

Council of Councils Working Group on  
**Assessing the Safety of  
Relocating At-Risk Chimpanzees**

**REPORT**

May 18, 2018



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## **Executive Summary**

This report summarizes the findings and recommendations of the Council of Councils Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees. The National Institutes of Health (NIH) formed this committee within the Council of Councils (“Council”), a federal advisory committee, to provide advice and recommendations for consideration by the Council on factors for licensed veterinarians to consider when deciding whether to relocate NIH-owned and NIH-supported chimpanzees to the federal chimpanzee sanctuary system.

A 2011 study by the Committee on the Use of Chimpanzees in Biomedical and Behavioral Research formed by Institute of Medicine and the National Research Council determined that the use of chimpanzees in research had become “largely unnecessary,” and the committee recommended approaches to minimize their use in federally supported research. The Council subsequently formed the Working Group on the Use of Chimpanzees in NIH-Supported Research to provide advice on implementing recommendations by the Institute of Medicine and to consider the population size and placement of NIH-owned and NIH-supported chimpanzees. On January 22, 2013, the Council accepted the working group’s recommendations and provided these recommendations to the NIH. After seeking and considering public comments, NIH accepted most of the Council’s recommendations on June 26, 2013. In 2015, the U.S. Fish and Wildlife Service announced that it had designated all captive chimpanzees as endangered.

Also in 2015, the NIH determined that all NIH-owned chimpanzees that resided outside of the federal sanctuary system operated by Chimp Haven, Inc., in Keithville, Louisiana, were immediately eligible for retirement. The animals were to be transferred to the sanctuary once space becomes available and on a timeline that allows the optimal transition of each chimpanzee with careful consideration of each animal’s welfare, including the animal’s health and social grouping. However, many of these chimpanzees have age-related ailments that can increase their risk of severe adverse events during the transfer and relocation process. The frail condition of some chimpanzees could mean that they cannot be moved safely to the federal sanctuary system even though the NIH’s intent is to retire all of its chimpanzees to the sanctuary.

### **Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees**

The NIH asked the Council to form the working group whose recommendations are provided in this report for the Council’s consideration. To fulfill its charge, the Council asked the working group to:

- Review two NIH reports summarizing the published literature on physiological and welfare concerns of at-risk chimpanzees and on selected statutes, regulations, and reference manuals
- Interview staff at NIH-supported facilities and other veterinarian experts about the relocation process and factors they consider when assessing relocation risk(s)
- Where possible, identify additional objective and subjective measures for use by the NIH and NIH-supported facilities in assessing the risk(s) of relocating individual chimpanzees
- Identify the documentation recommended to support subjective assessments

- Develop a points-to-consider report and/or risk-based selection matrix to inform decisions by the attending veterinarian and the NIH regarding chimpanzee relocation, particularly in ambiguous circumstances

## **Working Group Findings**

The working group conducted site visits to three facilities that house NIH-owned or -supported chimpanzees, interviewed 17 experts in person or by telephone, and reviewed letters voluntarily submitted by several nonprofit organizations as well as summaries prepared by the NIH of the relevant published literature and applicable laws and statutes. The working group also collected data from several research facilities and the federal sanctuary system on chimpanzee demographics, health status, and other characteristics.

The working group determined that as of March 2018, NIH owns or supports 504 chimpanzees. The federal sanctuary system holds 232 NIH-owned chimpanzees as well as 14 privately owned chimpanzees. Another 272 chimpanzees reside outside the federal sanctuary system; of these, 177 have chronic health conditions that could increase their risk of relocation-related adverse events. Each facility that houses NIH-owned or -supported chimpanzees must be staffed and equipped to care for at-risk chimpanzees.

The working group also learned that deciding whether to relocate chimpanzees to the federal sanctuary system is a complex process influenced by available sanctuary space as well as chimpanzee health, behavior, social grouping, and welfare. Transportation decisions are also constrained by statutory requirements in animal welfare laws and regulations that protect research animals from harm and other animals from the risk of contracting communicable diseases. These laws and regulations prohibit the transportation of animals that would be endangered by the move. The decision about whether an animal is fit for transport rests with a licensed veterinarian at the sending facility. Therefore, the working group could not recommend transporting an animal that would be endangered by the move. However, the working group did recommend strategies for relocating other at-risk animals.

## **Working Group Recommendations**

Based on its findings, the working group offers the following recommendations to the Council of Councils:

**Recommendation 1:** The NIH and the facilities that house NIH-owned and NIH-supported chimpanzees should relocate all of these chimpanzees to the federal sanctuary system unless relocation is extremely likely to shorten their lives.

**Recommendation 2:** The NIH should oversee the development of standardized approaches by facilities that house NIH-owned or -supported chimpanzees for assessing each chimpanzee based on its health, behavior, social needs, and environmental requirements. This assessment should be used to better understand the animal's needs in its current and future environments and should inform relocation decisions.



**Recommendation 3:** All facilities that house NIH-owned or -supported chimpanzees must use the same health and behavioral categorization system for these animals so that sending facilities, receiving facilities, and the NIH all understand why a chimpanzee is in a certain health status category. Veterinary records must be shared between sending and receiving facilities so that the receiving facility can provide informed feedback about the animal(s) considered for relocation.

**Recommendation 4:** Both sending and receiving facilities should collaborate to jointly expand the technical assistance available to the receiving facility to care for at-risk chimpanzees.

**Recommendation 5:** With guidance from the NIH, facilities that house NIH-owned or -supported chimpanzees should develop shared relocation standard operating procedures (SOPs). These SOPs should describe risk-mitigation strategies (e.g., engaging veterinarians, behaviorists, and caregivers at the sending and receiving facilities in regular discussions before and after transportation; sending chimpanzees in intact social groups; providing flexibility to house smaller social groups at the receiving facility) that can be used when relocating at-risk chimpanzees.

**Recommendation 6:** When facilities disagree about whether to relocate a chimpanzee, independent expert veterinary opinion should be sought to inform the relocation decision.

**Recommendation 7:** Facilities housing NIH-owned or -supported chimpanzees should give the NIH sufficient information to undertake actuarial and demographic analyses of data on these chimpanzees.

## Overview and Organization of the Report

This report addresses the charge of the Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees. The report has the following sections:

1. Background information on the use of chimpanzees in National Institutes of Health (NIH)-supported research, the principles and criteria of the Institute of Medicine's 2011 report on the need for chimpanzees in biomedical and behavioral research, and subsequent NIH decisions regarding the use of the chimpanzees it owns or supports in research, including the NIH plan to retire all NIH-owned or -supported chimpanzees to the federal sanctuary system
2. Descriptions of the process to relocate chimpanzees to the federal sanctuary system and the characteristics of the NIH chimpanzee population
3. The need for, charge, membership, and activities of the working group
4. Characteristics of at-risk chimpanzees and of the facilities that house NIH-owned or -supported chimpanzees, scientific reports on the health effects of chimpanzee relocation, selected rules and regulations governing chimpanzee transfer between facilities, and input received from experts interviewed by the working group and from members of the public
5. The working group's findings about factors that are or could be considered in relocation decisions and the working group's recommendations
6. Conclusions

This overview is preceded by a glossary of terms used in this report. The appendices consist of the working group member roster and biographies, list of interviewees, schedule of working group activities, summary of expert interviews conducted by the working group, descriptions of the four facilities that currently house NIH-owned or -supported chimpanzees, a white paper on selected statutes and regulations, and a literature review on physiological and welfare concerns of at-risk chimpanzees.

## Glossary of Terms Used in this Report

**Adequate veterinary care:** professional medical services provided to the chimpanzees within the federal sanctuary system through a program directed by a veterinarian who has qualifications acquired through training and/or experience and the appropriate authority to provide this care; includes guidance to caregivers on all matters related to the chimpanzees' health and well-being.

**American Society of Anesthesiologists (ASA) Physical Status Scale, as adapted by the Academy of Veterinary Technicians in Anesthesia and Analgesia:** classification system used to assess an animal's fitness for surgery<sup>1</sup> that some experts recommend using to categorize chimpanzee fitness for relocation.

**Animal Welfare Act of 1966 (P.L. 89-544), as amended:** sets general standards for humane care and treatment that must be provided for certain animals that are bred for commercial sale, sold sight unseen, exhibited to the public, used in biomedical research, or transported commercially.

**At-risk chimpanzee:** chimpanzee that, due to physical or behavioral impairment, is more likely than not to experience one or more severe adverse events because of the relocation process; categorized as Class IV or Class V in the American Society of Anesthesiologists Physical Status Scale. Class III chimpanzees might be at risk.

**Carrier:** as defined in the Animal Welfare Act, an operator of any airline, railroad, motor carrier, shipping line, or other enterprise that is engaged in the business of transporting any animals for hire.<sup>1</sup>

**Chimpanzee Health Improvement Maintenance and Protection (CHIMP) Act (P.L. 106-551):** an act, signed by the President on December 20, 2000, to amend the Public Health Service Act to provide for a system of sanctuaries for retired chimpanzees that are no longer needed in federally funded research.<sup>2</sup>

**Chimp Haven is Home Act (P.L. 110-170):** an act, signed by the President on December 26, 2007, to amend the Public Health Service Act and modify the CHIMP Act by terminating the authority to remove retired chimpanzees from the federal sanctuary system for research purposes.

**Class I chimpanzees:** a category of animals in the ASA Physical Status Scale, as adapted; animals that are normal and healthy, have no underlying disease, and are at minimal risk of one or more relocation-related adverse events.

**Class II chimpanzees:** a category of animals from the ASA Physical Status Scale, as adapted; animals with minor disease and a slight-to-mild systemic disturbance for which the animals can

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<sup>1</sup>Academy of Veterinary Technicians in Anesthesia and Analgesia. American Society of Anesthesiologists (ASA) Physical Status Scale. <http://www.avtaa-vts.org/asa-ratings.pml>.

<sup>2</sup> U.S. Department of Agriculture. Animal Welfare Act and Animal Welfare Regulations. [https://www.aphis.usda.gov/animal\\_welfare/downloads/AC\\_BlueBook\\_AWA\\_FINAL\\_2017\\_508comp.pdf](https://www.aphis.usda.gov/animal_welfare/downloads/AC_BlueBook_AWA_FINAL_2017_508comp.pdf).

compensate; include newborn, geriatric, and obese chimpanzees; at slight risk of one or more relocation-related adverse events.

**Class III chimpanzees:** a category of animals from the ASA Physical Status Scale, as adapted; animals with obvious disease, moderate systemic disease or disturbances, and mild clinical signs; include animals with anemia, moderate dehydration, fever, low-grade heart murmur, or cardiac disease; at moderate risk of one or more relocation-related adverse events.

**Class IV chimpanzees:** a category of animals from the ASA Physical Status Scale, as adapted; animals that are significantly compromised by disease, have preexisting systemic disease or severe disturbances (e.g., severe dehydration, shock, uremia, toxemia, high fever, uncompensated heart disease, uncompensated diabetes, pulmonary disease, or emaciation); at high risk of one or more relocation-related adverse events.

**Class V chimpanzees:** a category of animals from the ASA Physical Status Scale, as adapted; moribund animals with life-threatening, systemic disease (e.g., advanced heart, kidney, liver, or endocrine disease), profound shock, severe trauma, pulmonary embolus, or terminal malignancy; at extremely high risk of one or more relocation-related adverse events.

**Committee on the Use of Chimpanzees in Biomedical and Behavioral Research (“IOM Committee”):** committee formed by the Institute of Medicine and the National Research Council to review the current use of chimpanzees in NIH-funded biomedical and behavioral research that is needed for the advancement of the public’s health.

**Council of Councils (“Council”):** a federal advisory committee established by the NIH Reform Act of 2006, passed by Congress in December 2006, and signed into law by the President in January 2007. The Council advises the NIH director and other delegated officials on matters related to the policies and activities of the Division of Program Coordination, Planning, and Strategic Initiatives.

**Division of Program Coordination, Planning, and Strategic Initiatives (DPCPSI):** a component of the NIH whose mission is to identify emerging scientific opportunities, rising public health challenges, and scientific knowledge gaps that merit further research. DPCPSI oversees the NIH Chimpanzee Management Program.

**Endanger:** threaten the welfare of an animal, other animals, or public health.

**Federal sanctuary system:** created in compliance with the CHIMP Act to provide lifetime care for federally owned and non–federally owned, retired chimpanzees that are no longer needed for research.

**Federally supported facility:** institution that receives NIH funding to provide medical care and housing to NIH-owned or -supported chimpanzees previously used in research.

**Geriatric chimpanzee:** one that is 35 years old or older, according to the U.S. Government Accountability Office.

**Health certificate:** form completed by a licensed veterinarian certifying that he or she inspected the animal on a specified date (which must be no more than 10 days before delivery) and that the animal appears to be free of infectious disease or physical abnormalities that would endanger the animal, other animals, or public health.

**Healthy chimpanzee:** one that has no compromising diagnoses and is unlikely to experience adverse events as a result of relocation.

**Institute of Medicine (IOM):** an independent, nonprofit organization that works outside of government to provide unbiased and authoritative advice to decision makers and the public.

**Intermediate handler:** any person (including a department, agency, or government agency) engaged in any business in which that person receives custody of animals in connection with their transportation in commerce (trade, traffic, transportation, or other commerce within or between states that affects trade, traffic, transportation, or other commerce).

**National Institutes of Health (NIH):** an agency of the U.S. Department of Health and Human Services that is the primary U.S. government agency responsible for biomedical and health-related research.

**NIH-owned chimpanzees:** chimpanzees directly owned by the NIH.

**NIH-supported chimpanzees:** chimpanzees not owned by the NIH but supported through NIH awards, such as grants and contracts.

**Quality-of-life care:** support and medical care given to control pain and other symptoms toward the end of a chimpanzee's life and to keep the animal as comfortable as possible.

**Receiving facility:** facility (federal sanctuary system) to which NIH-owned or -supported chimpanzees are relocated.

**Research facility:** school, institution, organization, or person that has used or intended to use live animals in research, tests, or experiments.

**Retired chimpanzees:** ones that live permanently in the federal sanctuary system and cannot be removed from that system.

**Sending facility:** one that houses NIH-owned or -supported chimpanzees being considered for relocation to the federal sanctuary system.

**Serious adverse event:** can include permanent or serious injury, long-term destabilization, or death within 6 months of arriving at the receiving facility (a timepoint based on the duration of the post-trip adjustment phase and the additional time for follow-up).

**United States Department of Agriculture:** U.S. federal agency that provides leadership and oversight on food, agriculture, natural resources, rural development, nutrition, and related issues;

is responsible for enforcing the Animal Welfare Act and the Animal Welfare Regulations (9 CFR Parts 1-4).

**Veterinarian (licensed veterinarian):** a licensed, graduate veterinarian with demonstrated expertise in the clinical care and welfare of nonhuman primates (preferably chimpanzees) and who is directly responsible for the routine clinical care of the animal(s) in question.

**Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees:** NIH Council of Councils working group charged with providing advice and recommendations for consideration by the Council on factors to be considered by attending veterinarian staff when deciding whether to relocate NIH-owned or NIH-supported chimpanzees to the federal sanctuary system.

**Working Group on the Use of Chimpanzees in NIH-Supported Research:** created on February 1, 2012, within the NIH Council of Councils and charged with providing advice on implementing the principles and criteria in the IOM report, *Chimpanzees in Biomedical and Behavioral Research: Assessing the Necessity*. This working group concluded its work on January 22, 2013.

## **Section 1. Background**

The National Institutes of Health (NIH), part of the U.S. Department of Health and Human Services, is the nation's medical research agency. The mission of the NIH is to seek fundamental knowledge about the nature and behavior of living systems and to apply that knowledge to enhance health, lengthen life, and reduce illness and disability. To fulfill this mission, the NIH supports and conducts research throughout the world and in its own laboratories.

Some research activities supported by the NIH involve the use of animal models to study important biomedical and/or behavioral conditions, and the agency devotes additional resources to caring for and housing animals used in research. The use of animals in research has enabled scientists to identify new ways to treat illness, extend life, and improve health and well-being.

