Knob-billed Duck (*Sarkidiornis melanotos*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, January 2022
Revised, February 2022
Web Version, 6/14/2023

Organism Type: Bird
Overall Risk Assessment Category: Uncertain

Photo: CRaghavan. Licensed under CC BY-SA 4.0. Available: https://commons.wikimedia.org/wiki/File:Indian_Knob_billed_duck.jpg (January 2022).

1 Native Range and Status in the United States

Native Range

From Birdlife International (2016):

"Occurs throughout sub-Saharan Africa and Madagascar and from India to southern China, and south in SE Asia to Viet Nam, Thailand and Cambodia."

Status in the United States

No records of *Sarkidiornis melanotos* in the wild or in trade were found in the United States.

Sarkidiornis melanotos is listed on Hawaii's Restricted Animal List – Part B (Hawaii Department of Agriculture 2019). It is subject to importation restrictions in Maine as part of the family Anatidae (Maine Department of Inland Fisheries and Wildlife 2019).

Means of Introductions in the United States

No records of introductions within the United States were found for *Sarkidiornis melanotos*.

Remarks

There is significant taxonomic confusion when it comes to *Sarkidiornis melanotos*. Currently *Sarkidiornis melanotos* is recognized as a separate species from *Sarkidiornis sylvicola*, but in years past they have been lumped together as a single species under the name *Sarkiodiornis melanotos*. These species have been separated and lumped back together under this one name several times. Recently, they have been split apart again into separate species with *Sarkidiornis melanotos* being the species found in Africa and Asia and *Sarkidiornis sylvicola* being found in South America. This assessment follows the current understanding of the native range of Africa and Asia. Information searches for this screening were conducted using the current scientific name *Sarkidiornis melanotos* and its synonym *Sarkidiornis melanotus*.

From Birdlife International (2016):

"*Sarkidiornis melanotos* and *S. sylvicola* (del Hoyo and Collar 2014) were previously lumped as *S. melanotos* following Sibley and Monroe (1990, 1993), and prior to that had been split as *S. melanotos* and *S. sylvicola* in Collar and Andrew (1988), […]"

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2022):

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Tetrapoda
Class Aves
Order Anseriformes
Family Anatidae
Subfamily Tadorninae
Genus *Sarkidiornis*
Species *Sarkidiornis melanotos* (Pennant, 1769)

"Current Standing: valid"

Size, Weight, and Age Range

Biodiversity Explorer (2022) reports the longest living *Sarkidiornis melanotos* as 21 years and 6 months.

From Thai National Parks (2022):

"It is one of the largest species of duck. Length can range from 56 to 76 cm […], wingspan ranges from 116 to 145 cm […] and weight from 1.03 to 2.9 kg […]."

Environment

From India Biodiversity Portal (no date):

"[…] reported up to elevations as high as 3,500 metres."

Climate

From Biodiversity Explorer (2022):

"[…] absent from semi-arid and arid regions."

Distribution Outside the United States

Native

From Birdlife International (2016):

"Occurs throughout sub-Saharan Africa and Madagascar and from India to southern China, and south in SE Asia to Viet Nam, Thailand and Cambodia."

Introduced

There are no records of *Sarkidiornis melanotos* being introduced outside of its native range.

Means of Introduction Outside the United States

There are no records of *Sarkidiornis melanotos* being introduced outside of its native range.

Short Description

From Thai National Parks (2022):

"Adults have a white head freckled with dark spots, and a pure white neck and underparts. The upperparts are glossy blue-black upperparts, with bluish and greenish iridescence especially prominent on the secondaries (lower arm feathers). The male is much larger than the female, and has a large black knob on the bill. Young birds are dull buff below and on the face and neck, with dull brown upperparts, top of the head and eyestripe. Knob-billed ducks are generally larger in size when compared to comb ducks, and flanks are usually lighter (light grey, in females sometimes whitish)."

From India Biodiversity Portal (No Date):

"The Male [of the] species have a spectacular glossy blue-black or green-black upperparts, tail and wings. The underparts are white coloured and the flank region is of pale grey or black colour. The top of the head or the crown region along with the back side of the neck is black

coloured, and the rest if the head is white, speckled with black, with yellow tinges on the sides of the neck during the breeding season. It has narrow black bands run along the sides of the upper breast. Females are much smaller in size than males, their plumage is less glossy thn [sic] that of males, lesser well-defined black breast bands, more speckles are found on the head, which lacks any yellowish tinge, and sometimes with brownish mottling on the underparts. Females also lack the male's comb. Young comb ducks are brownish, with a dark eye-stripe, and attain adult plumage in the second year [Wildscreen Arkive.]"

