

PEST RISK ASSESSMENT

Chukar partridge

Alectoris chukar



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March 2011

This publication should be cited as:

Latitude 42 (2011) Pest Risk Assessment: Chukar partridge (*Alectoris chukar*). Latitude 42 Environmental Consultants Pty Ltd. Hobart, Tasmania.

About this Pest Risk Assessment

This pest risk assessment is developed in accordance with the *Policy and Procedures for the Import, Movement and Keeping of Vertebrate Wildlife in Tasmania* (DPIPWE 2011). The policy and procedures set out conditions and restrictions for the importation of controlled animals pursuant to s32 of the *Nature Conservation Act 2002*.

For more information about this Pest Risk Assessment, please contact:

Wildlife Management Branch
Department of Primary Industries, Parks, Water and Environment
Address: GPO Box 44, Hobart, TAS. 7001, Australia.
Phone: 1300 386 550
Email: wildlife.reception@dpiuwe.tas.gov.au
Visit: www.dpiuwe.tas.gov.au

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I. Summary

The chukar partridge (*Alectoris chukar*) is native to the mountainous regions of Asia, Western Europe and the Middle East (Robinson 2007, Wikipedia 2009). Its natural range includes Turkey, the Mediterranean islands, Iran and east through Russia and China and south into Pakistan and Nepal (Cowell 2008). It is native and widespread in the western Himalayas of India where it is found to an altitude of 5000m (BBI 2009). Chukar partridges have been introduced widely for game hunters and have become established in the U.S.A., Canada, England, New Zealand and Hawaii (Robinson 2007, Wikipedia 2009).

In agricultural areas chukar partridges utilize the grains of barley, oats, wheat and corn; the seeds of sweet clover (*Melilotus* sp.) and bluegrass; and the green shoots of alfalfa / lucerne (*Medicago sativa*). Chukar partridges have also been known to cause damage to agricultural crops such as apples and potatoes (Christensen 1970).

Introduced populations of chukar partridge are threatening native populations of red-legged partridge (*Alectoris rufa*) and rock partridge (*Alectoris graeca*) through hybridisation. Genetic data indicate that hybridisation with chukar partridges is widespread across the entire natural and introduced distribution range of the red-legged partridge and the rock partridge (Barliani 2007).

The natural distribution of chukar partridges includes areas similar in climate to Tasmania. Chukar partridges are very adaptable and there is therefore potential for this species to establish in Tasmania. If the chukar partridge established in Tasmania it is likely to compete with the brown quail (*Coturnix ypsilophora*) and the stubble quail (*Coturnix pectoralis*) for food and other resources. The establishment of the chukar partridge in Tasmania has the potential for high impact on agricultural industries as the species is known to be capable of damaging various commodities such as cereal grains, oilseeds, grain legumes, fruit and vegetables.

2. Introduction

2.1 NAME AND TAXONOMY

Kingdom:	Animalia
Phylum:	Chordata
Class:	Aves
Order:	Galliformes
Family:	Phasianidae
Genus:	<i>Alectoris</i>
Species:	<i>Alectoris chukar</i>



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Sub-species or variety: There are fourteen geographical subspecies that range from Turkey and Mediterranean islands in the west to India and central Nepal in the east.

Common names: Chukar partridge, rock partridge, red-legged partridge, Indian hill partridge.

Known hybrids: The chukar partridge is known to hybridise with the red-legged partridge (*Alectoris rufa*) and the rock partridge (*Alectoris graeca*).

Close relatives: The chukar partridge was earlier considered to be con-specific with Rock Partridge (*Alectoris graeca*), but is now considered a distinct species. There are no species in the genus *Alectoris* native to Australia.

2.2 DESCRIPTION

The chukar partridge is a plump, upright, medium-sized partridge approximately 38 cm high with a strongly patterned head and throat, plain upper parts, strongly barred flanks and rufous outer tail feathers. A dark black line across the forehead, eyes, and down the neck contrasts the white throat from the grey head and breast. There is no seasonal variation and plumage pattern is similar for both sexes. Males (510-800g) are slightly larger than females (450-680g) in length and mass (Marchant and Higgins 1993). The bill, margins of eyelids, legs and feet are coral pink to deep red or crimson. Both sexes can have a small tarsal spur, but usually this is characteristic of males. The chukar partridge is a fast runner and strong flier but it only flies short distances, usually downhill (BBI 2009).

