Department of Agriculture and Fisheries
Biosecurity Queensland

Invasive animal risk assessment

Camel

Camelus dromedarius

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Queensland Government

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Introduction

Identity and taxonomy

Species: *Camelus dromedarius*

Common names: Camel, dromedary, Arabian camel

Family: Camelidae

Related species: *C. bactrianus* (Bactrian camel), *Lama glama* (llama), *L. guanicoe* (guanicoe), *L. pacos* (alpaca) and *Vicugna vicugna* (vicuña) (Huffman 2004, 2005).

Description

The key diagnostic features of the camel are body length (300 cm), shoulder height (180–210 cm), tail length (50 cm) and weight (600–1000 kg) (Huffman 2004). Camels have a smooth coat that is beige to light brown, with the undersides slightly lighter. Their legs are long and slender, often with calloused knees, developed from where they touch the ground when the animal is lying down. Though often called the one-humped camel, the dromedary has two humps used for energy storage in the form of fat. The under-developed anterior hump sits over the shoulders and the large rear hump is found in the centre of the back. The upper lip is deeply split and the nostrils can be closed. The camel has long eyelashes to help to keep sand out of its eyes. The two broad toes on the feet are able to spread widely as an adaptation to walking on sand (Huffman 2004).

Biology

Life history

Gestation period: 12–13 months

Young per birth: 1

Birth interval: 18–24 months

Weaning: 1–2 years

Sexual maturity: Females 3–4 years; males 5–6 years

Sexual activity: Up to 30 years

Lifespan: Up to 50 years

(DEH 2004; Huffman 2004).

Camel populations have a relatively low maximum rate of increase of around 10% per annum (Edwards et al. 2004) due to a relatively high rate of adult survival and low fecundity. This is typical of large mammals, as is variable juvenile survival (Gaillard et al. 1998).

Social organisation

Feral camels live in three main types of non-territorial groups: year-round groups of bulls (males), summer groups of cows (females) and calves, and winter breeding groups that include a mature bull and several cows with calves. Old bulls tend to be solitary (DEH 2004).

Herds average 11 individuals but larger herds of up to several hundred animals may form in summer or during droughts when groups congregate (DEH 2004; Huffman 2004). In the breeding season, from May to October, single males defend a group of 20 or more cows against advances from other males. Large males engage in ritualised displays that may lead to serious fights.

Diet, thermoregulation and water requirements

As well as grazing on grass, feral camels browse on vegetation as high as 3.5 m above the ground. They eat a wide range of plant material, including fresh grass and shrubs, preferring roughage to pasture that has introduced grasses or has been fertilised. Camels have a high requirement for salt and they eat salty plants, even devouring thorny, bitter or toxic species that other herbivores avoid. At times when forage is green and moist, feral camels gain all the water they need from their food and do not require drinking water (DEH 2004).

Camels are renowned for their ability to survive in hot desert conditions without water for long periods. They have a flexible 'thermostat' and will not start sweating until their body temperature reaches 42 °C. Internal body heating mechanisms start when their internal temperature drops below 34 °C. Besides saving energy, this physiological adaptation allows the camel to 'store' coolness in preparation for the next day. On hot days, camels will rest together in closely packed groups, which considerably reduces the heat reflecting off of the ground (Huffman 2004).

Camels can glean much of their water requirements from desert vegetation and can survive after losing over 40% of their bodyweight in water. If water, whether fresh or brackish, is available in summer, camels will drink regularly and at dawn. In extreme drought camels need access to waterholes, with a dehydrated camel able to drink 200 L in three minutes. The camel's hump is mostly fat and provides a store of energy rather than water (Huffman 2004).

Preferred habitat

Feral camels are highly mobile and move over areas up to 5000 km^2 (Grigg et al. 1995; Edwards et al. 2001). They wander widely according to conditions, sometimes covering 70 km in a day. In summer, they are usually found in bushland and sandplain country that offers food and shelter from the sun, but in winter they move to salt lakes and salt marshes (DEH 2004). Dörges and Heucke (2003) report that in central Australia, camels feed on more than 80% of the available plant species.

Predators and diseases

There are no known predators of camels (Huffman 2004). In Australia, it is possible that dingoes or wild dogs take young animals. Camels are susceptible to tuberculosis and brucellosis.