Biology

From Birdlife International (2016):

"This species inhabits grassy ponds or lakes in savanna, open woodlands along large rivers and lakes (Johnsgard 1978), swamps (del Hoyo et al. 1992), marshes, floodplains, river deltas (Brown et al. 1982, Kear 2005a), flooded forest, pastures and rice-paddies (Kear 2005a) and occasionally sandbars and mudflats (Johnsgard 1978)."

From Mukherjee and Mukherjee (2021):

"They typically breed during the onset of monsoon season between late July and September. The breeding pair nests in cavities of large trees (Madge, Steve & Burn, Hilary, 1987) and sometimes on incidental man-made cavities on rooftops of buildings. Males can have more than one mate at a time (Pitman, 1965) […]. The comb ducks continue to nest in the same areas where old, large trees with cavities are present, but the lakes have now disappeared."

From Pitman (1965):

"The Knob-bill is not so nocturnal as most ducks, though resting a lot by day. In India where its habitat is normally associated with trees it has been described as 'strictly tree-loving' and it is probable that there it always roosts in trees; but in the tree-less swamp regions of Africa it rests on mud-banks and floating islets."

From BirdLife International (2016):

"This species is an intra-African migrant (Hockey et al. 2005) undertaking poorly-understood (Brown et al. 1982, del Hoyo et al. 1992, Hockey et al. 2005) seasonal movements in relation to water availability (Brown et al. 1982, del Hoyo et al. 1992). It breeds during the wet season in single pairs or small groups (Brown et al. 1982, del Hoyo et al. 1992) (harems [Brown et al. 1982]), and outside of the breeding season usually occurs in small parties of up to 30-40 individuals (Madge and Burn 1988). Large flocks also gather in the dry (non-breeding) season (Brown et al. 1982) on suitable waters (Madge and Burn 1988), but these break up and disperse to breeding grounds at the onset of the rains (Brown et al. 1982)."

"Its diet consists largely of vegetable matter, including the seeds of grasses and sedges, the soft parts of aquatic plants (e.g. water-lilies [Brown et al. 1982]), agricultural grain (e.g. rice, corn, oats [Johnsgard 1978], wheat and groundnuts [Hockey et al. 2005]) as well as aquatic insect larvae and locusts (Johnsgard 1978, Brown et al. 1982, del Hoyo et al. 1992)."

"The species nests close to water (Brown et al. 1982, Madge and Burn 1988, Kear 2005a), building rough structures of twigs and coarse grass (del Hoyo et al. 1992) in large hollow tree cavities (Madge and Burn 1988, Kear 2005a), between 7 and 12 m high (Brown et al. 1982), or in holes in the walls of isolated buildings (Madge and Burn 1988) (or other cavities with a floor diameter of c.200 mm [Kear 2005a]). It may also use the abandoned nests of other bird species, such as Hamerkop *Scopus umbretta* (Brown et al. 1982, Madge and Burn 1988, Kear 2005a), or nest on the ground (del Hoyo et al. 1992) in the shelter of tall grass or on tree stumps (Johnsgard 1978). When the species is tree nesting, the same cavity may be used from year to year (Brown et al. 1982)."

From Biodiversity Explorer (2022):

"Breeding season is from September to April"

"The female usually lays 8-11 eggs (probably one egg per day) and on completion of the clutch, incubates them for 28-30 days before they hatch. Clutches of up to 20 are probably due to more than one female laying in the nest. When the female leaves the nest to feed, she covers the eggs with down, which keeps them warm."

"Ducklings have very sharp claws and are able to climb vertical wooden surfaces. They jump from the nest when the female calls them from below the nest. Only the female looks after the young although the male is in the vicinity to drive off intruding males. By 65-70 days, the young have fully developed flight feathers."

Human Uses

Sarkidiornis melanotos is used as a food source within its native range (BirdLife International 2016). It is also present in trade internationally (River Cottage Waterfowl 2022).

