90-DAY FINDING PETITION REVIEW FORM
LISTING AS A THREATENED OR AN ENDANGERED SPECIES

Federal Docket No. FWS-HQ-ES-2022-0158

90-DAY FINDING ON A PETITION TO LIST THE COMMON HIPPOPOTAMUS (*Hippopotamus amphibius*) PURSUANT TO THE UNITED STATES ENDANGERED SPECIES ACT

Petitioned action being requested:

- ☒ List as an endangered or a threatened species
- ☐ Reclassify (uplist) from a threatened species to an endangered species
- ☐ Other

Petitioned entity:

- ☒ Species
- ☐ Subspecies
- ☐ DPS of vertebrates

Background

Section 4(b)(3)(A) of the Endangered Species Act (Act) requires that we make a finding on whether a petition to list, delist, uplist (reclassify the species from a threatened species to an endangered species), or downlist (reclassify the species from an endangered species to a threatened species) a species presents substantial scientific or commercial information indicating that the petitioned action may be warranted. Our regulations provide that, for a petition to meet the "substantial scientific or commercial information" standard, we must determine in the 90-day petition finding that the petition includes "credible scientific or commercial information in support of the petition's claims such that a reasonable person conducting an impartial scientific review would conclude that the action proposed in the petition may be warranted" (50 CFR § 424.14(h)(1)(i)).

Petition History

On March 23, 2022, we received a petition from The Humane Society of the United States, Humane Society International, Humane Society Legislative Fund, and Center for Biological Diversity, requesting that the common hippopotamus be listed as a threatened species or an endangered species under the Act. The petition clearly identified itself as such and included the requisite identification information for the petitioner, required at 50 CFR 424.14(c). This finding addresses the petition.

Evaluation of a Petition to List the Common Hippopotamus Under the Act

Species and Range

Does the petition present substantial information that the petitioned entity may be a listable entity (i.e, a species, subspecies, or distinct population segment)?

☒ Yes
☐ No

The common hippopotamus (*Hippopotamus amphibius*)

Historical range: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Côte d'Ivoire, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Eswatini (Swaziland), Tanzania, Togo, Uganda, Zambia, Zimbabwe

Current range: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Côte d'Ivoire, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, South Sudan, Eswatini (Swaziland), Tanzania, Togo, Uganda, Zambia, Zimbabwe; It is unknown if common hippos still occur in Sudan.

This is a recognized species by Linnaeus, 1758.

Statutory and Regulatory Standards for Evaluation of the Petition

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an "endangered species" or a "threatened species." The Act defines an endangered species as a species that is "in danger of extinction throughout all or a significant portion of its range," and a "threatened species" as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The Act requires that we determine whether any species is an "endangered species" or a "threatened species" because of any of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;
(B) Overutilization for commercial, recreational, scientific, or educational purposes;
(C) Disease or predation;
(D) The inadequacy of existing regulatory mechanisms; or
(E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

In accordance with 50 CFR 424.14(d), the Service's determination as to whether the petition provides substantial scientific or commercial information indicating that the petitioned action may be warranted will depend in part on the degree to which the petition includes the following types of information: (1) Information on current population status and trends and estimates of current population sizes and distributions, both in captivity and the wild, if available; (2) Identification of the factors under section 4(a)(1) of the Act that may affect the species and where these factors are acting upon the species; (3) Whether and to what extent any or all of the factors alone or in combination identified in section 4(a)(1) of the Act may cause the species to be an endangered species or threatened species (i.e., the species is currently in danger of extinction or is likely to become so within the foreseeable future), and, if so, how high in magnitude and how imminent the threats to the species and its habitat are; (4) Information on adequacy of regulatory protections and effectiveness of conservation activities by States as well as other parties, that have been initiated or that are ongoing, that may protect the species or its habitat; and (5) A complete, balanced representation of the relevant facts, including information that may contradict claims in the petition.