Juveniles are like the adults but smaller, the patterns of the head, throat and flanks are duller and less clear, and there is no black band on the head (Marchant and Higgins 1993). In its native habitat,

colouring can vary geographically; birds in more arid areas tend to be greyer and paler (Christensen 1996; del Hoyo 1994; National Geographic Society 1999).

Species similar to the chukar partridge are the red-legged partridge (*Alectoris rufa*) and the rock partridge (*Alectoris graeca*). The red-legged partridge differs in appearance to the chukar partridge with pale grey restricted to the fore-crown, hind-crown and have a brownish (not grey) nape. Additionally the black necklace below the throat of the red-legged partridge is bordered by white with a black streak running off the hind edge of the necklace giving it a wider appearance, and barring on the flanks is more chestnut (Marchant and Higgins 1993). The rock partridge (*Alectoris graeca*) is a rotund bird, with a light brown back, grey breast and buff belly. The face is white with a black gorget. It is very similar to the chukar partridge, but is greyer on the back and has a white, not yellowish fore-neck. The sharply defined gorget distinguishes this species from red-legged partridge (Wikipedia 2009).

There are no similar native species.

2.3 CONSERVATION AND LEGAL STATUS

CONSERVATION STATUS

The chukar partridge is not globally threatened. In most areas, populations are stable or increasing, though habitat loss and intensive hunting may affect some local populations in their native distribution. The chukar partridge is listed as least concern by the IUCN. The species has an extremely large range, the population trend appears to be stable and the population size is extremely large.

LEGAL STATUS AUSTRALIA

The species has been assessed as posing a serious risk by the Vertebrate Pest Committee (2007).

Alectoris chukar is not listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

In Tasmania the chukar partridge is a 'controlled animal' under the *Nature Conservation Act 2002*.

3. Biology and Ecology

3.1 LIFE HISTORY

Chukar partridges have been introduced throughout the world but there is limited information available on their basic life history characteristics (e.g. dispersal, home range, survival, etc) (Robinson 2007). It is thought that chukar partridges have a short life span that is demographically offset by high reproductive rates (Christensen 1996 cited in Robinson 2007). Chukar partridges are easy to breed in captivity (Cowell 2008) and can be raised under intensive captive conditions with high rates of productivity. (Yilmaz and Tepeli 2009). The Indian chukar partridge (*Alectoris chukar chukar*) is the partridge breed used exclusively in commercial enterprises in Australia. Of the game bird species, they are considered to be one of the more easily raised in captivity (Scott *et al* 2005).

Chukar partridges are monogamous. Pairs form in the spring after a male performs a courtship display involving a head-tilt and a showing of his barred flanks. Both begin to call and participate in a "tidbitting display" pecking at various objects. During drought, when food is scarce, breeding may be restricted to a few birds. Males guard the female from access by other males, but are not generally considered territorial (Encyclopedia of life: Christensen 1996; del Hoyo *et al* 1994).

Chukars usually breed once yearly depending on environmental conditions, although two broods of young may be raised when nesting conditions are favourable (WA Dept Ag and Food 2011). Breeding occurs from April to July in North America and in New Zealand they begin nesting in September (Olliver 2005). Nests are simple scrapes, sometimes lined with grass or feathers, in rocky or brushy areas. They are difficult to find and are not well studied. Clutch size varies between seven and twenty one and is determined by site and environmental condition. Incubation lasts approximately 24 days and is usually a female activity. In North America hatching can occur from May until August, depending on the success of the first clutch. Broods average around 10.5 chicks and clutch size is greatly reduced in drought years; in extreme drought breeding may not occur at all. Nesting chukars and chukar broods are normally found within 2 km of water (WA Dept Ag and Food 2011).

The young are cared for by their mother and perhaps father until they reach independence. Males are thought to remain until chicks are reared, though some are reported to leave after clutch completion and regroup with other males (Encyclopedia of life: Christensen, 1996; del Hoyo *et al* 1994). Chicks are highly developed upon hatching, and are capable of flight within a few weeks. They reach adult size in 12 weeks (WA Dept Ag and Food 2011).

Since the basic habitat of the chukar is found in arid or semi-arid regions the amount of precipitation that is received during key periods of the year appears to be the primary factor in determining reproductive success. The effective precipitation in any given range largely determines the composition, abundance and condition of essential food plants that in turn play a major role in influencing the yearly chukar partridge production. Temperatures, winds and prevailing soil conditions (frozen or not) also play an important role in determining the effectiveness of the precipitation (Christensen 1970).