Diseases

***Sarkidiornis melanotos* is known to be susceptible to avian influenza which is on the World Organisation for Animal Health's list of notifiable diseases (OIE 2022).**

From BirdLife International (2016):

"This species is also susceptible to avian influenza, so is potentially threatened by future outbreaks of the virus (Gaidet et al. 2007)."

From Phiri et al. (2012):

"The study found that H6N2 and H9N2 subtypes were present in the faeces of the Knob-billed ducks (*Sarkidiornis melanotos*). These data indicated that wild migratory ducks that inhabit the Bangweulu wetlands play a role as carriers of influenza viruses, thus necessitating continued surveillance studies so as to elucidate the ecology of the viruses in the area."

According to Poelen et al. (2014) *Sarkidiornis melanotos* can be the host to the following parasites: *Trinoton straeleni*, *Holomenopon leucoxanthum*, *Anaticola coloratus*, *Anatoecus icterodes*, *Anatoecus dentatus*, *Holomenopon* sp., mites (Acari), and *Plasmodium* sp.

In addition to those listed above, Biodiversity Explorer (2022) states that *Sarkidiornis melanotos* can be the host to the following parasites and pathogens: *Anaticola asymmetricus*, *Ornithoctona laticornis*, *Freyana anatine*, *Freyana largifolia*, *Bdellorhynchus psalidrus*, *Speleognathus womersleyi*, *Rhinonyssus rhinolethrum*, *Mycobacterium* causing avian tuberculosis (recorded in captivity), and *aspergillosus*.

Threat to Humans

No threats to humans have been reported for *Sarkidiornis melanotos*.

3 Impacts of Introductions

No records of introductions were found for *Sarkidiornis melanotos*; therefore, there is no information on impacts of introductions.

4 History of Invasiveness

The history of invasiveness is classified as No Known Nonnative Population. *Sarkidiornis melanotos* has not been recorded as introduced or established outside of its native range. This species has been found for sale in the United Kingdom, but the extent of its trade and the overall trade history could not be found.

