), Krefft's Turtle (<i>Emydura krefftii</i>), <i>Emydura</i> spp., Gulf Snapping Turtle (<i>Elseya lavarackorum</i>) (endangered), Pig-nosed Turtle (<i>Carettochelys insculpta</i>) (Cann 1998, Cogger 2000).</p> <p>Invertebrates: Dawson Valley Snail (<i>Adclarkia dawsonensis</i>) (critically endangered), land snails <i>Mesodontrachia fitzroyana</i>, <i>Semotrachia euzyga</i>, <i>Sinumelon bednalli</i> (endangered).</p> <p>Communities: The endangered community of native species dependent on natural discharge of groundwater from the Great Artesian Basin (Dept of the Environment Water Heritage and the Arts 2008).</p>
C7. Overseas primary production pest status (0–3)	1	<p><i>Minor pest of primary production in any country or region</i></p> <p>Diet consists mainly of fish (Nowell and Jackson 1996, Nowak 1999) (Haque and Vijayan 1993) cited in (Hamlin and Myers 2004); however, reported to feed on livestock (Gurung and Singh 1996), including sheep and calves (Finn 1929, Hamlin and Myers 2004), and chickens (Humphrey and Bain 1990).</p>
C8. Climate match to susceptible primary production (0–5)	4	<p>Score = 112 (Bomford 2008)</p> <p>See Commodity Scores Table – species has attributes making it capable of damaging sheep, cattle, pigs, poultry, aquaculture, and other livestock industries.</p>
C9. Spread disease (1–2)	2	<p><i>All birds and mammals (likely or unknown effect on native species and on livestock and other domestic animals).</i></p>
C10. Harm to property (0–3)	0	<p>\$0</p> <p>No reports found.</p>
C11. Harm to people (0–5)	4	<p><i>Injuries or harm severe or fatal but few people at risk</i></p> <p>Although shy (Gurung and Singh 1996), fishing cats are quite vicious (Humphrey and Bain 1990). Strong enough to kill a leopard (Anon 1991) cited in (Cat Survival Trust 2002), (Blanford 1888) cited in (Lekagul and McNeelly 1988), (Finn 1929), and possessing claws (Nowak 1999), fishing cats could cause severe injury to humans. May be dangerous to children, as there are reports of fishing cats killing human infants (up to four months old) in older literature (Finn 1929, Lekagul and McNeelly 1988).</p>

C. PEST RISK SCORE SUM C 1 TO 11 (1-37)	22	
STAGE A. PUBLIC SAFETY RISK RANK – RISK TO PUBLIC SAFETY POSED BY CAPTIVE OR RELEASED INDIVIDUALS 0 = Not dangerous; 1 = Moderately dangerous; ≥ 2 = Highly dangerous	1	MODERATELY DANGEROUS
STAGE B. ESTABLISHMENT RISK RANK – RISK OF ESTABLISHING A WILD POPULATION MODEL 1: FOUR-FACTOR MODEL FOR BIRDS AND MAMMALS (BOMFORD 2008) ≤ 5 = low establishment risk; 6-8 = moderate establishment risk; 9-10 = serious establishment risk; ≥11-13 = extreme establishment risk	10	SERIOUS ESTABLISHMENT RISK
STAGE B. ESTABLISHMENT RISK RANK – RISK OF ESTABLISHING A WILD POPULATION MODEL 2: SEVEN-FACTOR MODEL FOR BIRDS AND MAMMALS (BOMFORD 2008) ≤ 6 = low establishment risk; 7-11 = moderate establishment risk; 12-13 = serious establishment risk; ≥14 = extreme establishment risk	13	SERIOUS ESTABLISHMENT RISK
STAGE C. PEST RISK RANK - RISK OF BECOMING A PEST FOLLOWING ESTABLISHMENT < 9 = low pest risk; 9-14 = moderate pest risk; 15-19 = serious pest risk; > 19 = extreme pest risk	22	EXTREME PEST RISK
VERTEBRATE PESTS COMMITTEE THREAT CATEGORY		EXTREME – ENDORSED BY VPC
Median number of references per mammal, for all mammals assessed by (Massam et al 2010) (n=17) Total number of references for this species <i>(median number for references for Public Safety Risk, Establishment Risk and Overseas Environmental and Agricultural Adverse Impacts)</i>		37 28 – less than the median number of mammal references were used for this assessment, indicating an increased level of uncertainty.