3.2 HABITAT REQUIREMENTS AND PREFERENCES

The chukar partridge prefers rocky terrains but it has been recorded in a variety of open woodlands and grasslands (Cowell 2008). In the Himalayas, it inhabits open, rocky, dry mountain slopes, hillsides or canyon walls but is also found on open and flat deserts with sparse grasses and on barren plateaus (BBI 2009). In Israel, the chukar partridge occurs along a steep eco-geographical gradient extending from Mediterranean zones in the north to desert regions in the south (Kark *et al.* 1999). It is mainly found at an altitude of 2000 to 4000 m except in Pakistan, where it occurs at 600m. They are not found in areas of high humidity or rainfall (Wikipedia 2011).

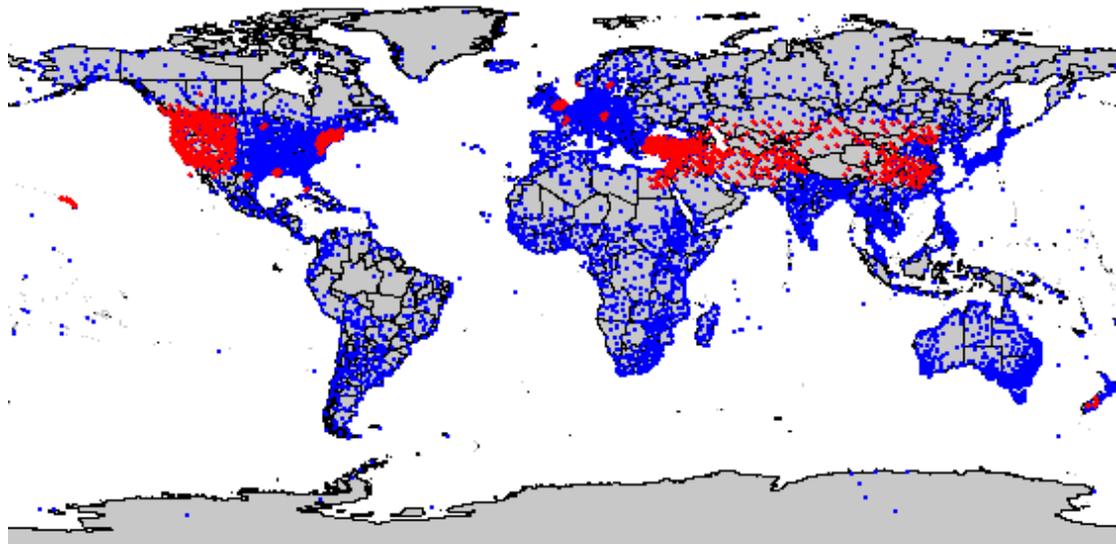
The chukar partridge can be found in North America throughout the west in steep, mountainous, rocky locations in mixed habitat types. The Great Basin area of desert shrub is representative of their preferred habitat; climate is arid to semiarid, water is generally available from scattered sources, and temperature varies. The grazed and disturbed public lands provide plentiful grasses and seeds with scattered shrubs while the rocky terrain provides cover. Unsuccessful attempts to introduce the chukar partridge into other areas of North America suggest that they are already established in most suitable habitat types (Encyclopedia of life 2011).

The summer distribution of the birds seems to depend a great deal upon the distribution and availability of water present in their habitat. Chukar partridges take advantage of all water, from rivers to small creeks and springs to nearly stagnant seeps that barely moisten the ground (Christensen 1970).

Chukar partridges exhibit altitudinal migration, moving from higher elevations to lower terrain during heavy snows. They may also move on to south-facing slopes to escape inclement weather. Nesting habitat is similar to foraging habitat: dry, rocky slopes with open, brushy cover. (Sullivan 1994).

3.3 NATURAL GEOGRAPHIC RANGE

The chukar partridge is native to the mountainous regions of Asia, Western Europe and the Middle East (Robinson 2007, Wikipedia 2009). Its natural range includes Turkey, the Mediterranean islands, Iran and east through Russia and China and south into Pakistan and Nepal (Cowell 2008). It is native and widespread in the western Himalayas of India where it is found up to an altitude of 5000m (BBI 2009). The species occupies approximately 14,055,247 km² (Figure 1).