In 2015, the NIH determined that all NIH-owned chimpanzees that resided outside of the federal sanctuary system<sup>3</sup> operated by Chimp Haven, Inc., Keithville, Louisiana, were immediately eligible for retirement. However, many of the NIH-owned and NIH-supported chimpanzees have age-related ailments that can increase their risk of severe adverse events during the transfer and relocation process. The NIH therefore established the Council of Councils Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees to understand and provide advice and recommendations for consideration by the Council on this decision-making process. After presenting background information in the initial sections, this report summarizes the evidence that the working group considered along with the group's conclusions and recommendations.

### **NIH-Supported Research Involving Chimpanzees**

Our closest human relative, the chimpanzee, has provided exceptional insights into human biology. But the use of chimpanzees in research has raised concerns from advocates, members of the public, scientists, and others who recognize that the chimpanzee's similarity to humans deserves special consideration and respect. Over time, scientists have had great success finding alternative technologies and methods that reduced the number of chimpanzees needed for research.

Recognizing these advances, the NIH commissioned a study by the Institute of Medicine (IOM) in December 2010 to assess whether chimpanzees are or will be necessary for biomedical and behavioral research in the future. The committee that wrote that report [Institute of Medicine 2011] concluded that the use of chimpanzees in research had become "largely unnecessary" and recommended approaches to minimize their use in federally funded research.

### **NIH Response to the IOM Report**

After accepting the IOM recommendations, the NIH charged the NIH Council of Councils with

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<sup>3</sup> The federal chimpanzee sanctuary system was established in 2000 by the Chimpanzee Health Improvement, Maintenance and Protection (CHIMP) Act. Chimp Haven, Inc., operates the sanctuary system, which the NIH oversees. The 2013 reauthorization of the CHIMP Act authorizes the NIH to continue funding the care, maintenance, and transportation of the agency's chimpanzees, including those housed in the federal sanctuary system.

assembling a working group to offer advice on implementing the IOM recommendations and to consider the size and placement of NIH-owned and NIH-supported chimpanzees. On January 22, 2013, the Council of Councils accepted recommendations<sup>4</sup> presented by its Working Group on the Use of Chimpanzees in NIH-Supported Research and provided these recommendations to the NIH. After seeking and considering public comments, the NIH accepted most of the Council's recommendations on June 26, 2013. See 78 Fed. Reg. 39741 (July 2, 2013) for a summary of the comments and the NIH's decisions and rationale.

After the NIH implemented the Council recommendations, the demand for using chimpanzees for research declined, and the U.S. Fish and Wildlife Service announced in June 2015 that it had designated all captive chimpanzees as endangered [United States Fish and Wildlife Service 2015]. Among other things, this designation required researchers to apply for and obtain a permit to use captive chimpanzees in research if this research could harm the animals.

Based on these many changes (summarized in Table 1) and the significantly reduced demand for chimpanzees in NIH-supported biomedical research, the NIH reassessed the need to maintain chimpanzees for biomedical research. On November 17, 2015, the agency decided that, effective immediately, the NIH would no longer maintain a limited colony of chimpanzees for future research [National Institutes of Health 2015]. All NIH-owned chimpanzees that resided outside of the federal sanctuary system were immediately eligible for retirement.

**Table 1. Timeline of Events Leading to the NIH Decision to End the Use of Chimpanzees in Research**

December 2010	The NIH director commissions a study by the IOM to determine the continued scientific need for chimpanzees in NIH-funded research.
December 2011	The IOM issues a report, <i>Chimpanzees in Biomedical and Behavioral Research: Assessing the Necessity</i> . The committee that authored this report concludes that most current use of chimpanzees in biomedical research is unnecessary and that the use of chimpanzees in research that might still be needed should be guided by a set of principles and criteria.
December 2011	The NIH director accepts the IOM recommendations. The NIH charges a working group of the Council of Councils to make recommendation for consideration by the Council on how to implement them.
January 2013	The NIH Council of Councils accepts the working group's recommendations and presents them to the NIH; having completed its report, the working group is dissolved.
June 2013	After seeking and reviewing public comments, the NIH announces that it accepts most Council recommendations and will significantly reduce the use of chimpanzees in research.
June 2015	The U.S. Fish and Wildlife Service finalizes a rule listing all chimpanzees as endangered under the Endangered Species Act.
November 2015	The NIH announces that it will no longer support biomedical research using chimpanzees.
August 2016	The NIH develops a plan to retire NIH-owned and NIH-supported chimpanzees.

<sup>4</sup> National Institutes of Health. NOT-OD-12-025: NIH Research Involving Chimpanzees. <http://grants.nih.gov/grants/guide/notice-files/NOT-OD-12-025.html>.



## NIH Plan to Retire all NIH-Owned and NIH-Supported Chimpanzees

### The Chimpanzee Health Improvement, Maintenance, and Protection (CHIMP) Act

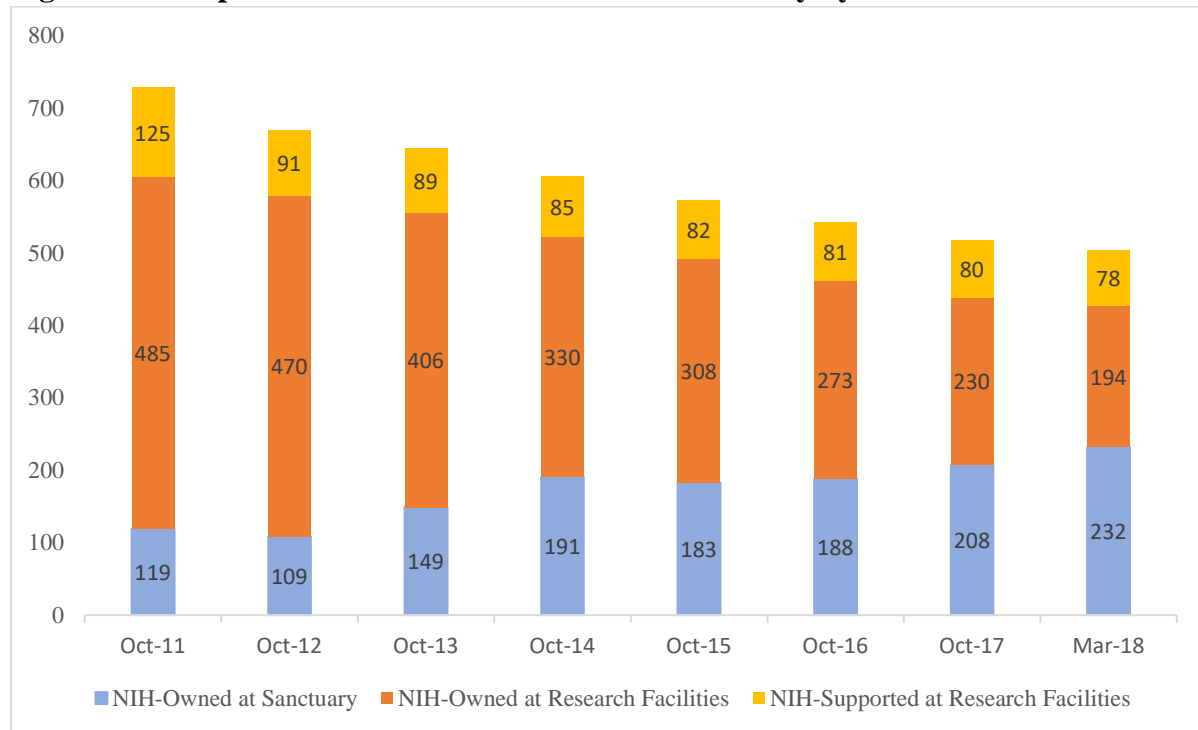
The CHIMP Act of 2000 affirms the federal government's responsibility to provide an orderly system for ensuring a secure retirement for surplus federal research chimpanzees and to meet their lifetime needs for shelter and care. The act requires the Secretary of Health and Human Services to establish a sanctuary system of lifetime care for retired chimpanzees. The federal sanctuary system is to be operated by a nonprofit private entity with appropriate expertise under contract with the Secretary of Health and Human Services and in compliance with standards established by the secretary and the criteria in the CHIMP Act.

In December 2007, the “Chimp Haven is Home Act” amendment was signed into law. This amendment prohibited the return of chimpanzees to research once they are retired into the federal sanctuary system. In November 2013, additional amendments removed a \$30 million spending cap in the CHIMP Act of 2000.

### NIH Retirement Plan

As of March 30, 2018, the NIH has relocated 364 chimpanzees to the federal sanctuary system since it opened in 2005. Figure 1 shows the decrease in the number of NIH-owned and NIH-supported chimpanzees over time, the decrease in the number of chimpanzees at research facilities, and the increase in the number of animals retired to the federal sanctuary system.

**Figure 1. Chimpanzee Relocation to the Federal Sanctuary System**



The retirement of chimpanzees to the federal sanctuary system proceeds according to a retirement plan<sup>5</sup> that the NIH developed to transition NIH-owned or -supported chimpanzees into the federal sanctuary system between 2015 and 2026. The NIH uses the retirement plan, along with the sanctuary's current capacity and modeling of the natural attrition rate in this aging population, to estimate the number of chimpanzees that can be transferred to the federal sanctuary system each year. The NIH estimated in 2016 that all NIH-owned and NIH-supported chimpanzees could be retired to the federal sanctuary system by 2026.

The retirement plan calls for the methodical transfer of NIH-owned or -supported chimpanzees to provide enough time to assess the medical and behavioral status of each chimpanzee, likely impact of the transfer process on each chimpanzee's health and well-being, and how each chimpanzee will respond to living in a new environment and, potentially, a new social group.

## **Section 2. The Chimpanzee Retirement and Relocation Process**

### **Process to Relocate Chimpanzees and Factors that Influence Relocation Decisions**

Deciding whether to relocate chimpanzees to the federal sanctuary system is a complex process influenced by available sanctuary space as well as chimpanzee health and welfare. Animal welfare laws and regulations place statutory requirements to protect research animals from harm and to protect other animals from the risk of contracting communicable diseases. In addition, federal laws and regulations prohibit a licensed veterinarian from issuing a health certificate for an animal that would be endangered by the transportation; they also prohibit carriers from transporting obviously ill, injured, or physically distressed animals. Selected laws and regulations are described more fully in Appendix G.

The process for relocating chimpanzees to the federal sanctuary system has three phases: assessment and preparation before the trip, during the trip, and after the trip.

#### Assessment and Preparation Before the Trip

Relocation decisions are preceded by weeks of effort by qualified individuals at the sending and receiving facilities to assess space, transport conditions, weather, social groupings, and each animal's health [Bloomsmith, Schapiro et al. 2006; Schapiro, Lambeth et al. 2012]. Decisions about whether a chimpanzee can be transported are based on a careful examination of the animal by a licensed veterinarian at the sending location. The veterinarian examination can include measurements of body weight and hematological and serum clinical chemistry, cardiac evaluations, and full dental and physical examinations. Whether a chimpanzee might harbor a communicable disease and endanger other animals and whether it would be endangered by the transportation and relocation process are deciding factors in transportation decisions [United States Department of Agriculture [USDA] 2017]. The veterinarian also assesses the impact of frequent anesthesia administration, stress, and new social groups. Without a health certificate, the USDA does not allow a commercial carrier to transport a chimpanzee out of state.

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<sup>5</sup> National Institutes of Health. NIH Plan to Retire All NIH-Owned and -Supported Chimpanzees. <https://orip.nih.gov/comparative-medicine/programs/nih-plan-retire-all-nih-owned-and-supported-chimpanzees>.

Trip preparation requires, among other things, that a licensed veterinarian inspect the chimpanzee (which requires anesthesia) within 10 days before the transportation. The veterinarian must document in a health certificate that the animal appears to be free of infectious diseases and physical abnormalities that would “endanger” it. Chimpanzees that are obviously ill, injured, or in physical distress must not be transported, except to receive veterinary care for the condition. The Animal Welfare Act also requires the carrier to make sure that the animal has had recent food and water, has an executed health certificate from the veterinarian, and has all other paperwork in order (including for medications).

### During the Trip

Chimpanzees are relocated to another facility by a trucking carrier designed to accommodate the size and strength of chimpanzees as well as to meet the federal transportation requirements of the Animal Welfare Act regarding such factors as interior temperature. Chimpanzees might be sedated temporarily to prepare them for loading into the vehicle. Depending on which facility is sending the chimpanzees, the trip to the federal sanctuary system can take approximately 8 to 15 hours, and the animal is transported in a temperature-controlled vehicle that meets Animal Welfare Act requirements.

### After the Trip

After the move, additional efforts must be made to satisfy applicable quarantine requirements (e.g., 42 CFR Part 9) in the federal sanctuary system and to ensure safe integration of the relocated chimpanzees into new social groups [National Academy of Sciences, Institute for Laboratory Animal Research 2011; Bloomsmith, Schapiro et al. 2006; Schapiro, Lambeth et al. 2012]. The post-trip phase can last 17–36 days for quarantine, and additional time is required (approximately 2 months or longer depending on the number of animals and their social history) for social group introductions.

## **Characteristics of the NIH Chimpanzee Population**

As of March 2018, NIH owns or supports 504 chimpanzees. Table 2 provides details on where these animals currently are housed, their ages, and their infection status. Important numbers to consider are:

- The federal sanctuary system holds 232 NIH-owned chimpanzees as of March 30, 2018, as well as 14 privately owned animals.
- Another 272 chimpanzees reside outside the federal sanctuary system; of these, 177 have chronic health conditions.

**Table 2. NIH-Owned (APF; KCCMR; CH) and NIH-Supported (SNPRC) Chimpanzees as of March 30, 2018**

	<b>APF</b>	<b>KCCMR</b>	<b>SNPRC</b>	<b>CH</b>	<b>TOTAL</b>
Total number*	66	128	78	232	504
Age range (years)	25–55	15–55	22–54	7–58	7–58
Average age (years)	38	31	30	31	32
Number that are geriatric (aged 35 years or older; %)	37 (56.1%)	44 (34.4%)	15 (19.2%)	82 (35.3%)	178
Number that have a chronic infection (%)**	11 (16.7%)	5 (3.9%)	26 (33.3%)	112 (48.3%)	154
Number that are chronically ill (%)†	55 (83.3%)	93 (72.7%)	29 (37.2%)	89 (38.4%)	266

APF, Alamogordo Primate Facility; KCCMR, Michale E. Keeling Center for Comparative Medicine and Research; SNPRC, Southwest National Primate Research Center; CH, Chimp Haven

\*Numbers in the facility columns might not add up to the amounts in the totals column because chimpanzees can be categorized into more than one group. The census of 232 of the federal sanctuary system operated by Chimp Haven, Inc. refers to the number of NIH-owned animals. In addition, 14 privately owned chimpanzees reside in the federal sanctuary system.

\*\*As reported by the facility; chronic illnesses include hepatitis A, hepatitis B, hepatitis C, HIV, simian immunodeficiency virus, and simian-T-cell leukemia virus.

†Chronic progressive disease requiring ongoing treatment, such as diabetes, cardiovascular disease, renal insufficiency, hepatitis, or arthritis

### **Section 3. Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees**

#### **Need for the Council of Councils Working Group**

NIH considers all NIH-owned chimpanzees that reside outside of the federal sanctuary system to be eligible for retirement and relocation to the sanctuary. However, many of the NIH-owned and NIH-supported chimpanzees currently awaiting retirement have age-related ailments that can complicate the transport and relocation process, including the decisions that must be made before, during, and/or after the relocation. These chimpanzees might be geriatric, have comorbid conditions and diseases, or have aggressive tendencies toward new social groups. These conditions can increase the risk of severe adverse events during the transfer and relocation process. A licensed veterinarian therefore determines whether the relocation process will endanger the animal, as required by federal animal welfare laws and regulations. Specifically, these laws and regulations prohibit the transportation of animals that would be endangered by the transportation or are obviously ill, injured, or physically distressed.

Which animals would be endangered by transportation is often determined collaboratively by the sending facility and the federal sanctuary system, although the final authority rests with a licensed veterinarian who certifies that a chimpanzee is fit for relocation. The NIH established

the Council of Councils Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees to understand and provide advice and recommendations for consideration by the Council on this decision-making process.

