**Hydropotes inermis**, Water Deer

Assessment by: Harris, R.B. & Duckworth, J.W.
**Taxonomy**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Phylum</th>
<th>Class</th>
<th>Order</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animalia</td>
<td>Chordata</td>
<td>Mammalia</td>
<td>Cetartiodactyla</td>
<td>Cervidae</td>
</tr>
</tbody>
</table>

**Taxon Name:** *Hydropotes inermis* Swinhoe, 1870

**Synonym(s):**
- *Hydropotes affinis*
- *Hydropotes argyropus*
- *Hydropotes kreyenbergi*

**Common Name(s):**
- English: Water Deer

**Taxonomic Notes:**
There are two subspecies:

- *H. i. argyropus* Heude, 1884; Korea (formerly also in Jilin and Liaoning provinces of China);
- *H. i. inermis* Swinhoe, 1870; China (Zhejiang, Jiangsu, Hubei, Henan, Anhui, Guangdong, Fujian, Jiangxi, Shanghai, Guangxi, but now extinct in the southern and western parts of this range).

**Assessment Information**

**Red List Category & Criteria:** Vulnerable A2cd ver 3.1

**Year Published:** 2015

**Date Assessed:** November 17, 2014

**Justification:**
Due to the lack of updated information it is not possible to assess the worldwide status of this species with complete certainty. However, a serious decline is nevertheless evident. Older sources seem to portray relatively healthy populations, in China (Ohtaishi and Gao 1990) and the Korean Peninsula (Won and Smith 1999). These are now decreasing due to poaching and habitat destruction. This species is not particularly adaptable and appears to be rather sensitive to environmental changes, which are ongoing and do not appear to be under control. Recent (prior to 2008) publications have suggested that the range for this species, especially in China continues to shrink. A decline rate of at least 30% over three generations (approximately 18 years) seems highly plausible.

**Previously Published Red List Assessments**

2008 – Vulnerable (VU)

1996 – Lower Risk/near threatened (LR/nt)

1994 – Vulnerable (V)

1990 – Rare (R)
Geographic Range

Range Description:
This species occurs in China (formerly from Liaoning to Guangxi including the lower Yangtze Basin) and Korea; it has been introduced to England and France (Whitehead 1993).

The Chinese population was originally found in Jilin and Liaoning provinces in the northeast of the country, in the eastern Yangtze Basin and islands at the mouth of this river, and in the southeast of the country in northwestern Guangdong, southern Hunan and central and eastern Guangxi (Ohtaishi and Gao 1990). According to Hu et al. (2006) it is now restricted in China to the central portion of that distribution in the eastern Yangtze Basin, and populations in northeastern and southeastern China are now extinct.

Currently, the species' distribution in both Koreas may be substantially reduced, but little specific information is available. It is reported as being "relatively widespread" in the Republic of Korea (N. Moores pers. comm. 2008), particularly along the west coast. It apparently remains relatively widespread in the lower-lying parts of DPR Korea, but assessing the true status is confounded by repeated reports of widespread and frequent releases of captive-bred stock. It is unclear at what levels these occurred in the past; since the mid-1990s they are likely to have been only at low, if any, levels in all except a few high profile areas. It is possible that Chinese stock have been included in the captive populations within DPR Korea, although this has not been confirmed (J.W. Duckworth in litt. 2008).

Country Occurrence:
Native: China; Korea, Democratic People's Republic of; Korea, Republic of

Introduced: France; United Kingdom
Hydropotes inermis

Range
- Extant (resident)

Compiled by:
IUCN (International Union for Conservation of Nature)

The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.
Population

Population densities have been said to be rather low in most places within its native range (Ohtaishi and Gao 1990, Won and Smith 1999, Hu et al. 2006), but few if any primary data have been presented in support of this. Signs (footprints, faeces) and sightings suggest high densities persist in semi-natural habitats of at least the lower (tidal) Chongchon plain of west-central DPR Korea (Pyongan North and Pyongang South provinces) in 2000-2004 although, as indicated above, some supplementation by released stock cannot be ruled out (J.W. Duckworth in litt. 2008). At another area holding the species in DPR Korea, Mount Kuwol (Hwanghae South province), signs were difficult to find in 1999 despite specific searches, although local farmers reported that significant numbers were still present. Repeated searches in the Myohyang mountains (Pyongan North, Pyongang South and Chagang provinces) in 1999-2004 found no evidence of the species but suitable habitat was marginal. Water Deer are readily observed in the outskirts of Pyongyang but are presumably releases and/or the descendents of releases. Reasonable numbers are reported to persist elsewhere in the DPR Korea lowlands (Ju Jong Sil, Academy of Sciences, verbally 2003 to J.W. Duckworth).