Distribution in Queensland

History of introduction

Camels were first brought into Australia in small numbers in the 1840s (McKnight 1969). Subsequently, demand for draught and transport camels increased and 10 000–20 000 camels were imported to supplement those being bred by the late 1880s. However, as motor transport became more widespread, the camel became redundant and many were released or escaped to form the basis of the today's feral camel population (Siebert & Newman 1989).

Distribution and abundance in Australia

Camels now have a wide distribution throughout central Australia and Western Australia, northern South Australia and the Northern Territory (Figure 1).

Figure 1. Australian distribution of *C. dromedarius* (Siebert & Newman 1989).

In the 1930s and 1940s, herds of up to 200 camels were seen further to the east of western Queensland (Mitchell et al. 1985). McKnight (1969) reported 15 000 to 20 000 feral camels in Australia, with 1500–2000 in Queensland. Mitchell et al. (1985) reported approximately 1000 camels in the far western districts of Queensland, with seasonal variations in water and food supplies controlling total population size. Camels were reported in the south-west corner of the Diamantina Shire, the north-western corner of the Bulloo Shire, the southern corner of the Winton Shire and around the border of the Boulia and Cloncurry Shires (Mitchell et al. 1985), with populations only occurring on the plains in the far western districts. Figure 2 shows a map of the 1985 and 2000 distribution of camels in Queensland.

In 2000, a presence and absence survey was conducted and is overlayed with the 1985 data in Figure 2. At this time, camels were reported in Diamantina, Boulia, Mount Isa, Cloncurry, McKinlay, Richmond and Flinders Shires. The distribution of camels observed in 2000 suggests a range expansion since 1985. However, it is important to note that this information only represents the presence of camels in the shire, and not the distribution within the shire.

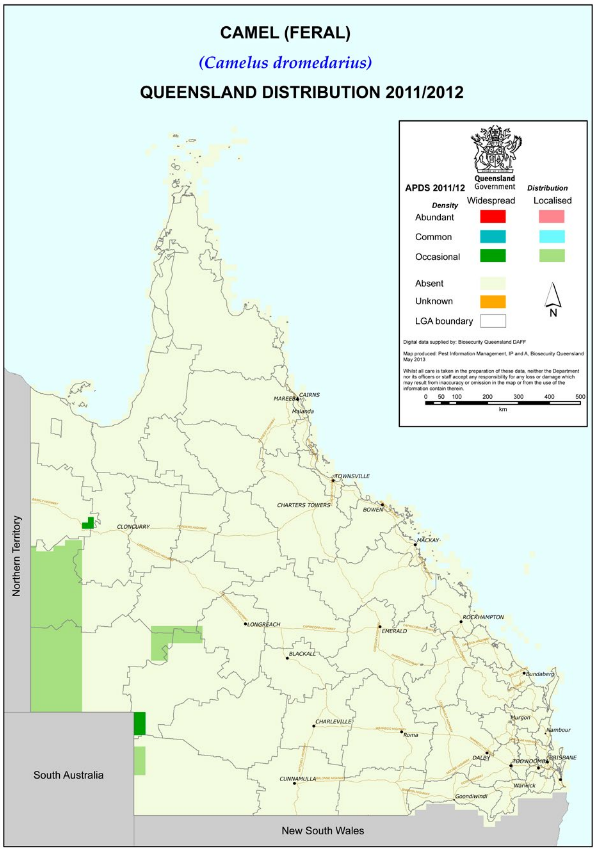

Figure 2. Queensland distribution of *C. dromedarius*

In 2003, a total of 80 camels were being held in captivity under five declared pest permits in Queensland (Danielle Butcher 2005, pers. comm.). However, this number probably underestimates the number of camels held in Queensland.

Edwards et al. (2004) reported a minimum estimate of 80 500 camels in the Northern Territory in 2001, with an overall population throughout Australia of 300 000. They observed a population increase close to the maximum rate of ~10% per year between aerial surveys in 1991 and 2001. This equates to an approximate doubling in population size every eight years (Edwards et al. 2004). Although the population cannot maintain this growth indefinitely, there is no indication that a reduction will occur soon (Edwards et al. 2004).

Assuming maximum population growth, McKnight's (1969) estimate of 4500–6000 camels in the Northern Territory would have increased to 72 000–96 000 camels by 1999. In Queensland, the population estimates of McKnight (1969), Mitchell et al. (1985) and Edwards et al. (2004) were projected to estimate a 2005 Queensland feral camel population of between 24 000 and 32 000. These population estimates are significantly less than the 50 000 camels in Queensland suggested by Warfield and Tume (2000).

