

Petition

Before the United States Fish and Wildlife Service United States Department of the Interior

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Requesting Rulemaking to List the Long-Tailed Macaque (*Macaca fascicularis*) as a Threatened or Endangered Species Under the Endangered Species Act

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I. EXECUTIVE SUMMARY

Primatologists describe the long-tailed macaque, *Macaca fascicularis*, as “the most traded primate species, the most culled primate species, the most persecuted primate species and when looking at numbers of threats and population decline, possibly one of the most endangered primate species currently.”¹ Multiyear assessments of wild populations of long-tailed macaques, conducted by researchers throughout Southeast Asia, yielded alarming data on the increasing threat to these once plentiful monkeys. Based on the data, in 2022, the International Union for Conservation of Nature (IUCN) elevated the species’ status from “vulnerable” to “endangered” on the IUCN Red List of Threatened Species.² The IUCN anticipates that the current level of exploitation will cut the population at least in half over the next three macaque generations (36-39 years).³

The Endangered Species Act (ESA) requires the U.S. Fish and Wildlife Service (FWS or “Service”) to list long-tailed macaques as “endangered” or “threatened” if, throughout all or a significant part of their range, the species is in danger of extinction or is likely to become endangered within the foreseeable future. A single threatening factor can be sufficient to trigger listing status. But, here, the long-tailed macaque is seriously threatened by multiple factors: (1) declining native habitats across Southeast Asia; (2) overutilization for scientific, commercial, and recreational purposes; (3) inadequate regulatory mechanisms; and (4) culling due to human-macaque conflicts.

Although long-tailed macaques have the constructive ability to “adapt to climate change, utilize degraded landscapes, and regenerate primary and secondary habitats through seed dispersal,”⁴ primatologists conclude that their flexible nature cannot withstand the destructive threats to their existence.⁵ Based on the petition herein, which summarizes, supplements, and incorporates by reference the IUCN’s detailed 2022 Assessment, the petitioners urge the Service to list the long-tailed macaque as an endangered or threatened species under the ESA.

II. INTRODUCTION

A. Petitioners

People for the Ethical Treatment of Animals, Inc. (PETA) is a non-profit organization dedicated to protecting animals from abuse, neglect, and cruelty, and undertakes these efforts through public education, cruelty investigations, research, animal rescue, legislation, special

¹ M. F. Hansen et al., *Macaca fascicularis*, THE IUCN RED LIST OF THREATENED SPECIES 10 (2022), <https://dx.doi.org/10.2305/IUCN.UK.2022-2.RLTS.T12551A221666136.en> [hereinafter “IUCN 2022 Assessment”] (amended version of 2022 assessment) [Ex. 1].

² *Id.* at 3; see also *Common Long-Tailed Macaque*, IUCN RED LIST, <https://www.iucnredlist.org/species/195351957/221668305> (last visited Apr. 3, 2023) [Ex. 2].

³ See *The New IUCN Red List Assessment of the Long-Tailed Macaque and All Subspecies*, THE LONG-TAILED MACAQUE PROJECT 2 (July 21, 2022), <https://theltmproject.org/activities/> [hereinafter “LTM Project”] [Ex. 3].

⁴ *Id.*

⁵ See Malene F. Hansen et al., *Conservation of Long-Tailed Macaques: Implications of the Updated IUCN Status and the CoVID-19 Pandemic*, 35 PRIMATE CONSERVATION 7 (2021), https://www.researchgate.net/publication/349338354_Conservation_of_Long-tailed_Macaques_Implications_of_the_Updated_IUCN_Status_and_the_CoVID-19_Pandemic [hereinafter “Hansen et al. 2021”] [Ex. 4].

events, celebrity involvement, protest campaigns, and lawsuits to enforce laws enacted to protect animals. Beginning in 1981 with an investigation that uncovered primates—including long-tailed macaques—suffering in a Maryland research facility, PETA has spent decades exposing abusive and deadly experiments on primates and persistently champions ending the use of animals in experiments. PETA scientists, having expertise in primatology, neuroscience, physiology, genetics, toxicology, animal welfare, and public health, work to change the paradigm of biomedical research by phasing out the use of animals in experiments and promoting the development and implementation of cutting-edge, human-relevant strategies in biomedical research and training. To further its work to end the importation of primates into the United States for experiments, PETA launched a campaign that persuaded major airlines to stop transporting primates—including long-tailed macaques—into the United States for use in experiments. When the biomedical research community petitioned the Department of Transportation to take enforcement action against the airlines, PETA submitted extensive comments in opposition. In November 2022, PETA filed a shareholder resolution calling for one of the largest importers of primates (mostly long-tailed macaques) into the United States to provide transparent reports describing the species, country of origin, and number of primates it imports into the United States, and measures it takes to mitigate its impact on wild populations.⁶

Primatologist **Lisa Jones-Engel, Ph.D.**, has studied the interface between humans and long-tailed and pig-tailed macaques in Indonesia, Singapore, Cambodia, Thailand, Myanmar, and Bangladesh, as well as in the primate biomedical facilities of the United States since the 1980s. Her scientific career has included field studies, research in the laboratory setting (most recently, the Washington National Primate Research Center), and teaching assignments. She has authored over 100 peer-reviewed articles covering the fields of primatology, virology, epidemiology, microbiology, and conservation and co-authored the IUCN 2022 Assessment. Dr. Jones-Engel serves as a senior science advisor on primate experimentation with PETA’s Laboratory Investigations Department.

Primatologist **Birutė Mary Galdikas, Ph.D.**, has committed five decades to the conservation and study of primates in Indonesia. She is the world’s authority on orangutans. Her field site in Indonesia is home to wild populations of long-tailed and pig-tailed macaques who share the rainforest with the orangutans. The Orangutan Foundation International, founded by Dr. Galdikas, takes a holistic and comprehensive approach with multiple complementary strategies to combat the complex challenges of conserving and protecting animals and forests.

Dr. Jane Goodall, DBE, founder of the Jane Goodall Institute and United Nations Messenger of Peace, has been a global champion for animal welfare and conservation for decades. She travels the world to promote the protection of the environment and the welfare of people and animals.

Action for Primates is a United Kingdom-based project that advocates globally on behalf of non-human primates. Action for Primates recognizes that all animals, not just non-human primates, deserve respect and protection from harm by people.

⁶ See Alka Chandna, *Illegally Captured Primates Used in Animal Testing Pose Health and Investor Risks*, PROXYPREVIEW (Mar. 21, 2023), <https://www.proxypreview.org/all-contributor-articles/illegally-captured-primates-used-in-animal-testing-pose-health-and-investor-risks> [Ex. 5].

Born Free USA is a leading wildlife charity that has worked for decades to end the exploitation of macaques, enhance the survival of threatened species in the wild, and protect natural habitats while respecting the needs and safeguarding the welfare of individual animals. The organization seeks to positively impact animals in the wild and protect their ecosystems in perpetuity for their intrinsic value and the critical roles they play within the natural world.

Sarah Kite is co-founder of Action for Primates. She has spent decades working to bring awareness of the international trade and use of non-human primates, in particular macaques, for the global research and toxicity testing industries.

Dr. Nedim Buyukmihci is an Emeritus Professor of Veterinary Medicine at the School of Veterinary Medicine, University of California-Davis, and co-founder of Action for Primates. His decades of non-human animal advocacy have included working on behalf of a wide range of species, in particular macaques and other non-human primates. He has many years of experience co-managing sanctuaries, including sanctuaries for farmed animals and non-human primates, and a wildlife refuge.

Angela Grimes is Chief Executive Officer of Born Free USA, a wildlife conservation and animal welfare organization. For the past decade, she has campaigned to ensure that long-tailed and pig-tailed macaques caught up in the wildlife, pet, or laboratory trade are provided with sanctuary.

Dr. Liz Tyson has worked in animal protection and conservation, focusing on primates, for twenty years. She currently works as Programs Director for Born Free USA and runs one of the largest long-tailed and pig-tailed macaque sanctuaries in the United States.

The Asia for Animals Macaque Coalition (MACC) was initiated in 2020 and is a working group of the Asia for Animals Coalition. MACC aims to collate and share information on the many welfare issues faced by macaques, as well as to facilitate networking and collaboration geared towards promoting respectful coexistence, alleviating their suffering, and protecting them at both the individual and species levels. MACC produced the 2022 Macaque Report: Indonesia's Unprotected Macaques.

Ecoflix is a not-for-profit media group that educates, inspires, and supports meaningful actions to deliver a tangible, measurable difference in saving animals and restoring the planet. Dr. Ian Redmond, Head of Conservation for Ecoflix, has spent decades raising awareness, through advocacy and research, about the trade in wildlife, including long-tailed and pig-tailed macaques.

Wildlife biologist and conservationist **Dr. Ian Redmond** has devoted decades to protecting primates and advocating for conservation. He currently chairs the Primate Working Group of the Species Survival Network, which brings together organizations and individuals to monitor the primate trade, publicize cases of illegal trade, and support efforts to repatriate confiscated live animals to the nearest suitable sanctuary to the point of origin.

Since 1973, under the leadership of its founder, Dr. Shirley McGreal, the **International Primate Protection League** has spent decades fighting to protect and save macaques worldwide. These

significant efforts included fighting smugglers, exposing the fate of long-tailed and pig-tailed macaques in research labs, establishing a gibbon sanctuary, and much more.

For decades, **Wildlife Alliance** has worked with stakeholders around the globe to combat the illegal wildlife trade in long-tailed macaques and other species.

The **Physicians Committee for Responsible Medicine** aims to eliminate the exploitation and use of macaques in testing worldwide through lobbying, publishing research, training scientists, and attending and conducting scientific meetings.

Dr. Michael Schillaci is a Professor of Anthropology at the University of Toronto Scarborough. Dr. Schillaci has spent two decades studying macaque morphology, growth, hybridization, and evolution, including *Macaca fascicularis*, in addition to other macaque species. He has also examined the consequences of human-macaque interactions in Southeast Asia.

For roughly 30 years, **One Voice** has been fighting against experiments on animals. Concerning macaques in particular, OneVoice opposes their capture in the wild and that they are bred, transported, and used in experiments. One Voice investigates, petitions, goes to court, analyzes data, and advocates on their behalf. The organization is also a member of the macaque coalition at an international level in Asia for Animals.

Abolición Vivisección is a Spanish NGO born in 2021. Their activities started exposing the terrible conditions of the macaques imported and held in Camarney (Spain), the largest macaque farm for experimentation in Europe. Currently, their work focuses on raising awareness about the trafficking of macaques, the suffering of animals, and the futility of vivisection as a valid scientific method.

Dr. Sam Shanee is a conservation biologist/conservationist who has worked in Asia and South America for over 20 years. Because much of his work centers on the illegal wildlife trade and human-wildlife conflict resolution, he has observed first-hand the multiple threats both long-tailed and pig-tailed macaques face.

Gemunu de Silva co-founded Tracks Investigations, an ethical investigations agency providing investigative content to the animal protection sector worldwide. He has been an animal advocate for over 35 years and has worked on various global projects and campaigns. Most notably, the Royal Society for the Prevention of Cruelty to Animals awarded him a Special Investigation Award for his work investigating the international trade of primates for research in Vietnam, Cambodia, and Mauritius.

Northwest Animal Rights Network (NARN) is an animal rights organization based in the Pacific Northwest (PNW). NARN monitors the use of macaques in the PNW and campaigns for those used in research in facilities around the PNW.

Neotropical Primate Conservation has been using primates as “flagship species” for community conservation projects for decades ensuring long-term habitat protection for the flagship species and all wildlife that shares their habitats. Through this work, they help local communities

strengthen their stewardship of nature and protect their traditional and cultural identities, benefiting humans and the environment.

The **EMS Foundation** is a not-for-profit organization based in South Africa that believes that there is a need to conserve and protect non-human primate populations living in the wild because of land transformation and persecution by humans, which result in the fragmentation of populations and decline in numbers. The existential crisis non-human primates find themselves in, whether they are taken from the wild or bred in captivity, is closely tied to the insatiable and ever-proliferating demand to own and kill rare and exotic wild animals.

Tim Ajax, Sanctuary Director of the **Oklahoma Primate Sanctuary**, has spent the last three decades working with captive non-human primates, including many species of macaques, such as long-tailed and pig-tailed macaques. Whether retired from research or rehomed from the exotic pet trade, he has worked tirelessly to provide high-quality care focusing on large enclosures where these intelligent primates can engage in normal behaviors.

Rise for Animals is a national animal rights organization on a mission to end animal experimentation. Their efforts to expose cruelty in laboratories, rescue animals, mobilize support, get laws passed, and advocate for innovative, humane, and effective research will end an outdated industry and free animals from cruelty. Founded as New England Anti-Vivisection Society, Rise for Animals has been working to free macaques and other non-human primates from biomedical research for decades. Ed Butler is the Executive Director at Rise for Animals. For over twenty years, he has worked on campaigns to save animals—including macaques.

Wildlife Friends Foundation Thailand (WFFT) is a registered foundation under Thai law that campaigns against all forms of animal abuse and exploitation in Thailand. WFFT actively seeks to combat the illegal wildlife trade in macaques and rescue animals living in poor conditions or exploited for human entertainment.

The **Douc Langur Foundation**, headed by Dr. Lois Lippold, focuses on exposing and mitigating the poaching, trapping, and illegal trade of primates from Southeast Asian forests.