Evaluation of Information in the Petition

When evaluating a petition, we assess the information in the petition and may use any readily available information (e.g., in our files or published literature that we are aware of) to determine the credibility of the information presented in the petition. Our implementing regulations at 50 CFR 424.14(h)(1)(i) state conclusions drawn in the petition without the support of credible scientific or commercial information will not be considered "substantial information." "Credible scientific or commercial information" may include all types of data, such as peer-reviewed literature, gray literature, traditional ecological knowledge, etc. Thus, we first must determine whether the information provided in the petition is credible. In other words, the Service must evaluate whether the information in the petition is substantiated and not mere speculation or opinion. Any claims that are not supported by credible scientific or commercial information do not constitute substantial information and will not be further evaluated. Next, we determine whether the conclusions drawn in the petition are reasonable (i.e., actually supported by that credible information).

After identifying the claims in the petition that are supported by credible information, we consider those claims in the context of the factors in section 4(a)(1) of the Act. When evaluating information presented in the petition, we consider factor D in light of the other factors, not independently. In other words, we consider whether the petition presents substantial information indicating that existing regulatory mechanisms may be inadequate to address the magnitude or imminence of threats identified in the petition related to the other four factors; therefore, we consider existing regulatory mechanisms in conjunction with each relevant claim presented in the petition.

To complete our analysis for a 90-day petition finding to list or uplist, we first identify the claims in the petition that are supported by credible information indicating that a potential threat is occurring or is likely to occur within the species' range. After identifying the claims that are supported by credible information, we next determine if the petition has presented credible

information that any one of those threats affects the species at a population or species level, after taking into account any mitigating actions or conditions that may ameliorate those threats, such that the petitioned action may be warranted. If we find that the petition does not present substantial information that the petitioned action may be warranted based on the information provided regarding the status and trends of the species or on one or more factors, we consider the cumulative impact of all of the threats that are supported by credible information. Based on these steps, we draw our conclusion and petition finding based on the standard for 90-day findings, which is whether the petition presents "credible scientific or commercial information in support of the petition's claims such that a reasonable person conducting an impartial scientific review would conclude that the action proposed in the petition may be warranted." Our evaluation assesses the extent to which the credible information in the petition indicates that a reasonable person would conclude that the petitioned action may be warranted.

Claims Addressing Threats

We first assess whether the claims in the petition are supported by credible information (i.e., whether the petition has presented credible information that the threat is occurring or is likely to occur and that the species may be exposed to the threat) (Table 1). If the supporting information indicates that the threat is occurring or is likely to occur in the future and that the species may be exposed to it, we then assess whether the petition presented credible information that reasonably indicates the presence of negative effects on the species as a whole.

If there are no population-level effects, our analysis of that individual threat presented in the petition is complete, as there would be no species-level effects; we may then analyze that threat later if we need to evaluate cumulative effects. If the credible information about the particular threat indicates species level effects, our analysis of that individual threat presented in the petition is complete. If the credible information about the particular threat does not indicate species-level effects but does indicate population-level effects, we assess the extent to which the credible information in the petition indicates that the scale of the effects of that threat are such that a reasonable person would conclude that listing or uplisting may be warranted.

If, for any one threat, we find that there is credible information indicating that the threat is having or is likely to have a negative effect on the species as a whole, we can stop and make a positive "substantial information" finding. We would then evaluate all of the threats in detail based on the best scientific and commercial data available when we conduct the status assessment and make the 12-month finding. If we do not find substantial information indicating that any one threat is having an impact at a species-level, we conduct a cumulative analysis of the effects of all of the threats.

TABLE 1: Evaluation of claims in the petition. Assessment of the credibility of scientific and commercial information in the petition and the extent to which claims supported by credible scientific or commercial information in the petition corroborates the presence of negative impacts to populations, or the species.