Distribution and abundance overseas

Originally confined to Arabia, the domestic camel now inhabits the deserts of northern and north-eastern Africa, the Middle East and central Asia (Lever 1985).

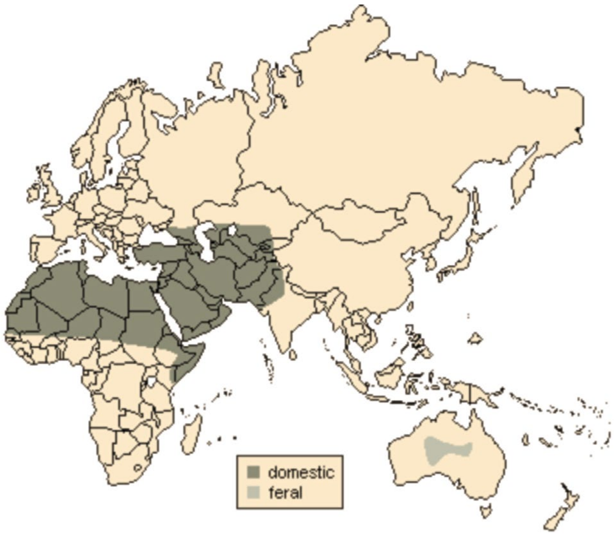

Figure 3. Worldwide distribution of domestic and wild *C. dromedarius* (Köhler-Rollefson 1991).

Management

Current and potential impact in Australia

Information on the impact of camels is limited and often contradictory. Short et al. (1988) report damage to hundreds of metres of stock fences, as well as damage to infrastructure at cattle watering points. Camels are susceptible to a number of livestock diseases and may act as a reservoir for reinfection. However, Wilson et al. (1992) stated there was little competition between camels and livestock and the impact of camels on watering points and fences was minimal.

It is only in the past decade that the impact of camels on native plants and animals has been examined. At low density, feral camels do not appear to have a major impact, as their padded leathery feet do much less damage than hooves of livestock and other feral animals such as horses, donkeys and goats. Their habit of browsing while moving over large areas means that camels tend not to feed intensively in any particular area. Serious impacts on vegetation are evident where camels occur at densities >2 camels/km^2 (Dörges & Heucke 2003). Dörges and Heucke (2003) also suggested that camel stocking rates during drought needed to be ≤0.2–1 camels/km^2 to have no adverse impact. Surveys by Wilson et al. (1992) and Edwards et al. (2004) both found that camels occur at, or above, this density.

Feral camels can defoliate and suppress recruitment of some shrub and trees species, with impacts exacerbated in drier years (Dörges and Heucke 2003). During drought, areas close to remote waterholes become refuges that are critical to the survival of a range of native animals and plants. Feral camels can quickly degrade these areas during drought to the point where they may no longer provide any refuge for native plants and animals, perhaps leading to local extinction of some species. *The action plan for Australian marsupials and monotremes* (Maxwell et al. 1996) recommends that feral camel numbers be reduced at specific sites to help protect the habitat of threatened animals such as the ampurta (*Dasycercus hillieri*).

Some important food plants traditionally harvested by Aboriginal people are also affected by camel browsing (Dörges & Heucke 2003). Feral camels have a noticeable impact on fragile salt lake ecosystems and destabilise dune crests, which can lead to erosion (Dörges & Heucke 2003). They are also an increasing safety hazard to motorists traversing outback roads (Edwards et al. 2004).

Mitchell et al. (1985) suggested, in general, little damage can be attributed to camels in Queensland. In 1985, a survey of landowners in western Queensland found that only 14% of participants regarded camels as a pest, whilst in central Queensland camels were not regarded as a pest by any respondents (Mitchell et al. 1985). However, when conditions become extreme in the desert regions camels will wander eastward into Queensland where they compete with domestic stock for food. They also foul waterholes and contaminate bore tanks and troughs with their carcasses during severe droughts (Mitchell et al. 1985).

Edwards et al. (2004) suggested that, over the arid zone of Australia, feral camels represent as much of a threat to the environment as feral goats and that this threat will increase with time in the absence of human intervention.