Fundacion Entropika works closely with local stakeholders in South America in community-led projects, educational and social programs, capacity building and empowerment of civil society, enforcing environmental and primate welfare laws, and cooperative research.

Dr. Angela Maldonado, Director of Fundacion Entropika, is a primatologist, ecologist, and conservationist working for over 20 years in the Colombian Amazon. Her work focuses on fighting the illegal wildlife trade and helping local communities. She has received multiple awards in recognition of her dedication to conservation.

Animal Defenders International, headed by Jan Creamer, has worked for decades to expose the violence and death that is associated with the capture, transport, and use of long-tailed and pig-tailed macaques destined for use in experiments.

World Animal Protection and Lindsay Oliver, World Animal Protection's Executive Director, fight to keep animals in their natural habitat, where they belong.

Paula Pebsworth focuses on human-primate coexistence and is currently the Head Scientist on a project run by the National Center for Wildlife in the Kingdom of Saudi Arabia to reduce human-baboon conflict. She has worked in India on projects to reduce human-macaque conflict.

Yuichi Hasegawa is the Executive Director of the **Japan Anti-Vivisection Association**, which has worked for many years to eliminate the use of macaque monkeys, especially Japanese macaques, in experiments, entertainment, and culling.

Animal Protection Denmark is a non-profit association founded in 1875. The organization engages in animal welfare at national, European, and international levels through project collaboration and networking, involving political, fundraising, and communications work.

Born Free Foundation is a UK-based international wildlife protection charity that promotes compassionate conservation to enhance the survival of threatened species in the wild and protect natural habitats while respecting the needs and safeguarding the welfare of individual animals. The organization works closely with local communities to engage, empower, and enhance the lives of those who live alongside wildlife. As a leading wildlife charity, Born Free opposes the exploitation of wild animals in captivity and campaigns to keep them where they belong—in the wild.

Dr. Mark Jones trained as a veterinarian at Liverpool University and worked for many years in fish health and disease control before spending five years traveling extensively and working on rescue and rehabilitation projects for primates, bears, birds, and reptiles in South America and Asia. He has master's degrees in both aquatic and wild animal health and several years of experience in the non-government animal protection sector. He joined the UK-based international wildlife charity Born Free in 2014, where he is currently Head of Policy, managing a team focused on promoting the adoption of progressive legislation and policy concerning wildlife conservation, management and trade, and the welfare of both free-living and captive wild animals, at international, national and local levels.

Dr. Agustín Fuentes is a Professor of Anthropology at Princeton University. Dr. Fuentes has conducted research across four continents and multiple species, spanning two million years of human and primate history. Dr. Fuentes has published 7 books, 17 edited volumes, and more than 200 peer-reviewed articles and chapters. Human-macaque interactions have been a focus of Dr. Fuentes' work for more than twenty-five years. He is a co-author of the main scholarly book on long-tailed macaques, and author or co-author of fifty articles and book chapters on long-tailed macaques. He is a member of the IUCN Species Survival Commission (SSC) Primate Specialist Group, the senior editor of the International Encyclopedia of Primatology, and one of the co-founders of the field of Ethnoprimatology. Dr. Fuentes is the co-founder of the Long-Tailed Macaque Project, which is a conservation collaboration and capacity-building project centered around human-long-tailed macaque interfaces in Southeast Asia.

Animal Alliance of Canada (AAC) is a federally incorporated non-profit organization fighting for the protection of all animals through advocacy, political action, rescue, and education. As a

non-profit, AAC actively engages with elected representatives to influence them to pass sound animal and environmental protection laws.

Dr. Anthony B. Rylands has served as Deputy Chair of the IUCN SSC Primate Specialist Group since 1996 and has increasingly focused his work on the group’s objectives—networking, coordinating, and publishing on themes that focus on the conservation of threatened primates worldwide, including long-tailed and southern pig-tailed macaques. From 1977 to 1982, Dr. Rylands carried out pioneer field studies of the behavior and ecology of marmosets and lion tamarins. From 1993 to 2017, he worked for Conservation International, first working with staff on the development of conservation strategies for the Amazon and Atlantic Forest and later acting as Senior Director for Conservation Biology. Currently, Dr. Rylands is the Primate Conservation Director for Re:wild, a force multiplier that brings together Indigenous peoples, local communities, influential leaders, nongovernmental organizations, governments, companies, and the public to protect and rewild. Dr. Rylands maintains a taxonomic and conservation status database of over 700 primate species and subspecies, is the founding editor of *Neotropical Primates* and editor of the journal *Primate Conservation*, and has edited eighteen books and authored more than 350 articles and book chapters on protected areas and conservation, primate behavior, ecology, conservation, distributions, and taxonomy.

Dr. Russell Mittermeier is a renowned primatologist, conservationist, and biodiversity advocate who has dedicated his career to protecting the world’s most endangered species and habitats. He is well known for his extensive research on primates and his efforts to highlight their ecological importance and conservation needs. As a former President of Conservation International, current Chief Conservation Officer of Re:wild, and long-time Chair of the International Union for the Conservation of Nature, Species Survival Commission Primate Specialist Group, he is a key figure in global biodiversity initiatives; Dr. Mittermeier has been instrumental in promoting conservation strategies across the globe.

The petitioners submit this petition with an interest in ensuring the protection of long-tailed macaques under the ESA.

B. Endangered Species Act

Congress enacted the ESA of 1973, 16 U.S.C. §§ 1531–1544, “to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved [and] to provide a program for the conservation of such endangered species and threatened species.” 16 U.S.C. § 1531(b). An “endangered species” means “any species which is in danger of extinction throughout all or a significant portion of its range.” *Id.* § 1532(6). A “threatened species” is one “which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” *Id.* § 1532(20). Only those species listed as endangered or threatened receive the ESA’s protection. The FWS, through the authority delegated to it by the Secretary of the Interior (“Secretary”), must list a species if the species qualifies as endangered or threatened because of any one 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.

50 C.F.R. § 424.11(c); *see* 16 U.S.C. § 1533(a)(1); 50 C.F.R. § 402.01(b).

To prevent the Secretary from implementing the ESA haphazardly (i.e., “on the basis of speculation or surmise”), *Bennett v. Spear*, 520 U.S. 154, 176 (1997), the statute requires the listing determination to be made “solely on the basis of the best available scientific and commercial information regarding the species’ status.” 16 U.S.C. § 1533(b)(1)(A); 50 C.F.R. § 424.11(b).

Within ninety days after receiving a petition to list a species, the Secretary must determine “whether the petition presents substantial scientific or commercial information indicating that the petitioned action may be warranted.” 16 U.S.C. § 1533(b)(3)(A). In other words, there must be “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 C.F.R. § 424.14(h)(i).

The “reasonable person” standard is a “lesser standard”; a petition does not need to contain “conclusive evidence of a high probability of species extinction to warrant further consideration of listing that species.” *Ctr. for Biological Diversity v. Morgenwreck*, 351 F. Supp. 2d 1137, 1141 (D. Colo. 2004). Rather, a petitioner must “simply show that the substantial information in the Petition demonstrates that listing of the species *may* be warranted.” *Id.* (emphasis added). As described in 50 C.F.R. section 424.14(d), whether a particular listing petition provides “substantial” information depends on:

- (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 [16 U.S.C. § 1533(a)(1)] 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 [16 U.S.C. § 1533(a)(1)] may cause the species to be an endangered species or threatened species . . . 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.

If the Secretary finds that substantial information exists then, within twelve months after receiving the petition, the Secretary must review the species status and determine whether the species should be listed. *See* 16 U.S.C. § 1533(b)(3)(B). If the finding demonstrates that the petition is not

warranted, the listing process ends but the negative finding may be judicially reviewed. *See* 16 U.S.C. § 1533(b)(3)(C)(ii).

III. NATURAL HISTORY⁷

A. Common Name

The common names for *Macaca fascicularis* are Long-tailed Macaque, Crab-eating Macaque, and Cynomolgus Macaque.⁸ Throughout this petition, the species is referred to as “long-tailed macaque.”

B. Taxonomy

Table 1 identifies the taxonomic classification for the petitioned species, *Macaca fascicularis*.

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Primates
Family	Cercopithecidae
Genus	<i>Macaca</i>
Species	<i>fascicularis</i>

Table 1. Taxonomy of *Macaca fascicularis*.⁹

C. Description

Named for their remarkably long tails, which measure approximately 19–23.5 inches and extend beyond their 15–18.5-inch head and body length, long-tailed macaques are physically smaller members of the genus.¹⁰ Females weigh approximately 6.5–8.5 pounds and have beards; males weigh approximately 10.5–15.5 pounds and have mustaches.¹¹ The pelage color ranges from brown to grey, but underbellies are whitish.¹² Their faces are pink, eyes are yellow-brown, and ears are large and square.¹³ Lifestyles vary across their range, but their days consist mainly of moving, resting, and feeding.¹⁴ Fruits, flowers, young leaves, and invertebrates comprise their natural diet.¹⁵

⁷ Refer to the IUCN 2022 Assessment [Ex. 1], pages 1–2, 8, for detailed notes on the species’ natural history.

⁸ IUCN 2022 Assessment, *supra* note 1, at 1; *Macaca fascicularis*, INTEGRATED TAXONOMIC INFO. SYS., https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=180098#null (last visited Apr. 3, 2023) [hereinafter “ITIS Report”] [Ex. 6].

⁹ ITIS Report, *supra* note 8.

¹⁰ IUCN 2022 Assessment, *supra* note 1, at 1; Jennifer Botting, *Long-Tailed Macaque*, NEW ENGLAND PRIMATE CONSERVANCY (July 2022), <https://neprimateconservancy.org/long-tailed-macaque/> [Ex. 7].

¹¹ Botting, *supra* note 10.

¹² IUCN 2022 Assessment, *supra* note 1, at 1.

¹³ Botting, *supra* note 10.

¹⁴ *Id.*

¹⁵ *Id.*

D. Habitat

Long-tailed macaques have adapted to living in a diverse range of habitats (e.g., coasts, mountains, forests)¹⁶ and, while they most commonly can be found in riverine habitats (e.g., mangroves and swamp forests), they are also regularly found in human-altered habitats, such as roadsides, temples, and rural/urban settlements.¹⁷

IV. GEOGRAPHIC RANGE¹⁸

Long-tailed macaques are distributed across Southeast Asia, and the Nicobar Islands in South Asia, in a patchy, non-continuous distribution.¹⁹ Table 2 summarizes the geographic range described in greater detail in the IUCN 2022 Assessment.²⁰

Description	Country of Occurrence
Native, Extant (resident)	Brunei Darussalam; Cambodia; India (Nicobar Islands); Indonesia; Malaysia; Myanmar; Philippines; Singapore; Thailand; Timor-Leste; Vietnam
Native, Extinct	Bangladesh
Native, Presence Uncertain	Lao People's Democratic Republic (PDR)
Extant and Introduced (resident)	Mauritius; Palau; Papua New Guinea

Table 2. Countries of long-tailed macaque occurrence.²¹

¹⁶ See IUCN 2022 Assessment, *supra* note 1, at 8 (citing Fooden 1995 [Ex. 8]).

¹⁷ See *id.* (citing Gumert 2011).

¹⁸ Refer to the IUCN 2022 Assessment [Ex. 1], pages 4-6, for detailed notes on the species' geographic range.

¹⁹ IUCN 2022 Assessment, *supra* note 1, at 4 (citing Fooden 1995 [Ex. 8], Gumert 2011, Eudey 2008 [Ex. 9]).

²⁰ *Id.* at 4-5.

²¹ *Id.* at 5.



Figure 1. Long-tailed macaque distribution map.²²

V. POPULATION STATUS AND TRENDS²³

The IUCN documents a decreasing population trend.²⁴ Although “very few habitat countries have authoritative estimates of their entire *M. fascicularis* populations,”²⁵ primatologist Jack Fooden estimated that the long-tailed macaque population in the 1980s totaled approximately five million.²⁶ A conservative population estimate from the early 2000s records the population at approximately three million (i.e., a forty-percent reduction).²⁷ Based on historical figures, the

²² *Distribution Map*, IUCN (2022), https://www.iucnredlist.org/api/v4/assessments/221666136/distribution_map/jpg [Ex. 10].

²³ Refer to the IUCN 2022 Assessment [Ex. 1], pages 7–8, for detailed notes on the species’ population status and trends.

²⁴ *Common Long-Tailed Macaque*, *supra* note 2; IUCN 2022 Assessment, *supra* note 1, at 8.

²⁵ IUCN 2022 Assessment, *supra* note 1, at 3.

²⁶ *Id.* at 7 (citing Fooden (1995, p. 54) [Ex. 8]).

²⁷ *Id.* (citing Fooden (2006, p. 5) [Ex. 11]) (noting the tendency to overestimate population size based on the species’ visibility in anthropogenic landscapes).

IUCN suspects that, in the last forty years (or three generations), the population declined forty percent and, because the threats fueling the decrease (e.g., environmental impacts and removal) have increased over time, the population decline is “likely to increase to surpass 50% in the coming three generations.”²⁸ The long-tailed macaque’s IUCN Red List status, based on historical assessments, shows an ominous population trajectory: Lower Risk/Near Threatened (1996, 2000), Least Concern (2008), Vulnerable (2020, 2021), and Endangered (2022).²⁹

VI. THREATS³⁰

All of the statutory listing factors described in 16 U.S.C. § 1533(a)(1) threaten the species. While many of the factors are threats independent of other factors (e.g., overutilization), the severity is exacerbated when the factors work in combination (e.g., overutilization and inadequate regulatory mechanisms).

A. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Deforestation, habitat fragmentation, and increased contact with humans (i.e., extensive overlap with anthropogenic habitats) are major threats to the species.³¹ “Ongoing habitat destruction and conversion [of natural habitats to other land uses] are decimating wild populations of long-tailed macaques.”³² In general, Southeast Asia’s changing landscape has resulted in decreased available undisturbed habitat and increased human-species contact.³³ Between 1990 and 2010, the region’s forest cover decreased by 32 million hectares (from 268 million hectares to 236 million hectares).³⁴ In 2004, Southeast Asia reportedly had the “highest relative rate of deforestation of any major tropical region.”³⁵ Between 2005 and 2015, Southeast Asia lost roughly 80 million hectares of forest, with Indonesia accounting for a 62% share, Malaysia accounting for a 16.6% share, Myanmar accounting for a 5.3% share, and Cambodia accounting for a 5.0% share.³⁶ In 2019, Southeast Asia remained a “deforestation hotspot” as forest clearance, driven by anthropogenic factors (e.g., logging, clear-cutting for food production, agriculture, and cash crops), resulted in habitat loss estimated to be “among the highest and most severe in terms of biodiversity loss.”³⁷ In 2022, Cambodia reported deforestation as the main threat to long-tailed macaques.³⁸

As a result of deforestation, conversion, development of infrastructure, and widespread encroachment, the long-tailed macaque’s “natural habitats are being increasingly fragmented,

²⁸ *Id.*

²⁹ *Id.* at 3–4.

³⁰ Refer to the IUCN 2022 Assessment [Ex. 1], pages 8-10, for detailed notes on threats to the species.

³¹ IUCN 2022 Assessment, *supra* note 1, at 9 (citing Sodhi et al. 2004 [Ex. 12], Gumert 2011).

³² LTM Project, *supra* note 3, at 2.

³³ IUCN 2022 Assessment, *supra* note 1, at 9 (citing Gumert et al. 2011).

³⁴ Ronald C. Estoque et al., *The Future of Southeast Asia’s Forests*, NATURE COMMUNICATIONS 2 (2019), <https://www.nature.com/articles/s41467-019-09646-4> [Ex. 13].

³⁵ Navjot S. Sodhi et al., *Southeast Asian Biodiversity: An Impending Disaster*, 19 Trends in Ecology & Evolution 654, 654 (2004) [Ex. 12].

³⁶ Estoque et al., *supra* note 34, at 2.

³⁷ *Id.*

³⁸ See IUCN 2022 Assessment, *supra* note 1, at 10.

degraded, and changed by human activity[,] . . . isolat[ing them] from each other and [increasing] the risk of inbreeding and/or outbreeding depression.”³⁹ Long-tailed macaques are increasingly found near human settlements due to anthropogenic habitat alteration.⁴⁰ Increased interface between humans and long-tailed macaques has been linked to heightened health risks from bi-directional pathogen transfer, negative perceptions of the species as “pests” and “weed species,” and culling activities to address human-macaque conflicts.⁴¹

B. Overutilization

The long-tailed macaque is considered to be the “most highly traded species of primate.”⁴² As detailed in the IUCN 2022 Assessment and summarized below, overutilization for scientific, commercial, and recreational purposes threatens the species.

Long-tailed macaques are “heavily demanded for biomedical and toxicology research.”⁴³ As the “predominant species in the international trade in live primates for research,”⁴⁴ the species accounts for “10% of the annual revenue of all animals exported globally.”⁴⁵ Large numbers of long-tailed macaques are exported from Cambodia, Mauritius, Viet Nam, Indonesia, and Philippines, with international demand coming from the United States (the leading importer in the live long-tailed macaque trade),⁴⁶ Japan, China, and the European Union.⁴⁷

From 2008–2019, at least 450,000 live long-tailed macaques (captive and wild-caught), and over 700,000 specimens (a broad-ranging term that can include tissue or blood samples, body parts or hair) from an unknown number of long-tailed macaques were part of this trade, with over 50,000 identified as wild-caught (specimens and live).⁴⁸

³⁹ Suchinda Malaivijitnond et al., *Human Impact on Long-Tailed Macaques in Thailand*, in *MONKEYS ON THE EDGE: ECOLOGY AND MANAGEMENT OF LONG-TAILED MACAQUES AND THEIR INTERFACE WITH HUMANS* 118, 118 (Michael D. Gumert et al. eds., Cambridge Univ. Press, 2011).

⁴⁰ *Id.*

⁴¹ Hansen et al. 2021, *supra* note 5, at 5.

⁴² IUCN 2022 Assessment, *supra* note 1, at 8 (citing Hansen et al. 2022 [Ex. 14]).

⁴³ *Id.* (citing, e.g., Eudey 2008 [Ex. 9], Hansen et al. 2021 [Ex. 4]).

⁴⁴ Hansen et al. 2021, *supra* note 5, at 4.

⁴⁵ Regina Kate Warne et al., *Is Biomedical Research Demand Driving a Monkey Business*, 16 *ONE HEALTH* 1 (2023), <https://www.sciencedirect.com/science/article/pii/S235277142300040X?via%3Dihub> [Ex. 15].

⁴⁶ See *CITES Trade Database*, CITES (2022), <https://trade.cites.org/> (last visited Apr. 3, 2023) (comparing gross exports of live *Macaca fascicularis* from 2015-2021 for “all countries”); *Lab Pauses Monkey Imports*, *SCIENCE* (Mar. 2, 2023), <https://www.science.org/content/article/news-glance-monkey-shipments-controversial-visa-and-support-geoengineering-research> [Ex. 16] (reporting that long-tailed macaques “accounted for 96% of the nearly 33,000 nonhuman primates the [United States] imported in 2022”).

⁴⁷ IUCN 2022 Assessment, *supra* note 1, at 8 (citing Foley and Shepherd 2011, Hansen et al. 2021 [Ex. 4], Hansen et al. 2022 [Ex. 14]); see also *CITES Trade Database*, *supra* note 46 (comparing gross imports of live *Macaca fascicularis* from 2015-2021 for “all countries”); Dan Robitzski, *What Happens to Science When Model Organisms Become Endangered*, *THE SCIENTIST* (Oct. 13, 2022), <https://www.the-scientist.com/news-opinion/what-happens-to-science-when-model-organisms-become-endangered-70619> [Ex. 17] (noting that the CITES database shows that exports to the United States represented the vast majority of reported live macaque trade in 2020).

⁴⁸ Hansen et al. 2021, *supra* note 5, at 5 [Ex. 4] (citing CITES Trade Database 2021).

Since the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) does not track domestic trade within a given country, the number of long-tailed macaques taken from the wild and used in local research is not counted in the above totals.⁴⁹ A significant discrepancy exists between declared exports and imports by countries of live long-tailed macaques on the CITES Trade Database, likely the result of importers failing to report to CITES.⁵⁰ Therefore, a precise account of the global trade (and trade to the United States) is not possible.⁵¹ Additionally, the above numbers do not factor in long-tailed macaques traded without valid CITES export permits (i.e., illegally traded)—which may add twenty-eight percent to trading totals.⁵² In November 2022, United States federal prosecutors charged eight people, including two Cambodian Forestry Administration officials, in an alleged international smuggling ring that spanned from 2017 to 2022 and involved the export of thousands of wild-caught long-tailed macaques into the United States.⁵³ A press release reported:

In order to make up for a shortage of suitable monkeys at the putative breeding facilities in Cambodia, the co-conspirators enlisted the assistance of the CITES authority in Cambodia and the Ministry of Agriculture, Forestry and Fisheries (MAFF) to deliver wild-caught macaques taken from national parks and protected areas in Cambodia. These macaques were taken to breeding facilities and provided false CITES export permits. A collection quota of 3,000 “unofficial” monkeys was allowed for which MAFF officials received cash payments.⁵⁴

And, as recently as March 2023, police and officers from the Mauritius Ministry of Agro-Industry seized 440 captive long-tailed macaques held in the country, suspecting that the wild-caught monkeys were part of an illegal trafficking network presumably destined for animal experimentation laboratories.⁵⁵ Following the raid, police arrested the director of the operation for alleged illegally possession and trafficking of the primates.⁵⁶

⁴⁹ IUCN 2022 Assessment, *supra* note 1, at 8); *see also* Robitzski, *supra* note 47 [Ex. 17] (“[T]he Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which monitors international animal exports, doesn’t track domestic trade in a given country, so macaques taken from the wild and used in local research or to establish or replenish breeding farms are not tracked internationally—and within-country data collection can be patchy.”).

⁵⁰ Warne et al., *supra* note 45, at 3 (explaining that a large discrepancy in reported macaque trade observed in 2019 and 2020 was likely attributed to a lack of reporting to CITES by importers).

⁵¹ *See id.*

⁵² IUCN 2022 Assessment, *supra* note 1, at 8 (citing Tittensor et al. 2020 [Ex. 18]).

⁵³ *Cambodian Officials and Six Co-Conspirators Indicted for Taking Part in Primate Smuggling Scheme*, IRS (Nov. 16, 2022), <https://www.irs.gov/compliance/criminal-investigation/cambodian-officials-and-six-co-conspirators-indicted-for-taking-part-in-primate-smuggling-scheme> [Ex. 19].

⁵⁴ *Id.*

⁵⁵ Narain Jasodanand, *Traffic in Jin Fei: Monkeys Kept in Barbaric Conditions*, LEXPRESS.MU (Mar. 20, 2023), <https://lexpress.mu/article/420389/trafic-jin-fei-singes-maintenus-dans-conditions-barbares> [Ex. 20]; *Primate Breeding – Radhakrishna Veerapa: “Monkeys Are On Hold, Pending Decision,”* LEMAURICIEN.COM (Apr. 3, 2023), https://www.lemauricien.com/actualites/societe/elevage-de-primates-radhakrishna-veerapa-les-singes-sont-on-hold-pending-decision/547772/?fbclid=IwAR3IdbSSRcyA__rwmqW9qROFjSbDbagDVA79cuwLDv4ym-WUIhw8Q-sAGiI [Ex. 21].

⁵⁶ Jasodanand, *supra* note 55.

From 2010 to 2019, international trade in long-tailed macaques totaled approximately \$1.25 billion.⁵⁷ The COVID-19 pandemic seriously intensified the demand.⁵⁸ The average price internationally of an individual macaque quadrupled from 2019 to 2022,⁵⁹ possibly incentivizing both legal and illegal trade in this species. Currently, “an individual macaque can be sold for between \$20,000 and \$24,000.”⁶⁰ Between 2017 and 2022, the U.S. imported an estimated 165,000 long-tailed macaques; the number of imports has increased year-over-year since 2020.⁶¹ The need for vaccines and treatment is anticipated to sustain the demand.⁶²

Increased export quotas also fuel the overutilization threat. For example, in 2022, the export quota in Lao People’s Democratic Republic doubled from 3,000 to 6,000 live captive-bred specimens.⁶³ Since export data have not yet been reported to CITES, the numbers are not recorded in the CITES Trade Database.⁶⁴

Domestic trade for pets and entertainment (e.g., street performances), and the influence of social media platforms (e.g., trading on Facebook), further threaten the species.⁶⁵ The effect particular practices have had on wild macaques is not always known “but it is likely that it either added to their capture in the wild or added to the demand for them in local animal markets, or both.”⁶⁶ Indonesian, Philippines, and Vietnamese organizations currently report capture for pets and research as the main threat to the long-tailed macaque population.⁶⁷

C. Disease or Predation

Disease, associated with keeping the species as pets and as a consequence of the decline in natural habitat, has been recognized as a threatening factor. For example, in Viet Nam, where it is common to keep the species as pets, “[c]onfiscated long-tailed macaques are often released without proper procedure, contributing to negative human-macaque interactions and possible disease and parasite introduction in the release area.”⁶⁸ Furthermore, as long-tailed macaques are increasingly found

⁵⁷ IUCN 2022 Assessment, *supra* note 1, at 9 (citing Hansen et al. 2022 [Ex. 14]).

⁵⁸ *Id.* at 8 (citing Hansen et al. 2022 [Ex. 14]).

⁵⁹ *Id.* at 9 (citing Hansen et al. 2022 [Ex. 14]).

⁶⁰ Warne et al., *supra* note 45, at 3.

⁶¹ The number of long-tailed macaques imported into the U.S. between 2017 and 2021, according to Centers for Disease Control and Prevention (CDC) records released to PETA in July 2022, totaled 133,777: 20,110 (FY2017), 25,700 (FY 2018), 32,439 (FY2019), 24,879 (FY2020), 30,649 (FY2021). Steve Schapiro, Ph.D. (a former president of the American Society of Primatologists) reportedly received the total number imported in 2022 (31,522) from the CDC.

⁶² See Hansen et al. 2021, *supra* note 5, at 6.

⁶³ See *CITES Export Quotas*, CITES, <https://cites.org/eng/resources/quotas/index.php> (last visited Apr. 5, 2023).

⁶⁴ See *CITES Trade Database*, *supra* note 46.

⁶⁵ IUCN 2022 Assessment, *supra* note 1, at 9 (citing Hansen et al. 2021 [Ex. 14]).

⁶⁶ Hansen et al. 2021, *supra* note 5, at 4.