Climatch v1.0
 Invasive Animals CRC
 Bureau of Rural Sciences 2008

Figure 1: Global distribution of the Chukar partridge (*Alectoris chukar*) as selected for climate matching during risk assessment process. (Source: CLIMATCH – <http://adl.brs.gov.au:8080/Climatch/>)

3.4 INTRODUCED GEOGRAPHIC RANGE

Chukar partridges have been introduced widely for game hunters and have become established in the U.S.A., Canada, England, New Zealand and Hawaii (Robinson 2007, Wikipedia 2009). They are a popular game animal for sport hunters and many hunters consider them one of the most challenging game-birds due to their quick flight, preference for steep habitat, and tendency to run (Wikipedia 2009).

In New Zealand introduced populations are widespread east of the Southern Alps on the South Island (Marchant and Higgins 1993). Chukar partridges live at altitudes up to 2,000m on high semi-arid shale and rocky slopes, interspersed with areas of low tussock and scattered sub-alpine vegetation (Olliver 2005).

In the U.S.A., self-sustaining wild populations of non-native chukar partridges are found in Arizona, California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington and Wyoming (Robinson 2007, Robinson *et al.* 2009).

Chukar partridges are a common aviary species in Australia and are considered one of the more easily raised game bird species (Scott *et al.* 2005). Marchant and Higgins (1993) reported that,

although they have been introduced to Australia, there were no published accounts of chukar partridges establishing in the wild in Australia. In the 1800s, some birds were released at Gembrook, Victoria and five birds were released at Phillip Island before 1873 (Marchant and Higgins 1993). Marchant and Higgins (1993) reported that there were unconfirmed records of an established population near Gulgong, east of Dubbo, NSW and records of probably escaped birds at Martins Creek, NSW. There are more recent reports of a feral population of chukar partridges from Gulgong, NSW, with the birds having been released for a sporting shoot (Morcombe 2000, Norris *et al.* 2005). The NSW Game Council has a mandate to manage chukar partridge despite this species not being confirmed in the wild (Norris *et al.* 2005, Booth 2009).

3.5 POTENTIAL DISTRIBUTION IN TASMANIA

Using modelling applications by the Bureau of Rural Science (DAFF), climate is compared between the species' historical distribution and potential Australian distribution (shown in Figure 2). Modelling indicates that mainland Australia has highly similar climate which may support the establishment of introduced populations. Tasmania has areas where the climate is highly similar (highest climate match score: 8). The natural distribution of chukar partridges includes areas similar in climate to Tasmania. Chukar partridges are very adaptable and there is therefore potential for this species to establish in Tasmania.