Current and potential benefits in Australia

A small industry based on the wild-harvest and export of live feral camels has been in operation since 1993. The current annual harvest is less than 5000 animals (P. Seidel pers. comm. in Edwards et al. 2004). While the live export market is fickle in regard to the size and sex of animals required at particular times of year, the construction of a purpose-built export abattoir might open up new markets for camel meat (P. Seidel pers. comm. in Edwards et al. 2004).

In 1992, the Central Australian Camel Industry's estimated value was $2.25 million, including tourism, live export and abattoir trade. The industry's goal was to be worth at least $12 million by 2005 (CACIA n.d.).

There are at least 100 camel farms in Australia that offer camel rides and safaris. These rides range from 10 minutes to overnight and week-long safaris. There are approximately five operators in Queensland. Many camel operators also provide camels for sale for breeding stock, meat or racing.

An industry in Queensland was launched in June 2004, with the Queensland Camel Industry Association (QCIA) investigating interest in a live export trade to the Middle East. In late June 2004, a domestic market abattoir for camels was launched in Blackall.

Camels are being imported into Queensland from the Simpson Desert by the Queensland Camel Industry Association to be sold to graziers for weed control. In western Queensland camels are used predominately for the control of prickle bushes, such as prickly acacia and parkinsonia (Shane Campbell 2005, pers. comm.). In south-eastern Queensland camels are being used for the control of lantana (Andrew Clark 2005, pers. comm.).

White (1997) reports that camels will eat a substantial range of plants classified as woody weeds, but do not appear to be useful for controlling woody weeds where mixed vegetation is available.

Impact overseas

There are currently no known feral populations of camels outside Australia. Camels were considered feral in the United States and Canada in the mid-nineteenth century (Lever 1985).

Quantitative assessment

Introduction

A numerical risk assessment system is used to rank species according to their likely impacts and level of risk as pests. This approach allows ranking and prioritisation of large numbers of pest species. There are four steps: assessment of potential distribution, assessment of establishment risk, assessment of current and potential impacts and benefits, and an assessment of the feasibility of control. First, a species' potential distribution is predicted using climate-modelling computer programs. The remaining steps involve allocating scores for each of a number of attributes relevant to a species' pest status. Attributes are wide-ranging, including aspects of the species' biology, costs to the economy, the environment and society, and management efficacy

Two people made independent risk assessments for camels, providing an indication of one aspect of uncertainty. The more pessimistic assessment is described below, but the range of values is given in Appendix 4.

Potential distribution

One of the main factors that determines the potential range of a pest species is climate. Climate-modelling software (CLIMATE Version 1) was used to predict the area of Australia where climate is suitable for feral camels (Figure 4). Based purely on an assessment of climatic parameters, substantial areas of western Queensland appear suitable. However, it is important to note that other habitat requirements, such as the availability of food, will determine the species' range and abundance.

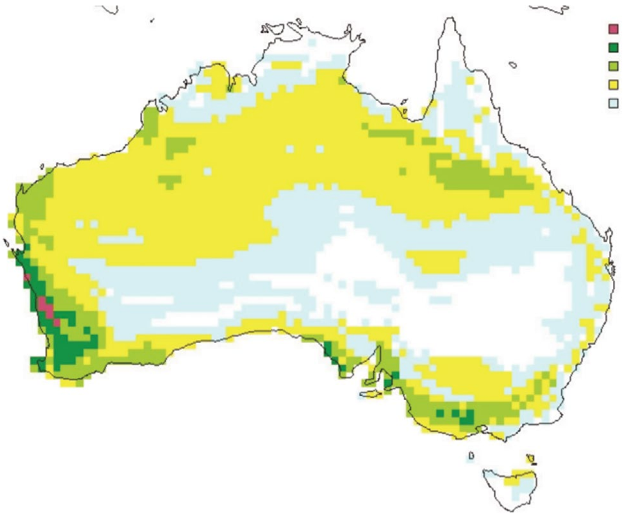

Figure 4. Potential distribution of *C. dromedarius* (climatic suitability is highest in red areas and declines from dark green, to light green, yellow, blue to white; white being unsuitable).

Establishment risk

Using the Bomford (2003) system, camels in Queensland were assessed as a ‘serious’ threat species.

Impact and feasibility of control

Using the Walton Species Assessment (WaSA), camels have a current net impact score of 15 and a potential net impact score of 74. The feasibility of regulation score is 32.