### **Working Group Charge**

An important objective of the NIH is to provide direction for the relocation and overall welfare of the retirement-eligible chimpanzees. On February 20, 2018, the NIH therefore charged the Council of Councils Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees with providing advice and recommendations for consideration by the Council on factors for licensed veterinarians to consider when deciding whether to relocate NIH-owned and NIH-supported chimpanzees to the federal sanctuary system. The working group was asked to provide its findings to the Council of Councils for consideration.

To fulfill this charge, the working group was to:

- Review two NIH summary background reports:
  - “The Decision to Approve the Transportation of Chimpanzees from Research Facilities to the Federal Chimpanzee Sanctuary System: A Summary of Selected Statutes, Regulations, and Reference Manuals” (Appendix G)
  - “Physiological and Welfare Concerns of the At-Risk Chimpanzee Population—A Literature Review” (Appendix H)
- Interview staff at NIH-supported facilities and other veterinarian experts in chimpanzee relocation about the relocation process and factors they consider when assessing the risk(s) of relocating chimpanzees
- Where possible, identify additional objective and subjective measures for use by the NIH and NIH-supported facilities in assessing the risk(s) of relocating individual chimpanzees
- Identify the documentation recommended to support subjective assessments
- Develop a points-to-consider report and/or risk-based selection matrix to inform decisions made by the attending veterinarian and NIH regarding chimpanzee relocation, particularly in ambiguous circumstances

### **Working Group Membership**

The NIH selected one member of the Council of Councils, Terry Magnuson, PhD, to serve as chair of the working group and oversee its activities. In consultation with the chair, the NIH selected members of the working group who had expertise in chimpanzee behavior, conservation, veterinary medicine, anesthesiology, and applicable federal regulations. The working group’s membership roster, member biographies, and list of interviewees are available in Appendix A, Appendix B, and Appendix C, respectively. A schedule of the working group’s meetings, interviews, and site visits are available in Appendix D. At least one NIH employee attended all working group meetings.

## Timeline of Major Activities

The timeline for establishing the Council of Councils Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees and completing its major activities is provided in Table 3.

**Table 3. Timeline of Creation of Working Group and Major Working Group Activities**

Activity	Date
Council of Councils establishes the working group.	January 26, 2018
The NIH officially charges the working group.	February 20, 2018
The working group presents its final report to the Council of Councils.	May 18, 2018

## Section 4. At-Risk Chimpanzees and Relocation

### Characteristics of At-Risk Chimpanzees

This section summarizes the working group’s findings, based on interviews with a broad range of experts (see Appendix C for a list of those interviewed and Appendix E for a summary of the interviews) and site visits to facilities (listed in Appendix D) that house NIH-owned or -supported chimpanzees, regarding the characteristics of chimpanzees that facility staff (i.e., veterinarians) consider to be at risk of adverse events during and after relocation to the federal sanctuary system.

The decision to transfer chimpanzees depends on the results of the evaluation of characteristics in these animals that would increase their risk of adverse events if they are relocated. The working group’s assessment of chimpanzee colonies at animal facilities—Alamogordo Primate Facility (APF), Michale E. Keeling Center for Comparative Medicine and Research (KCCMR), and Southwest National Primate Research Center (SNPRC)—revealed certain characteristics in chimpanzees that facility staff consider to be risks. Examples of severe medical or behavioral conditions in at-risk chimpanzees include:

- Advanced cardiac conditions (e.g., congestive heart failure)
- Renal failure
- Severe hepatic disease
- Spinal or other disabling orthopedic conditions or nerve injuries
- Recent and significant weight change for undiagnosed reasons
- Blindness or inability to exhibit species-specific behavior, which endangers them when they interact with other chimpanzees
- Extreme aggression toward themselves or others in new social situations
- Old age combined with multiple comorbidities
- Uncontrolled medical conditions (e.g., epilepsy and diabetes) that cannot yet be managed and would put the animals at risk without constant observation and medical management

Chimpanzees at increased risk of experiencing relocation-related adverse events often have certain behavioral problems, such as self-injury and other aggressive behaviors, that are induced by stress. Chimpanzees that have spent their entire lives in established social groups might display aggression when introduced into a different, larger group. At one facility, an animal that the sending facility reluctantly transferred exhibited aggressive behavior when introduced into a new social group, which resulted in the death of another chimpanzee.

At-risk chimpanzees often have severe cardiac outcomes, such as sudden cardiac death due to presumed fatal arrhythmias in the presence of myocardial fibrosis and left ventricular hypertrophy. Facility senior staff members agreed that cardiac disease that is manageable (less severe) does not preclude transfer, although no uniform system to categorize the severity of cardiac disease is available.

No objective biomarkers can be used to support relocation decisions. However, staff members at one facility determined that in their experience, chimpanzees survive on average 3 years after developing a health status that staff consider a contraindication to being transferred. At two facilities, cardiac ailments are more common in males, although female chimpanzees also develop cardiovascular disease. Cardiac disease prevalence increases with age, although apparently healthy chimpanzees in their 20s sometimes die suddenly and are found to have myocardial fibrosis on necropsy.

Stress-induced behavior, severe heart disease, advanced age, age-related chronic conditions (e.g., osteoarthritis) and comorbidities, and male sex are characteristics of at-risk chimpanzees. No hard evidence supports the conclusion that a particular characteristic will result in transfer-related death. Nonetheless, experts believe that careful monitoring of each animal and other intervention strategies (e.g., proper social grouping) can help mitigate the risk of adverse events when chimpanzees are relocation.

### **Characteristics of Facilities that House NIH-Owned and NIH-Supported Chimpanzees**

Each facility that houses NIH-owned or -supported chimpanzees is to be staffed and equipped to care for at-risk chimpanzees. This section provides brief summaries of the staffing capabilities and housing at each of these four facilities. Detailed reports on resources and staffing provided by each facility are available in Appendix F.

Chimp Haven, Inc., which operates the federal sanctuary system, has a full-time veterinarian as well as animal caregivers, veterinary technicians, a behaviorist, and animal husbandry supervisors. Animal care and veterinary care staff monitor each chimpanzee daily for signs of illness, injury, or aberrant behavior. All chimpanzees undergo a physical examination at least once a year, and an onsite pharmacy provides a range of treatments. Chimp Haven, Inc. uses positive reinforcement to train chimpanzees to undergo medical care, minimizing the need for sedation, and to encourage physical activity. Chimp Haven, Inc. modifies its enclosures to accommodate the needs of aged, arthritic, or obese chimpanzees, and it can relocate older chimpanzees with altered cognition or mobility to smaller habitats as needed to reduce injury risk and increase accessibility. Staff provide physical and mental enrichment, and veterinary staff

determine the appropriate diet for each animal. Chimp Haven, Inc. has detailed guidelines to ensure humane end-of-life decisions.

The APF has a well-defined health-care and enrichment program along with experience providing veterinary care to geriatric, aging, and chronically ill chimpanzees. Its staff members include two veterinarians who are on call at all times and an occupational health nurse. APF staff monitor all animals for unusual, undesirable, or abnormal behavior. All chimpanzees undergo an annual physical examination, and more frequent examinations are conducted when needed to monitor disease progression and treatment. The APF has trained all chimpanzees for sedation using positive reinforcement techniques, and it has trained several animals for cage-side physical examinations or to give voluntary urine and/or blood samples. All animals have access to indoor, outdoor, and play yard areas 24 hours a day. The facility meets chimpanzees' socialization needs by dividing dens in ways that let animals interact on their own schedules. The chimpanzees' diet is heart healthy. APF has a humane endpoint policy with the goal of providing proper quality of life until the animals can no longer remain healthy (e.g., able to display species-typical behavior).

The SNPRC staff includes technicians, behavioral services staff, a colony manager, other caretakers, clinical and administrative veterinarians, and veterinary pathologists. Each chimpanzee undergoes an annual wellness examination that includes a review of all body systems and testing for various diseases and infections. Chimpanzees are assigned to individual caregivers so that they can develop close relationships. Each animal undergoes a daily wellness check as well as more in-depth behavioral assessments each quarter. All chimpanzees participate in the environmental enrichment program (i.e., structural, sensory, occupational, and social enrichment) that encourages the expression of species-typical behaviors. Positive reinforcement training is used to obtain voluntary cooperation with routine management procedures and gives the animals a sense of control and predictability. All animals have 24-hour access to indoor and outdoor housing, and the chimpanzees live in socially compatible groups. On-site cage and facilities maintenance groups can address any issues that arise, including the need for cage modifications to accommodate mobility-impaired animals. Facilities are evaluated and renovated based on the population's changing needs. A quality-of-life committee reviews the needs of chronically or acutely ill animals that might require end-of-life decisions.

The staff of the National Center for Chimpanzee Care at KCCMR includes board-certified veterinarians; a behavioral scientist; managers; positive reinforcement trainers; and animal husbandry, veterinary care, behavioral, and support staff. Staff observe all chimpanzees at least four times a day for signs of illness, injury, or unusual behavior. All chimpanzees receive either annual or biannual physical examinations, depending on their health status. The center integrates noninvasive complementary therapies (e.g., acupuncture and laser therapy) into chimpanzee treatment plans. The trainers use positive reinforcement training and have established a high level of trust with the chimpanzees, which enhances the animals' cognitive stimulation and choices as well as the quality of care that the facility provides. The chimpanzees voluntarily present wounds for treatment, allow staff to use medical devices, and participate in the collection of various samples for testing. KCCMR also performs blood tests in house, which is important for making timely clinical decisions. Modifications to enclosures for geriatric and mobility-impaired chimpanzees include the addition of wide ramps with hand holds to existing play



structures, beds at different heights, and pathways that give access to all areas. The center's quality-of-life program is designed to improve care for chimpanzees with a terminal or chronic debilitating condition, and a quality-of-life team determines how best to minimize pain or suffering and assist with end-of-life decision making.

### **Scientific Reports on Health Effects of Relocation**

Scientific reporting on chimpanzees has helped scientists model human diseases, including hepatitis and HIV infections as well as cardiovascular disease. This modeling has helped identify physiological and general welfare considerations for these animals. The scientific literature shows that the health status of chimpanzees can affect transfer and relocation outcomes as well the ability to maintain social groups.

On November 3, 2017, the NIH hosted the Physiological and Welfare Concerns of the At-Risk Chimpanzee Population—Literature Review Meeting. The participants, all NIH staff members, included subject-matter experts in veterinary medicine, nonhuman primates, and animal welfare. The purpose of the meeting was to evaluate scientific articles relevant to chimpanzee health. These experts were asked to consider whether the peer-reviewed literature provided sufficient information to develop a risk-assessment system for safely transporting chimpanzees and maintaining their long-term care.

Appendix H summarizes the results of the systematic review of relevant chimpanzee literature from the last 20 years [Ely, Zavaski et al. 2013; Lammey, Baskin et al. 2008; Lammey, Lee et al. 2008; Laurence, Kumar et al. 2017; Nunamaker, Lee et al. 2012; Videan, Fritz et al. 2007; Yamanashi, Teramoto et al. 2016; Yamanashi, Morimura et al. 2016]. This review identified cardiovascular disease, renal disease, stress, metabolic diseases (e.g., obesity), aging, viral infection, and osteoarthritis as potential considerations for relocating chimpanzees to the federal sanctuary system.

The expert reviewers noted that the risks of anesthesia could be exacerbated by the repeated physical examinations (and the sedation involved) required for relocation. Furthermore, cardiovascular disease, liver disease, stress, gastroenterological disorders, and (possibly) age and sex affect the relocation risks for chimpanzees. The experts offered the following recommendations:

- Avoid transporting animals with late-stage cardiovascular or liver disease
- Consider preferentially transporting chimpanzees that have early-stage cardiovascular disease, diabetes, or osteoarthritis

### **Selected Laws, Rules, and Regulations Governing Transfers Between Facilities**

Veterinarians must consider certain statutory and regulatory requirements when determining whether to issue the health certificate required for a chimpanzee's transportation. Facilities that transport chimpanzees must adhere to these statutes and regulations.

The Animal Welfare Act of 1966 created standards for the humane treatment, care, and transportation of animals by animal research facilities, breeders, and exhibitors. The USDA is

responsible for enforcing compliance with this act's regulations through inspections at facilities performed by the USDA Animal and Plant Health Inspection Service. The USDA also requires a licensed veterinarian to issue a health certificate verifying that he or she inspected the animal on a specified date and that the animal appears to be free of infectious disease or physical abnormalities that would endanger the animal, other animals, or public health.

The act and its regulations describe the roles of licensed veterinarians (9 CFR Parts 1–4) and intermediate handlers and carriers (9 CFR Part 2 §2.78). These veterinarians are responsible for satisfying the stipulations of the Animal Welfare Act, including the execution of a health certificate before the chimpanzee is transported. They must also sign a statement no more than 10 days before delivery of the animal for transportation certifying that the animal is acclimated to air temperatures lower than 50°F but not lower than the minimum temperature generally and professionally accepted for the species. Intermediate handlers and carriers may not transport animals without a properly executed health certificate, and they may refuse to transport an animal that is obviously ill, injured, or physically distressed or because of unsafe enclosures or incomplete documentation.

Several local statutes also govern the transport of chimpanzees in certain states. For example, Louisiana state law requires the company that operates the federal sanctuary system receiving NIH-owned or -supported chimpanzees that are relocated from research centers in Texas or the research reserve in New Mexico to obey the Louisiana Department of Agriculture and Forestry's animal import rules and federal requirements.

Appendix G contains a report, “The Decision to Approve the Transportation of Chimpanzees from Research Facilities to the Federal Chimpanzee Sanctuary System—A Summary of Selected Statutes, Regulations, and Reference Manuals,” that provides more information on relevant laws and regulations.

### **Input from Members of the Public**

The working group received letters from five nonprofit organizations. The authors offered recommendations on the composition of the Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees and called for transparency on the group's membership. Letter writers recommended, for example, that the working group be composed primarily of veterinarians, behaviorists, and/or caregivers with experience integrating chimpanzees into social groups and that it include or consult bioethicists and representatives of animal protection organizations. The letters also emphasized the need to ensure that members have no perceived or real conflicts of interest. Other suggestions were to make the working group's deliberations transparent and arrange for all working group members to visit all three laboratory facilities that house the NIH-owned and NIH-supported chimpanzees. One letter asked the Council of Councils to accept public comment on the working group's recommendations.

Recommended topics for the working group to address included the following:

- The current housing environments for chimpanzees in biomedical research laboratories
- Ways to improve the housing, enrichment, and veterinary care of animals waiting for transfer to the federal sanctuary system

- The fact that chimpanzee death is a natural factor of chimpanzee life in retirement
- The financial costs of retirement in place (i.e., in the research facility)
- The goal of laboratory enclosure design, which is to support research and not to maximize chimpanzee welfare

Some authors stated that the laboratories maintaining NIH-owned or -supported chimpanzees lack the capacity to meet the standards of care called for in federal regulations and that are necessary for chimpanzee well-being according to the published literature. They stated that none of the laboratories housing the animals can offer the same standard of living as the federal sanctuary system, arguing that these environments do not meet the “ethologically appropriate” principle established by the IOM. They also noted that laboratories are designed to advance human health through research, whereas the sole purpose of sanctuaries is to promote animal welfare. Furthermore, they were concerned that staff at these laboratories might be biased in favor of keeping the animals at their facilities because of the federal funding they receive in exchange. Other concerns were the mistreatment of primates, management problems at research laboratories in the past, and published reports on the risks to chimpanzees held in laboratories.

However, other authors were concerned that moving all NIH-owned or -supported chimpanzees to the federal sanctuary system would move animals out of a familiar setting, where the caretakers are familiar with their health status and personalities, to a novel setting and was not in the animals’ best interests. In addition, they commented that the stress associated with the move and the need to form a new social group could destabilize the animals’ health and could be fatal.

Some authors pointed out that sanctuaries in general allow chimpanzees to express natural behaviors and choose how to spend their day. Furthermore, they stated that retiring the chimpanzees to the federal sanctuary system would save money. In addition, the federal sanctuary system has expertise in the psychological and physical rehabilitation of chimpanzees formerly used in biomedical research, so virtually all chimpanzees would benefit from being transferred there, even if they do not live long once they arrive.