⁶⁷ IUCN 2022 Assessment, *supra* note 1, at 10.

⁶⁸ See *id.* (citing Aldrich and Neale 2021 [Ex. 22]); see also Hansen et al. 2021, *supra* note 5, at 3–4 (describing “diseases from introduced macaques” as a threatening factor).

near human settlements due to anthropogenic habitat alteration,⁶⁹ interface between humans and long-tailed macaques heightens health risks from bi-directional pathogen transfer.⁷⁰

Both anecdotal and documented hunting monitoring reports confirm that subsistence hunting is a threat to the species.⁷¹ In particular, this is a significant threat in Myanmar,⁷² where hunting for village-scale consumption and restaurant cuisine creates pressure on the long-tailed macaque population.⁷³

D. Inadequacy of Existing Regulatory Mechanisms

The IUCN 2022 Assessment describes a “notable lack of legal protection and malaise of enforcement for any laws that do apply to protecting long-tailed macaques,”⁷⁴ while acknowledging the protections already conferred. Specifically, the IUCN observes that the species is:

- included in Appendix II of CITES and thus is monitored and requires permits for international trade of live specimens and its parts;⁷⁵
- a normally protected species in Cambodia and the Philippines;
- assessed to be “vulnerable” in Myanmar, but legally is still a normally protected species;
- a protected species on Appendix 2B on Decree 84/2021/ND-CP in Viet Nam;
- not listed as a protected species in Indonesia,⁷⁶ but is subject to a national wild-capture quota system;⁷⁷
- not specifically listed on the Wild Animal Preservation and Protection Act, B.E. 2535 (1992), in Thailand, but is given the normal protection of wildlife, which restricts hunting and capture in all protected areas and forest lands;

⁶⁹ Malaivijitnond et al., *supra* note 39.

⁷⁰ Hansen et al. 2021, *supra* note 5, at 4. Researchers have determined that trade in long-tailed macaques and rhesus macaques carries the greatest potential for zoonotic disease. See Stefan Borsky et al., *CITES and the Zoonotic Disease Content in International Wildlife Trade*, 76 ENV'T & RES. ECON. 1001, 1008 (2020), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7399621/pdf/10640_2020_Article_456.pdf [Ex. 23]; see also Amanda L. Johnson et al., *Common and Not So Common Pathologic Findings of the Gastrointestinal Tract of Rhesus and Cynomolgus Macaques*, 50 TOXICOL PATHOL. 1 (2022), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9308647/pdf/nihms-1781619.pdf> [Ex. 24] (acknowledging that recent importations of long-tailed macaques have been associated with “increased exposure to naturally-occurring pathogens,” all of which are zoonotic).

⁷¹ IUCN 2022 Assessment, *supra* note 1, at 8, 10 (citing Ibbett et al. [Ex. 25]).

⁷² *Id.* at 8 (citing San and Hamada 2011).

⁷³ Aye Mi San & Yuzuru Hamada, *Distribution and Current Status of Long-Tailed Macaques (Macaca fascicularis aurea) in Myanmar*, in *Monkeys on the Edge: Ecology and Management of Long-Tailed Macaques and their Interface with Humans*, 60, 63 (Michael D. Gumert & Lisa Jones-Engel eds., Cambridge Univ. Press, 2011).

⁷⁴ IUCN 2022 Assessment, *supra* note 1, at 10.

⁷⁵ Only an export permit or re-export certificate is required; an import permit is not needed unless required by national law. *How CITES Works*, CITES, <https://cites.org/eng/disc/how.php> (last visited Apr. 3, 2023) [Ex. 26].

⁷⁶ IUCN 2022 Assessment, *supra* note 1, at 10 (citing MOEF 2018 [Ex. 27]).

⁷⁷ The annual capture/export quotas for Indonesia were published in January 2023; no quotas were set for long-tailed macaques. See Kementerian Lingkungan Hidup dan Kehutanan, Keputusan Direktur Jenderal, Konservasi Sumber Daya Alam dan Ekosistem, Nomor: SK. 1/KSDAE/KKHSG/KSA.2/1/2023 Tentang Kuota Pengambilan Tumbuhan Alam dan Penangkapan Satwa Liar Periode Tahun 2023 [Ex. 28].

- protected under Singapore’s Wild Animals & Bird Act, which restricts all wildlife from being captured, held as pets, or traded without permission;
- protected according to the Wildlife Conservation Act of 2010 in Malaysia;
- listed on Schedule I, Part I, Indian Wildlife (Protection Act) of 1972, in India, and is considered an endangered species due to the species’ limited range.⁷⁸

Yet, although the long-tailed macaque has been listed in CITES Appendix II since 1977,⁷⁹ the population has declined and is now considered endangered by the IUCN based on the levels of exploitation driven, in part, by trade.⁸⁰ CITES’ regulations have not adequately controlled the species trade. For example, Indonesia reported exporting 1,600 long-tailed macaques in 2021 for commercial (“T”) purpose (see Table 3).⁸¹

Year	App.	Taxon	Class	Order	Family	Genus	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2021	II	<i>Macaca fascicularis</i>	Mammalia	Primates	Cercopithecidae	Macaca	CN	ID			1000	live		T	F
2021	II	<i>Macaca fascicularis</i>	Mammalia	Primates	Cercopithecidae	Macaca	US	ID			240	live		T	F
2021	II	<i>Macaca fascicularis</i>	Mammalia	Primates	Cercopithecidae	Macaca	US	ID			360	live		T	W

Table 3. Live long-tailed macaques exported from Indonesia in 2021.

Although CITES requires a Non-Detrimental Finding (NDF)—“a science-based study that assesses whether any trade will have a negative (or detrimental) effect on the survival of that species”—to be carried out before any permit for trade can be issued, Indonesia reportedly exported these hundreds of long-tailed macaques without an NDF.⁸²

Additionally, as noted in the IUCN 2022 Assessment,

[t]he trade issue is compounded by a deficiency in the scrutiny by wildlife managers to ensure that such cropping from the wild population is managed sustainably, or where not sustainable, that it is ceased. One significant problem arising around the *M. fascicularis* trade is the capturing of wild caught macaques to bring into the so-

⁷⁸ IUCN 2022 Assessment, *supra* note 1, at 10; *see also* *Macaca fascicularis*, CITES, <https://cites.org/eng/taxonomy/term/1132> (last visited Apr. 3, 2023) [Ex. 29].

⁷⁹ *Review of Significant Trade in Specimens of Appendix-II Species*, AC27 Doc. 12.4 (Rev. 1), CITES 6 (Apr. 28, 2014), <https://cites.org/sites/default/files/eng/com/ac/27/E-AC27-12-04.pdf> [Ex. 30].

⁸⁰ IUCN 2022 Assessment, *supra* note 1, at 2–3.

⁸¹ *Comparative Tabulation Report*, CITES, <https://trade.cites.org> (last visited Apr. 5, 2023) [Ex. 31]; *see A Guide to Using the CITES Trade Database*, CITES 19 (Sept. 2022), https://trade.cites.org/cites_trade_guidelines/en-CITES_Trade_Database_Guide.pdf [Ex. 32]. The sources of the species were either animals born in captivity (“F”) or specimens taken from the wild (“W”); the importing countries included China (“CN”) and the United States (“US”).

⁸² *What’s An NDF and Why Is It Important*, CITES (Oct. 28, 2022), <https://cites.org/eng/news/whats-ndf-important> [Ex. 33]; *see* Amelia Rahima Sari, *Long-Tailed Monkey Coalition: Wild Monkeys in Indonesia are Captured and Exported without NDF*, TEMPO.CO (Apr. 2, 2023), <https://bisnis.tempo.co/read/1710233/koalisi-monyet-ekor-panjang-monyet-liar-di-indonesia-ditangkap-dan-diekspor-tanpa-ndf> [Ex. 34]; *Comparative Tabulation Report*, *supra* note 81.

called breeding facilities found in the eastern nations of Southeast Asia – Cambodia, Laos and Viet Nam, (Lee 2011, Hamada et al. 2011). These captured macaques are subsequently traded as captive born and bred, which masks the true level of impact on the wild population (Foley and Shepherd 2011). These high levels of trade and uncertainty on their population-level effects leaves *M. fascicularis* highly vulnerable to significant declines in the near future.⁸³

E. Other Factors

Both “formal and informal population control measures, such as out-right killing, culling and sterilization” have led to “widespread persecution toward the species.”⁸⁴ Across the range, culling is a reoccurring practice.⁸⁵ Between 2011 and 2021, “Malaysia and Singapore initiated substantive culling actions against macaques, with Singapore culling approximately one-third of their population in 2013 and 2015.”⁸⁶ In Malaysia, the Department of Wildlife and National Parks (PERHILITAN) Peninsular Malaysia culled over 345,000 long-tailed macaques, between 2015 and 2020, as part of human-conflict management. *See* Table 4.

Year	# Culled by PERHILITAN
2020	58,069
2019	46,594
2018	53,687
2017	62,845
2016	61,231
2015	62,706
TOTAL	345,132

Table 4. Culled long-tailed macaque totals in Malaysia.⁸⁷

⁸³ IUCN 2022 Assessment, *supra* note 1, at 8 (citing Lee 2011, Hamada et al. 2011, Foley and Shepherd 2011).

⁸⁴ *Id.* at 9 (citing, e.g., Eudey 1994 [Ex. 35], Gumert 2004, Sha et al. 2009 [Ex. 36], Feng 2015 [Ex. 37], Boonkong and O’Connor 2019 [Ex. 38], Beech 2020 [Ex. 39]).

⁸⁵ Hansen et al. 2021, *supra* note 5, at 4.

⁸⁶ *Id.*

⁸⁷ 2020 Annual Report, PERHILITAN 154 (2020), <https://www.wildlife.gov.my/images/document/penerbitan/laporantahunan/LT2020.pdf> [Ex. 40]; 2019 Annual Report, PERHILITAN 122 (2019), <https://www.wildlife.gov.my/images/document/penerbitan/laporantahunan/LT2019.pdf> [Ex. 41]; 2018 Annual Report, PERHILITAN 84 (2018), <https://www.wildlife.gov.my/images/document/penerbitan/laporantahunan/LT2018.pdf> [Ex. 42]; 2017 Annual Report, PERHILITAN 82 (2017), <https://www.wildlife.gov.my/images/document/penerbitan/laporantahunan/LT2017.pdf> [Ex. 43]; 2016 Annual Report, PERHILITAN 86 (2016), <https://www.wildlife.gov.my/images/document/penerbitan/laporantahunan/LP2016%20-%2020022018.pdf> [Ex. 44]; 2015 Annual Report, PERHILITAN 93 (2015), https://www.wildlife.gov.my/images/stories/penerbitan/laporan_tahunan/%5B%5DPERHILITAN-annual-report-2015.pdf [Ex. 45].

The IUCN 2022 Assessment also highlights current removal activities in the Philippines and Malaysia,⁸⁸ and recognizes the practice “has contributed to known localised declines and extinctions, and will likely contribute to many more in the future.”⁸⁹

VII. CONCLUSION

The petitioners urge the Service to list the long-tailed macaque (*Macaca fascicularis*) as an “endangered” or “threatened” species under the ESA. The long-tailed macaque has experienced catastrophic population decline for decades and is projected to experience at least a fifty percent decline in the next forty years. Threatened by the destruction of their natural habitat, the current levels of trade (legal and illegal, international and domestic) for scientific, commercial, and recreational purposes, culling, and a general lack of protection (despite the laws in several habitat countries), the long-tailed macaque is being pushed to the brink of extinction. As the leading importer in the live long-tailed macaque trade, year-over-year the United States adds its weight to that push. The FWS has the authority and obligation to act swiftly and add long-tailed macaques to the list of animals protected under the ESA.

⁸⁸ IUCN 2022 Assessment, *supra* note 1, at 10 (citing GMA News 2022 [Ex. 46], The Star 2022).

⁸⁹ *Id.*

VIII. ADDENDUM

On April 12, 2023, petitioners submitted a petition (“2023 Petition”) urging FWS to list *Macaca fascicularis* (long-tailed macaques) as an endangered or threatened species under the ESA.⁹⁰ Sections I through VII of the 2023 Petition are reproduced herein, and the 2023 Petition is incorporated by reference.⁹¹ The Petitioners hereby supplement the 2023 Petition with the information in this Addendum. The Addendum discusses new information that became available after FWS received the 2023 Petition that the Service did not previously consider in its 90-day determination—information that directly addresses comments raised in FWS’s 90-Day Finding Petition Review—including the following:⁹²

- A new report published in *Science Advances* described alarming levels of decline in long-tailed macaque populations in Southeast Asia; the declines are larger than those reported and considered in the 2023 Petition.⁹³
- A new population estimate from the Wildlife Conservation Society Cambodia showed that the long-tailed macaque population in Keo Seima Wildlife Sanctuary (KSWS)—a protected area in Cambodia—has declined by at least 49% since 2010, suggesting that the declines might be at least as significant outside this area.⁹⁴
- A population viability analysis (PVA) conducted by the IUCN Species Survival Commission (SSC) Conservation Planning Specialist Group and published in 2024 described the severity of the threats affecting populations of long-tailed macaques in different regions across the species’ range and examined how various threats impacted population viability via modeling.⁹⁵ The PVA revealed that removing adult female long-tailed macaques from their native habitat or randomly removing individuals across age classes leads to plummeting populations that are difficult, if not impossible, to recover.⁹⁶
- A new case study published in the *International Journal of Primatology* examined the connection between human management efforts in Mauritius and the country’s 75% reduction in free-ranging populations of long-tailed macaques since the 1980s.⁹⁷

⁹⁰ See *Petition*, ECOS (Apr. 12, 2023), https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/petition/4093.pdf (exhibits omitted) [hereinafter “2023 Petition”] [Ex. 47].