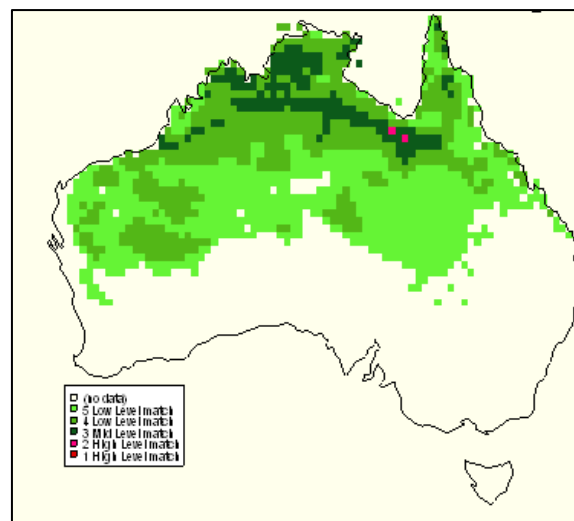
WORLDWIDE DISTRIBUTION - Fishing Cat (*Prionailurus viverrinus*), including natural populations (black) and introduced populations (red).

Each black or red dot is a location where meteorological data was sourced for the climate analysis (see B1); faint grey dots are locations available for CLIMATE analysis but are not within the species distribution therefore not used.



Map 1. Climate match between the world distribution of Fishing Cat (*Prionailurus viverrinus*) and Australia for five match classes.

Colour on Map	Level of Match from Highest (10) to Lowest (6)	No. Grid Squares on Map
Red	10 HIGH MATCH	0
Pink	9 HIGH MATCH	2
Dark Green	8 MOD MATCH	148
Mid Green	7 MOD MATCH	529
Lime Green	6 LOW MATCH	755
		CMS= 1434



Fishing Cat (*Prionailurus viverrinus*) Susceptible Australian Primary Production – Calculating Total Commodity Damage Score

The commodity value index scores in this table are derived from Australian Bureau of Statistics 2005 – 2006 data. The values will require updating if significant change has occurred in the value of the commodity (Bomford 2008).

Industry	Commodity Value Index (based on 1999 - 2000 data)	Potential Commodity Impact Score (0-3)	Climate Match to Commodity Score (0-5)	Commodity Damage Score (columns 2 X 3 X 4)
Cattle (includes dairy and beef) consumption of stock fodder consumption of stock fodder only therefore commodity value adjusted down by 1/3	11	2	3	66
Timber (includes native and plantation forests)	10	0	0	0
Cereal grain (includes wheat, barley sorghum etc) no reports of damage to this commodity	8	0	0	0
Sheep (includes wool and sheep meat) consumption of stock fodder only therefore commodity value adjusted down by 1/3	5	2	3	30
Fruit (includes wine grapes)	4	0	0	0
Vegetables	3	0	0	0
Poultry and eggs	2	2	3	12
Aquaculture(includes coastal mariculture)	2	0	0	0
Oilseeds (includes canola, sunflower etc) no reports of damage to this commodity	1	0	0	0
Grain legumes (includes soybeans) no reports of damage to this commodity	1	0	0	0
Sugarcane	1	0	0	0
Cotton	1	0	0	0
Other crops and horticulture (includes nuts tobacco and flowers etc)	0	0	0	0
Pigs	1	1	3	3
Other livestock (includes goats, deer, camels, rabbits)	0.5	1	2	1
Bees (included honey, beeswax and pollination)	0.5	0	0	0
Total Commodity Damage Score (TCDS)				112

[Table 9 Rational

Potential Commodity Impact Score (0-3)

Assess Potential Commodity Impact Scores for each primary production commodity listed in Table 9, based on species' attributes (diet, behaviour, ecology), excluding risk of spreading disease which is addressed in Question C9, and pest status worldwide as:

0. Nil (species does not have attributes to make it capable of damaging this commodity)

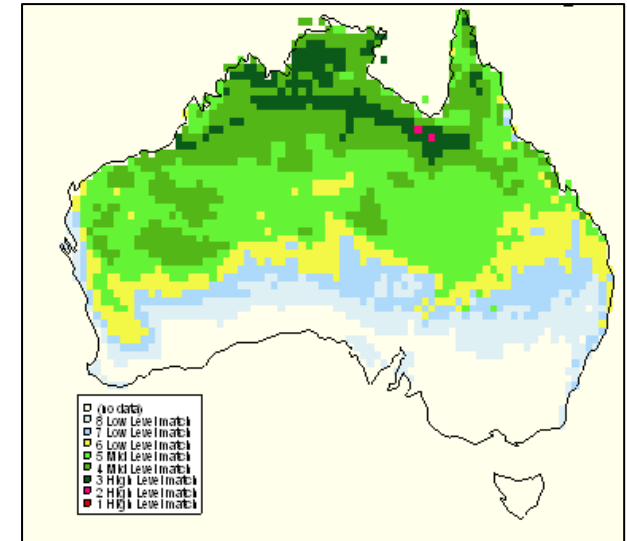
1. Low (species has attributes making it capable of damaging this or similar commodities and has had the opportunity but no reports or other evidence that it has caused damage in any country or region)
2. Moderate-serious (reports of damage to this or similar commodities exist but damage levels have never been high in any country or region and no major control programs against the species have ever been conducted OR the species has attributes making it capable of damaging this or similar commodities but has not had the opportunity)
3. Extreme (damage occurs at high levels to this or similar commodities and/or major control programs have been conducted against the species in any country or region and the listed commodity would be vulnerable to the type of harm this species can cause).