These letter writers noted that simply because an animal’s medical record shows that the animal has risk factors does not mean that it cannot do well once it is transferred to the federal sanctuary system. They argued that chimpanzees can be relocated with minimal stress and injury provided that:

- Veterinarians and other trained staff travel with the animals.
- Appropriate quarantine measures (e.g., placing animals with familiar chimpanzees) are implemented before and after the animals arrive at the federal sanctuary system.
- Chimpanzees are housed with suitable social partners.
- Consideration is given to the sex of the animals in advance to ensure proper social groupings.

Some letter writers encouraged the NIH to safely transport all remaining NIH-owned and NIH-supported chimpanzees to the federal sanctuary system as safely and quickly as possible. They also recommended that the working group expedite the timeline for transferring the animals to the federal sanctuary system. Others argued that the NIH should consider retiring the chimpanzees in place and not moving them to the federal sanctuary system.

## **Section 5. Recommendations and Points to Consider when Relocating At-Risk Chimpanzees**

### **Working Group Findings on Relocation Considerations**

The working group's fact-finding activities to assess the safety of relocating at-risk chimpanzees included interviewing experts in chimpanzee care, transportation, health, and behavior. The working group also met with facility representatives to understand transportation decisions, colony characteristics, and whether certain health conditions disqualify a chimpanzee from transportation. In addition, the working group considered written input from organizations that volunteered their views. Throughout the fact-finding process, the working group heard shared opinions on some issues and divergent viewpoints on others.

This section summarizes the issues raised during the working group's fact-finding activity. Section 4 and Appendix E provide more details on the input received. The working group used this information to develop the recommendations provided later in this section.

#### Should Health be a Factor in Decisions to Transfer a Chimpanzee?

The working group defines at-risk chimpanzees as those that are more likely than not to experience one or more severe adverse events because of the relocation and integration process. Severe adverse events include permanent or serious injury, long-term destabilization, or death within 6 months of arriving at the receiving facility (a timepoint based on the duration of the post-trip adjustment phase and the additional time for follow-up). The "at-risk" chimpanzees might include those with obvious disease (certain Class III animals, as described in Table 4) and others that are significantly compromised by disease (Class IV) or are moribund (Class V).

Veterinary staff at sending and receiving facilities tend to agree that animals with severe conditions are very fragile and should not be relocated. They also typically agree that transferring the most at-risk animals could lead to their deaths shortly after arrival or would severely destabilize or injure these chimpanzees or others.

A few experts suggested that health not be a factor in deciding whether to relocate animals and recommended that the NIH transfer all chimpanzees to the federal sanctuary system irrespective of their health status, unless the animals are dying. They stated that chimpanzees should have the opportunity to live in the federal sanctuary system even if the transportation process shortens their lives.

#### How Do Facilities Determine Which Animals Are "At Risk"?

Many facilities use a grading system to categorize the overall medical or behavioral health of each animal and social group. Some scales use qualitative descriptors (e.g., "healthy" or "very fragile/receiving quality-of-life care"), a three-tier system that ranks risk from low to high, or a numerical scale. In addition, one facility uses a behavioral assessment that identifies extreme behaviors that could endanger other chimpanzees. Other experts recommended use of the American Society of Anesthesiologists Physical Status Scale, as adapted by the Academy of

Veterinary Technicians in Anesthesia and Analgesia, which uses five classes to assess an animal's physical fitness (Table 4). Although the scales that facilities use are similar, different facilities use different scales.

### Which Components of the Relocation Process Pose the Biggest Threat to At-Risk Chimpanzees?

Experts suggested that physical transit between sites is less hazardous for chimpanzees than other components of the transportation process because the vehicles are climate controlled, a caretaker or veterinarian observes the chimpanzees at regular intervals, and all aspects of the process comply with Animal Welfare Act requirements. The sending facility representatives could not recall hearing of any deaths during transit.

The experts interviewed stated that each animal's ability to survive anesthesia before the trip as well as post-trip stress and integration are the main factors used to decide whether an at-risk chimpanzee should be relocated. Veterinarians routinely conduct pre-trip anesthesia evaluations before sedating and physically examining animals. Several chimpanzees are categorized as being at "high anesthesia risk" because they have severe medical conditions, and facility staff are concerned that these animals might not survive the sedation required for the physical examination that must be conducted before relocation and for quarantine examinations after relocation. In addition, experts reported their impression that changing environments and being introduced to new caregivers, facilities, and social groups is stressful for some chimpanzees. One receiving facility representative expressed concern that a small amount of time (e.g., 1 month) might not be sufficient for staff, newly relocated animals, and other resident chimpanzees to acclimate to the demands of frequent additions of newly arrived chimpanzees to the colony.

Both sending and receiving facility representatives tended to agree that healthy chimpanzees should continue to be relocated to the federal sanctuary system, although several expressed concerns about separating social groups to relocate healthier animals while frailer chimpanzees remain at the sending facility. According to sending facility representatives, most of the animals they send to the federal sanctuary system are healthy, meaning that they have no compromising diagnoses and are unlikely to experience adverse events as a result of the relocation. However, interviewees generally agreed that transportation carries some risk even for healthy animals, although the process is less risky than for less healthy animals.

### Which Factors Disqualify At-Risk Animals from Relocation?

Sending facilities report that their most difficult decisions are whether to transfer chimpanzees that are medically or behaviorally compromised (e.g., have chronic conditions or hyper-aggressiveness). These animals are in a "grey zone" in which they might experience one or more serious adverse events, but little evidence is available to quantify this risk. Questions these staff members ask themselves are:

- Is the animal sufficiently stable for transportation?
- Is the receiving facility appropriately staffed and equipped to provide the care that the animal requires?
- Can the chimpanzee travel with its social group, or will the animal need to be separated from its social group if it cannot be relocated?

- Will the animal have adequate time to stabilize in the new facility before being introduced to a new social group?

On occasion, a receiving facility disagrees with a sending facility's assessment of a chimpanzee and asks why the animal was categorized as compromised, fragile, or otherwise unable to be sufficiently stable for transportation. These professional disagreements are reportedly infrequent, and deference is given to the sending facility, which has the most experience with the animal. Some interviewees suggested that involving a third party (i.e., experienced external veterinarians) could facilitate the decision-making process for animals in this grey zone.

### Which Strategies Do Experts Suggest for Mitigating Relocation Risks to Chimpanzees?

Experts offered suggestions, listed below, that might lessen the hazards of relocating certain at-risk chimpanzees:

- Maintain a regular dialogue between veterinarians and caregivers at the sending and receiving facilities before and after transportation. Facility staff should communicate with one another about the health and welfare of each animal after transportation, medical follow-up provided, and deaths. These discussions also allow the sending facility to complete its files.
- Share veterinary and behavioral records with the receiving facility before the animal selection process so that the receiving facility can provide informed input and have time to prepare for the animals' arrival.
- Send all chimpanzees with their favorite items (e.g., toys, nesting materials, towels, blankets, and food).
- Allow caregivers from the sending facility to participate in all aspects of the relocation process, including escorting the chimpanzees to the receiving facility and providing support as needed during transportation. In addition, the experts recommended allowing the sending site's caregivers to greet the animals when they arrive at the receiving facility and to stay at the receiving facility for a day or more to help with the animals' transition.
- Transfer entire social groups together, including Class III and IV chimpanzees as appropriate, and keep them together at the receiving facility. If an animal travels with others not in its social group, the sending facility should ensure that the animal is integrated into the group that it will travel with and that it is stable in this group for at least 6–8 months before transportation.
- Offer flexibility to house smaller social groups at the receiving site, which makes it possible to accommodate at-risk animals that become highly aggressive in new and large groups.
- Ensure sufficient time between transfers so that sanctuary staff and resident chimpanzees can adjust to the expanded population.

### What Standard Operating Procedures Exist to Guide the Transportation Process?

Some facilities use standard operating procedures (SOPs) to guide the transportation process. Animal welfare is a top priority in these SOPs, and the stated goal is to successfully relocate each chimpanzee so as to ensure that it is integrated, socialized, and thriving at the new facility. The NIH, sanctuary, and APF have used mutually agreed-on SOPs since late 2016. These SOPs

specify, for example, the formats of records to be shared and call for twice-weekly teleconferences to optimize communication. However, not all sites use SOPs or use the same SOPs.

### Which Data or Evidence Base Can Inform Decision Making?

Limited published data are available on whether transportation affects a chimpanzee's lifespan or whether health factors have contributed to transportation-related deaths. In addition, because sending facilities often are not given follow-up information about chimpanzees they have transferred to the federal sanctuary system, data on site-specific outcomes are not always available to inform subsequent shipments. The NIH does not store health and behavior information on individual chimpanzees and can only produce data when it requests the information from the facilities that house NIH-owned or -supported chimpanzees.

Even if mortality and colony health data were readily available to the working group, many interviewees cautioned that using historical colony data to predict whether relocation would endanger an individual chimpanzee would be shortsighted because of the significant differences in the health status of the chimpanzees that have been relocated to date and the ones currently under consideration. All interviewees emphasized that that relocation decisions must be based on the best interests of the chimpanzee taking into consideration its age, health, behavior, social grouping, and medical and housing environment needs. This determination is necessarily based, at least partly, on subjective information from veterinarians, behaviorists, and caregivers at the sending and receiving facilities.

### What Are the Roles of the Sending and Receiving Facilities in Deciding Whether to Relocate a Chimpanzee?

Sending facilities largely rely on an internal team approach when deciding which chimpanzees to relocate. The final decision typically rests with the facility's attending (licensed) veterinarian, who seeks input from a team that is familiar with the animal (e.g., the behaviorist, caregiver, facility director, and other veterinarians) if needed. The attending veterinarian or the facility director might also sign the document authorizing the shipment.

Sending facilities gauge whether the receiving facility can accommodate the health-care needs (e.g., for medicine to control seizures) and behavioral needs (e.g., to be housed in a small social group) of each animal. Some sending facilities ask a set of screening questions before deciding which animals to relocate to a specific facility.

Receiving facilities also provide input on which animals are relocated. Among other things, they consider whether they can meet the needs of each chimpanzee, they have sufficient quarantine space, and they have sufficient staffing to accommodate additional animals. Some facility representatives described occasions when they decided against receiving an animal because of its health or behavioral factors. One interviewee noted that a rapid influx of new animals is stressful for the resident chimpanzee population in addition to the chimpanzees being transferred to that facility. Receiving facilities consider the stress level of the resident population when agreeing to

accept more chimpanzees. One individual stated that nonveterinarian facility leaders provide opinions about which animals should be relocated.

All facilities tended to support and value mutual decision making by both the sending and receiving facilities.

Representatives of nearly all facilities reported that caregivers develop strong bonds with chimpanzees that could lead a facility's staff to decide against relocation for reasons unintentionally affected by emotional concerns. Furthermore, lowering a facility's chimpanzee census could lead to decreased funding, whereas increasing the federal sanctuary system's census could result in additional funding. In both situations, facility staff might have a perceived financial or other conflict of interest. Some interviewees therefore suggested calling on outside specialists (i.e., veterinarians not affiliated with the sending or receiving facility) to provide "unbiased" views on whether a chimpanzee should be relocated. However, bias does not appear to be an overriding concern because sending and receiving facilities tend to agree on which animals to relocate.

Some interviewees noted that the sending facility has legal liability when it certifies that an animal is suitable for relocation and that federal law requires a licensed veterinarian to inspect the chimpanzee and certify that it will not be endangered by the transportation. The role and authority of the outside specialists in relocation decisions would therefore need to be carefully considered. An independent veterinary perspective on an individual chimpanzee's fitness for transportation would be valuable, but some experts were concerned that an outside expert panel would place undue pressure on the sending facility's veterinarian. Interviewees largely agreed that although the USDA simply requires a licensed veterinarian to issue the health certificate required to permit an animal's relocation, this veterinarian should be based at the sending institution. They also agreed that outside experts—even if they are licensed veterinarians—should not have this authority because they would not be sufficiently familiar with the individual animal's needs.

### **Working Group Recommendations**

After considering input and information from experts and organization representatives, the working group used the following framework to guide its recommendations:

- Relocate chimpanzees unless relocation poses an extremely high risk of shortening their lives.
- Make decisions in the best interest of each chimpanzee based on an assessment of the chimpanzee's age, health, behavior, social grouping, and environmental needs.
- Use standardized procedures and best practices.
- Use risk-mitigation strategies to help offset the hazards of moving frailer chimpanzees.
- Manage real or perceived conflicts of interest in the decision-making process.
- Increase communication and information sharing among the sending facility, receiving facility, and NIH.

The working group's recommendations are provided below along with rationales and additional points to consider for each recommendation.



**Recommendation 1: The NIH and the facilities that house NIH-owned and NIH-supported chimpanzees should relocate all of these chimpanzees to the federal sanctuary system unless relocation is extremely likely to shorten their lives.**

Discussion: Chimpanzees should be relocated to the federal sanctuary system unless relocation would place the chimpanzee's life, safety, and welfare at extreme risk. Facilities should continue to transfer healthy chimpanzees because these animals are expected to be at the lowest risk of adverse events due to relocation and should not be withheld from relocation because of the frailest social group members. At-risk chimpanzees should be considered for relocation to avoid separating social groups as much as possible. Sending facilities should use the recommended risk-mitigation strategies (see Recommendation 5) to lessen the hazards of relocation for at-risk chimpanzees. If facilities determine that the risk-mitigation strategies do not sufficiently offset the hazards of sending an entire social group with its at-risk members, the sending facility should reconfigure social groups so that the relocation of healthier animals is not contingent on the frailest social group members.

Animals categorized as very fragile (i.e., moribund) should not be relocated. Although some experts believed that all NIH-owned or -supported chimpanzees should be relocated to the federal sanctuary system, federal law prohibits a facility from transporting an animal that would be endangered by the transportation.

**Recommendation 2: The NIH should oversee the development of standardized approaches by facilities that house NIH-owned or -supported chimpanzees for assessing each chimpanzee based on its health, behavior, social needs, and environmental requirements. This assessment should be used to better understand the animal's needs in its current and future environments and should inform relocation decisions.**

Discussion: Ultimately, decisions about whether to relocate at-risk chimpanzees to the federal sanctuary system turn on whether the benefits of moving the animal outweigh the risks. Sending and receiving facilities tend to agree on which chimpanzees to relocate. However, the processes that facilities use to reach these conclusions are not standardized, and much of the information they use to inform these decisions is subjective. A recommended categorization framework is provided in Table 4.

**Table 4. Categorization Framework That Could be Used in Relocation Decisions<sup>6</sup>**

<b>Class Number</b>	<b>Chimpanzee Characteristics</b>	<b>Implications for Relocation</b>
I Minimal risk	Animals that are normal and healthy, have no underlying disease or behavioral concerns, and are at minimal risk of one or more relocation-related adverse events	Relocation recommended
II Slight risk	Animals with minor disease and a slight-to-mild systemic physical health or behavioral disturbance for which the animals can compensate; class includes newborn, geriatric, and obese chimpanzees; at slight risk of one or more relocation-related adverse events	Relocation recommended
III Moderate risk	Animals with obvious disease, moderate systemic disease or disturbances, and mild clinical signs; class includes animals with anemia, moderate dehydration, fever, mild to moderate cardiac disease, or moderate behavioral issues; have a history of successful social group integration; at moderate risk of one or more relocation-related adverse events	Relocation recommended along with use of strategies to mitigate the risks of relocation, as appropriate
IV High risk	Animals that are significantly compromised by disease, have preexisting systemic disease or severe disturbances (e.g., severe dehydration, shock, uremia, toxemia, high fever, moderate to severe or uncompensated heart disease, uncompensated diabetes, pulmonary disease, or emaciation) or severe behaviors that could cause severe harm to the animals themselves or to other animals and that may restrict their integration into social groups; at high risk of one or more relocation-related adverse events	Relocation might be possible on a case-by-case basis with use of strategies to mitigate the risks of relocation, as appropriate
V Extremely high risk	Moribund animals with life-threatening, systemic disease (e.g., advanced cardiovascular, kidney, liver, or endocrine disease; profound shock; severe trauma; pulmonary embolus; or terminal malignancy); extremely severe behavioral issues; at extremely high risk of one or more relocation-related adverse events	Relocation not recommended

After the chimpanzee’s health and behavioral assessments are complete, the sending facility, receiving facility, and NIH should assess the receiving facility’s capability to provide adequate care for the at-risk chimpanzees. The assessment could include such parameters as veterinary staffing, diagnostic capability, and relevant equipment and resources. The assessment should also be based on whether a chimpanzee requires a small social group and whether the receiving facility can accommodate small social groups.