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Appendices

Appendix 1. Quantitative risk assessment of pests in Queensland

When resources are limited, it is useful to rank taxa according to their risk as pests so they can be prioritised. Ranking can be done using qualitative assessment, rule sets, explicit population models or point scoring systems. The latter method is employed by the Department of Natural Resources and Mines and involves a scoresheet where points are allocated for a number of attributes relevant to a taxon's pest risk status. The advantage of this system is that it is transparent and so to some extent repeatable; it allows a large number of attributes to be examined together and taxa can be readily compared. While the assessment is quantitative, some attributes will be poorly known for a taxa and attribute scores will vary among assessors. Such uncertainty needs to be considered in the assessment. Pest risk assessments in the Department of Natural Resources and Mines use the Walton Species Assessment (WaSA) (Walton 2005). The system involves five steps that are described below.

i. Establishment risk

There is a weed risk assessment (WRA) (Pheloung 2001) and equivalent assessment for vertebrates (Bomford 2003). Both provide a screening of organisms presently in captivity or proposed for import. They estimate the likelihood of a population establishing in the wild and the probable consequences. Both systems generate a score that can be compared with scores for other taxa or some threshold value determining a recommendation. Higher scores indicate a greater chance of establishment in the wild.

The WRA involves a series of 49 questions each giving a value ranging from –1 to 5. The questions cover eight categories related to establishment risk, with greatest weight given to the occurrence of the taxa as a weed elsewhere. Other categories include biological attributes of the taxon, its history of domestication, climatic preferences, undesirable traits and potential control. A total score >6 would recommend rejection for import, <0 acceptance and 0–6 would require further evaluation.

Bomford's (2003) system is similar, scoring 11 attributes on scales ranging 0–5. Attributes cover three categories: risk to public safety, establishment risk and risk the taxon would become a pest. Again, these include biological factors, climatic preferences and potential impact. Scores in the three categories are then combined to place the taxon in one of four Vertebrate Pests Committee (VPC) categories. These categories can be used to determine restrictions for the import, movement and keeping of exotic vertebrates (Natural Resource Management Standing Committee 2004).

ii. Potential distribution

The distribution of many plant and animal species is often well described by climatic variables such as mean annual rainfall and maximum temperature. Potential distribution can therefore be modelled by matching the climate of the taxon's overseas distribution with the climate across Australia. The resulting maps are used in impact assessment (see iii below). The software CLIMATE (Pheloung 1996) produces a map of the climate match for grid squares (½° blocks) within Australia. For each grid square, the ‘distance’ is calculated between its climate and that for meteorological stations in the taxon’s overseas distribution. The smallest value is selected and compared with a normal distribution of reference values. A close match is a value within 10% of the mean reference value whereas a poor match is a value >80%. The software CLIMEX (Sutherst et al. 1998) similarly predicts a taxon’s potential distribution in grid squares from climate in its overseas distribution. The taxon’s response to temperature and moisture, in terms of growth and survival, is described by an ‘ecoclimatic’ index (EI) ranging 0–100 and indicating increasing potential for establishment. For vertebrate pests, CLIMATE is generally preferred because of fewer data requirements, a good correlation between climate match and establishment success and the high sensitivity of CLIMEX to data uncertainty (Bomford 2003).

A climate match score ranging 1–6 can be calculated for a taxon using either CLIMATE or CLIMEX, reflecting the number of grid squares it could occupy, weighted by the probability of occurrence (i.e. EI value or percentage category).

iii. Impact

Scores are given for a range of questions on the economic, environmental and social impacts and benefits of a taxon. Scores are combined using a weighting of 2:2:1 for economic, environmental and social aspects, respectively. A final net impact score is calculated by subtracting benefits from impacts. Questions cover the geographic extent and intensity of impacts and benefits. Current and potential impacts and benefits are scored separately. Little difference between current and potential impact suggests declaration will not be useful. A plot of the net impact scores for a range of plant and animal taxa in Queensland is given below.

iv. Feasibility of control

The ability to reduce pest impact is as assessed through 29 questions including socio-political, biological, financial and technical criteria. Higher scores indicate increased chance of damage mitigation. A score of ›50 would generally support a declaration.

v. Management classification

Using the previous four steps, taxa can be classified into one of four categories shown in Table 1.

Table 1. Thresholds for classification of taxa using the Walton Species Assessment (WaSA). All thresholds within a column must be met for a taxon to be listed in a category. LGA, local government area.