⁹¹ The schedule of petitioners included in the 2023 Petition has been updated herein. See *supra* Section II.A.

⁹² See generally 50 C.F.R. § 424.14(h)(iii) (“Where the prior review resulted in a final agency action, a petitioned action generally would not be considered to present substantial scientific and commercial information indicating that the action may be warranted unless the petition provides new information not previously considered.”).

⁹³ See Andre L. Koch Liston et al., *A Model for the Noninvasive, Habitat-Inclusive Estimation of Upper Limit Abundance for Synanthropes, Exemplified by M. fascicularis*, 10 SCI. ADVANCES 4 (2024) [Ex. 48].

⁹⁴ See CAIN AGGER, THE STATUS OF KEY SPECIES IN KEO SEIMA WILDLIFE SANCTUARY 2022 3, 18 (2022) [Ex. 49].

⁹⁵ See generally A POPULATION VIABILITY ANALYSIS (P.V.A.) APPROACH TO THE CONSERVATION OF THE LONG-TAILED MACAQUE (*MACACA FASCICULARIS*) (Simon Valle ed. 2024), <https://www.cpsg.org/sites/default/files/2024-10/PVA%20for%20the%20Long-tailed%20Macaque%20%28Macaca%20fascicularis%29.pdf> [hereinafter “PVA”] [Ex. 50].

⁹⁶ *Id.* at 34.

⁹⁷ Gal Badihi et al., *Perspectives on Conservation Impacts of the Global Primate Trade*, 45 INT’L J. PRIMATOLOGY 972, 976 (2024) [Ex. 51].

In 2021, Indonesia exported hundreds of long-tailed macaques without a CITES-required Non-Detrimental Findings (NDF) assessment that addressed whether trade would negatively impact the species' survival.⁹⁸ The National Research and Innovation Agency (BRIN) and the Ministry of Environment and Forestry (KLHK) subsequently published the NDF in 2023, which concluded, based on the scoring system utilized, that the long-tailed macaque population in Indonesia could be used through a quota mechanism.⁹⁹ However, **the IUCN rejected the assessment's "positive" status finding.**¹⁰⁰

The assessment presented a seemingly incomplete analysis based on assumptions made despite the dearth of data on population trends and threats from trade. For example, the assessment scored the national population trend as "stable" but did not provide quantitative information about the current population to substantiate this finding or address the impact of threats on populations, including illegal trade and unrecorded hunting activity.¹⁰¹ Instead, the assessment noted "the need for annual monitoring to observe population trends of long-tailed macaques in Indonesia."¹⁰² Notably, no systematic population survey had been carried out. The surveys referenced in the NDF generally focused on protected areas—areas that shield long-tailed macaques from threats encountered in the wild—and some tourist spots; and some data was outdated.¹⁰³ Furthermore, the NDF's population estimates for long-tailed macaques in protected areas in Indonesia—areas that represent "the last remaining reserve population in the country"—totaled only 105,187 individuals, reinforcing why "[p]roper management is crucial for the utilization of long-tailed macaques outside conservation areas, considering the vulnerability of their population and habitat to threats of habitat degradation and hunting."¹⁰⁴

The 2023 Petition summarized, supplemented, and incorporated by reference the IUCN 2022 Assessment, which elevated the status of long-tailed macaques from "vulnerable" to "endangered" on the IUCN Red List of Threatened Species. In response to a listing challenge from the National Association for Biomedical Research, on June 24, 2024, the IUCN Red List Standards and Petitions Committee ("SPC") reaffirmed its position to list long-tailed macaques as endangered.¹⁰⁵ In its justification, the IUCN noted that the NDF's "positive" status finding did not change its determination.¹⁰⁶ Furthermore, it expounded on, inter alia, the connection between suspected range-wide reduction and population-level effects and explained why edge habitats are a risk factor threatening the species' survival:

⁹⁸ See *supra* Part VI.D.

⁹⁹ See *Non-Detrimental Findings (NDF) for Long-Tailed Macaque (Macaca fascicularis) in Indonesia*, NAT'L RSCH. & INNOVATION AGENCY & MINISTRY OF ENV'T & FORESTRY 6 (2023) [hereinafter "2023 NDF"] [Ex. 52].

¹⁰⁰ See *Ruling of the IUCN Red List Standards and Petitions Committee on the Listing of the Long-Tailed Macaque, Macaca fascicularis*, IUCN 3 (June 24, 2024) [hereinafter "IUCN Ruling"] [Ex. 53].

¹⁰¹ 2023 NDF, *supra* note 99, at 65.

¹⁰² *Id.* at 57.

¹⁰³ See *id.* at 16 (basing the population estimate for North Sumatera Tanjung Puting National Park—the location reportedly having the most number of individuals—on a 2012 data source).

¹⁰⁴ *Id.* at 37–43, 46.

¹⁰⁵ See IUCN Ruling, *supra* note 100, at 4.

¹⁰⁶ *Id.* at 3 (explaining that "the SPC did not find any data in [the 2023 NDF's] references that would change the listing").

For [long-tailed macaque (LTM)], one issue that complicates assessment of range-wide reduction is the importance of, and the species' performance in, secondary and edge habitats. Based on the frequent observations of LTM in these habitats, the petitioners infer that the species could not possibly be at risk of extinction. The [Red List Authority (RLA)] interprets the use of secondary and edge habitats as a risk factor because of increased susceptibility to disease and capture, increased risk of human-wildlife conflict, and decreased area-based protection in these habitats. They also present evidence that, although use of these habitats makes LTM more visible to humans, LTM population densities are actually lower in these habitats. Although there is substantial uncertainty, and although the species' use of these habitats is an indication of its flexibility, it appears to be also a factor that increases LTM's extinction risk.¹⁰⁷

The IUCN generally concluded that adequate evidence—including information available after the IUCN 2022 Assessment's release—existed to support the long-tailed macaque's current "endangered" listing status.¹⁰⁸ Likewise, the information detailed in the supplemental publications described in this Addendum strengthens the support for and underscores the urgency of the Petitioners' request that FWS list the long-tailed macaque as an endangered or threatened species under the ESA.

Population Status and Trends

Research published in May 2024 in *Science Advances* ("SA Report") updated former population size estimates, revealing long-tailed macaque populations to be up to 80% smaller than expected (and described in the 2023 Petition).¹⁰⁹

Fooden's assessments of the long-tailed macaque population size from 1990 to 2006 indicated a decrease from 5 million to 3 million individuals. Our current estimate of approximately 1 million reflects a continuous decline representing an alarming 80% reduction over approximately 35 years. The severity of this decline is further

¹⁰⁷ *Id.* at 2–3; see IUCN 2022 Assessment, *supra* note 1, at 9 ("Environmental shifts are driving even more of the *M. fascicularis* population into an extensive overlap with anthropogenic habitats (Gumert 2011). Furthermore, the synanthropic nature of the *M. fascicularis* relationship with humans goads a widespread persecution towards the species, leading to formal and informal population control measures, such as out-right killing, culling and sterilization (Eudey 1994, Gumert 2004, Sha et al. 2009, Feng 2015, PERHILITAN 2018 [Ex. 42]), Boonkong and O'Connor 2019, Beech 2020)."), at 7 ("The synanthropic nature of the species has resulted in a trend of overestimation of the population sizes of the species.") (citing Kyes et al. 2011, Hansen et al. 2019 [Ex. 54]); *supra* Part VI.A (explaining that long-tailed macaques are increasingly found near human settlements due to anthropogenic habitat alteration and that increased interface between humans and long-tailed macaques has been linked to heightened health risks from bi-directional pathogen transfer, negative perceptions of the species as "pests" and "weed species," and culling activities to address human-macaque conflicts).

¹⁰⁸ See IUCN Ruling, *supra* note 100, at 4.

¹⁰⁹ See Liston et al., *supra* note 93, at 4.

emphasized by the nature of the model, which overestimates the population due to its calibration in a protected area, making the true decline possible greater Furthermore, given the substantial and rapid decline we report here, reductions may occur faster than our data collection efforts, despite our use of recently collected data (2020 – 2022).¹¹⁰

The population estimates in the *SA Report* (and described in Table 5) showed the upper limit of long-tailed macaque populations across Southeast Asia, broken down by country. The report categorized those countries where researchers drew the most data as “high-confidence countries.”¹¹¹

Location	Best upper limit estimation	Extremes of upper limit estimation
High confidence countries	269,929 ± 520	134,320–538,525
Cambodia	75,544 ± 275	37,768–150,142
Laos	10,933 ± 105*	5,439–21,774
Malaysia	119,499 ± 105	59,319–238,905
Vietnam	63,953 ± 253	31,794–127,704
Lower confidence countries	632,709 ± 795	313,614–1,266,924
Indonesia	428,404 ± 655	212,063–858,805
Myanmar	42,239 ± 206	21,016–84,571
Philippines	102,594 ± 320	50,756–205,671
Singapore	234 ± 15	119–463
Thailand	59,238 ± 243	29,660–117,414
Entire region	904,638 ± 1,210	448,941–1,809,400

*A thorough investigation from 2021 to 2023 only revealed approximately 600 individuals in entire Laos (P.Phiapalath, personal observation).

Table 5. Estimates for upper limit long-tailed macaque populations in Southeast Asia.¹¹²

Compared to data from a 2015 report that estimated the population in Cambodia to be three million free-ranging long-tailed macaques in 2009, the *SA Report*’s findings indicated a 97.5% decline over fourteen years.¹¹³ A 2011 survey showed the population size of mainland Malaysia to be 127,050 individuals but did not provide a population size for Bornean Malaysia.¹¹⁴ The current long-tailed macaque population estimate for the entire country of Malaysia (119,499 individuals) evinces a population reduction. The estimates for Vietnam represented the country’s first nationwide estimation.¹¹⁵

The *SA Report*’s population estimate was benchmarked against published data for Keo Seima Wildlife Sanctuary (KSWs), a protected area within the eastern plains of Cambodia.¹¹⁶ Another recently published report, *The Status of Key Species in Keo Seima Wildlife Sanctuary 2022*

¹¹⁰ *Id.* at 4; see Jack Fooden, *Systematic Review of Southeast Asian Longtail Macaques, Macaca fascicularis* (Raffles, [1821]), 81 *FIELDIANA, ZOOLOGY* 54 (1995) [Ex. 8] (calculating a total species population of approximately 5 million based on provisional calculations of 3,726,860 in Indonesia, 309,360 in mainland Southeast Asia north of West Malaysia, and roughly 963,780 in the Nicobar Islands, Malaysia, Brunei, and the Philippines).

¹¹¹ Liston et al., *supra* note 93, at 2.

¹¹² *Id.* at 4.

¹¹³ *Id.*

¹¹⁴ *Id.*

¹¹⁵ *Id.*

¹¹⁶ *Id.* at 4, 8.

(“KSWS Report”), presented the results of surveys conducted over the prior twelve years to reveal the population trends of several key species—including long-tailed macaques—inhabiting Keo Seima.¹¹⁷ The KSWS Report noted that the population of long-tailed macaques in KSWS, which had appeared stable during surveys in 2020, had significantly decreased when surveyed in 2022: “In the 2020 assessment, populations of long-tailed macaque . . . were considered healthy. In only two years, their population trends have worsened, highlighting the intensity and immediacy of the threats that wildlife faces in KSWS.”¹¹⁸ Figure 2 illustrates a 49-55% decline in the long-tailed macaque population over twelve years.¹¹⁹ The black line represents the population trend, with dotted lines denoting 95% confidence levels.¹²⁰

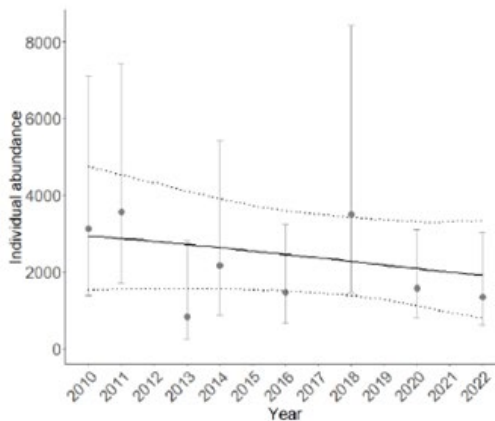


Figure 2. Estimated number of long-tailed macaque individuals within KSWS’ REDD+ project area from 2010 to 2022.¹²¹

In KSWS, a decreasing population trend resulted in a 2022 population estimate for long-tailed macaques totaling 1,344 individuals.¹²² This is especially alarming because the rates of decline in KSWS “are **likely to be significantly slower than those outside of the protected area**, illustrating KSWS’ success in mitigating certain threats.”¹²³ Despite the protections, the decline in long-tailed macaques has been significant.¹²⁴ The KSWS Report described the following threats responsible for this trend:

¹¹⁷ See generally AGGER, *supra* note 94.