<sup>6</sup> Based on the American Society of Anesthesiologists (ASA) Physical Status Scale, as amended by the Academy of Veterinary Technicians in Anesthesia and Analgesia. <http://www.avtaa-vts.org/asa-ratings.pml>.

**Recommendation 3: All facilities that house NIH-owned or -supported chimpanzees must use the same health and behavioral categorization system for these animals so that sending facilities, receiving facilities, and the NIH all understand why a chimpanzee has been assigned to a certain health status category. Veterinary records must be shared between sending and receiving facilities so that the receiving facility can provide informed feedback about the animal(s) considered for relocation.**

Discussion: A standardized health and behavioral categorization system and increased records sharing would enhance site personnel's understanding of why chimpanzees are assigned to a given category. This information would be useful because some relocation decisions are based on subjective opinions about the chimpanzees. In addition, given the high prevalence of cardiac conditions among captive chimpanzees, the sending facility should complete a cardiac workup if one is clinically indicated and use the results to inform its relocation decision. The receiving facility's attending veterinarian staff must independently determine whether the federal sanctuary system can provide adequate veterinary care for the chimpanzee before agreeing to receive it. Because different facilities use at least three different types of scales to categorize animals, it is unclear how one facility would interpret another's categorization. A recommended approach is to use the physical scale developed by the American Society of Anesthesiologists and adapted by the Academy of Veterinary Technicians in Anesthesia and Analgesia (Table 4), but to incorporate behavioral factors as well. See Recommendation 2.

**Recommendation 4: Both sending and receiving facilities should collaborate to jointly expand the technical assistance available to the receiving facility to care for at-risk chimpanzees.**

Discussion: Providing care for at-risk chimpanzees is complex, and the number of at-risk chimpanzees in the federal sanctuary system is expected to increase as its animal population grows and ages. Chimp Haven, Inc. should continue to scale up its veterinary capacity to care for an increasing number of at-risk chimpanzees and to comply with Standards of Care for Chimpanzees Held in the Federally Supported Sanctuary System (9 CFR Part 42). Sending facilities have considerable resources, such as specialized clinical and diagnostic expertise and equipment, and several facilities have offered access to these resources for at-risk chimpanzees in the federal sanctuary system. The working group recommends that the sending and receiving facilities enhance their existing collaborations and establish new partnerships to ensure continued care for relocated chimpanzees.

**Recommendation 5: With guidance from the NIH, facilities that house NIH-owned or -supported chimpanzees should develop shared relocation standard operating procedures (SOPs). These SOPs should describe risk-mitigation strategies (e.g., engaging veterinarians, behaviorists, and caregivers at the sending and receiving facilities in regular discussions before and after a chimpanzee's transportation; sending chimpanzees in intact social groups; and providing flexibility to house smaller social groups at the receiving facility) that can be used when relocating at-risk chimpanzees.**

Discussion: Not all facilities that house NIH-owned or -supported chimpanzees have SOPs for transportation, and the SOPs used differ among sites. Sending facilities should jointly develop a

standardized set of SOPs that describes the optimal time between transfers as well as communications protocols and that provides checklists for collecting and transmitting information on the chimpanzees' medical, behavioral, social, and environmental needs. The SOPs should specify that sending facilities will share veterinary and behavioral records with the receiving facility several weeks before the animals are transported. The shared relocation SOPs should also identify the licensed veterinarian(s) at the sending and receiving facilities and discuss their authority to make decisions or provide input in the best interests of the chimpanzees without influence from the organization.

In addition, the SOPs should describe the strategies that could mitigate the risks of relocation. Based on its interviews with a range of experts and site visits to facilities that house NIH-owned and NIH-supported chimpanzees, the working group determined that several strategies might reduce the risk associated with chimpanzee relocation, including:

- Engage veterinarians, behaviorists, and caregivers at the sending and receiving facilities in regularly scheduled discussions before transportation and for approximately 6 months afterward, including about the animals' health and welfare after transportation.
- As appropriate, send chimpanzees with their favorite toys, foods, and nesting materials.
- Allow caregivers from the sending facility to participate in an end-to-end relocation process that might involve escorting the chimpanzees to the receiving site, providing support during transit, greeting the animals when they arrive at the receiving facility, facilitating chimpanzee introduction to the receiving facility, orienting the receiving facility's caregivers to each chimpanzee, reviewing veterinary and behavioral records, completing post-transfer checklists, and serving as a resource for the new facility. Unless otherwise approved by the NIH, optimal shipping conditions include sending a familiar caregiver with the chimpanzees to the receiving facility.
- Transfer entire social groups, including at-risk chimpanzees if appropriate, and keep them together at the receiving site.
- Give social groups sufficient time to stabilize at the receiving facility before being removed from quarantine and integrated into social groups with other animals in the colony. The pace of shipments should be sufficiently flexible to optimize the health and welfare of federal sanctuary system chimpanzees.
- Provide flexibility to house smaller social groups at the receiving facility to accommodate animals that become highly aggressive in new and large groups.

**Recommendation 6: When facilities disagree about whether to relocate a chimpanzee, independent expert veterinary opinion should be sought to inform the relocation decision.**

Discussion: Ideally, sending and receiving facilities will continue to agree on which animals to relocate. However, if agreement cannot be reached, the working group recommended that the sending and receiving facilities consult one or more external, licensed, and accredited veterinarian(s) who specialize in nonhuman primate medicine and can provide independent, expert perspective. This perspective will help inform the decision of the licensed veterinarian at the sending facility who inspects the animal before relocation and has final authority for making the decision and issuing the health certificate required by federal law. The independent, external veterinarian(s) should not issue the health certificate.

**Recommendation 7: Facilities housing NIH-owned or -supported chimpanzees should give the NIH sufficient information to undertake actuarial and demographic analyses of data on these chimpanzees.**

Discussion: The NIH has some general census information on the chimpanzees it owns or supports, but its information on the health of this chimpanzee population is incomplete. The NIH therefore lacks the data necessary to proactively assess the health of individual chimpanzees in its colony, track chimpanzees over time, or conduct its own population or actuarial research.

## **Section 6: Conclusions**

This report by the Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees provides seven recommendations to the Council of Councils, a federal advisory committee of the NIH. The report completes the task of the working group, which was to provide advice and recommendations for consideration by the Council on factors for licensed veterinarians to consider when deciding whether to relocate NIH-owned and NIH-supported chimpanzees to the federal chimpanzee sanctuary system. The working group addressed the following five-point charge:

- Review two NIH reports summarizing the published literature on physiological and welfare concerns of at-risk chimpanzees and on selected statutes, regulations, and reference manuals
- Interview staff at NIH-supported facilities and other veterinarian experts about the relocation process and factors they consider when assessing relocation risk(s)
- Where possible, identify additional objective and subjective measures for use by the NIH and NIH-supported facilities in assessing the risk(s) of relocating individual chimpanzees
- Identify the documentation recommended to support subjective assessments
- Develop a points-to-consider report and/or risk-based selection matrix to inform decisions by the attending veterinarian and the NIH regarding chimpanzee relocation, particularly in ambiguous circumstances

In developing its recommendations, the working group conducted site visits to facilities that house NIH-owned or -supported chimpanzees, interviewed experts, reviewed letters voluntarily submitted by several organizations, and considered summaries prepared by the NIH of relevant published literature and applicable laws and regulations. The working group is pleased to have responded to each element of its charge and presents this report as its final deliverable. In submitting this report to the NIH Council of Councils on May 18, 2018, the working group concludes a series of activities thoughtfully conducted to facilitate the NIH's goal to retire the chimpanzees it owns or supports to the federal sanctuary system.

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Members of the working group appreciate the opportunity to have been part of this important effort and hope that its work facilitates the NIH's efforts to relocate chimpanzees to the federal sanctuary system.



## **Appendix A. Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees Membership Roster**

Terry Magnuson, PhD (Chair), Member, Council of Councils; Sarah Graham Kenan Professor of Genetics and Vice Chancellor for Research, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina

James G. Else, DVM, MPVM, Chief Environmental Science Advisor, Level Growth, LLC, Atlanta, Georgia; Professor Emeritus, Emory University; Associate Director, Animal Resources (Retired), Yerkes National Primate Research Center

Sachin Kheterpal, MD, MBA, Member, Council of Councils; Associate Professor of Anesthesiology and Associate Dean for Research Information Technology, University of Michigan School of Medicine, Ann Arbor, Michigan

Gwendalyn Maginnis, DVM, Non-Human Primate Specialist, Center for Animal Welfare, Animal Care, Animal and Plant Health Inspection Service, U.S. Department of Agriculture, Kansas City, Missouri

Judy McAuliffe, Curator, Primates, and Chimpanzee Species Survival Program Leader, Houston Zoo, Houston, Texas

Hayley Murphy, DVM, Vice President of Animal Divisions and Veterinary Advisor, Gorilla Species Survival Plan, Zoo Atlanta; Founder and Director, Great Ape Heart Project, Atlanta, Georgia

Marisa St Claire, DVM, MS, DACLAM, Chief Veterinary Medical Officer, Office of the Chief Scientist, Integrated Research Facility, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Frederick, Maryland

## **Appendix B. Biographies of Members of the Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees**

Terry Magnuson, PhD, is the Sarah Graham Kenan professor of genetics and vice chancellor for research at The University of North Carolina (UNC) at Chapel Hill. Dr. Magnuson was recruited to UNC in 2000 as the founding chair of the Department of Genetics and director of the newly established Carolina Center for Genome Sciences. He also created the Cancer Genetics Program in the UNC Lineberger Comprehensive Cancer Center. He was appointed vice dean for research in the School of Medicine in July 2010 and then vice chancellor for research for the university in 2016. A founding member of the International Mammalian Genome Society, Dr. Magnuson was also on the external advisory committee for the Mouse Genome Database at the Jackson Laboratory and was chair of the Jackson Laboratory Board of Scientific Overseers. He has served on the board of directors of the Society for Developmental Biology and the Genetics Society of America (GSA). He currently serves as the vice president of the GSA and will serve as its president in 2019. He was appointed by the National Academies of Science, Engineering, and Medicine to establish guidelines for work with human embryonic stem cells. He also served as vice chair of a National Academy of Medicine committee that evaluated the California Institute for Regenerative Medicine and as a member of the National Academy of Medicine committee that reviewed the charge of the National Institutes of Health (NIH) Recombinant DNA Advisory Committee. He is a member of the NIH Stem Cell Working Group and the NIH Council of Councils. He has been elected to the National Academy of Medicine and the American Academy of Arts and Sciences, and he is a fellow of the American Association for the Advancement of Science. The Magnuson laboratory's research focuses on the role of mammalian genes in unique epigenetic phenomena, such as genomic imprinting, X-chromosome inactivation, and stem cell pluripotency. The laboratory also studies the tumor suppressor role of chromatin remodeling complexes and has developed a novel mouse model for ovarian clear cell carcinoma. Dr. Magnuson received his PhD from Cornell University and was a postdoctoral fellow at the University of California, San Francisco.

James G. Else, DVM, MPVM, is chief environmental science advisor at Level Growth, LLC, and professor emeritus at Emory University. Dr. Else was formerly associate director for animal resources at the Yerkes National Primate Research Center, Emory University, where he was responsible for all animal care and use programs. He focused on providing an optimal environment for nonhuman-primate-based biomedical and behavioral research at Yerkes. He studied intra- and interspecies disease transmission and control, especially retroviruses and simian immunodeficiency virus pathogenesis in natural hosts. Previously, as director of the Institute of Primate Research in Kenya, Dr. Else developed an extensive nonhuman-primate-focused conservation and biomedical research program. While serving as deputy director of the Kenya Wildlife Service, he oversaw the veterinary department, ecological monitoring, and wildlife research programs of all of Kenya's national parks and reserves. He currently consults on various health and environmental issues related to several great ape and primate species. Dr. Else received his degrees from the University of California, Davis, and completed a 2-year nonhuman primate residency at the California National Primate Research Center.

Sachin Kheterpal, MD, MBA, is associate professor of anesthesiology and associate dean for research information technology at the University of Michigan School of Medicine in Ann

Arbor, Michigan. Dr. Kheterpal received his medical and master's degrees from the University of Michigan. His career has focused on the novel use of information technology and electronic health records for patient care, quality improvement, and research. He is a national leader in perioperative large dataset clinical research and has published numerous articles, editorials, and book chapters on intraoperative management and long-term postoperative outcomes.

Gwendalyn Maginnis, DVM, is the nonhuman primate specialist at the Center for Animal Welfare, Animal Care, Animal and Plant Health Inspection Service of the U.S. Department of Agriculture in Kansas City, Missouri. She received her doctorate in veterinary medicine from the University of California, Davis. While in veterinary school, Dr. Maginnis chose to study in the zoological medicine track and completed internships at the Los Angeles and Woodland Park zoos. After graduating, she received her primate medicine residency certificate from the California National Primate Research Center. Before joining the U.S. Department of Agriculture, Dr. Maginnis supported good laboratory practice toxicology research at WIL Research Laboratories, LLC, and served in various capacities (including as chief of the Clinical Medicine Unit, acting head of the Division of Animal Resources, and attending veterinarian) in the Division of Animal Resources at the Oregon National Primate Research Center of Oregon Health & Science University.

Judy McAuliffe is the curator of primates and Chimpanzee Species Survival Program leader at the Houston Zoo in Texas. She holds a degree in exotic animal training from Moorpark College. Before joining the Houston Zoo, she cared for chimpanzees at the Primate Foundation of Arizona and the Riverside Zoo in Nebraska. She also worked with primates and elephants for the Walt Disney Company and with chimpanzees at the Michale E. Keeling Center for Comparative Medicine and Research in Texas.

Hayley Murphy, DVM, is vice president of the Animal Divisions at Zoo Atlanta and the founder and director of the Great Ape Heart Project, an internationally recognized collaborative project dedicated to diagnosing, treating, and preventing cardiac disease in great apes, in Atlanta, Georgia. Dr. Murphy is one of the veterinary advisors for the Gorilla Species Survival Plan for the Association of Zoos and Aquariums and previously served as the director of veterinary services at Zoo New England. Dr. Murphy graduated from the New York State College of Veterinary Medicine at Cornell University.

Marisa St Claire, DVM, MS, DACLAM, is the chief veterinary medical officer in the Office of the Chief Scientist at the Integrated Research Facility of the National Institute of Allergy and Infectious Diseases, National Institutes of Health, in Frederick, Maryland. She and the comparative medicine staff conduct in vivo studies in support of animal biosafety Level 3 and 4 research for the institute's studies, including studies of infections requiring high levels of biocontainment. Dr. St Claire received her DVM from the University of Minnesota and her MS in comparative medicine from the University of Missouri. She simultaneously completed an NIH postdoctoral fellowship at the University of Missouri.