Attribute	Class 1	Class 2	Class 3		High risk		
Establishment risk	›0 (WRA) ›SERIOUS (Bomford)	›0 (WRA) ›SERIOUS (Bomford)	›0 (WRA) ›SERIOUS (Bomford)				
Occurrence	‹10% of state or ‹10 LGAs	›10% of state or ›10 LGAs	›10% of state or ›10 LGAs				
Climate match	›3						
Current net impact		›20	›20	›20	50–100	50–100	50100
Potential net impact	›100	›100	›100	50–100			
Environmental impact				›200	›100		
Economic impact						›100	
Social impact							›100
Feasibility of control	›50	›50	›50	›50			

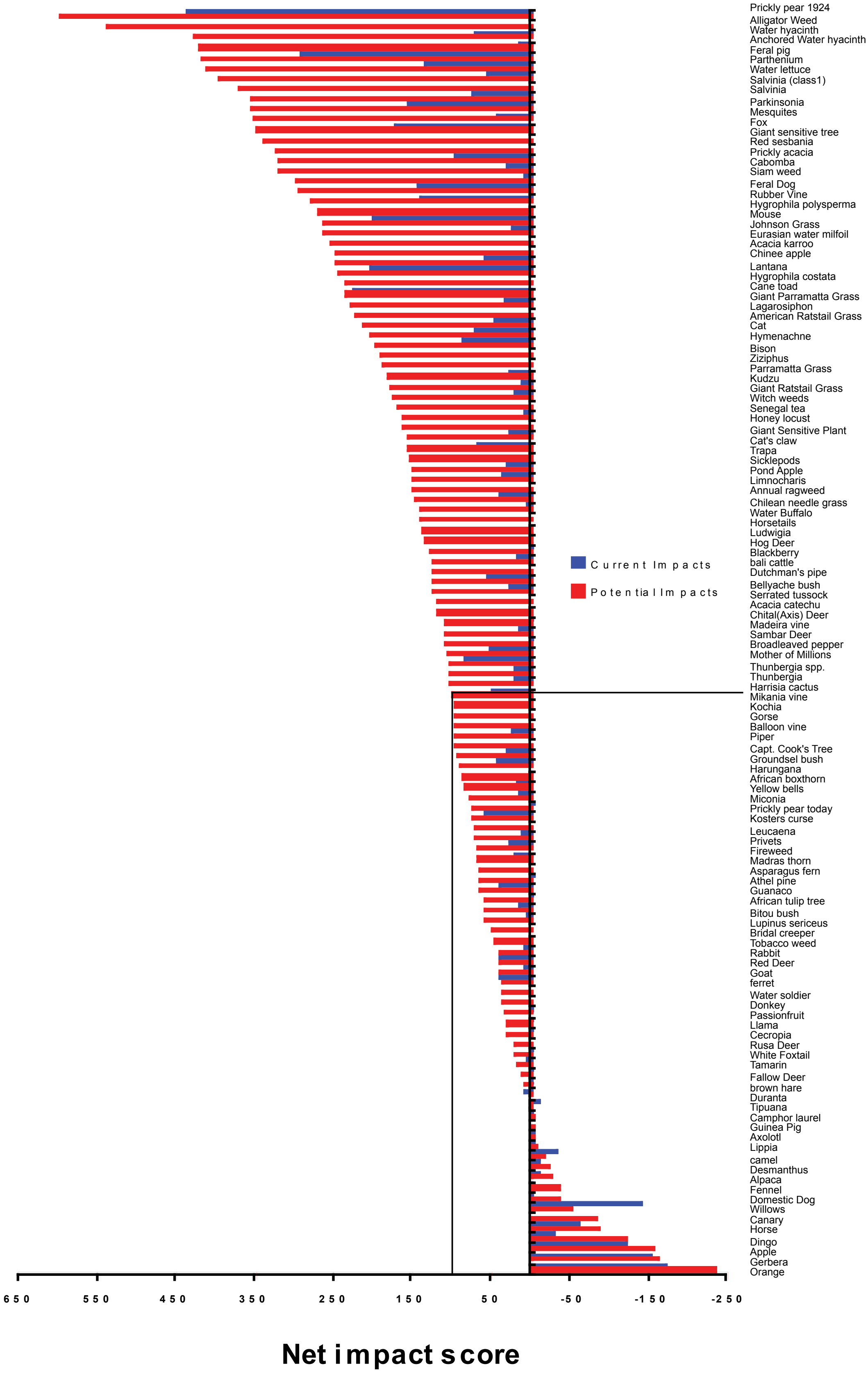

Figure 5. Current and potential net impact scores (see iii. Impact) for taxa in Queensland. A suggested threshold for declaration of 100 is identified (see Table 1).