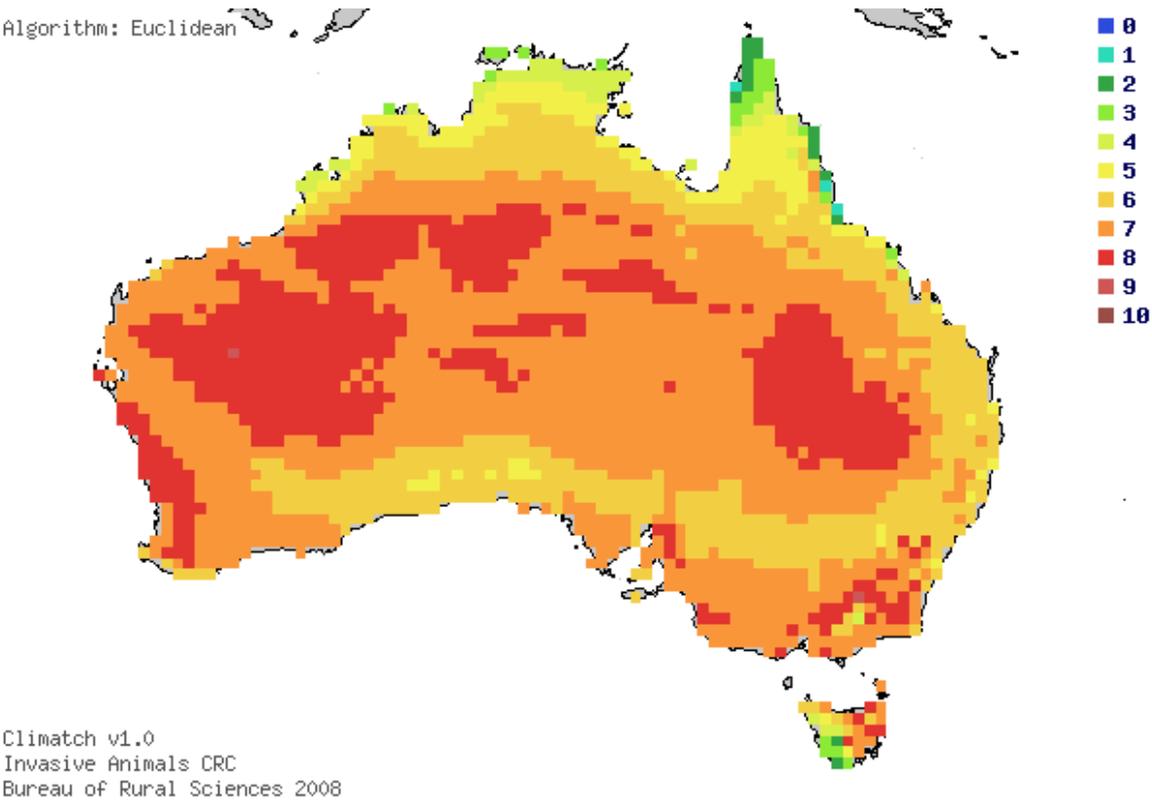


Figure 2: Climate match results showing the potential geographic distribution of the chukar partridge, *Alectoris chukar*, in Australia (Source: CLIMATCH – <http://adl.brs.gov.au:8080/Climatch/>).

3.6 DIET AND FEEDING BEHAVIOUR

Chukar partridges are diurnal and forage on the ground throughout the morning and afternoon. They feed on a wide variety of seeds and some insects (Wikipedia 2009). The bulk of their diet in the Himalayas is composed of grass seeds, grass blades, basal shoots, bulbs, stems, leaves, plant buds and cereals (BBI 2009). The diet of young partridges includes a high proportion of insects (termites, caterpillars, crickets, ants and insect eggs) whereas the adult diet contains not more than 15% of insects by volume (BBI 2009).

All types of water sources are utilized by chukar partridges and tend to dictate distribution during the hot summer months; they will stray farther from water in the winter when green vegetation is available (Encyclopedia of life 2011, del Hoyo *et al* 1994).

During the breeding season, chukar partridges feed in pairs. For the rest of the year feeding occurs in coveys, usually en route to watering areas. Coveys are usually about 20 birds, although occasionally as many as 40 or more birds will form a covey. Foraging occurs in the early morning and late afternoon (Sullivan 1994). During winter the chukar partridge will dig through up to 20 cm of snow for food (BBI 2009).

3.7 SOCIAL BEHAVIOUR AND GROUPINGS

Chukar partridges do not migrate and seasonal movements are altitudinal. Flight is generally restricted to short distances downhill, usually when flushed. They hop when crossing rough terrain and prefer running to flight (Discover Life 2011).

The primary social group is a covey, consisting of varying numbers of adults (5 – 40) and their offspring. Covey size depends on many factors, including time of year, rainfall and weather. In dry conditions, the birds congregate around water sources but will range 3-4 kilometres away. After rain, they will scatter and the coveys will be reduced to their family groups. Large coveys (100+) are formed as larger, unrelated groups come together and mingle (Discover Life 2011).

Chukar partridges use a number of vocalizations in interactions that are divided into three categories: alarm social contact, agonistic, and sexual. The most common call is a low *chuck, chuck, chuck* used by both sexes that changes gradually to a *chukar chukar* and can be heard from long distances, hence the name 'chukar'. Communication presumably also occurs through visual cues. (del Hoyo *et al* 1994).

During the spring, summer and early autumn, water appears to be the determining factor in chukar distribution and movements. Birds have been seen from the valley floor (4,000 ft.) to high mountain basins (between 10,000 and 11,000 ft.) in areas where water is available. After the first autumn rains, when grasses begin germinating and succulent food is present, the birds, in coveys, move freely throughout their range and inhabit waterless sites that were previously unoccupied. Heavy snow will cause the chukars to move to lower elevations where feed is available and they return to higher elevations as the snow recedes. In the breeding season, when the birds pair, there is a general movement both altitudinally and latitudinally throughout their range. The chukar partridge normally travels over a mile radius in the course of feeding, watering and roosting during the day (Christensen 1970).