## **Appendix C. Interviewees for the Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees**

Jocelyn Bezner, VMD, Senior Veterinarian, Save the Chimps

Patricia A. Brown, VMD, MS, Director, Office of Laboratory Animal Welfare, Office of the Director, National Institutes of Health (NIH)

Joyce K. Cohen, VMD, DACLAM, Associate Director, Division of Animal Resources, Yerkes National Primate Research Center, Emory University

Erika Fleury, Program Director, North American Primate Sanctuary Alliance

Diana Goodrich, MS, Co-Director, Chimpanzee Sanctuary Northwest

Franziska B. Grieder, DVM, PhD, Director, Office of Research Infrastructure Programs (ORIP), Division of Program Coordination, Planning, and Strategic Initiatives (DPCPSI), NIH

Mary Lee Jensvold, PhD, Associate Director and Primate Communication Scientist, Fauna Foundation

R. Paul Johnson, MD, Director, Yerkes National Primate Research Center, Emory University

Jeffrey P. Kahn, PhD, MPH, Andreas C. Dracopoulos Director, Berman Institute of Bioethics, Johns Hopkins University

Robert Lanford, PhD, Director, Southwest National Primate Research Center

K.C. Kent Lloyd, DVM, PhD, Associate Dean for Veterinary Research and Graduate Education Programs and Professor of Anatomy, Department of Anatomy, Physiology and Cell Biology, School of Veterinary Medicine; Director, Mouse Biology Program, University of California, Davis

J.B. Mulcahy, MS, Co-Director, Chimpanzee Sanctuary Northwest

Stephanie J. Murphy, VMD, PhD, Director, Division of Comparative Medicine, ORIP, DPCPSI, NIH

Molly Polidoroff, Executive Director, Save the Chimps

Stephen Ross, PhD, Director, Lester E. Fisher Center for the Study and Conservation of Apes, Lincoln Park Zoo

Meg Sleeper, VMD, DACVIM (cardiology), Clinical Professor of Cardiology, Department of Small Animal Clinical Sciences, College of Veterinary Medicine, University of Florida

Francois J. Villinger, DVM, Director, New Iberia Research Center, University of Louisiana at Lafayette

## **Appendix D. Schedule of Meetings, Interviews, and Site Visits of the Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees**

### **Teleconferences**

February 20, 2018: Video-assisted meeting

March 5, 2018

March 19, 2018

April 16, 2018

April 23, 2018

April 27, 2018

April 30, 2018

May 7, 2018

May 9, 2018

### **Interviews**

The working group conducted phone or in-person interviews with the following people chosen because of their expertise in or experience with chimpanzees or issues to consider when relocating them.

April 3, 2018: Dr. Stephen Ross, Lincoln Park Zoo (in person at Chimp Haven, Inc.)

April 4, 2018: Ms. Erika Fleury, North American Primate Alliance

April 5, 2018: Dr. Robert Lanford, Southwest National Primate Research Center

April 6, 2018: Dr. Mary Lee Jensvold, Fauna Foundation

April 9, 2018: Dr. Jeffrey Kahn, Berman Institute of Bioethics, Johns Hopkins University

April 9, 2018: Ms. Diana Goodrich and Mr. J.B. Mulcahy, Chimpanzee Sanctuary Northwest

April 9, 2018: Dr. K.C. Kent Lloyd, University of California, Davis

April 13, 2018: Drs. Franziska B. Grieder and Stephanie J. Murphy, Office of Research Infrastructure Programs, Division of Program Coordination, Planning, and Strategic Initiatives, National Institutes of Health (NIH)

April 17, 2018: Drs. R. Paul Johnson and Joyce K. Cohen, Yerkes National Primate Research Center

April 18, 2018: Dr. Francois J. Villinger, New Iberia Research Center, University of Louisiana at Lafayette

April 20, 2018: Dr. Meg Sleeper, College of Veterinary Medicine, University of Florida

May 2, 2018: Molly Polidoroff and Dr. Jocelyn Bezner, Save the Chimps

May 2, 2018: Dr. Patricia A. Brown, Director, Office of Laboratory Animal Welfare, NIH

## **Site Visits**

The working group conducted site visits to the following chimpanzee facilities to observe and better understand the colony and environments in which the animals are housed:

March 29, 2018: Alamogordo Primate Facility, Alamogordo, New Mexico

April 3, 2018: Chimp Haven, Inc., Keithville, Louisiana

April 12, 2018: Michale A. Keeling Center for Comparative Medicine and Research,  
Bastrop, Texas

## **Appendix E. Summary of Expert Interviews Conducted by the Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees**

The working group visited animal facilities and interviewed experts who have experience relocating chimpanzees as well as expertise in chimpanzee welfare and bioethics.

### **Relocation-Associated Observations**

One sending facility reported that nine chimpanzees (eight of which were geriatric or had chronic conditions) died within a year and a half of arriving at the federal sanctuary system. However, representatives of sanctuaries that house chimpanzees consistently reported that chimpanzees, even those that are old and frail, do well after relocation to a sanctuary as long as appropriate steps are taken to minimize risks (e.g., having a caretaker the animals know accompany them and placing animals next to animals they are close to on the trailer). All of the sanctuary representatives that the working group interviewed, including one that had relocated more than 300 chimpanzees, reported that none of the relocated animals died during the journey or within 6 months after arrival. These experts also said that if space is available, their sanctuaries would only decline to accept chimpanzees that are very ill or close to death.

### **Risk Classification Systems**

The Academy of Veterinary Technicians in Anesthesia and Analgesia adapted the American Society of Anesthesiologists Physical Status Scale, which is designed to assess physical fitness before surgery and is applicable to animals. This scale, and potentially others, can provide insights into transportation risks as well.

Animals in Class I are normal and healthy, and they have no underlying disease, whereas those in Class II have a minor disease or condition (such as being obese or geriatric) but can compensate for it. The experts that the working group interviewed deemed chimpanzees in Class I and Class II as having a low risk of relocation-related adverse events and therefore being healthy enough to be relocated. Class III animals have a moderate systemic disease or disturbances along with mild clinical signs (e.g., moderate dehydration or low-grade cardiac murmur). Class IV animals are significantly compromised by disease or have a preexisting systemic disease or severe disturbances (e.g., severe dehydration or uncompensated cardiac disease or diabetes). The experts regarded chimpanzees in Class III and Class IV as having a relatively high risk of experiencing one or more adverse events if they are transported. Class V animals are moribund and have life-threatening systemic disease, and the experts viewed these animals as having an extremely high risk of relocation-related adverse events. Class V chimpanzees should not be relocated.

### **Factors to Consider in Relocation Decisions**

Additional factors that experts suggested considering in the context of relocation decisions are whether the chimpanzee has congestive heart failure, interstitial nephritis, a weight loss of 20 kilograms within the past 6 months (or less), inability to climb or run, a social handicap, or aggressive behavior. A veterinary cardiologist advised against relocating animals that have

ventricular premature contractions; poorly functioning, thin cardiac walls; left ventricular hypertrophy; or dilated cardiomyopathy. Based on many years of experience, this individual reported that multiform premature ventricular complexes on electrocardiograms are associated with reduced life expectancy and myocardial fibrosis at necropsy. These findings suggest that new multiform premature ventricular complexes are predictors of risk of sudden cardiac death and other cardiac conditions.

One facility uses a five-point scale to categorize animal behavior. An expert identified behavioral factors that would disqualify an animal from being transported, including a high level of stress, maladaptation to new environments, and unstable chronic conditions (e.g., type 2 diabetes or epilepsy).

Facility leaders do not know of any biomarkers they can use to predict relocation outcomes or help them make decisions about transferring chimpanzees. Experts did agree that a preexisting condition (e.g., heart disease) that is manageable should not preclude transporting a chimpanzee. They stated that health-related considerations should be broad and include a complete health history and information on the animal's social grouping.

Experts identified transportation-induced stress, cardiomyopathy, and liver cancer as risk factors for relocation-related death. A healthy young animal died at one facility of transport-related stress after relocation.

### **Ethical Dilemmas**

Ethical dilemmas might be associated with decisions to relocate chimpanzees that are more likely than not to experience a serious health complication or death during or soon after transportation. The experts questioned whether relocation in this scenario is better than allowing the animals to spend their remaining lifespan at their current location. Some experts argued that it is better to transfer chimpanzees to a sanctuary even if they live for only a short time afterward than to keep them at a research facility. One expert commented that the best interests of the at-risk chimpanzee are a more important consideration for a relocation decision than exclusive reliance on colony demographic data or standardized risk classification systems. Instead, this expert argued that the process to determine whether chimpanzees are sufficiently fit for relocation should be based on a more holistic perspective that considers the animal's physical and psychological health. According to this expert, the benefits of relocation must outweigh the potential risks.

### **Feedback from an External Expert Panel**

The experts discussed the advantages and disadvantages of seeking input from an external expert committee. Some experts argued against consulting such a committee, stating that licensed veterinarians at each facility can make these decisions on their own and are more knowledgeable about each animal's health status. However, other experts suggested that if questions arise about a relocation decision, a three-member external panel of other veterinarians could offer recommendations or facilitate further discussion. A few experts acknowledged that an external panel could help curb any biased views of animal care staff. One expert commented that



experience, expertise, and familiarity are necessary for veterinarians to make a decision about relocation. One facility plans to solicit outside expertise to help form new social groups when new chimpanzees arrive. Others recommended increasing the interactions between the receiving and sending facilities, sending personnel from the sending facility to travel with the chimpanzees, and allowing these personnel to remain at the receiving facility for a short time after the animals are moved.

### **Social Groupings**

Several experts emphasized the need to maintain or create social groups after relocation to mitigate the associated stress and ensure the well-being of transferred chimpanzees. One facility representative reported that integrating chimpanzees from other facilities into new social groups has led to fights among the animals, but this facility plans to continue integrating social groups consisting of new animals as long as these groups remain manageable and stable. Another sending institution forms new social groups of animals that will be transferred 6–8 months before the transfer, which reduces the stress associated with introducing the animals to a new social group after relocation. One facility representative indicated that pets and performance chimpanzees are the hardest animals to introduce to a group. However, this facility has been able to introduce all of its animals to social groups.

One veterinarian indicated that the formation of new social groups is a more important consideration for relocation decisions than the transportation process. All experts agreed on the importance of keeping social groups formed at the sending facility intact after their arrival at the federal sanctuary system. However, because of limited sanctuary capacity, these smaller social groups are often integrated into existing social groups after quarantine, although this must be done carefully to minimize stress.

### **Stress-Prevention Strategies**

To help alleviate the stress of relocation for chimpanzees, several experts suggested that caregivers from the sending facility travel with the animals to their new location. One facility always sends a staff member to travel with the truck transporting the animals so that the chimpanzees see someone familiar when they are loaded off the vehicle. This staff member remains at the receiving facility for up to 2 days. However, contractual (government) and logistical (insufficient number of staff members) factors can prohibit staff from accompanying animals. Experts also recommended that animals be given sufficient time to adjust to their new surroundings (up to 3 months) before they are introduced to their new social group.

### **Availability of Standard Operating Procedures**

Most facilities do not have standard operating procedures (SOPs) for transferring chimpanzees. Instead, they use institution-specific best practices, questionnaires they provide to the receiving institution, and other criteria. Experts from one facility indicated that it uses various SOPs that are based on the animals' original location, health status, and prior exposure to the public. Animals previously exposed to the public are more likely to be infected and therefore require different quarantine procedures when they are transferred.

## **Long-Term Care**

One expert stated that chimpanzees, particularly those that are frail, require a high level of care to ensure their long-term well-being. One expert questioned whether Chimp Haven, Inc., can provide adequate long-term care, particularly given the growing number of animals that the facility now houses. Concerns were also raised about the long-term care of chimpanzees that remain at their current facilities. These animals also need a high level of continued medical care and behavioral and social support because of their frailty. The working group agreed that the federal sanctuary system's continual cardiac monitoring capability (e.g., using echocardiograms) should be considered in relocation decisions for at risk-chimpanzees.

## Appendix F. Current Care and Housing of NIH-Owned and NIH-Supported Chimpanzees



### Chimp Haven Statement of Long-term Care of Geriatric and Chronically Ill Residents

Chimp Haven has successfully retired 359 chimpanzees into the federal sanctuary system. Long-term care of these chimpanzees is tailored to each individual's medical and psychological needs and includes management of several chronic diseases such as, but not limited to, cardiovascular disease, kidney disease, diabetes, liver disease, neurodegenerative disease, periodontal disease, obesity, arthritis, HIV and Hepatitis A, B, and C.

Successful management of chronically ill patients is performed by a high functioning team that meets the complex needs of each individual patient. This is accomplished at Chimp Haven through the measures listed below.

Qualified Staffing: Chimp Haven employs an animal care team with many years of experience working with nonhuman primates. There are currently 20 animal caregivers, 1 full-time veterinarian, 3-veterinary technicians, 1 full-time behaviorist, 1 full-time Director of Animal Care, and 2 full-time husbandry supervisors. Veterinary staff are on-site 11 hours per day/7 days per week. There is an animal care/husbandry staff member and security personnel onsite after hours. Veterinary services are readily available at all times to meet the routine and emergency needs of the colony.

Medical Consultants: Chimp Haven currently has four (4) consulting physicians in the fields of oral & maxillofacial surgery, cardiology, ophthalmology, ear nose & throat, and virology that provide services in conjunction with the attending veterinarian in specialty cases.

Disease Detection and Monitoring: The earlier a disease is diagnosed, the better the long-term outcome. Chimpanzees undergo physical examinations annually or biennially including body weight determination, a systematic assessment of all major bodily systems (ophthalmic, otic, dental, lymphatic, cardiovascular, respiratory, abdominal palpation, musculoskeletal, urogenital, and neurologic), palpebral tuberculin testing, dental prophylaxis (dental cleaning, ultrasonic periodontal debridement, and tooth extractions), immunizations (rabies-annually, tetanus and diphtheria-every 5 years), blood collection (CBC + differential, serum chemistry panel, beta natriuretic peptide (BNP)), anthelmintic therapy, fecal analysis (if diarrhea is observed), and nail trimming. Noninvasive blood pressure monitoring, baseline electrocardiogram (ECG), and ultrasound of the liver, kidneys, and uterus or prostate also occur. The detailed physical examination serves as a means to detect disease at an early time point and monitor disease progression.

Treatment: Chimp Haven has a pharmacy that provides treatment/therapy options to assist with management of various medical diseases, including cardiovascular disease, kidney disease, liver disease, diabetes, and HIV.

Daily Observation: Chimp Haven adheres to a colony health surveillance program in which both the animal care and veterinary care staff observe each chimpanzee daily. Animal caregivers are trained by the veterinarian to recognize signs of illness, injury or disease, aberrant behavior, body condition, food and

water consumption, urine and feces output, and fecal consistency. These observations are performed every 4-6hours.

Reporting: Any deviations from the norm are verbally reported directly to veterinary personnel during normal working hours. An on-call veterinarian is available by phone outside of normal working hours and within 1 hour of commute should their presence be needed onsite. Animal health and care problems are also discussed at the Monday morning care staff meetings, bi-weekly management meetings, and monthly husbandry meetings.

Positive Reinforcement Training for Medical Care: Chimpanzees undergo operant conditioning to medical procedures, such as presentation of body parts, oral inspection, stethoscope, injection, venipuncture, urine and semen collection, blood pressure monitoring, ECG recordings, and auscultation. These parameters are essential information needed for maintaining chronic cases such as animals with cardiovascular disease, renal or hepatic disease or diabetes mellitus. The program provides positive interactions between the veterinarian(s) and the chimpanzees and also minimizes the requirement for sedation.

Positive Reinforcement Training for Exercise: Encouraging physical activity promotes the health of chimpanzees at Chimp Haven. Operant conditioning is used to promote activity through a callisthenic workout program for overweight chimpanzees.

Enclosure Enhancement: Chimp Haven has an enclosure enhancement team that incorporates furniture adaptation (ramps, ladders or hand holds to assist in climbing) to outdoor/indoor enclosures to accommodate the needs of aged/arthritis and obese chimpanzees. Obese chimpanzees may be asked to navigate additional structural items, such as a short obstacle course to increase movement.

Enrichment: Enrichment is provided daily by behavioral specialists and caregivers and consists of novel food items, simulated fishers to continue to stimulate cognitive abilities, physical enrichment in the form of toys, destructible items, and perches and other structures. Interaction with caregivers is also a form of enrichment that may be modified to accommodate special needs chimpanzees through either increasing the amount of movement (for obese chimpanzees) or slowing it down for elderly animals. Additional blankets and bedding are provided to elderly chimpanzees for both warmth and comfort.

Alternative Housing Options: Geriatric chimpanzees with altered mentation and mobility, and individuals with insulin-dependent diabetes have the ability to be relocated by animal care staff from large habitats to smaller courtyards at the request of the veterinarian to reduce the risk of injury and increase the ease of accessibility and treatment as needed.

Nutrition: Veterinary personnel have calculated the daily caloric needs of each chimpanzee based on the NRC guidelines for nonhuman primates. Chimpanzees receive chow with mixed produce (fruits/vegetables) based on this allotted caloric value. Obesity increases the risk of cardiovascular disease and appropriate oversight of the basic diet and food enrichment is used to promote good long-term health. Other age related issues, such as diabetes, and cardiac and renal disease, may prompt further specific adaptations through diet restrictions and/or supplements.