Appendix 2. Potential distribution—CLIMATE parameters

Climate prediction system—analysis results for camel.

Summarising prediction for statistics.

16 variables in analysis. 498 location records analysed.

Cumulative method used. Closest Euclidian match used.

Statistics						
	Mean St.	Dev.	Skew	Kurtosis	Min	Max
1. Mean annual temp.	20.36	5.17	-0.31	3.17	-3.59	30.44
2. Min temp. cool month	6.72	7.05	-0.29	3.81	-22.24	23.35
3. Max temp. warm month	34.42	5.78	-0.13	2.36	14.45	45.60
4. Average temp. range	27.70	8.32	0.04	1.87	7.50	45.59
5. Mean temp. cool quarter	13.90	7.19	-0.42	3.26	-15.10	28.63
6. Mean temp. warm quarter	26.50	5.27	-0.25	2.47	7.13	37.06
7. Mean temp. wet quarter	18.05	7.55	0.13	2.42	-3.89	36.02
8. Mean temp. dry quarter	23.10	6.10	-0.93	6.01	-8.43	36.03
9. Average annual rainfall	535.67	490.76	1.15	3.84	0.00	2452.00
10. Rainfall wet month	124.16	111.70	1.20	4.32	0.00	666.00
11. Rainfall dry month	4.53	10.65	4.80	33.84	0.00	99.00
12. CV monthly rainfall	107.72	50.28	1.82	9.04	0.00	346.41
13. Rainfall wet quarter	297.84	275.07	1.19	4.13	0.00	1549.00
14. Rainfall dry quarter	23.64	42.25	3.56	20.53	0.00	352.00
15. Rainfall cool quarter	155.04	210.07	2.15	7.83	0.00	1170.00
16. Rainfall warm quarter	89.99	117.21	1.66	5.74	0.00	665.00

Australian prediction: Data Point Match

Summary of prediction:

812 locations within 50% of the mean.

1110 locations within 40% of the mean.

254 locations within 30% of the mean.

56 locations within 20% of the mean.

6 locations within 10% of the mean.

2238 matching locations from 2798 comparisons.

Appendix 3. Establishment risk

Using the Bomford (2003) system, camels in Queensland were considered a *serious* threat species.

Species	*Camelus dromedarius*—camel (dromedary, Arabian camel)	
Date of assessment:	17 June 2005	
Literature search type and date:	See reference sheet	
Factor	**Score**	
A1. Risk to people from individual escapees (0–2)	0	Escaped or released individuals are unlikely to make provoked attacks causing injury requiring medical attention. During the breeding season, males can be aggressive.
A2. Risk to public safety from individual captive animals (0–2)	0	Apart from someone entering an enclosure or otherwise being in reach of a captive animal, there is nil or low risk to public safety.
Stage A. Risk posed by captive or released individuals = sum of A1 to 2. (0–4)	**0**	
B1. Degree of climate match between species overseas range and Australia (1–6)	3	CMI = 864 (climate match score = 3). Discrepancy with conversion to climate match score—under Walton system = 4, but should be the same as Bomford.
B2. Exotic population established overseas (0–4)	0	Exotic populations have only established in Australia. Camels were feral for a short time in United States and Canada in the mid-19th century and in Australia.
B3. Taxonomic class (0–1)	1	Mammal
B4. Non-migratory behaviour (0–1)	1	Non-migratory but nomadic
B5. Diet (0–1)	1	Generalist diet includes: grass, shrubs, preferring roughage to pasture, any vegetation as high as 3.5 m. Camels have a high need for salt and therefore eat salty plants, even thorny, bitter or toxic species.
B6. Lives in disturbed habitat (0–1)	1	Can live in human-disturbed habitat.
B. Probability escaped or released individuals will establish a free-living population = sum of B1 to B6. (1–14)	**7**	
C1. Taxonomic group (0–4)	2	Artiodactyla
C2. Overseas range size including current and past 300 years, natural and introduced range (0–2)	0	Overseas geographic range less than 10 million square kilometres (3 million km). Note true wild camels are not found overseas but domestic camels are common in the above range.
C3. Diet and feeding (0–3)	3	Mammal that is primarily a browser.