In California there are records of chukar partridges moving 20 miles in three months and 33 miles in two years and three months. The ability of the chukar partridge to move long distances in a relatively short time has been a primary factor in establishing this bird throughout suitable habitat in North America (Christensen 1970).

3.8 NATURAL PREDATORS AND DISEASE

For healthy chukar populations in areas with adequate cover, losses to predators are probably not significant. (Sullivan 1994). The chukar is a very alert bird and a sentinal bird usually sounds the alarm well ahead of the predator (Christensen 1970).

Known predators of the chukar partridge in North America are the coyote (*Canis latrans*), bobcat (*Lynx rufus*), great horned owl (*Bubo virginianus*), prairie falcon (*Falco mexicanus*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*) and golden eagle (*Aquila chrysaetos*) (Christensen 1970). In Utah, the mortality of wild, introduced populations of chukar partridges has been attributed to predation (mainly from avian predators), hunting and weather. Magpies, ravens and various ground predators, particularly snakes, have been reported as being instrumental in destroying the eggs in chukar nests (Christensen 1970).

Other predators of adult chukar partridges may include feral house cat (*Felis* spp.), grey fox (*Urocyon cinereoargenteus*), skunks (*Conepatus* spp. and *Mephites* spp.), badger (*Taxidea taxus*), raccoon (*Procyon lotor*), rock squirrel (*Spermophilus variegatus*), ringtail (*Bassiriscus astutus*), mountain lion (*Felis concolor*), coati (*Nasua nasua*), Mexican wolf (*Canis lycaon*), broad-winged hawk (*Buteo platypterus*), peregrine falcon (*Falco peregrinus*), northern goshawk (*Accipiter gentilis*), Mexican goshawk (*Asturina plagiata*), zone-tailed hawk (*Buteo albonotatus*), aplomodo falcon (*Falco femoralis*), and ravens (*Corvus* spp.) (Sullivan 1994).

In New Zealand chukar partridge predators include stoats, cats, hedgehogs, rats and harriers, all of which cause damage during the nesting season or in the period after hatching when the young are unable to fly (Christensen 1970).

Potential predators of the chukar partridge in Tasmania are raptors (brown goshawk, harrier and peregrine falcon), quolls, Tasmanian devils, feral cats and foxes. Snakes may predate on chicks.

Wild chukar partridges appear to be relatively disease free. In Nevada, North America, in 1951, two wild birds collected near Pyramid Lake had infections of malaria (*Plasmodium* sp. and *Haemoproteus* sp.). Also in Nevada, wild chukar partidges have been found to be have sarcosporidiosis, a disease caused by an infection of a protozoan (*sarcocystis* spp.). Since a great number of chukar partridges often concentrate at a small spring or seep it would appear that these sites would be the primary source of contamination in spreading disease. As yet there are no reports of disease or parasitism causing serious mortality (Christensen 1970).

Game farm chukar partridges are susceptible to many of the common fowl diseases. Coccidiosis is probably the most common disease. There have been reports of gapeworm (*Syngamus trachea*), tapeworm (*Raillietina* sp.) and infectious coryza are a few of the diseases found in Washington game farms. Blackhead and caecal worms (*Heterakis* sp.) have been reported in Missouri, and intestinal flagellates (*Hexamita* sp.) and *Trichomonas gallinarum* have been found in game farm birds from

Salinas Valley. Nematodes (*Ascaridia galli*) have been identified in reared birds and eastern viral encephalomyelitis has also been reported (Christensen 1970).

3.9 THREAT TO HUMAN SAFETY

Chukar partridges are susceptible to several avian diseases and might act as a vector for infections that can be passed from avian hosts to humans, such as Chlamydia, when raised in game-farming situations (Encyclopedia of Life 2011). However, there have been no recorded adverse effects of chukar partridges on humans.

3.10 HISTORY AS A PEST

When chukar partridges are in the vicinity of agriculture investigations have found that they utilize the grains of barley, oats, wheat and corn; the seeds of sweet clover (*Melilotus* sp.) and bluegrass; and the green shoots of alfalfa/lucerne (*Medicago sativa*) (Sandfort 1954, Johnson 1957, Ferkovich 1965) There are occasional instances where chukar partridges have been known to cause damage to specific agricultural crops (apples and potatoes in Nevada, and potatoes in Washington and California). However, these incidents are considered rare (Christensen 1970).