#### Endpoint Criteria/End of Life Decisions:

The 'Standards of Care for Chimpanzees Held in the Federally Supported Sanctuary System' mandates that none of the chimpanzees may be subjected to euthanasia except in the best interest of the chimpanzee, and as determined by the veterinarian. Chimp Haven has adopted guidelines for humane endpoints and a program for quality of life assessment to prevent or reduce the severity of pain and

suffering in chimpanzees. The veterinarian informs the SCCC/IACUC of the need to place an animal on quality of life watch. The clearly defined criteria and responsibilities are agreed upon and the staff trained to observe for changes in the condition of the chimpanzee. Veterinary personnel complete a written quantitative monitoring assessment sheet daily to monitor and predict endpoints or changes in the health status of the animal.

## **Southwest National Primate Research Center Capabilities for Long-Term Care of Chimpanzees**

Introduction. The Southwest National Primate Research Center (SNPRC) has a long history of using chimpanzees in critical research arenas for the advancement of science and medicine. It has well established facilities and experienced staff, and is well placed to provide the highest possible standards of care. Included in the SNPRC population are animals that are naïve to human pathogens, as well as animals that are persistently infected with HIV, HBV or HCV. Texas Biomedical Research Institute (Texas Biomed), host to SNPRC, is accredited by the Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC) International. We were last site visited in September 2017 and received continuation of Full Accreditation with no significant findings. In addition, SNPRC operates in accordance with the NIH PHS Policy on Humane Care and Use of Laboratory Animals and the Animal Welfare Act. Texas Biomed is also registered with the USDA as a research facility. Animals are cared for in accordance with the Guide for the Care and Use of Laboratory Animals, and all protocols including the husbandry application for the NHP colonies are approved by the IACUC.

Expertise. The staff working with chimpanzees are a select group of individuals who have an aptitude for working with great apes and tend to form life-long bonds with the animals under their care. This group provides clinical care for the chimpanzee colony and is led by a supervisor who has over 40 years of experience working with chimpanzees. Within the chimpanzee technical and animal care staff we have over 150 years of combined experience, including a night technician who provides nighttime observations, as well as over 75 combined years of veterinary expertise. The head of Behavioral Services has over 25 years of experience with nonhuman primates and the Behavioral Services staff members who work with chimpanzees have a combined experience of 48 years. Our colony manager is a former chimpanzee caretaker who is well versed in the challenges that maintaining such a colony presents. Also available are 3 other clinical veterinarians, 2 administrative veterinarians, 3 veterinary pathologists and various technicians and caretakers who all provide assistance in times of need. Veterinary care for emergencies and clinical observations is provided on a rotating schedule by the 6 clinical vets 24/7. The staff remain updated on their knowledge through inhouse training programs as well as through attending external conferences and workshops.

Preventative/clinical medicine program. The staff is uniquely qualified to safely manage animals infected with HIV and hepatitis viruses, as well as managing aging animals and the chronic conditions that are often associated with chimpanzee aging. Our preventative medicine program includes an annual wellness exam. In this exam we review all body systems, perform dental exam and cleanings, measure blood pressure, perform and review a 12-lead ECG recording, and perform abdominal/cardiac ultrasound as needed. We perform TB testing, and document alopecia if present. Viral load and antibody titers of all infected animals, CBC, comprehensive clinical chemistry panel are assessed, as well as coccidiomycosis and an MRSA screen as needed. Most of the tests can be performed in-house by our clinical pathology lab, with immediate turnaround of results. Complete animal histories, including all lab work, are maintained in a computerized database. All chimps are vaccinated for MMR, DTaP and Strep pneumoniae. We have a parasite control program consisting of the rotating use of anthelmintics (dewormers). Chimpanzees are assigned to individual caregivers, so that they may develop close

relationships. These individuals spend the majority of their workday interacting with them. The night technician conducts continuous rounds on them between 8pm-4am. Daily clinical rounds are made by vet staff and when clinical problems are identified a full diagnostic workup is performed. Clinical care is provided in a social group setting. We have a fully equipped surgical suite, digital radiography, portable ultrasonography capabilities and laser therapy. We have access to a variety of imaging modalities (MRI, PET scan) as well as access to an assortment of local veterinary/medical experts in specialty fields such as diabetes, orthopedics, and ophthalmology.

Facilities. All animals have 24-hour access to spacious indoor/outdoor housing and live in socially compatible groups. We have on-site cage maintenance as well as facilities maintenance groups who are available to address any issues that arise, including cage modifications to accommodate mobility impaired individuals. Facilities are evaluated and renovated based on the population's changing needs. A contract security agency controls all access to the campus 24 hours per day. Extra security guards patrol the animal and laboratory areas during non-working hours.

Quality of Life (QOL) committee. The QOL committee is composed of veterinarians, care providers, a behaviorist, and a lay member who are familiar with the chimpanzee colony. Veterinarians and behaviorists familiar with the chimpanzee colony assess the entire colony for general overall health and psychological wellbeing. If an animal develops an issue that requires continued care, a plan is generated, increased observations occur, and a daily QOL assessment is conducted. These individuals are brought to the attention of the committee. The committee meets on an as-needed basis to review cases that arise regarding chronically or acutely ill animals that may require end-of-life decisions. A complete pathological examination is performed on each deceased animal.

Behavioral monitoring. Monitoring programs are in place to assess behavior. Each animal is assessed daily for a wellness check, which includes full body inspection and behavioral evaluation. In addition to the daily observations, more in-depth assessments are performed on a quarterly basis to evaluate the animal's behavioral time budget and space use. This information is used to measure behavioral changes over time and to evaluate and improve the behavioral management program. Animals requiring additional attention are enrolled in the Behavioral Intervention Program, where the severity and possible causes of the issue are evaluated, and an intervention plan is implemented. Behavioral assessments are also conducted upon request, and extensive behavioral records are maintained for each chimpanzee.

Environmental enrichment. All chimpanzees participate in the environmental enrichment program. The main goal of this program is to provide an environment that encourages the expression of species typical behaviors. Enrichment strategies fall under a number of categories. All enclosures contain structural enrichment (e.g., brachiation bars, tire swings, hammocks) for climbing, perching, and swinging. Additional enrichment provided to the chimpanzees includes manipulatable items (e.g., balls, chew toys, mirrors), nutritional enrichment (e.g., fruits, grains, novel food items), sensory enrichment (e.g., radios, television, aromatherapy), and occupational enrichment (e.g., nesting material, feeder devices, pipe feeders). Social enrichment is an important component of chimpanzee behavioral management. Extensive records are maintained

on individual temperaments and social history, which are used to identify social partners when forming new groups. Behavioral data are collected during group formations and the newly formed group is regularly assessed for compatibility.

Behavioral training program. A behavioral training program is in place which maximizes positive reinforcement training (PRT) for all chimpanzees. PRT is used to gain voluntary cooperation in routine management procedures such as shifting, cooperative feeding, sedation, and presenting body parts for inspection and/or wound care. Training provides a positive relationship with the caregiver, a sense of control and predictability for the animals, and goal-directed, enriching activities.



## **Alamogordo Primate Facility (APF) Capabilities to Manage a Chronically Ill Population of Captive Chimpanzees**

Charles River Laboratories has optimally managed the Alamogordo Primate Facility (APF) for almost two decades. During this tenure, APF has implemented a premiere chimpanzee management program. We have established a well-defined health care and enrichment program that provides optimal veterinary care specifically for geriatric, aging and chronically ill captive chimpanzees. APF has achieved and retain full Association for the Assessment and Accreditation of Laboratory Animal Care International (AAALAC) accreditation and is inspected voluntarily by the United States Department of Agriculture (USDA). APF provides a strong and committed staff who understands the significant needs of the animals they care for. All eighteen APF personnel are well trained and qualified. Professional staff has an average of over 26 years of chimpanzee care experience and the animal care staff has an average of 27 years of chimpanzee care experience. Thirteen APF staff members are currently AALAS certified.

APF is unique in its professional ability to provide optimal care for geriatric, aging and chronically ill captive chimpanzees. Constant observations are a significant part of a quality animal care program. Since chimpanzees naturally mask overt signs of illness, the APF staff members have all been trained to observe animals for unusual, undesirable, or abnormal behavior. Until recently, all animals at APF were observed at least every two (2) hours 24 hour a day, 7 days per week. Currently, the observation schedule is 16 hours per day, 7 days per week. Two (2) veterinarians are on-call at all times. A program of obtaining alert monthly weights has also been implemented to detect subtle weight loss. This program has resulted in the early detection and treatment of medical conditions, improved animal monitoring and served as further positive reinforcement of transfer box training. Daily veterinary clinical rounds are conducted and the clinicians ensure that personnel are aware of any changes in individual animal health status. All APF animals receive intensive monitoring and treatment.

Cardiovascular disease (CVD) and subsequent sudden cardiac death has been identified as a major cause of mortality in great apes. The Alamogordo Primate Facility (APF) has been a leader in the identification and clinical management of cardiovascular disease in captive chimpanzees. The APF chimpanzee diet (PMI Lab Diet) has been reviewed and redesigned to lower the sodium content and maximize dietary fiber in order to provide a more heart healthy diet. The omega fatty acid content/ratio in the biscuit is being altered in order to improve the diet's cardioprotective value. Each animal receives an annual physical exam were their cardiac function is evaluated by an experienced primate veterinarian. This annual exam includes complete blood counts, blood chemistries, and ultrasonography of all major organs. Blood pressure, EKG, radiographs, tuberculosis testing and dental evaluation /cleaning are also incorporated into the annual examination. The highest level of medical technology is used to diagnose and treat clinical diseases; some of the on-site diagnostic procedures include clinical chemistries, ultrasonography, echocardiograph, radiography, and endoscopy. If animals are noted to have any unusual cardiovascular findings such as arrhythmias or systemic hypertension, a board certified veterinary cardiologist is consulted and the animal is given a complete cardiac examination. At that point the cardiologist will recommend any further medical management treatments needed. Animals with cardiovascular disease and other advance chronic disease processes are monitored intensely for any changes in clinical signs, decompensation, pain or

distress. Frequency of physical examinations may be increased in order to properly evaluate the progression and treatment of the disease. Sudden cardiac deaths are common in all great ape species. Due to APF's current colony population of geriatric and infected animals, they may have a greater risk of developing cardiovascular disease. 91% of all transfer ineligible chimpanzees at APF have some form of cardiovascular disease. APF's current animal population's average age is 39 years old which places it well past the accepted geriatric age of captive chimpanzees. APF will continue to clinically investigate and medically manage all diseases that afflict our current population. The information that is obtained will be published in order to assist all individuals to better manage great ape populations.

APF also has a full time occupational health nurse on staff. Since numerous disease processes are transferred from humans to chimpanzees, it is imperative that the animal care staff are evaluated before coming in contact with the colony. Chimpanzees have been noted to be predisposed to respiratory illnesses. Having a quality occupational health program at APF managed by our occupational health nurse has resulted in limited respiratory outbreaks and animal deaths associated with them.

Behavioral profiles and ethograms have been performed on all animals in the colony. In addition, all chimpanzees in the colony have been trained using positive reinforcement techniques for sedation. No animals have been sedated with a dart gun since Charles River obtained the APF contract in 2001. This has reduced the level of stress placed on the animal and assists with providing them with an optimal animal welfare environment. Several animals have been trained for cage side physical examinations or to give voluntary urine and/or blood samples (for diabetic glucose monitoring) in order to provide quality medical care and avoid sedating them frequently to monitor their health status. No births have occurred at APF since Charles River has managed the facility.

Animal Care and Veterinary SOPs are continually reviewed and updated annually to improve the animal care program. Some of the components include: a Humane Endpoints policy, a Body Condition Score system, and a Pain and Distress Management policy. This program, along with a highly experienced staff has resulted in an optimal level of animal care and healthcare. APF has had an established humane endpoint policy since its inception in 2001. The ultimate goal is to provide a proper quality of life for the APF animals until they reach a point where they cannot maintain health that allows for activities of daily living such as social housing and species typical behavior. It is critical that chronically ill animals be closely monitored by experienced personnel who are familiar with the individual animal's normal behavior and health status. The APF staff is uniquely qualified to provide the optimal care needed for the APF animals during the end of life process. All remaining animals at APF will have an individualized humane endpoint document in place. When needed, humane euthanasia techniques are applied in accordance with the AVMA Guidelines for the Euthanasia of Animals (2013).

The main chimpanzee holding complex at APF is highly specialized in its design. Due to its unique construction and layout, APF is appropriately positioned to intensively monitor chronically ill chimpanzees and provide them the optimal care required. All animals at APF have indoor access, outdoor access and play yard access 24 hours a day. All dens have radiant heat in the floor that provides an additional level of comfort especially for the arthritic and degenerative

joint disease patients. No animal is singly housed at APF and they are all cared for in a functionally appropriate chimpanzee environment. Many current animals at APF have been in established social groups for decades. Socialization is enhanced and achieved by a division of dens that allow animals interact at their own schedule. Animals are also able to be divided quickly in case the socialization process becomes difficult. This results in minimal stress being placed upon the animals being socialized. The entire APF animal complex is in excellent condition and has been well maintained.

### **National Center for Chimpanzee Care (NCCC) Program for Long-Term Care of Chimpanzees with Chronic Disease/Conditions**

The NCCC, located at the Keeling Center for Comparative Medicine and Research (KCCMR) at The University of Texas MD Anderson Cancer Center, has developed a comprehensive chimpanzee health program with more than 40 years of experience caring for chimpanzees. This program is recognized for its outstanding standard of care. Because many chimpanzees at the NCCC are classified as geriatric (35+ years old), special care is required to meet their needs. The NCCC has developed a health status classification system to provide an enhanced level of care for chimpanzees diagnosed with chronic health conditions or conditions associated with advanced age. The four health status classifications are as follows:

**Healthy** – Chimpanzees with no chronic debilitating health conditions.

**Compromised** – Situationally fragile with one or more diagnosed chronic diseases. Animals in this category have conditions including non-severe cardiac disease, uterine mass, HCV/STLV+, and anesthetic risk.

**Fragile** – Severe debilitating health condition(s) that require enhanced care may include cardiac disease, osteoarthritis, hepatic disease, renal disease, hypothyroidism, seizures, diabetes, and high anesthetic risk.

**Very Fragile, QOL** – Enrolled in Quality of Life Program (see details below).

Of the 128 NIH-owned chimpanzees living at the NCCC, 30 (23%) are **Healthy**, 26 (20%) are **Compromised**, 61 (48%) are **Fragile**, and 11 (9%) are **Very Fragile** and enrolled in our Quality of Life Program.

#### **Staff:**

The KCCMR has approximately 150 veterinary and other doctoral faculty, staff, and students. Approximately 30 staff members are assigned to the NCCC including 2 board-certified veterinarians, plus five back-up veterinarians, a behavioral scientist, two managers, 17 husbandry/vet care/support staff, two positive reinforcement trainers, and five behavioral staff. Caregivers are available 22 hours per day/7 days a week, and security support is provided 24 hours/day through the University of Texas police.

#### **Comprehensive Care Program:**

Our veterinary care program is a team effort led by two board-certified veterinarians who are available after hours for emergencies and are within 30 minutes of campus. Each chimpanzee is observed at least four times per day for signs of illness, injury, or unusual behavior. Staff members are very familiar with each individual and report even subtle changes in behavior that may indicate a more serious underlying health condition.

All chimpanzees receive either annual or biannual physical exams, depending on health status. Individual geriatric and fragile animals occasionally require supplemental oxygen to assure their safety. Patients are connected to anesthesia monitoring equipment measuring blood pressure, SpO<sub>2</sub>, heart rate, respiratory rate, body temperature, and electrocardiograph. It is critical to monitor vital signs during anesthesia to provide appropriate medical support. The veterinarians examine the

eyes/ears/nose/throat; examine teeth and perform dental care; examine reproductive system; perform abdominal ultrasounds to monitor liver/kidneys/reproductive organs/gastrointestinal tract; and auscultate the chest to monitor for cardiac or respiratory disease. The chimpanzees receive immunizations (rabies, tetanus, and pneumococcal pneumonia vaccine) to prevent life-threatening infections, quarterly anthelmintic treatment, and blood collection to monitor for health conditions (CBC, serum chemistry, BNP, troponin, HgA1c, etc.). Endoscopy (both rigid and flexible), radiographs, surgery, and a cardiac defibrillator are available to assure provision of adequate veterinary care. A board-certified veterinary cardiologist provides interpretation of echocardiograms on cardiac disease cases and provides treatment recommendations. Because MD Anderson operates a large hospital, our veterinarians can consult with multiple medical doctors from virtually every medical specialty.