Water Deer occur in the Republic of Korea and it said to be "moderately widespread", particularly along the west coast, as well as within the demilitarized zone between the two Koreas (Kim and Cho 2005), but its population cannot be estimated.

Within China, Ohtaishi and Gao (1990) estimated fewer than 10,000 individuals in the lower reaches of the Yangtze River; 1,200-1,500 in coastal areas of Jiangsu; 600-800 in the Zhoushan Islands of Zhejiang; and 1,000 in the Poyang Lake (Jiangxi) region. Sheng (1998) estimated 500-1,1000 in the coastal areas of Jiangsu (see also Xu et al. 1998), 1,500 in the Zhoushan Islands, around 1,000 in the Poyong Lake region, and an additional ~500 individuals in Anhui.

Hu et al. (2006) present a map showing a considerable reduction in the current distribution of H. inermis compared with its known, historical range, and describe population declines of the species as "drastic". Their map suggests that the species no longer occurs in Jilin, Liaoning, Hebei, Shaanxi, Shandong, Henan, or Fujian provinces, and has become rarer in Hubei, Hunan, and Zhejiang provinces. However, the time period over which this range reduction is not known with any precision. Hu et al. (2006) also provide data suggesting that H. inermis in the eastern-most (and densest) populations within China in Zhejiang and Jiangsu provinces retain a relatively high amount of genetic diversity, although populations on the Zhoushan archipelago displayed some divergence from those on the mainland. Within Yancheng Nature Reserve, their geographic distribution decreased and became markedly more fragmented between the 1980s and 2001 (Zhu et al. 2004).

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

Water Deer is evidently an "edge" species, preferring habitats characterized by shrubs and small trees (Rhim and Lee 2007). It prefers coastal plains, salt marshes, and riparian areas, and is negatively affected by human presence (Zhang et al. 2006a, b). It is unclear whether the species persists in Korea in purely agricultural areas away from the semi-natural riparian vegetation associated with large rivers and coastal plains (J.W. Duckworth in litt. 2008). However, further south in Korea, where unmodified waterways and patches of fallow habitat persist, Water Deer appears capable of living in rice-paddies (N.
As suggested by its name, Water Deer can swim (Guo and Zhang 2002), but appears unlikely to colonize areas >20 km from a source population.

Other than during the mating season, it is in general a solitary species; stable pairs or small groups have been reported in places with high population densities. The rut, in England, starts in late November and extends through December and occasionally into January. From May to July, females will deliver litters of up to six fawns although the most common figure is only from one to three). Offspring mortality is high, with up to 40% of juveniles dying during their first four weeks.

**Systems:** Terrestrial, Freshwater

**Use and Trade (see Appendix for additional information)**

The Chinese Water Deer is legally and illegally hunted within its native area, as a source of venison and traditional medicines - the semi-digested milk found in the rumen of unweaned fawns is used in traditional medicine as a cure against indigestion in children (Won and Smith 1999). There is a very limited stalking market for this species in the UK. Specimens are usually killed during, or shortly after, the capture process. This species is not usually kept as livestock.

**Threats (see Appendix for additional information)**

Poaching and habitat destruction are major threats to this species (Won and Smith 1999). The species is valued for its meat, and for the semi-digested milk found in the rumen of unweaned fawns, which is used in traditional medicine as a cure against indigestion in children (Won and Smith 1999). It is sometimes trapped as a pest in China, and is reported to be a low-concern pest of rice fields in DPR Korea (J.W. Duckworth in litt. 2008). Hunting is carried out at night with dogs (Sun Lixing pers. comm. 1990). Most hunting in DPR Korea is probably with snares; guns are highly restricted and active hunting with dogs, although doubtless occurring to some extent, is too publicly visible to be the preferred choice. Snares for deer are at very high density in forest hill areas; no assessment has been made of their usage in the lower Chongchon plain where Water Deer remain common. It is not therefore possible to speculate on the species’ resilience to such hunting (J.W. Duckworth in litt. 2008).