Threat or Activity	**Exposure. Is the claim of the threat in the petition supported by credible scientific and commercial information? Does the petition support the claim that there is a potential threat and it is occurring or is likely to occur within the range of the species? If no, explain. If yes, include brief summary statement and citations to the credible information.**	**Response (Populations/Species). Do the claims and the supporting information indicate negative effects to one or more populations and if so, to the species as a whole? Yes or no. Explain and describe below.**
Habitat degradation, loss, and fragmentation (Factor A)	Yes. The petition presents credible information that habitat loss, degradation, and fragmentation is occurring within the species range. The IUCN Red List assessment for the hippo indicates habitat loss to be a primary threat across much of their range, including in Western, Central, and Eastern Africa, where habitat loss stems from water diversion for agriculture and development in and around wetlands (Lewison & Pluháček, 2017a). The petition provides credible information that human settlement, agriculture expansion, grass collecting, livestock overgrazing, mud brick manufacturing, and land use changes around wetland habitats are causing human encroachment in and degradation to hippo habitat in Ethiopia and Kenya (Ertiban, 2016; Kanga et al. 2012; Long et al., 2020). The petition states that increased irrigation and water demand is	Yes. The petition provides credible information indicating negative impacts of habitat degradation, loss, and fragmentation on hippo populations. The petition provides credible information on hippo vulnerability to habitat loss due to their reliance on freshwater habitats near terrestrial grazing locations. The petitioners indicate hippos require freshwater pools for thermoregulation and skin health, hydration, reproduction, foraging, and gene flow (Eltringham, 1993, pp. 47, 51; Eltringham, 1999, pp. 4, 31-33, 38; Ertiban, 2016; Kanga et al., 2012; Lewison & Pluháček, 2017a; Luck & Wright, 1964; Noirard et al., 2008, Okello et al., 2005; Smit & Bond, 2020; Field, 1970; Smuts and Whyte, 1981; Utete, 2020). As noted in the petition, land conversion, dam construction, and water diversion has led to decreased pool abundance and size in the dry seasons which creates hippo hot spots where large concentrations of hippos reside in a single pool with demographics that skew away from a normal social structure (Stears et al., 2018; Stears et al., 2019; Stears et al., 2021; Stommel et al.; 2016). Credible information in the petition indicates that this can and has led to increased disease outbreaks, aggression, hippo displacement with hippos migrating further distances, and increased human/hippo conflict which leads to retaliatory killings and population declines (Baker et al., 2020; Utete et al., 2017; Stears et al., 2018; Stears et al., 2019; Stears et al., 2021; Stommel et al.; 2016). Credible citations in the petition suggest buffer zones have been used as conservation measures to reduce hippo-human conflict near protected areas and have proven effective in some locations (Lewison & Carter, 2004; Sheppard et al. 2010) but can also exacerbate negative views of hippos in others (Marowa et al.,2021). According to credible claims in the petition, habitat loss and subsequent population fragmentation also has impacts on gene flow and adaptive capacity (Okello et al.,