Species	*Camelus dromedarius*—camel (dromedary, Arabian camel)	
Date of assessment:	17 June 2005	
Literature search type and date:	See reference sheet	
Factor	**Score**	
C4. Competition with native fauna for tree hollows (0–2)	0	Does not use tree hollows.
C5. Overseas environmental pest status (0–3)	0	Camels were considered feral for a short time in the United States and Canada in the mid-19th century. Otherwise considered a domestic animal overseas.
C6. Climate match to areas with susceptible native species or communities (0–5)	3	Feral camels severely defoliate and suppress the recruitment of some shrub and trees species, with impacts exacerbated in drier years. Camels can quickly degrade these areas during a drought to the point where they may no longer provide any refuge for native plants and animals. Note: subjective assessment as no geographic distribution of susceptible plants/animals available to match with CLIMATE output map. A lower score for this category could lessen pest establishment to moderate, which in turn would make the VPC threat category MODERATE.
C7. Overseas primary production pest status (0–3)	0	Considered a domestic animal overseas.
C8. Climate match to susceptible primary production (0–5)	3	Contradictory information—camels compete with domestic stock, primarily cattle for available feed and water. Other records state there is little competition between camels and livestock. Note: subjective assessment as no geographic distribution of production available to match with CLIMATE output map—Sheet Q C8 score used as guide only. A lower score for this category could lessen pest establishment to moderate, which in turn would make the VPC threat category MODERATE.
C9. Spread disease (1–2)	2	Camels are susceptible to tuberculosis and brucellosis, which are serious diseases of livestock, and feral camels may act as a reservoir for reinfection. Camels not thought to pose disease threat because of their isolation, but in Queensland are being co-grazed with cattle, which increases the risk.
C10. Harm to property (0–3)	1	$1–10 million—damage to infrastructure (i.e. fences, watering points/public facilities).
C11. Harm to people (0–5)	1	Very low risk. During the breeding season, males can be aggressive.

Species	*Camelus dromedarius*—camel (dromedary, Arabian camel)	
Date of assessment:	17 June 2005	
Literature search type and date:	See reference sheet	
Factor	**Score**	
C. Probability an exotic species would become a pest (for birds, mammals, reptiles and amphibians) = sum of C1 to C11. (1–37)	**15**	
A. Risk to public safety posed by captive or released individuals		
A = 0 = not dangerous; A = 1 = moderately dangerous; A ≥2 = highly dangerous	0	Not dangerous
B. Risk of establishing a wild population		
For birds and mammals: B <7 = low establishment risk; B = 7–8 = moderate establishment risk; B = 9–10 = high establishment risk; B >10 = extreme establishment risk	8	Moderate establishment risk
C. Risk of becoming a pest following establishment		
C <9 = low pest risk; C = 9–14 = moderate pest risk; C = 15–19 = high pest risk; C >19 = extreme pest risk	15	High pest risk
VPC threat category	Serious	

Appendix 4. Impact and feasibility of control

Summary table	Current	Potential
Economic impact score	2–13	18–19
Economic benefit score	0–52	1–71
Environmental impact score	23–37	23–178
Environmental benefit score	0–0	0–0
Social impact score	3–10	10–17
Social benefit score	4–30	30–33
Impact score	16–16	19–82
Benefit score	1–6	7–35
Total score	10–15	-16–74

Declared pest animals generally have a high current score greater than 20 and/or a potential score greater than 100.

Two separate assessors provided a relatively narrow range of values that do not recommend declaration. The assessments used slightly different predicted distributions using CLIMATE. The greatest disparity was the in the future economic benefits and environmental impacts of camels. One assessor predicted no threatened regional ecosystems or protected areas would be affected by camels. The other assessor considered a greater number of bioregions would be affected including numerous threatened regional ecosystems and that camels could reach moderate densities in at least some of these areas if uncontrolled

Socio-political	Operational	Financial	Technical	Comparative	Total score
9–23	39–40	23–51	80–90	3–7	32–41

Declared pest animals generally have a feasibility of regulation score greater than 50.

The two assessments were very similar. One assessor considered that the various control costs were largely unknown (yielding a low score), whereas the other assessor suggested low-medium control costs (yielding a high score).