¹¹⁸ *Id.* at 3, 18; cf. Susan Cheyne et al., *Occupancy Patterns of Endangered Long-Tailed Macaques (Macaca fascicularis) in Forests Across Indonesian Borneo*, 2024 PRIMATE CONSERVATION, http://www.primatesg.org/storage/pdf/PC38_Cheyne_et_al_M_fascicularis_occupancy_Borneo.pdf (examining patterns of occurrence of long-tailed macaques across study areas on Indonesian Borneo, explaining that LTM presence in protected areas cannot be assumed without robust data, and highlighting the risk of extrapolating high local occupancy estimates from some anthropogenic areas to other areas, natural forest habitats, or even protected areas).

¹¹⁹ AGGER, *supra* note 94, at 18.

¹²⁰ *Id.* The dots show conventional distance sampling estimates, with vertical lines representing estimate confidence intervals. *Id.*

¹²¹ *Id.*

¹²² *Id.* at 4.

¹²³ *Id.* at 3 (emphasis added).

¹²⁴ *Id.* at 31.

The severity of range contractions in these species illustrates the consequences of these declines. Threats associated with spending significant time on the ground combined with pervasive threats that affect all species, such as land clearance and degradation from logging, have caused continued declines. It is concerning considering that species who that [sic] are not entirely restricted to dwelling on the ground, such as the long-tailed macaque . . . are still declining.

Dog ownership and hunting remains [sic] widespread within the protected area. While concerted efforts have been made to curb snaring, it is still used as a way to protect farms and catch wildlife for consumption. The declines of . . . long-tailed macaque . . . are alarming as these species are normally considered robust to hunting and habitat disturbances.¹²⁵

Threats

A recent population viability analysis (PVA) undertaken by the IUCN SSC Conservation Planning Specialist Group assessed the long-tailed macaque's risk of extinction and identified the main threats to its survival in different regions across its range.¹²⁶ The PVA is summarized herein and incorporated by reference into the petition. A Threat Analysis Working Group analyzed the types of threats acting in different geographic regions and the aspects of long-tailed macaque life history (including reproduction, survival, and dispersal) that would be most affected by these threats by undertaking a three-step process, which included (1) prioritizing the known threats, (2) understanding the geographical distribution and intensity of the main threats, and (3) examining the effects of the main threats on population dynamics.¹²⁷ This information was then used to build a PVA model to investigate the impact of different threats across the species' range.¹²⁸

The PVA constructed baseline models of long-tailed macaque populations of different theoretical initial sizes (large = 2,000 individuals, medium = 600 individuals, and small = 200 individuals).¹²⁹ The Addendum uses the "large" size for illustrative purposes. However, the threat's effects may be more severe as the initial population size is set to a smaller value, which is more representative of typical long-tailed macaque populations. The PVA accounted for a finite growth rate ("λ") equal to 1.02 to represent those populations that exhibit only slight population growth (i.e., 2% growth) over time and 1.06 to represent fast-growing populations.¹³⁰

¹²⁵ *Id.* at 31 (internal citations omitted).

¹²⁶ *See generally* PVA, *supra* note 95.

¹²⁷ *Id.* at 4, 7.

¹²⁸ *Id.* at 4.

¹²⁹ *Id.* at 30. The PVA defines "population" as "a group of individuals of the same species inhabiting a specific geographic area that is not fragmented." *Id.* at 18. The baseline models set the initial population sizes to arbitrary values loosely inspired by real cases. *Id.* at 30 ('large' = 2,000 individuals – Thailand, Prey Lang in Cambodia). Alternate baseline models applied a λ equal to 1.06 to represent particularly abundant and healthy populations. *Id.* at 18.

¹³⁰ *Id.* at 18.

Since the 1.06 growth rate is associated with privileged populations shielded from human predatory pressures, provisioned by locals and tourists, and monitored by local research and veterinary teams (e.g., the resident population in Padangtegal Monkey Forest (Bali))—not typical populations of long-tailed macaques living in the forests or near human settlements—figures throughout the Addendum use $\lambda = 1.02$ (unless noted otherwise).

In Step 1, the working group identified the following as the leading causes of long-tailed macaque population decline or extirpation across the range: (1) biological resource use (i.e., the threat from harvest for food consumption, the pet trade, or use in the biomedical industry), (2) human intrusion and disturbance, (3) residential and commercial development, and (4) agriculture and aquaculture.¹³¹

In Step 2, the working group estimated the severity of the four threat categories to long-tailed macaques inhabiting the mainland (Table 6) and island (Table 7) portions of the range:

Country	Biological resource use	Human intrusions & disturbance	Residential & commercial development	Agriculture & aquaculture
Bangladesh	n.a.	High	High	High
Cambodia	High	Medium	Low	Medium
Lao PDR	Low	Low	Low	Medium
Myanmar	n.a.	Low	n.a.	n.a.
Vietnam	High	Medium	Low	Low
Thailand	Medium	High	n.a.	High

Table 6. Estimated severity of the main threats to long-tailed macaques in the mainland portion of their range.¹³²

Country	Islands	Biological resource use	Human intrusions & disturbance	Residential & commercial development	Agriculture & aquaculture
India					
	<i>Nicobar Islands</i>	Low	Low	Low	Medium
Indonesia					
	<i>Sumatra & Java</i>	High	High	n.a.	High
	<i>Bali</i>	Low	Low	Medium	Medium
Malaysia					
	<i>Peninsular Malaysia</i>	High	High	High	n.a.
	<i>Borneo</i>	Low	Low	Low	Low
Philippines		High	n.a.	Low	Medium

¹³¹ *Id.* at 10, 15.

¹³² *Id.* at 11. In Bangladesh, the species is currently considered “missing.” *Id.*

Table 7. Estimated severity of the main threats to long-tailed macaques in the island portions of their range.¹³³

As shown in these tables and described in the PVA:

In mainland regions, biological resource use was high in Cambodia and Vietnam, driven by harvesting for the biomedical industry and meat consumption. Human intrusions and disturbances were prevalent in Thailand and Bangladesh (where the species is presumed extinct). Agriculture and aquaculture posed a high threat in Thailand but varied across other regions.

In island regions, the severity of threats varied by location. In the Philippines, biological resource use was high in some areas due to hunting and conflict with agricultural practices. In Indonesia, Sumatra faced threats from human intrusions and disturbance, while Bali experienced medium threats from agriculture and aquaculture. Malaysian Borneo had low threat levels overall, while Peninsular Malaysia faced high threats from various sources due to frequent human-macaque interactions.¹³⁴

In Step 3, the working group examined the effects of threats on the species at a population level. Using this information, a baseline model of a long-tailed macaque population was built to produce probabilistic outcomes on population viability due to different threats. Although researchers tested the threats in isolation for diagnostic reasons, threats are likely to occur simultaneously in the real world. For example, the same population that is harvested may also be affected by loss of habitat, a disease outbreak, or an extreme weather event. Concurrent threats would exacerbate the already significant impact on population viability revealed in the PVA.

- **Data Describing Population-Level Impact Due to Habitat Loss from Residential and Commercial Development:**

Drawing a connection between habitat loss and population-level effects, the working group classified land conversion for residential and commercial development as high in Bangladesh, explaining that “[t]his may have been one of the factors driving LTM to its likely extirpation as well as preventing it from recolonizing the country from bordering Myanmar.”¹³⁵ The PVA also noted that the southeast region of Bangladesh “has seen further development (mostly removal of

¹³³ *Id.* at 14.

¹³⁴ *Id.* at 4; *see also* 2023 NDF, *supra* note 99, at 17 (“Habitat degradation is a significant factor that affects the population of long-tailed macaque. Degradation of its natural habitat such as habitat conversion, fragmentation, and human interaction have a negative impact on the primate population. To reach a viable population, shelters with supporting capacity are needed to increase its natural habitat such as forests, mangroves, swamp forests, nipa palm, riverine and periphery forest.”) (internal citation omitted).

¹³⁵ PVA, *supra* note 95, at 11, 12.

mangroves) for the building of a harbour and other recreational structures. In other areas, amidst the deterioration of the security status, army and refugee camps were created.”¹³⁶

- **Data Detailing Population-Level Impact from Direct Harvesting of Individuals:**

The working group deemed the direct harvest of individuals to be the most severe of all threat categories.¹³⁷ The PVA used “harvest” to broadly refer to removing individuals from a population.¹³⁸ Depending on the geographic region and the final use of the yielded individuals (e.g., meat consumption, the pet trade, or export for the biomedical industry), harvest can be implemented in various ways and impact populations differently.¹³⁹ In Java, the species is highly threatened by capture for the biomedical industry.¹⁴⁰ In the mainland countries where the severity of the biological resource use threat also ranked high, the PVA explained:

Delegates from Cambodia and Vietnam report cases where LTMs are killed as accidental or opportunistic bycatch, e.g. in snares or during hunts, respectively. It is hard to quantify these incidents and they are likely to affect different sexes and age classes at random. When this involves females with infants, the infants are nearly always sold to the pet trade. Because of this, the capture of adult females is highly valued also as they are prized as breeders in captive rearing [sic] facilities.¹⁴¹

Figure 3 illustrates the effects of a 5% annual harvest with different capture methods on the mean population size over 100 years with an initial population of 2,000 and a $\lambda = 1.02$.¹⁴² The blue line represents the baseline with no harvest, the red line indicates that juveniles 1-2 years old are targeted, the green line indicates that only adult males are captured, the purple line indicates that only adult females are taken, and the black line indicates that individuals are removed randomly across age classes.

¹³⁶ *Id.* at 12.

¹³⁷ *Id.* at 15.

¹³⁸ *Id.* at 31.

¹³⁹ *Id.* at 31; see also Paul A. Garber et al., *Global Wildlife Trade and Trafficking Contribute to the World’s Nonhuman Primate Conservation Crisis*, FRONTIERS CONSERVATION SCI. 8–10, 13, Supplementary Table S3 (2024) [Ex. 55] (describing the unsustainable trade and trafficking of wild long-tailed macaques for meat, traditional medicine, biomedical research, and pets as major contributors to population decline).

¹⁴⁰ PVA, *supra* note 95, at 13.

¹⁴¹ *Id.* at 15.

¹⁴² *Id.* at 34.

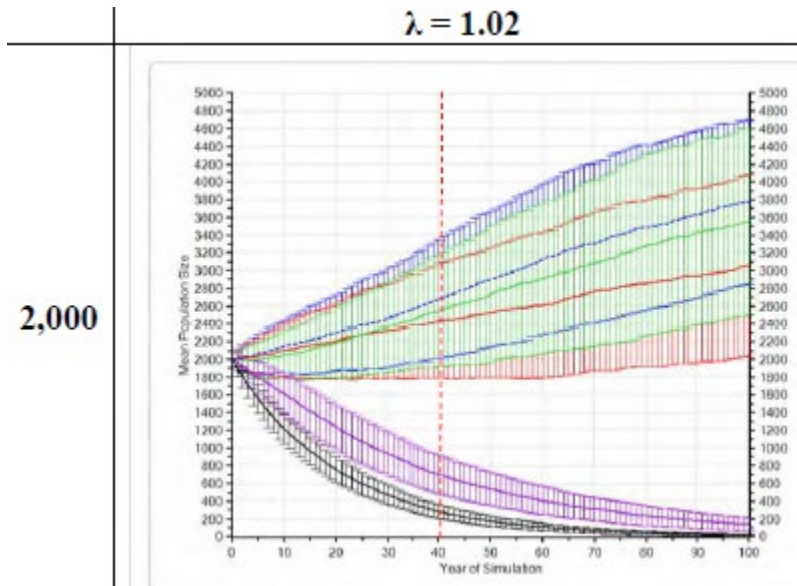


Figure 3. Effects of 5% annual harvest with different capture methods on the mean population.¹⁴³

The model showed that capturing adult female long-tailed macaques and random individuals had an increasingly greater impact on population viability in the short and long term—even with an optimistically large population—underscoring that the “presence and abundance of females in a population are key to its short- and long-term viability.”¹⁴⁴ Harvesting adult female long-tailed macaques, or individuals at random across age classes, led to plummeting populations. The effects were progressively more severe as the initial population size was set to increasingly smaller values.¹⁴⁵

The PVA noted that the capture of adult female long-tailed macaques is highly valued “as they are prized as breeders in captive rearing facilities.”¹⁴⁶ The PVA also discussed that, in Cambodia, Indonesia, and Vietnam, a widespread harvesting technique used for yielding a large number of individuals (to be used for biomedical experimentation) involves targeting the tree where long-tailed macaques spend the night “and clearing the surrounding trees to prevent them from escaping.”¹⁴⁷ The effects of harvesting adult female long-tailed macaques and individuals at random across age classes, as demonstrated in Figure 3, explain documented population level declines and projections.

The PVA’s sensitivity analysis further underscored how female mortality impacted population trends: “At each consecutive 5% increase in female mortality (adult or juvenile), the mean projected population trajectory decreases substantially. This, in the case of a slow-growing population, can reverse the population’s trend with just as little as 10% and 25% increased

¹⁴³ *Id.*

¹⁴⁴ *Id.* at 33, 46.

¹⁴⁵ *Id.* at 33.

¹⁴⁶ *Id.* at 15.