5 Global Distribution

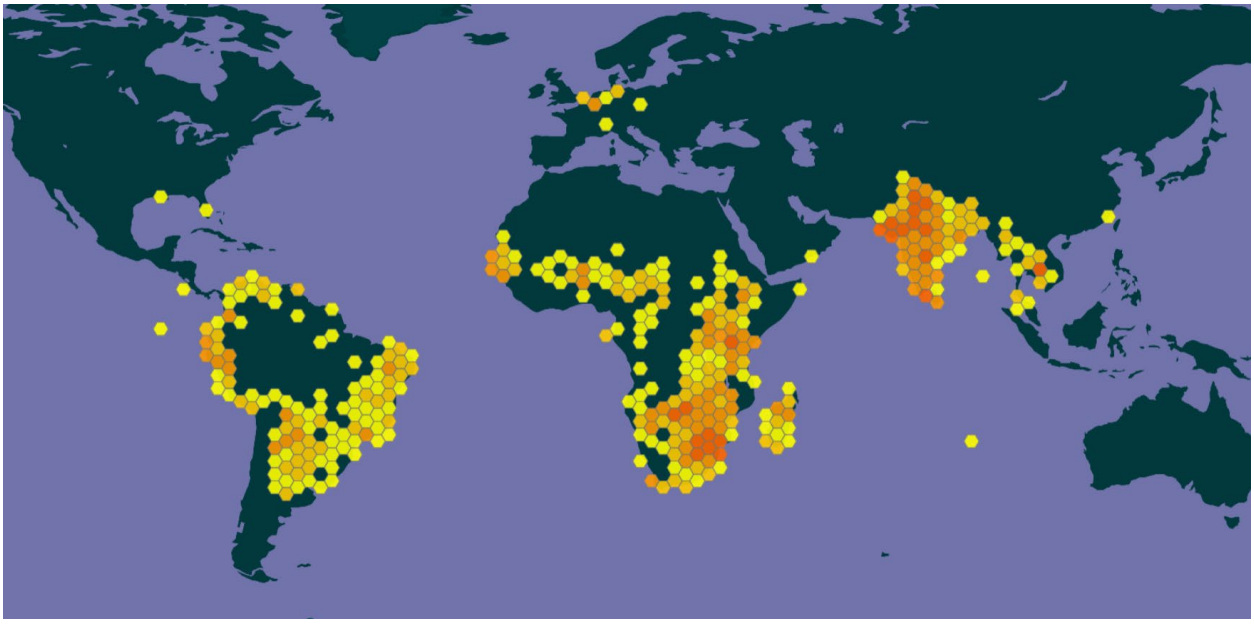

Figure 1. Known global distribution of *Sarkidiornis melanotos*. Observations are reported from Sub-Saharan Africa, Madagascar, India, southern mainland Asia. Map from GBIF Secretariat (2022). GBIF Secretariat (2022) treats the species *S. sylvicola* as a synonym of *S. melanotos* (see Remarks) and as such that species' range in South and Central America is depicted in this map.

All points located in South America in GBIF Secretariat (2022) were recorded under the name *Sarkidiornis sylvicola* and therefore were not included in the climate match analysis for *S. melanotos*. In addition, the points in the United States were from preserved specimens and were not from wild populations and therefore were not used in the climate matching analysis. The point in Oman was also excluded from the climate matching analysis as it was an observation from a farm and not a wild population. The point in Fujian, China was excluded from the climate matching analysis because the point was representative of the location of a museum specimen and not an established population. The points in Belgium, Germany, Czechia (Czech Republic), and Italy were not included in the climate matching analysis because it could not be determined if they were representative of an established population, a bird moving through the area, or a nonnative introduction; no information confirming established populations in those areas could be found.

6 Distribution Within the United States

No records of *Sarkidiornis melanotos* in the wild in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

Much of the contiguous United States had a medium to high local climate match. Areas of high match were found in southern Peninsular Florida, southern Great Plains region, and southern California. Areas of low match were found in the Northeast, and in patches in the Rocky Mountain region and the Northwest. The overall Climate 6 score (Sanders et al. 2021; 16 climate variables; Euclidean distance) for the contiguous United States was 0.382, High (scores of 0.103 and greater are classified as High). The following States had High individual Climate 6 scores: Arizona, California, Colorado, Florida, Iowa, Kansas, Louisiana, Missouri, Montana, Nebraska, New Mexico, Nevada, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wisconsin, and Wyoming. Alabama, Georgia, Idaho, Illinois, Maine, Massachusetts, Minnesota, Mississippi, New York, North Carolina, North Dakota, South Carolina, Virginia, and West Virginia all had Medium individual Climate 6 scores. All other States had Low individual scores.