	leading to a reduction in and degradation of available aquatic habitat through the construction of dams, the diversion of water for human use, and livestock use of available water sources in Nigeria (Baker et al., 2020), Zimbabwe (Utete et al., 2017), and Tanzania (Stears et al., 2018; Stears et al., 2019; Stears et al., 2021; Stommel et al.; 2016). The petition provides evidence that human mortality from hippo interactions has increased, indicating acceleration of hippo habitat loss and higher density of human-hippo cohabitation (Kanga et al., 2012; Lewison & Pluháček, 2017a). The petition states that the threat of habitat loss and degradation is only expected to increase with human population growth and continued urbanization (OECD/SWAC, 2020; Roberts et al, 2011). The petition also presents credible information that climate change impacts on hippo habitat is occurring and will continue to occur within the species range through unpredictable rainfall, increased temperature, high evapotranspiration, and increased frequency and severity of droughts (Hoegh-Guldber et al., 2018). Additionally, the petition presents credible information on the threats that war poses to hippo habitat through deforestation (Gaynor et al., 2016; Shoumatoff, 2001) with armed conflicts occurring in 71% of all Afrotropical Protected Areas between 1946 and 2010 (Daskin & Pringle, 2018).	2005). The petition identifies negative impacts from watershed changes on hippo populations in Zimbabwe, Tanzania, and Nigeria and similar threats exist in watersheds in other range states including Kenya and Senegal (Baker et al., 2020; Utete et al., 2017; Snoussi et al., 2007; Stears et al., 2019; Stommel et al., 2016). Credible sources cited in the petition indicate that Western and Central African hippo populations are at the highest risk of extinction, which is due to habitat fragmentation, large human populations, and the resultant human-hippo conflict (Lewison & Pluháček, 2017a). Additionally, in Eastern Africa, Ethiopia's hippo populations are declining with habitat loss cited as one of the major threats (Lewison & Pluháček, 2017a). As described by credible citations identified in the petition, Southern Africa is a conservation stronghold for hippos with Zambia having the highest population estimates of any country (Lewison & Pluháček, 2017a; Lewison & Pluháček, 2017b). Although a stronghold, there is concern for populations outside of protected areas due to human-hippo conflict (Lewison & Pluháček, 2017a). Hippo population sizes in Zambia are also known to fluctuate with changes in climate conditions and resulting impacts on habitat (Lewison & Pluháček, 2017a). As noted in the petition, although hippo population estimates are difficult to obtain and come with high levels of uncertainty, the IUCN report, citing habitat loss as a major threat to the species, 65% of range states have unknown (9 range states) or declining (16 range states) populations (Lewison & Pluháček, 2017b). The petition also provides credible information on expected human population growth and urbanization in hippo range states, suggesting human induced habitat loss/degradation and human-hippo conflict will also continue to increase (OECD/SWAC, 2020). The petition presents credible information of examples in the literature of impacts of habitat loss from climate change on hippo populations in South Africa on and near Kruger National Park where drought resulted in 27 to 59% mortality in 2016/2017 (Smit and Bond, 2020; Smit et al., 2020), in Zimbabwe where hippo populations in Gonarezhou National Park declined by over 80% over two decades primarily due to drought (Utete, 2020; Kupika et al., 2017), and in Tanzania where both anthropogenic impacts on the watershed and climate change have resulted in large aggregations of hippos in smaller pools during the dry season due to reduction in surface water (Stears et al., 2018; Stears et al., 2019; Stears et al., 2021; Stommel et al., 2016). While the petition does not present information on negative climate change impacts across all range states, it does provide credible information from models that suggest large ungulates will be susceptible to negative impacts on community composition because of climate change (Veldhuis et al., 2019). The multitude of factors influencing habitat loss and degradation and the reliance of hippos on specific aquatic and terrestrial habitat requirements suggest that habitat loss may be threatening the conservation of the species which we will investigate further during our status review.

Cumulative Effects of Claims Supported by Credible Information

Because we have found that the petition presented substantial information that one or more threats are having an impact on the species to the point that the species' status may have changed, the petition presents substantial information indicating that the species may warrant listing. We do not need to assess cumulative effects at the 90-day finding stage because we will address cumulative effects of all threats in the 12-month finding.

Evaluation of Information Summary

The petitioner provided credible information indicating potential threats to hippo populations from habitat loss (Factor A) in consequence of land conversion for agricultural and human settlements, the resultant demand for irrigation and water, climate change impacts, and war. The petitioner provided information that indicates the threats under Factor A are negatively impacting hippo populations in much of their range and this in combination with hippo ecology, which makes them particularly vulnerable to habitat loss, may be threatening the species. The petition provides information on additional threats from legal international trade, poaching, disease, predation, and traditional and medicinal use of hippo parts that we will investigate further during our full status review.

Petition Finding

We reviewed the petition, sources cited in the petition, and other readily available information. We considered the factors under section 4(a)(1) and assessed the effect that the threats identified within the factors—as potentially ameliorated or exacerbated by any existing regulatory mechanisms or conservation efforts—may have on the species now and in the foreseeable future. Based on our review of the petition and sources cited in the petition, we find that the petition presents substantial scientific or commercial information indicating that listing the common hippopotamus (*Hippopotamus amphibius*) under the Endangered Species Act may be warranted due to potential threats associated with habitat loss and degradation due to land conversion and urbanization, demand for irrigation and water, climate change, and war (Factor A). The petitioners also presented information suggesting overutilization from legal international trade and poaching (Factor B), disease and predation (Factor C), and traditional and medicinal use of hippo parts (Factor E) may be threats to the common hippopotamus and that existing regulatory mechanisms, particularly as they pertain to trade and poaching, may be inadequate to address impacts of these threats (Factor D). We will fully evaluate these potential threats during our 12-month status review, pursuant to the Act's requirement to review the best scientific and commercial information available when making that finding.

Author

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