In Yancheng Nature Reserve, poaching is reported as severe, and there is high mortality during periods of flooding. Fawns have been bought from local people to establish and support the captive population, where the mortality rate is reportedly high (Zhang 1994). Water Deer have evidently been reduced or extirpated in most of the reserve, remaining only in the relatively small core area (Xu et al. 1998, Zhu et al. 2004).

Habitat loss through reclamation for agriculture and urban development is a major threat to Water Deer in eastern China (Xu et al. 1998). Formerly widespread areas of appropriate habitat north of the Yangtze River delta have been lost and the remaining areas fragmented, leaving remaining subpopulations of Water Deer vulnerable.

The Korean subpopulations, at least in DPR Korea, are highly threatened by habitat loss, on the assumption that wild population will not persist in fully agricultural landscapes. It is reported, however, to be "moderately widespread" at least in the Republic of Korea. In DPR Korea, agricultural policies have led to a large-scale land rezoning programme which involves the canalisation of streams, removal of
damp hollows and generally the conversion to active farmland of all areas within the plains which have retained semi-natural vegetation to date. This programme is ongoing. Coastal habitats have so far fared better but there are ambitious plans for the reclamation of large proportions of the intertidal areas on the west coast, and this will involve major loss of the currently extensive suitable habitat present in natural coastal plains. With no empirical information on the use of purely agricultural regions by Water Deer in Korea, the precise effects of these ongoing and planned habitat changes are unclear; field study is required. Ground-dwelling mammals in DPR Korea are under heavy snaring pressure, at least in forest areas. The extent of snaring in the non-forest habitats occupied by this species and the effects of snaring on local populations are unclear. The situation in the lower Chongchon plain, an area with high human population densities and heavy conversion of plains land to agriculture (although retaining a largely natural coastal zone and channel profile for the river itself) suggest that either snaring levels are not so high in these areas or Water Deer are resilient to them (J.W. Duckworth in litt. 2008).

Conservation Actions (see Appendix for additional information)

This species is listed on the Chinese Red List as Vulnerable A1acd+B1ab(i,ii,iii)2ab(i,ii,iii) and is on China Key List II.

This species occurs in Poyang Lake Nature Reserve and Yancheng Nature Reserve, where around 1,000-1,500 animals are present in isolated subpopulations, each with less than 100 animals (Xu et al. 1998). However, nature reserve designation at Yancheng has evidently not prevented continued habitat loss and fragmentation (Zhu et al. 2004, Zhang et al. 2006a, b). Poyang Lake Nature Reserve has a management plan and is regularly patrolled. A small captive population has been established in Yancheng Nature Reserve, but the justification for this is unclear (Zhang 1994, Hu et al 2006)

Recommended conservation actions in China include:

• Poyang Nature Reserve: Enlarge the reserve and improve its protection. The reserve covers only a small part of H. inermis? range in the Jiangxi region, and it is recommended that this be increased in size and that protection be extended to nocturnal patrols when the majority of poaching takes place.
• Yancheng Nature Reserve: Establish habitat corridors to link small, isolated populations.
• Strengthen existing protected areas management: increase staffing levels and improve communications and equipment supply; introduce anti-poaching patrols; develop community-based management strategies and an education program in response to human encroachment and poaching; and introduce training program for reserve staff in wildlife management techniques.
• Create new protected areas (only a small proportion of the total population is currently protected).

In the Koreas, measures are needed to control poaching and to provide extensive areas of secure habitat for the species.