¹⁴⁷ *Id.*

mortality in adult and juvenile females, respectively.”¹⁴⁸ Figure 4 shows the relationship between stochastic r and the incremental 5% increase in adult male (blue line), juvenile male (green line), juvenile female (yellow line), and adult female (red line) mortality (up to 75%) over 100 years on an initial population of 25 individuals with $\lambda = 1.02$.¹⁴⁹

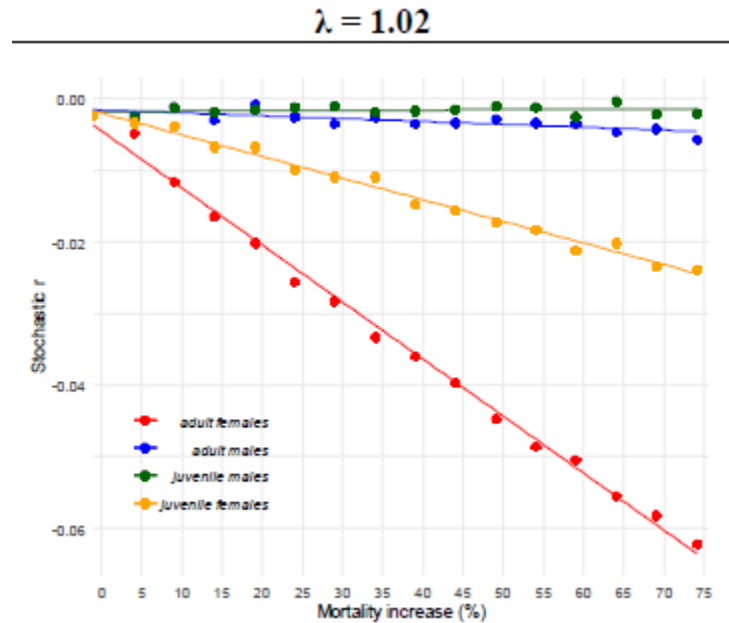


Figure 4. Relationship between stochastic r and the incremental 5% increase in mortality.¹⁵⁰

The graph showed a 109% decrease in stochastic r if adult female mortality rose by only 5% and a 43% decrease in stochastic r if juvenile female mortality rose by 5%.¹⁵¹

Removing random individuals decreased the population trend even in an ultra-optimistic, fast-growing population.¹⁵² While removing adult female long-tailed macaques in such a scenario did not, on its own, result in a population’s extinction, it had a significant negative impact on the population’s growth if compared to a population that experienced other types of harvest or no harvest at all. Figure 5 illustrates this disparity by graphing the effects of a 5% annual harvest with different capture methods on the mean population size over 100 years with an initial population of 2,000 and $\lambda = 1.06$.¹⁵³ The blue line represents the baseline with no harvest, the red line indicates that children 1-2 years old are targeted, the green line indicates that only adult males are captured, the purple line indicates that only adult females are taken, and the black line indicates that individuals are removed randomly across age classes.

¹⁴⁸ *Id.* at 44.

¹⁴⁹ *Id.* Stochastic r refers to the intrinsic rate of natural increase (r) of a population accounting for random variations in birth and death rates over time. See Anna Christina Vinton & David Alan Vasseur, *Evolutionary Tracking is Determined by Differential Selection on Demographic Rates and Density Dependence*, *ECOLOGY & EVOLUTION* 5725, 5726 (2020), <https://pmc.ncbi.nlm.nih.gov/articles/PMC7319176/pdf/ECE3-10-5725.pdf> [Ex. 56].

¹⁵⁰ PVA, *supra* note 95, at 44.

¹⁵¹ *Id.*

¹⁵² *Id.* at 34.

¹⁵³ *Id.* The PVA also provides graphs with initial populations of 600 and 200. See *id.*

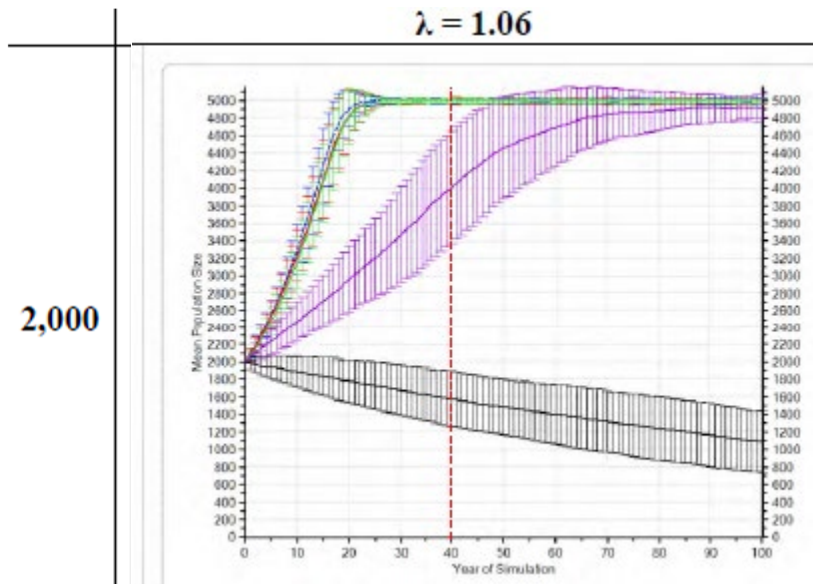
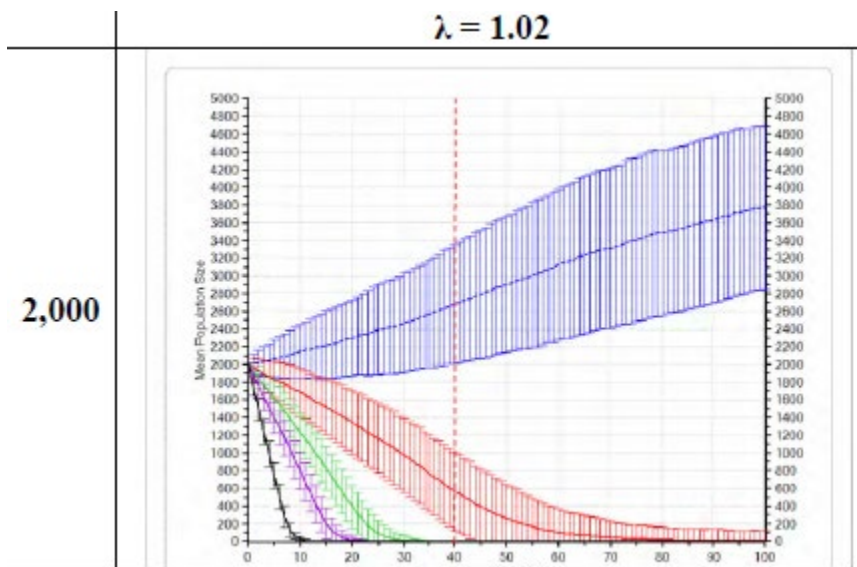


Figure 5. Effects of 5% annual harvest with different capture methods on the mean population.¹⁵⁴

Figure 6 depicts the effects of the annual harvest of small (40 individuals) or large (120 individuals) groups on the mean population size over 100 years with an initial population of 2,000 and $\lambda = 1.02$.¹⁵⁵ The blue line represents the baseline with no harvest, the red line represents the removal of one small group per year, the green line represents the removal of two small groups per year, the purple line represents the removal of one large group per year, and the black line represents the removal of two large groups per year.



¹⁵⁴ *Id.*

¹⁵⁵ *Id.* at 36.

Figure 6. Effects of annual harvest of groups on the mean population size.¹⁵⁶

The model showed that harvesting entire groups can significantly impact population viability; depending on its scale, harvesting can lead to sharp population declines that may cause the population to be extirpated as quickly as ten years.¹⁵⁷

Another 2024 publication, *Perspectives on Conservation Impacts of the Global Primate Trade*, included several case studies focused on the threat from trade on long-tailed macaque populations.¹⁵⁸ The first case study described the role of introduced island populations of long-tailed macaques in trade for biomedical experimentation.

For the past decade at least, Mauritius has been one of the leading global exporters of *Macaca fascicularis*, many of which are wild-caught. Due to a potential founder effect, in which a bottleneck increases genetic homogeneity in introduced populations, low genetic diversity of the Mauritius *Macaca fascicularis* also makes them sought-after for biomedical research. The free-ranging population on Mauritius is estimated to have decreased from 40,000 in the 1980s to 10,000 in just three decades in response to human management efforts. Trade in wild-caught individuals is substantial when primates originate from introduced populations.¹⁵⁹

A second case study provided an overview of global international trade in live primates and discussed how the import numbers of long-tailed macaques during the pandemic revealed a change in trade patterns.¹⁶⁰ More exports came from range countries (e.g., Cambodia, Thailand, and Vietnam) than China—which historically exported many captive-bred primates.¹⁶¹ This change is expected to have had “a significant effect on free-ranging populations” as these range countries could not provide the same number of captive-bred individuals.¹⁶²

¹⁵⁶ *Id.*

¹⁵⁷ *Id.* at 5, 33.

¹⁵⁸ Badihi et al., *supra* note 97, at 972.

¹⁵⁹ *Id.* at 976 (citations omitted).

¹⁶⁰ *Id.* at 984.

¹⁶¹ *Id.*; *see generally* Garber et al., *supra* note 139, at 9–10 (“A consequence of the COVID-19 pandemic was that China suspended almost all wildlife exports, and this included their captive long-tailed macaque breeding colonies, which contained an estimated 250,000 individuals. Between 2010 and 2018, China exported an average of 20,147 long-tailed macaques per year for biomedical research (total of 181,328 over this the [sic] 9-year period). This accounted for 44% of the total worldwide export”) (internal citations omitted). According to an Indonesia Annual Report, exports of long-tailed macaques surged in 2019. *See* 2023 NDF, *supra* note 99, at 31 (“Based on data from WCMC-UNEP CITES, Indonesia exported 24,765 individuals of live Long-tailed macaques between 1999 and 2008. The export increased by 40% from 10,285 (1999-2003) to 14,480 (2004-2008) Data of export realization in Indonesia shows a quite high number in 2010 but tends to decrease until 2014 and no export at all in 2015-2018, however, the export saw significant increase in 2019.”). Wild-caught long-tailed macaques accounted for approximately 17% (260 individuals) of the total number of individual long-tailed macaques (from captive breeding and the wild) exported from Indonesia in 2021 according to an Indonesia Annual Report. *See* 2023 NDF, *supra* note 99, at 34.

¹⁶² Badihi et al., *supra* note 97, at 984; *see also* Garber et al., *supra* note 139, at 10 (“The pandemic-related reduction in the availability of captive-bred long-tailed macaques is alleged to have resulted in an increase in the importation of wild monkeys falsely labelled as captive bred and pathogen-free”).

The total U.S. CDC primate import numbers increased by 49% from 21,861 individuals (*Macaca fascicularis* constituted 20,110 ~ 92%) in 2017 to 32,709 individuals (*Macaca fascicularis* constituted 31,522 ~ 96%) in 2022. In 2017, 29% (6,029 individuals) of *Macaca fascicularis* imports originated from Cambodia. In 2022, it was 62% (19,618 individuals).¹⁶³

The quantity of free-ranging long-tailed macaques taken to breeding centers (to supply the international trade or as breeding stock), the number that remains part of the domestic trade, and the number traded illegally internationally is unknown.¹⁶⁴ Nonetheless, as the case study pointed out, breeding centers often rely on wild-caught individuals to replenish their breeding population; this is not necessarily documented by CITES or primate breeding facilities.¹⁶⁵ Based on information shared by the United States to the CITES Secretariat and the Chair of the Animals Committee related to investigations conducted by authorities in the United States regarding long-tailed macaques exported from Cambodia, including an analysis of the possible production rates from the captive-breeding facilities, the Secretariat recommended that, at the February 2025 meeting, the CITES Standing Committee vote to suspend trade of long-tailed macaques from Cambodia.¹⁶⁶ The Animal Committee summarized the concerns:

Overall, concerns remain that the high productivity rates cannot reflect a closed-cycle breeding operation in five out of six facilities reported by Cambodia, according to analyses conducted by the United States of America (National Fish and Wildlife Forensics Laboratory). The report shows that the reported breeding output from five out of six of the captive-breeding facilities exceeds the biological capacity of the species to produce that number of offspring in captivity; in two cases, the supposed monthly breeding outputs exceeded the highest documented breeding outputs by an order of magnitude for months on end. This seems to point to these five facilities obtaining new stock (presumably from the wild) rather than breeding them in-house.¹⁶⁷

The CITES Secretariat’s recommended trade ban on long-tailed macaques from Cambodia came on the heels of the Secretariat’s recommendation to suspend trade in long-tailed macaques from the Lao People’s Democratic Republic until the country “proves the legal acquisition of original

¹⁶³ Badihi et al., *supra* note 97, at 984 (citation omitted).

¹⁶⁴ *Id.* at 987–88.

¹⁶⁵ *Id.* at 985; *see also* Garber et al., *supra* note 139, at 10 (explaining that “some primate breeding centers in range countries capture wild primates for general upkeep of their captive breeding populations”).

¹⁶⁶ *See Resolution Conf. 17.1 (Rev. CoP19) on Review of Trade in Specimens Reported as Produced in Captivity*, SC78 Doc. 35.1, CITES 4, 16 (Jan. 13, 2025), <https://cites.org/sites/default/files/documents/E-SC78-35-01.pdf> [Ex. 57]; *see generally* 2009-2023 Cambodian Monkey Farm Census Data with Visualization, PETA (July 10, 2024), <https://www.peta.org/wp-content/uploads/2024/07/2009-2023-Census-data-and-visualization-Cambodian-monkey-farms-CITES.pdf> [Ex. 58].