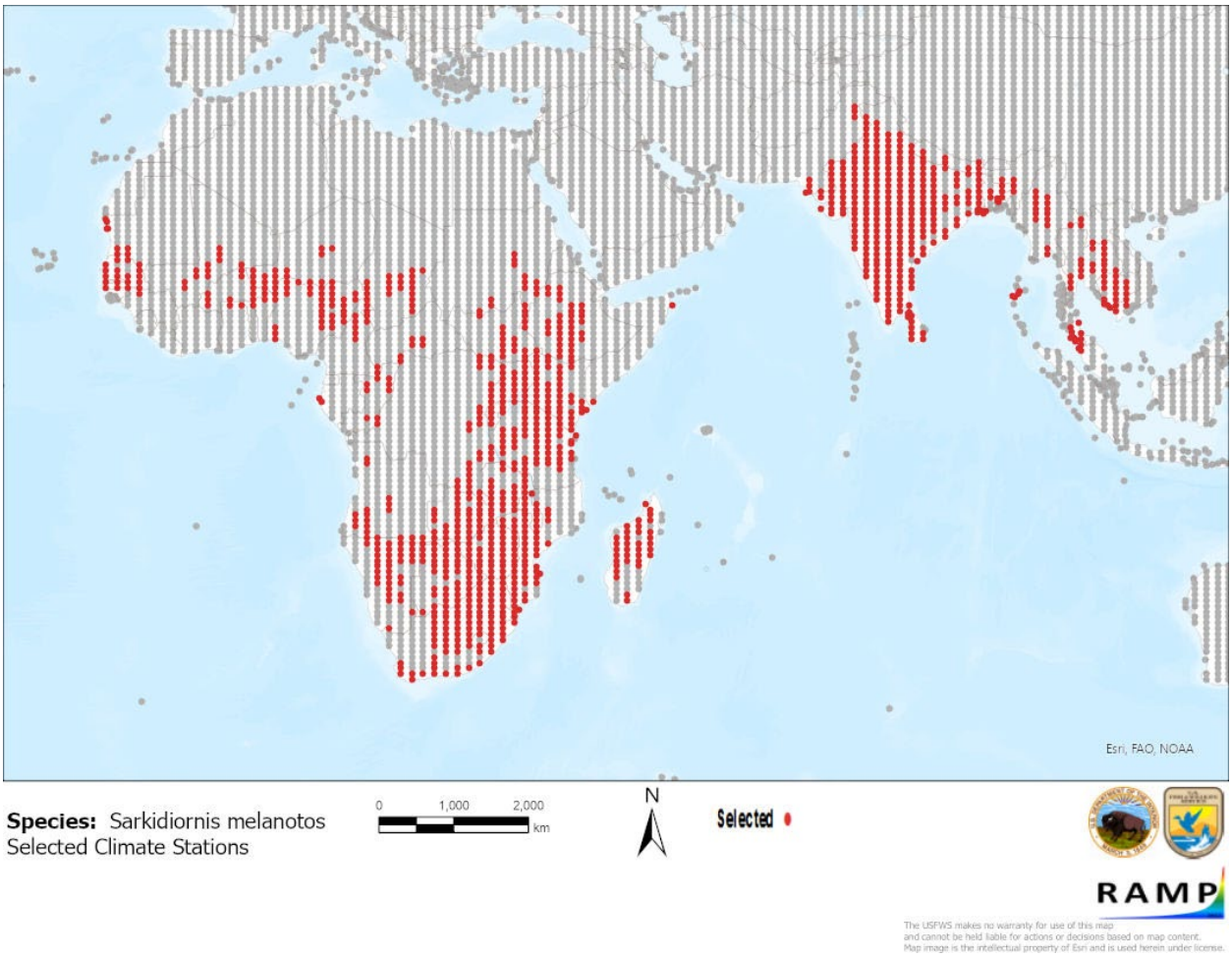

Figure 2. RAMP (Sanders et al. 2021) source map showing weather stations in Africa and Asia selected as source locations (red; Africa: Angola, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Democratic Republic of the Congo, Equatorial Guinea, Eswatini, Ethiopia, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Republic of the Congo, Rwanda, Senegal, South Africa, South Sudan, Sudan, Somalia, Tanzania, Uganda, Zambia, Zimbabwe, Asia: Bangladesh, Cambodia, Laos, India, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, and Vietnam) and non-source locations (gray) for *Sarkidiornis melanotos* climate matching. Source locations from GBIF Secretariat (2022). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