Credits

Assessor(s): Harris, R.B. & Duckworth, J.W.
Reviewer(s): Brook, S.M. & McShea, W.J.
Contributor(s): Moores, N.
Bibliography


Citation


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External Resources

For Images and External Links to Additional Information, please see the Red List website.
Appendix

Habitats
(http://www.iucnredlist.org/technical-documents/classification-schemes)

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Season</th>
<th>Suitability</th>
<th>Major Importance?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Forest -&gt; 1.4. Forest - Temperate</td>
<td>-</td>
<td>Marginal</td>
<td>-</td>
</tr>
<tr>
<td>3. Shrubland -&gt; 3.4. Shrubland - Temperate</td>
<td>-</td>
<td>Suitable</td>
<td>Yes</td>
</tr>
<tr>
<td>4. Grassland -&gt; 4.4. Grassland - Temperate</td>
<td>-</td>
<td>Suitable</td>
<td>Yes</td>
</tr>
<tr>
<td>5. Wetlands (inland) -&gt; 5.3. Wetlands (inland) - Shrub Dominated Wetlands</td>
<td>-</td>
<td>Suitable</td>
<td>Yes</td>
</tr>
<tr>
<td>5. Wetlands (inland) -&gt; 5.4. Wetlands (inland) - Bogs, Marshes, Swamps, Fens, Peatlands</td>
<td>-</td>
<td>Suitable</td>
<td>Yes</td>
</tr>
<tr>
<td>12. Marine Intertidal -&gt; 12.5. Marine Intertidal - Salt Marshes (Emergent Grasses)</td>
<td>-</td>
<td>Suitable</td>
<td>Yes</td>
</tr>
<tr>
<td>15. Artificial/Aquatic &amp; Marine -&gt; 15.8. Artificial/Aquatic - Seasonally Flooded Agricultural Land</td>
<td>-</td>
<td>Suitable</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Use and Trade
(http://www.iucnredlist.org/technical-documents/classification-schemes)

<table>
<thead>
<tr>
<th>End Use</th>
<th>Local</th>
<th>National</th>
<th>International</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food - human</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Medicine - human &amp; veterinary</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Sport hunting/specimen collecting</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Threats
(http://www.iucnredlist.org/technical-documents/classification-schemes)

<table>
<thead>
<tr>
<th>Threat</th>
<th>Timing</th>
<th>Scope</th>
<th>Severity</th>
<th>Impact Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Residential &amp; commercial development -&gt; 1.1. Housing &amp; urban areas</td>
<td>Ongoing</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stresses:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Ecosystem stresses -&gt; 1.1. Ecosystem conversion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Ecosystem stresses -&gt; 1.2. Ecosystem degradation</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1. Residential &amp; commercial development -&gt; 1.2. Commercial &amp; industrial areas</td>
<td>Ongoing</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Stresses:</td>
<td></td>
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<td>1. Ecosystem stresses -&gt; 1.1. Ecosystem conversion</td>
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<tr>
<td>1. Ecosystem stresses -&gt; 1.2. Ecosystem degradation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Agriculture &amp; aquaculture -&gt; 2.1. Annual &amp; perennial non-timber crops -&gt; 2.1.2. Small-holder farming</td>
<td>Ongoing</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
### Conservation Actions in Place


**In-Place Land/Water Protection and Management**
- Ongoing in at least one PA: Yes

**In-Place Species Management**
- Subject to ex-situ conservation: Yes

### Conservation Actions Needed


**Conservation Actions Needed**

1. Land/water protection -> 1.1. Site/area protection
2. Land/water protection -> 1.2. Resource & habitat protection
3. Land/water management -> 2.1. Site/area management
5. Species management -> 3.1. Species management -> 3.1.2. Trade management
6. Education & awareness -> 4.3. Awareness & communications
7. Law & policy -> 5.1. Legislation -> 5.1.2. National level
8. Law & policy -> 5.1. Legislation -> 5.1.3. Sub-national level
9. Law & policy -> 5.4. Compliance and enforcement -> 5.4.2. National level

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http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T10329A22163569.en
Conservation Actions Needed

5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.3. Sub-national level

6. Livelihood, economic & other incentives -> 6.1. Linked enterprises & livelihood alternatives

Research Needed
(http://www.iucnredlist.org/technical-documents/classification-schemes)

Research Needed

1. Research -> 1.2. Population size, distribution & trends

1. Research -> 1.3. Life history & ecology

1. Research -> 1.5. Threats

1. Research -> 1.6. Actions


Additional Data Fields

Population
Continuing decline of mature individuals: Yes
Population severely fragmented: Yes

Habitats and Ecology
Generation Length (years): 6
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