The chukar partridge is listed by US Council of Agricultural Science and Technology (CAST 2002) as an introduced higher vertebrate species that can affect U.S. agricultural or ecological systems.

Invasive species and translocated populations of chukar partridge are threatening native populations of red-legged partridge (*Alectoris rufa*) and rock partridge (*Alectoris graeca*) by hybridisation, raising risks of genetic extinction, loss of local adaptations or outbreeding depression. Genetic data indicate that hybridisation with chukar partridges is widespread across the entire natural and introduced distribution range of the red-legged partridge. Between the 1960s and the 1980s chukar partridges, or their hybrids, were massively released to restock hunted red-legged populations in Iberia, France, and Italy, leading to widespread genetic pollution of native red-legged partridge populations. Hybridisation with chukar partridges is also found across the entire native distribution of the rock partridge (Barliani 2007).

3.11 POTENTIAL IMPACT IN TASMANIA

If the chukar partridge established in Tasmania it is likely to compete with the brown quail (*Coturnix ypsilophora*) and the stubble quail (*Coturnix pectoralis*) for food and other resources. The chukar partridge has a high climate match with Tasmania (score of 19) and a high percentage of the range of the common bronzewing and brush bronzewing overlaps with areas with which there is a high climate match with the chukar partridge (grids with climate match scores 7 & 8).

Although hybridisation of chukar partridges with other species of the genus is widespread there are no closely related species in Tasmania that would be at risk from hybridisation.

The establishment of the chukar partridge in Tasmania has the potential for an impact on agricultural industries as the species is known to be capable of damaging various commodities such as cereal grains, oilseeds, grain legumes, fruit and vegetables. Agricultural areas in Tasmania overlap with areas with which there is a high climate match with the chukar partridge (grids with climate match scores 6, 7 & 8). This means that the chukar partridge, if established, is likely to come into contact with these commodities.

4. Risk Assessment

4.1 PREVIOUS RISK ASSESSMENTS

The Vertebrate Pests Committee (2007) assessed chukar partridges as being in the Serious Threat Category. Species placed in the Serious Threat Category “...may be introduced and/or should be kept only in collections approved by the relevant state/territory authority as being primarily kept for (1) public display and education purposes, and/or for (2) genuine scientific research approved by the relevant state/territory authority, and as meeting best practice for the purposes of keeping the species concerned” (Vertebrate Pests Committee 2007).

The Invasive Animals Cooperative Research Centre assessed the risk posed by chukar partridge by applying a risk assessment model. This assessment concluded that the chukar partridge posed a “serious” risk of establishment (Bomford 2008).

4.2 RISK ASSESSMENT

The following risk assessment determines the risk of *Alectoris chukar* to Tasmania using the Bomford model (2008) and proposes assigned threat categories and import classifications for the species.

Species:	Chukar partridge (<i>Alectoris chukar</i>)	
Date of Assessment:	March 2011	
Literature search type and date:	See attached references	
Factor	Score	
A1. Risk posed from individual escapees (0-2)	0	Low risk
A2. Risk to public safety from individual captive animals (0-2)	0	Low Risk
Stage A. Risk posed by individual animals (risk that a captive or escape animal would harm people)	Public Safety Risk Score = A1 + A2 = 0	Public Safety Risk Ranking A=0, NOT DANGEROUS
B1. Climate match score (1-6)	5	Climate match score = 19
B2. Exotic population established overseas score (0-4)	4	Introduced populations established in USA, Canada, New Zealand, England and Hawaii.
B3. Overseas range size score (0-2)	1	Range = 3,880,568 km ²
B4. Taxonomic class score (0-1)	0	Bird
Stage B. Likelihood of establishment (risk that a particular species will establish a wild population in Tasmania)	Establishment Risk Score = B1+B2+B3+B4 = 10	Establishment Risk Ranking B = 9-10, SERIOUS