¹⁶⁷ *Resolution Conf. 17.1 (Rev. CoP19) on Review of Trade in Specimens Reported as Produced in Captivity*, *supra* note 166, at 32.

breeding stocks for captive-breeding facilities, as well as for additional wild caught specimens added to these breeding stocks, where relevant, to the satisfaction of the Secretariat and the Chair of the Standing Committee.”¹⁶⁸ A January 6, 2025, CITES Compliance document noted the following:

[T]he conduct of trade in and captive breeding management of *M. fascicularis* in the Lao People’s Democratic Republic raises questions and serious concerns. Five new breeding facilities have been established since 2021 and are at different stages in the development of their captive-breeding programmes. However, it is not fully clear which facility is sourcing its breeding stock from other captive-breeding operations, and which is sourcing it from the wild. It is equally unclear whether wild caught specimens are being added to the current breeding stocks of established operations and, if so, whether an NDF had been made concerning such additions. While the NDF communicated in September 2024 is comprehensive and robust from the scientific point of view, the Secretariat notes that it is essential that the collection process be assessed and that the conclusion by the [Management Authority (MA)] that there is currently an “overpopulation” of macaques does not seem to be based on the NDF.¹⁶⁹

The referenced NDF described a total estimated national population of 30,586 individuals in the wild, with two regions (Attapeu and Champasak Provinces) having the highest population concentrations (11,809 and 6,918 individuals respectively).¹⁷⁰ Smaller populations in other zones and territories accounted for the remaining individuals.¹⁷¹ While the NDF discussed a 5% capture rate, the Scientific Authority noted that “collection would predominantly target breeding females.”¹⁷²

The CITES Compliance document also described instances of law enforcement uncovering the use of fraudulent permits to facilitate trade in long-tailed macaques. For example, the document explained:

The validity of [Lao Universal Development Co., Ltd.’s authorization to export 500 individuals of *M. fascicularis*] and other permits is currently under scrutiny due to the discovery of numerous false and invalid documents in the trade of *M. fascicularis* between the Lao People’s Democratic Republic and Myanmar. On this

¹⁶⁸ *Application of Article XIII in the Lao People’s Democratic Republic*, SC78 Doc. 33.8, CITES 1, 18, 19 (Jan. 6, 2025), <https://cites.org/sites/default/files/documents/E-SC78-33-08.pdf> [Ex. 59].

¹⁶⁹ *Id.* at 15.

¹⁷⁰ *Id.* at 14; *but see* IUCN 2022 Assessment, *supra* note 1, at 7 (“The actual population size in Lao PDR is now down to 300-500 individuals for the entire country.”); Litson et al., *supra* note 93, at 4 (estimating the upper limit of the long-tailed macaque population in Laos as 10,933).

¹⁷¹ *Application of Article XIII in the Lao People’s Democratic Republic*, *supra* note 168, at 14.

¹⁷² *Id.*

matter, the Secretariat received information from the MA of Myanmar that the export permit for 500 *M. fascicularis* to be exported from Myanmar to Lao Universal Development Co., LTD, is fraudulent and has not been issued by the designated MA of Myanmar.¹⁷³

As noted earlier, the consequences of harvesting long-tailed macaques (particularly when such harvest focuses on adult female long-tailed macaques or random individuals) can devastate a population, and estimates in Cambodia show a substantial negative population trend.¹⁷⁴

- **Data Showing Population-Level Impact Due to Disease Outbreak and Predation Associated with Human Intrusion and Disturbance, Residential and Commercial Development, and Agriculture and Aquaculture:**

The PVA described how disease outbreaks may significantly impact the population growth of long-tailed macaque populations and present a heightened risk to those closest to human settlements or at high densities.¹⁷⁵ Human intrusion and disturbance (e.g., feeding from humans) contribute to the impact because the progressive habituation of the long-tailed macaque to human presence increases the chances of negative interactions between the species and humans, including exposure to human-mediated diseases and accidental poisoning, and intra-specific hostile interactions (which can result in heightened mortality rates) due to concentrations of individuals within restricted areas.¹⁷⁶ Pressure from residential and commercial development and threats to agriculture and aquaculture are also factors.

On one hand, the degradation and destruction of LTM's natural habitat is [sic] likely to decrease their access to the necessary resources i.e. food and space. On the other hand, the proximity to residential, commercial and agricultural development would expose LTMs to unnaturally high concentrations of resources which would boost the population. In both cases, the result is likely to be some unusually abundant populations in localised and restricted suitable areas competing for food and space. This, in turn, may increase the chances of exposure to diseases (and potential related outbreaks) and parasites (both human-mediated and non). In these conditions, LTMs are expected to be more likely to enter into conflictual interactions with humans which would result in negative public perception and direct persecution.¹⁷⁷

¹⁷³ *Id.* at 15.

¹⁷⁴ See PVA, *supra* note 95, at 34, 36; Liston et al., *supra* note 93, at 4 (describing a 97.5% decline in long-tailed macaque populations in Cambodia over a fourteen-year period); AGGER, *supra* note 94, at 18 (describing a 49-55% decline in the long-tailed macaque population in KSWs over a twelve-year period); Garber et al., *supra* note 139, at 10 (noting that monkey laundering appears to be increasing “[g]iven the number of primates used in biomedical research and constraints on the captive supply,” and emphasizing that “[e]nding the use of wild-caught primates in biomedical and pharmaceutical research is imperative to protecting wild primate populations from extirpation”).

¹⁷⁵ PVA, *supra* note 95, at 32.

¹⁷⁶ *Id.* at 15.

¹⁷⁷ *Id.* at 16.

Figure 7 depicts the effects of a low-impact (~2% additional mortality; red line), high-impact (~6% additional mortality; green line), and very high-impact (50% additional mortality; purple line) disease outbreak with a 14-year frequency in an initial population of 2,000 and a $\lambda = 1.02$.¹⁷⁸

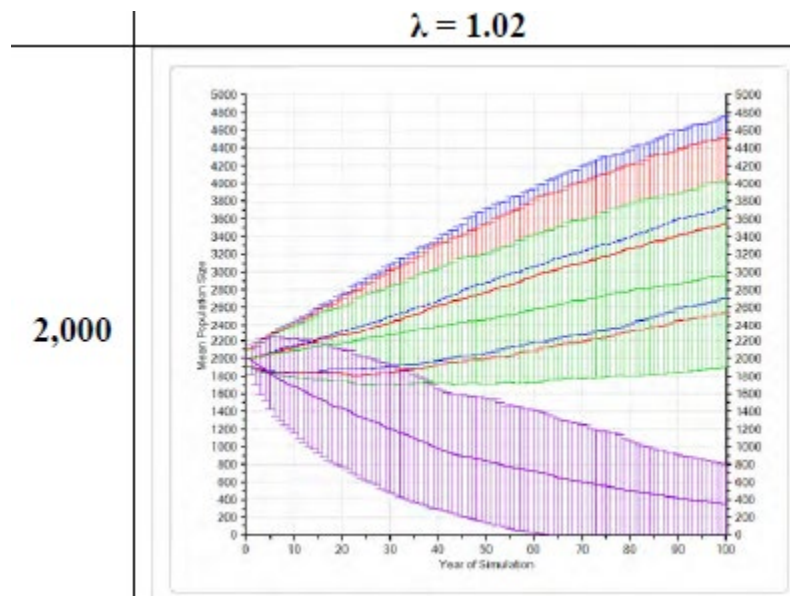


Figure 7. Population-level effects from disease outbreak.¹⁷⁹

Figure 7, modeled on data collected after a 2022 *Streptococcus* outbreak in the Padangtegal Monkey Forest (Bali) population, shows how disease outbreaks of different lethality may affect wild populations of long-tailed macaques.¹⁸⁰ The PVA described how a slow-growing population “is much less resilient to high levels of adult mortality and shows a declining mean population trajectory over a 100-year period. In many cases, the probability of the population being extirpated over the simulation period is still very low . . . but the decline is inexorable.”¹⁸¹ In other words, populations may exhibit a slow but persistent decline that may be difficult to detect and impossible to interrupt in the absence of a timely, suitable, and consistent monitoring effort.

- **Data Describing Population-Level Impact Due to Catastrophic/Extreme Weather Events:**

The PVA described how insular populations of long-tailed macaques may be greatly affected by extreme weather events (e.g., severe tropical storms or tsunamis).¹⁸² The PVA used data on the effects of an extreme weather event on long-tailed macaque populations from studies conducted in the Nicobar Islands following a disastrous tsunami in 2004.¹⁸³ The PVA noted: “In this

¹⁷⁸ *Id.* at 42.

¹⁷⁹ *Id.*

¹⁸⁰ *See id.* at 32, 41.

¹⁸¹ *Id.* at 41.

¹⁸² *Id.* at 32.

¹⁸³ *Id.*

instance, researchers[] found no significant decrease in abundance but changes in the population structure and local abundance suggest an uneven effect on the populations.”¹⁸⁴ Figure 8 illustrates the effects of a decrease of 2.5% (purple line), 5% (green line), and 10% (red line) in the annual survival due to a catastrophic event with a yearly 48% chance of happening and a decrease of 2.5% (black line) in the annual survival for an event with an annual frequency of 25%.¹⁸⁵ The blue line represents the baseline.

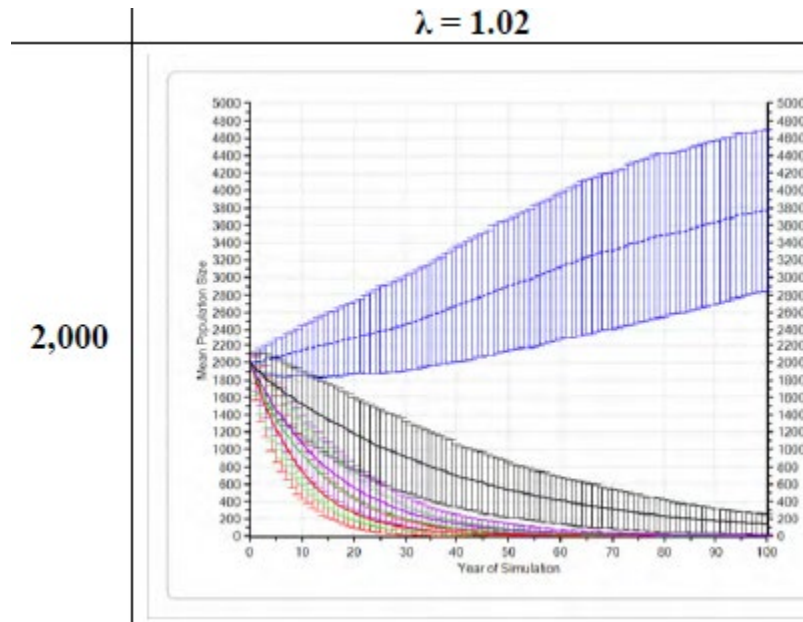


Figure 8. Effects of a decrease in annual survival due to a catastrophic event.¹⁸⁶

The simulation of extreme, sporadic but deadly events highlighted two key aspects. Firstly, those events which increase mortality non-discriminatorily across age classes are likely to have a more significant impact on the population trajectory in the long term even at reasonably low mortality rates (e.g. 2.5% per year[]) Secondly, the frequency of such events will be a key factor in allowing the population to recover (or not) from the additional mortality.¹⁸⁷

The supplemental information in this Addendum strengthens the support included in the 2023 Petition for listing the long-tailed macaque as an endangered or threatened species under the ESA. The species has experienced catastrophic population declines that are more severe than those considered in the 2023 Petition. Even populations in protected areas have experienced a decline. Threats of varying severity impact long-tailed macaques across the species’ range. The PVA

¹⁸⁴ *Id.*

¹⁸⁵ *Id.* at 39. The PVA based the frequency “on available meteorological data which show the incidence of category-5 tropical storms in SE Asia over the last 50 years (1972-2022).” *Id.* at 32.

¹⁸⁶ *Id.* at 39.

¹⁸⁷ *Id.* at 38.

illustrated the effects of threats on the viability of populations and emphasized how activities (e.g., harvesting, management intervention, natural events) that negatively target females threaten population viability and lead to extinction. The Addendum reinforces the urgent need for FWS to add long-tailed macaques to the list of animals protected under the ESA.

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XI. APPENDIX – Petitioners’ Contact Information and Signatures



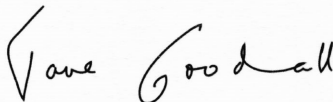
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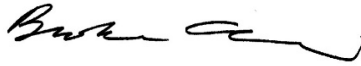
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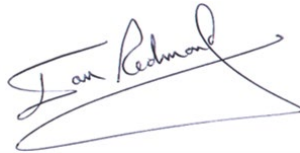
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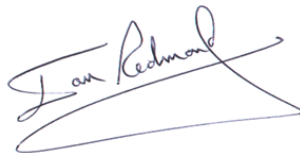
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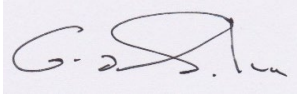
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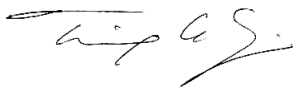
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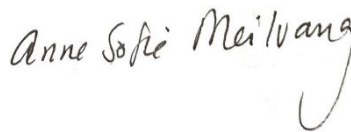
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