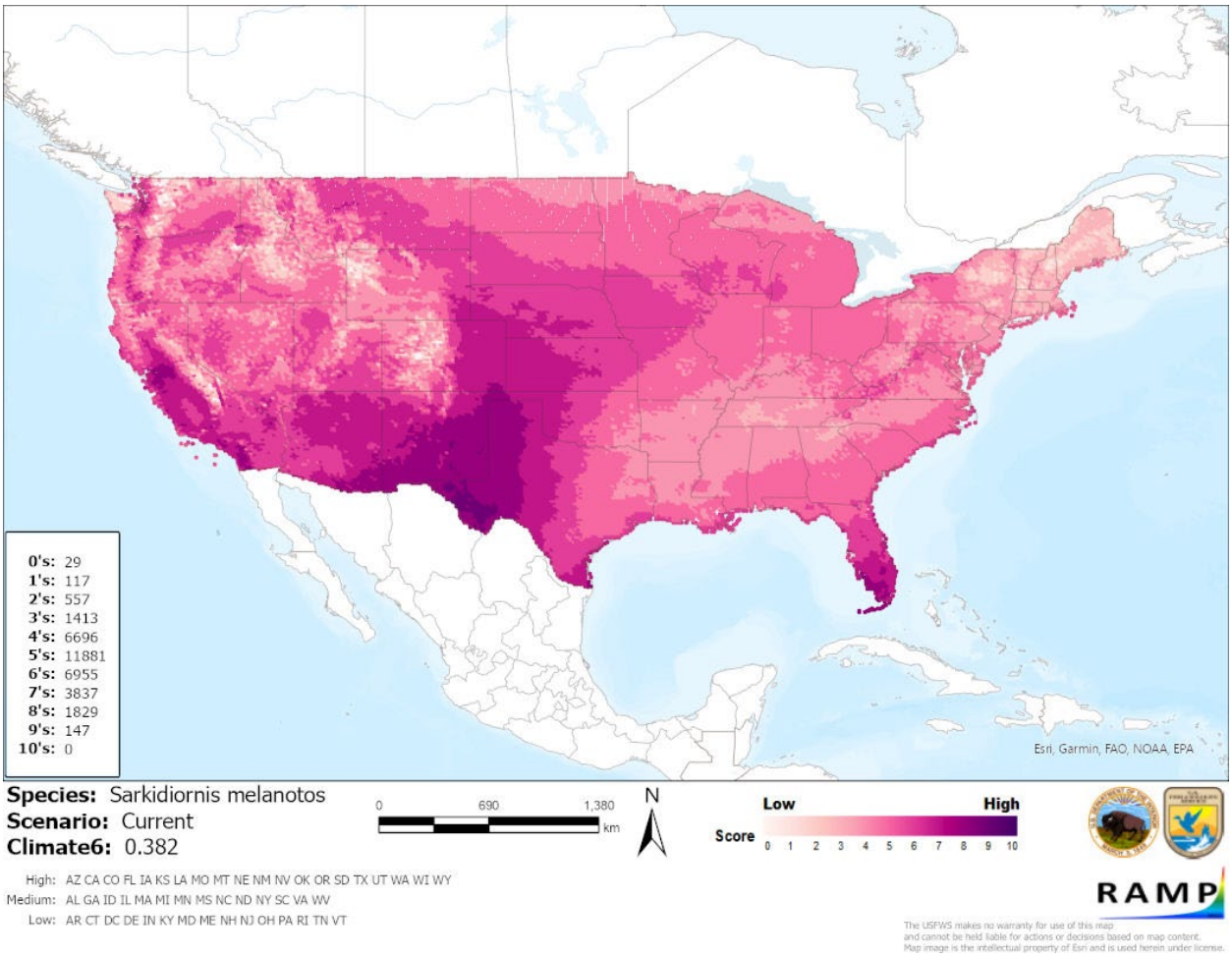

Figure 3. Map of RAMP (Sanders et al. 2021) climate matches for *Sarkidiornis melanotos* in the contiguous United States based on source locations reported by GBIF Secretariat (2022). Counts of climate match scores are tabulated on the left. 0/Light Pink = Lowest match, 10/Dark Purple = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: (Count of target points with climate scores 6-10)/ (Count of all target points)	Overall Climate Match Category
0.000≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

8 Certainty of Assessment

The certainty of this assessment is Low. There is adequate information available on the biology and habitat requirements of *Sarkidiornis melanotos*. However, there was no information available regarding any introductions and therefore no information on impacts of introductions. *Sarkidiornis melanotos* is in trade but the exact volume and trade history could not be

determined. There is also significant taxonomic confusion between *Sarkidiornis melanotos* and *Sarkidiornis sylvicola*, with both species being lumped together under the name *Sarkidiornis melanotos* and split back apart into two separate species several times. As a result, the native range for both species is unclear in the literature.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Sarkidiornis melanotos, the knob-billed duck, is a duck native to sub-Saharan Africa, Madagascar, India, and southeast Asia. *Sarkidiornis melanotos* is known for the knob on its bill and large size. There is evidence that this species is in trade, but the exact volume and history could not be determined. No reliable evidence was found of this species having ever become established outside its native range leading to a History of Invasiveness classification of No Known Nonnative Population. The Overall Climate Match for *Sarkidiornis melanotos* is High, with areas in Peninsular Florida, southern Great Plains region, and southern California having the highest local climate match. The Certainty of Assessment is Low due to the lack of information regarding history of invasiveness and taxonomic confusion with a related species. The Overall Risk Assessment Category is Uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 4): No Known Nonnative Population**
- **Overall Climate Match Category (Sec. 7): High**
- **Certainty of Assessment (Sec. 8): Low**
- **Remarks/Important additional information: Difficulty in discerning range between *Sarkidiornis melanotos* and *Sarkidiornis sylvicola*. *Sarkidiornis melanotos* is known to have avian influenza (OIE 2022).**
- **Overall Risk Assessment Category: Uncertain**

10 Literature Cited

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 11.

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11 Literature Cited in Quoted Material

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

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