C1. Taxonomic group (0-4)	0	In family Phasianidae but no native species in the same genus
C2. Overseas range size (0-2)	1	Range = 3,880,568 km ²
C3. Diet and feeding (0-3)	0	Bird
C4. Competition for native fauna for tree hollows (0-2)	0	Nests are simple scrapes lined with grass or feathers
C5. Overseas environmental pest status (0-3)	2	Hybridisation with chukar partridge is widespread across the entire range of the red-legged partridge.
C6. Climate match to areas with susceptible native species or communities (0-5)	4	14 grid squares with climate match scores 7 & 8 overlap with the range of brown quail and stubble quail - competitor
C7. Overseas primary production (0-5)	1	Known to feed on grains of barley, oats, wheat and corn, seeds of sweet clover and bluegrass, and green shoots of alfalfa. Also caused damage to apple and potato crops in the US.
C8. Climate match to susceptible primary production (0-5)	3	More than 50% of the range of susceptible commodities overlaps with grid squares with climate match scores of 6-8.
C9. Spread disease (1-2)	2	Bird
C10. Harm to property (0-3)	1	Low risk
C11. Harm to people (0-5)	0	Nil risk
Stage C. Consequence of Establishment (risk that an established population would cause harm)	Consequence Risk Score = sum C1 to C11 =14	Consequence Risk Ranking C = 9-14, MODERATE
ASSIGNED THREAT CATEGORY:	SERIOUS	
PROPOSED IMPORT CLASSIFICATION:	IMPORT RESTRICTED TO THOSE LICENCE HOLDERS APPROVED FOR KEEPING SERIOUS THREAT SPECIES	

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6. Appendices

APPENDIX A: CALCULATING TOTAL COMMODITY DAMAGE SCORE

Column 1	Column 2	Column 3	Column 4	Column 5
Industry	Commodity Value Index (CVI)	Potential Commodity Impact Score (PCIS, 0-3)	Climate Match to Commodity Score (CMCS, 0-5)	Commodity Damage Score (CDS columns 2 x 3 x 4)
Cattle (includes dairy and beef)	11	0	0	0
Timber (includes native and plantation forests)	10	0	0	0
Aquaculture	6	0	0	0
Sheep (includes wool and meat)	5	0	0	0
Vegetables	5	1	4	20
Fruit (includes wine grapes)	5	1	4	20
Poultry (including eggs)	1.5	0	0	0
Cereal grain (includes wheat, barley, sorghum etc)	1	2	4	8
Other crops and horticulture (includes nuts and flowers)	1	1	4	4
Pigs	1	0	0	0
Bees (includes honey, beeswax, and pollination)	0.5	0	0	0
Oilseeds (includes canola, sunflower etc)	0.5	2	4	4
Grain legumes (includes soybeans)	0.3	2	4	2.4
Other livestock (includes goats and deer)	0.3	0	0	0
Total Commodity Damage Score (TCDS)				58.4

C8. Climate match to susceptible primary production (on a scale of 0–5)

3

APPENDIX B: ASSIGNING SPECIES TO THREAT CATEGORIES

A: Danger posed by individual animals (risk a captive or escaped individual would harm people)	B: Likelihood of establishment (risk that a particular species will establish a wild population in Tasmania)	C: Consequence of establishment (risk that an established population would cause harm)	Threat category	Implications for any proposed import into Tasmania
Highly, Moderately or Not Dangerous	Extreme	Extreme	Extreme	Prohibited
Highly, Moderately or Not Dangerous	Extreme	Serious		
Highly, Moderately or Not Dangerous	Extreme	Moderate		
Highly, Moderately or Not Dangerous	Extreme	Low		
Highly, Moderately or Not Dangerous	Serious	Extreme		
Highly, Moderately or Not Dangerous	Serious	Serious		
Highly, Moderately or Not Dangerous	Moderate	Extreme		
Highly, Moderately or Not Dangerous	Serious	Moderate	Serious	Import restricted to those license holders approved for keeping serious threat species
Highly, Moderately or Not Dangerous	Serious	Low		
Highly, Moderately or Not Dangerous	Moderate	Serious		
Highly Dangerous	Moderate	Moderate		
Highly Dangerous	Moderate	Low		
Highly, Moderately or Not Dangerous	Low	Extreme		
Highly, Moderately or Not Dangerous	Low	Serious		
Highly Dangerous	Low	Moderate		
Highly Dangerous	Low	Low		
Moderately or Not Dangerous	Moderate	Moderate	Moderate	Import restricted to those license holders approved for keeping Moderate Threat species
Moderately or Not Dangerous	Moderate	Low		
Moderately or Not Dangerous	Low	Moderate		
Moderately Dangerous	Low	Low		
Not Dangerous	Low	Low	Low	Import Permitted
Unknown	Any value	Any value	Extreme until proven otherwise	Prohibited
Any Value	Unknown	Any value		
Any Value	Any value	Unknown		
Unassessed	Unassessed	Unassessed		

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