Climate Match to Commodity Score (0-5)

- None of the commodity is produced in areas where the species has a climate match within the highest eight climate match classes (ie classes 10, 9, 8, 7, 6, 5, 4 and 3) = 0
- Less than 10% of the commodity is produced in areas where the species has a climate match within the highest eight climate match classes = 1
- Less than 10% of the commodity is produced in areas where the species has a climate match within the highest six climate match classes (ie classes 10, 9, 8, 7, 6 and 5) = 2
- Less than 50% of the commodity is produced in areas where the species has a climate match within the highest six climate match classes AND less than 10% of the commodity is produced in areas where the species has a climate match within the highest three climate match classes (ie classes 10, 9 and 8) = 3
- Less than 50% of the commodity is produced in areas where the species has a climate match within the highest six climate match classes BUT more than 10% of the commodity is produced in areas where the species has a climate match within the highest three climate match classes = 4
- OR More than 50% of the commodity is produced in areas where the species has a climate match within the highest six climate match classes BUT less than 20% of the commodity is produced in areas where the species has a climate match within the highest three climate match classes = 4
- More than 20% of the commodity is produced in areas where the species has a climate match within the highest three climate match classes OR overseas range unknown and climate match to Australia unknown = 5.]

Map 2. Climate match between the world distribution of Fishing Cat (*Prionailurus viverrinus*) and Australia for eight match classes.

Colour on Map	Level of Match from Highest (10) to Lowest (3)	No. Grid Squares on Map
Red	10 HIGH MATCH	0
Pink	9 HIGH MATCH	2
Dark Green	8 HIGH MATCH	148
Mid Green	7 MOD MATCH	529
Lime Green	6 MOD MATCH	755
Yellow	5 MOD MATCH	301
Blue	4 LOW MATCH	255
Light blue	3 LOW MATCH	320



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Vertebrate Pests Committee Threat Categories (Natural Resource Management Standing Committee 2004, Natural Resource Management Standing Committee and Vertebrate Pests Committee 2004)

VPC Threat Category			
A species' VPC Threat Category is determined from the various combinations of its three risk ranks; (A) Public safety risk rank, (B) Establishment risk rank, (C) Pest risk rank.			
B. Establishment Risk Rank¹	C. Pest Risk Rank¹	A. Public Safety Risk Rank	Threat Category
Extreme	Extreme	Highly Dangerous, Moderately Dangerous or Not Dangerous	Extreme
Extreme	High	Highly Dangerous, Moderately Dangerous or Not Dangerous	Extreme
Extreme	Moderate	Highly Dangerous, Moderately Dangerous or Not Dangerous	Extreme
Extreme	Low	Highly Dangerous, Moderately Dangerous or Not Dangerous	Extreme
High	Extreme	Highly Dangerous, Moderately Dangerous or Not Dangerous	Extreme
High	High	Highly Dangerous, Moderately Dangerous or Not Dangerous	Extreme
High	Moderate	Highly Dangerous, Moderately Dangerous or Not Dangerous	Serious
High	Low	Highly Dangerous, Moderately Dangerous or Not Dangerous	Serious
Moderate	Extreme	Highly Dangerous, Moderately Dangerous or Not Dangerous	Extreme
Moderate	High	Highly Dangerous, Moderately Dangerous or Not Dangerous	Serious
Moderate	Moderate	Highly Dangerous	Serious
Moderate	Moderate	Moderately Dangerous or Not Dangerous	Moderate
Moderate	Low	Highly Dangerous	Serious
Moderate	Low	Moderately Dangerous or Not Dangerous	Moderate
Low	Extreme	Highly Dangerous, Moderately Dangerous or Not Dangerous	Serious
Low	High	Highly Dangerous, Moderately Dangerous or Not Dangerous	Serious
Low	Moderate	Highly Dangerous	Serious
Low	Moderate	Moderately Dangerous or Not Dangerous	Moderate
Low	Low	Highly Dangerous	Serious
Low	Low	Moderately Dangerous	Moderate
Low	Low	Not Dangerous	Low

¹ 'Establishment Risk' is referred to as the 'Establishment Likelihood' and 'Pest Risk' is referred to as the 'Establishment Consequences' by the Natural Resource Management Standing Committee (2004).