The NCCC has led efforts to integrate complementary therapies, such as acupuncture and laser therapy, into the treatment plans for chimpanzees. These therapies provide non-invasive techniques to manage pain and treat disease. Chimpanzees enthusiastically participate in these therapies by presenting the body part of interest as soon as the vet and trainer approach them. We have had much success in alleviating osteoarthritis-related pain in chimpanzees using acupuncture and published these results in 2013. We have also used acupuncture for soft tissue injuries, wounds, and cardiac arrhythmias (published in 2016). Low-level laser therapy has advanced our care program by improving wound care, reducing healing time, and reducing pain. In many cases, the addition of these complementary therapies has improved the quality of life of the chimpanzees.

The trainers use positive reinforcement training techniques and have established a high level of trust with the chimpanzees, working very closely with them for over 25 years. This greatly increases their cognitive stimulation and choices, and also enhances the quality of care we can provide. The chimpanzees voluntarily present wounds for topical or laser treatment, allow us to use medical devices such as stethoscopes and ECG leads, and willingly participate in the collection of various samples such as blood and urine. Diabetic patients are trained to present for glucose testing and insulin administration. Chimpanzees have also been trained to allow the application of eye ointment and antibiotic ear drops. This advanced level of training is critical when treating an older population with chronic health conditions. We can often avoid the stress and risk associated with sedation because our chimpanzee patients are trained to willingly participate in their own care.

### **Diagnostic Laboratories:**

The KCCMR has on-campus comprehensive diagnostic clinical and anatomic pathology laboratories staffed by certified medical technologists. We have three board-certified veterinary pathologists and one board-certified diagnostic laboratory veterinarian who are all experts in nonhuman primates. The availability of these labs enables us to obtain immediate diagnostic lab results to aid in the treatment of critical patients and make rapid and, at times, life-saving medical management decisions. The anatomic pathologists provide biopsy and postmortem diagnoses to help the clinical veterinarians improve treatment decisions. This team approach between the clinical veterinarians and the veterinary pathologists allows us to learn from each case and determine if we can make improvements going forward.

### **Accommodations to Housing for Physically-Impaired Chimpanzees:**

We have made a number of modifications to our housing enclosures for geriatric or mobility-impaired chimpanzees including adding wide ramps with hand holds to the existing large play structures; extra beds at different heights; enhanced flooring to facilitate movement; and additional pathways to enable access to all areas and allow chimpanzees to choose how to move. Most

importantly, the design of our large outdoor habitats allows for 360° visibility to quickly monitor for illness or injury. We can also rapidly assess and communicate emergencies. This allows us to provide treatment to the animals within minutes.

**Quality of Life (QOL) Program:**

We developed a QOL program (published in 2013 to aid other centers in developing their own QOL programs) to improve care for chimpanzees diagnosed with a terminal or chronic debilitating conditions. The QOL Program includes four major components of animal welfare: veterinary care (the medical plan), husbandry considerations (special needs), positive reinforcement training to facilitate treatments, and behavioral assessments. A QOL team is formed with people representing each welfare component. They focus on ways to minimize pain or suffering and assist in the end-of-life decision making process. The QOL team defines unique behavioral characteristics of that chimpanzee, discusses any changes that occur as the disease or condition progresses, and provides recommendations to the veterinarians based on changes in their quality of life.

**Appendix G. The Decision to Approve the Transportation of At-Risk Chimpanzees from Research Facilities to the Federal Chimpanzee Sanctuary System: A Summary of Selected Statutes, Regulations, and Reference Manuals**

Information for the Council of  
Councils Working Group on  
Assessing the Safety of Relocating  
At-Risk Chimpanzees

The Decision to Approve  
the Transportation of  
At-Risk Chimpanzees from  
Research Facilities to the  
Federal Chimpanzee  
Sanctuary System

A Summary of Selected Statutes,  
Regulations, and Reference  
Manuals

As of December 22, 2017

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This document does not represent legal advice or an exhaustive listing of all laws, regulations, and policies that may have an impact on the decision to approve the transportation of chimpanzees from research facilities to the Federal Chimpanzee Sanctuary System. This document was prepared by the NIH only for informational purposes for the Council of Councils Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees, and it does not represent the official views or legal interpretations of the U.S. Department of Agriculture, other federal agencies, or the State of Louisiana.



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# Information for the Council of Councils Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees

## The Decision to Approve the Transportation of At-Risk Chimpanzees from Research Facilities to the Federal Chimpanzee Sanctuary System: A Summary of Selected Statutes, Regulations, and Reference Manuals

### Executive Summary

The subject of transporting chimpanzees owned or supported by the National Institutes of Health (NIH) to the Federal Chimpanzee Sanctuary System (Sanctuary System) from research centers or a research reserve has generated interest among Congress, animal welfare advocates, the public, and other stakeholders whom have asked why relocating chimpanzees is a complicated process that, in some cases, takes longer than preferred.

Since the Sanctuary System opened in 2005, the NIH has relocated 333 for permanent retirement. Among the factors that drive relocation is the individual chimpanzee's health and welfare, which requires a veterinarian's assessment to determine that the relocation process will not harm the animal. All relocation of NIH-owned or -supported chimpanzees involves anesthesia events, hours of inter-state transportation, quarantine at the new facility, and new social group introduction.

Before transportation ensues, the United States Department of Agriculture (USDA) requires, among other things, that a licensed veterinarian execute and issue a health certificate that concludes the animal is "*free of any infectious disease or physical abnormality which would endanger the animal*". The USDA requires the health certificate when chimpanzees are transported to another state; the Sanctuary System is in Louisiana and research centers and the research reserve are located in Texas and New Mexico, respectively. Absent a properly executed health certificate, the USDA will not permit a chimpanzee to be transported out of state even if all other transportation requirements are met. Although the USDA policies describe the "transportation" of nonhuman primates it is important to recognize that the decision to transport includes a broad range of factors that could put a chimpanzee at risk when being moved from one facility to another, such as the stress of multiple events of general anesthesia, geriatric age, comorbid conditions and diseases, and introductions to new social groups.

This review sought to understand statutory and regulatory factors that veterinarians consider when deciding whether to issue a health certificate for purposes of transportation and what resources inform

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their decision. This review is particularly relevant to several NIH-owned or -supported chimpanzees that are geriatric or have conditions that call into question whether transportation would “endanger” the animal or others. Key questions addressed in this review include:

- What selected statutes or regulations influence the decision to transport a chimpanzee between facilities? [Section 1]
- Who has authority to decide which chimpanzees are relocated? Can these decisions be overturned or vetoed if there is disagreement? Which parties, if any, could be subject to civil, criminal, or other penalties for failing to adhere to applicable laws? [Section 2]
- What health documentation is completed to transport a chimpanzee to another state? What information is necessary or consulted to complete the health certificate? How might a veterinarian determine if a chimpanzee or others will not be “endangered”? [Section 3]
- Does guidance exist elsewhere to inform these decisions? [Section 4]

This summary has been prepared by the NIH Division of Program Coordination, Planning, and Strategic Initiatives and is being provided for informational purposes to the Council of Councils Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees, as they consider developing recommendations for deliberation by the NIH Council of Councils.

## Background and Introduction

Our closest human relative -- the chimpanzee -- has provided exceptional insights into human biology. But their use in research has raised concerns from certain advocates, members of the public, scientists, and others who recognize that the chimpanzee’s similarity to humans deserves special consideration and respect. Over time, scientists had great success finding alternative technologies and methods so that fewer chimpanzees were needed for research. Recognizing these advances, NIH commissioned a study by the Institute of Medicine (IOM) in December 2010 to assess whether chimpanzees are or will be necessary for biomedical and behavioral research in the future. That report (Institute of Medicine and National Research Council, 2011) stated the use of chimpanzees in research has become “largely unnecessary” and recommended approaches to minimize their use in federally funded research. The NIH Council of Councils then provided advice (Council of Councils, National Institutes of Health, 2013) that NIH has followed since 2013 to implement the recommendations (National Institutes of Health, 2013).

Two important developments occurred during a two-year period after the NIH implemented Council recommendations. First, the NIH observed a significantly reduced demand for chimpanzees for research, and second, the U.S. Fish and Wildlife Service announced in June 2015 (United States Fish and Wildlife Service, 2015) that it had designated all captive chimpanzees as endangered. Among other things, this designation required researchers to apply for and obtain a permit to use captive chimpanzees in research if it could harm the animal. Because of these changes, in November 2015, the NIH decided that

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all NIH-owned chimpanzees residing outside of the Sanctuary System<sup>7</sup> were eligible for retirement (National Institutes of Health, 2015).

Relocation of the chimpanzees to the Sanctuary System is a priority for the NIH and proceeds according to a retirement plan (National Institutes of Health, 2016). As a general matter, relocating occurs as space becomes available and on a timescale that allows for optimal transition of each individual chimpanzee with careful consideration of its welfare, including its health and social grouping (National Academy of Sciences, Institute of Laboratory Animal Research, 2011). As of October 2017, the NIH owned or supported 518 chimpanzees: 208 were permanently retired and lived in the Sanctuary System (Louisiana) while 310 chimpanzees resided in research centers (Texas) or a research reserve (New Mexico) (National Institutes of Health, Office of Research Infrastructure Programs, 2017). These 310 chimpanzees no longer participate in biomedical research and are in the queue for relocation to the Sanctuary System for permanent retirement by 2026 (National Institutes of Health, 2016).

Relocating chimpanzees to the Sanctuary System is an involved process influenced by: 1) availability of sanctuary space; 2) availability of a qualified trucking company to transport the chimpanzees; 3) the temperature and other weather conditions; 4) social grouping factors; and 5) the chimpanzee's health (National Institutes of Health, 2016) (United States Department of Agriculture, 2017) (National Academy of Sciences, Institute of Laboratory Animal Research, 2011) (National Academy of Sciences, Institute for Laboratory Animal Research, 2006). Relocation decisions are preceded by weeks of effort by qualified individuals at the sending and receiving sites to assess space, transport, weather, social groupings, and the health of the animal (National Academy of Sciences, Institute of Laboratory Animal Research, 2011). The move is then followed by additional efforts to satisfy applicable quarantine requirements (42 CFR Part 9, 2016) at the Sanctuary System and to ensure safe integration of the relocated chimpanzees into new social groups (National Academy of Sciences, Institute of Laboratory Animal Research, 2011) (National Academy of Sciences, Institute of Laboratory Animal Research, 2011). Due to these factors, the NIH can currently relocate approximately 30-45 chimpanzees per year until the Sanctuary System reaches an approximate capacity of 310 chimpanzees (National Institutes of Health, 2016) (Chimp Haven, 2018). Once capacity is reached, the NIH will continue relocating chimpanzees based on availability of space due to anticipated population mortality (5-10 percent each year, or approximately 11-23 chimpanzees per year) (National Institutes of Health, 2016) (United States Government Accountability Office, April 2016).

Relocation may involve several anesthesia events (during physical examinations before and after transfer and when required for loading into a transport container and onto the truck and off-loading from the truck). Relocation also involves a multi-hour inter-state truck ride to the Sanctuary System, quarantine at a new location, and eventual introduction into new social groups (Schapiro, 2012) (Bloomsmith, 2006). Research has shown that transporting animals can result in physical, physiological, and psychological stress during the pre-trip, intermodal, and post-trip phases (National Academy of

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<sup>7</sup> The Federal Chimpanzee Sanctuary System was established in 2002 by the Chimpanzee Health Improvement, Maintenance and Protection (CHIMP) Act, and Chimp Haven, Inc., operates the Sanctuary System, which is overseen by NIH. The 2013 reauthorization of the Chimp Act authorizes the NIH to continue funding the care, maintenance, and transportation of the agency's chimpanzees including those housed in the Federal Sanctuary.

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Sciences, Institute for Laboratory Animal Research, 2006). For chimpanzees, transportation has been reported to have physiological and behavioral consequences, including significant weight loss and changes in clinical chemistry, hematology, and immunology that last at least 12 weeks post-trip (Schapiro, 2012). A complicating factor in relocating NIH-owned or -supported chimpanzees is their increasing age and whether the animal's health favors the process. Some portion of the 310 chimpanzees are geriatric (>35 years of age) and/or chronically ill (United States Government Accountability Office, April 2016), i.e., factors that increase the risk of relocating those individuals. Previous work showed that chimpanzee age upon arrival at the Sanctuary System was strongly predictive of mortality though the analysis lacked individual-level data to account for coexisting health condition or disease status of the animals (Lauer, 2016).

NIH has a longstanding interest in understanding the effects of transportation on research animals and the development of science-based best-practices toward their safe and humane transportation. Resulting in a report that appeared in 2006, the NIH asked the National Research Council to form a committee of experts to address problems encountered in transporting research animals and offer recommendations to remedy these problems for the benefit of the animals and the research community (National Academy of Sciences, Institute for Laboratory Animal Research, 2006). That report discussed regulations and guidelines for the transportation of research animals (including nonhuman primates to the extent that data were available), best-practices in transportation, and biosecurity. The report did not discuss, however, the selection of animals for transportation.

A deciding factor influencing whether a chimpanzee can be transported – which is determined following a careful examination of the animal by a licensed veterinarian at the sending location (i.e., research center or research reserve) – is the potential for the particular chimpanzee to harbor a communicable disease and endanger other animals and whether the chimpanzee itself would be endangered by the transportation (United States Department of Agriculture, 2017). This review focuses on a chimpanzee's health factors that a veterinarian considers when deciding to issue a health certificate for transportation and summarizes the findings for the Council of Councils Working Group on Assessing the Safety of Relocating At-Risk Chimpanzees.

## Section 1. What selected statutes or regulations influence the decision to transport a chimpanzee between facilities (as of December 2017)?

The laws, rules, regulations, policies, and/or guidelines that mainly influence the inter-state transportation of selected, captive chimpanzees,<sup>8</sup> include the Federal Animal Welfare Act and applicable

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<sup>8</sup> On June 16, 2015, the Director, United States Fish and Wildlife Service, issued a final rule (80 FR 34500) that listed all chimpanzees – wild and captive – as an endangered species as defined by the Endangered Species Act of 1973. Although NIH's use of chimpanzees in research is covered by the agency's biological opinion describing the effects of NIH-supported research or NIH-authorized activities on chimpanzees, the biological opinion does not extend to "animal transportation to the Sanctuary System." Transportation, in this regard, is not for the purposes of interstate commerce, e.g., selling the chimpanzee to a buyer. See NIH's biological opinion for additional information. (National Institutes of Health, Division of Program Coordination, Planning, and Strategic Initiatives, 2016)

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laws and regulations of the state receiving the animals – which in this case is Louisiana, as the home of the Sanctuary System.

### Quick Summary

- The Animal Welfare Act and Regulations place federal requirements on licensed veterinarians, consignors, and carriers or intermediate handlers before transporting nonhuman primates.
- The purpose of the health certificate is primarily to protect against spreading contagious diseases.
- Veterinarians must issue a health certificate, attesting that the animal appeared free of any infectious disease or physical abnormality that would endanger the animal, other animals, or public health.
- Nonhuman primates that are obviously ill, injured, or in physical distress must not be transported in commerce, except to receive veterinary care for the condition.
- The State of Louisiana requires the importer (Chimp Haven) to: 1) report to the State Veterinarian within 10 days of the date of shipment, 2) make the animals immediately available for examination by the Livestock Sanitary Board to determine the health status of the animals, and 3) ensure that the animals have an official health certificate and are free of infectious diseases and parasites.

### Federal Animal Welfare Act

Since 1966, the Animal Welfare Act has established standards for the humane treatment of certain animals by various commercial enterprises, including animal research facilities, breeders, and exhibitors<sup>9</sup>. The USDA, through its Animal and Plant Health Inspection Service (APHIS), enforces compliance with the Animal Welfare Act. APHIS, which has inspectors nationwide who conduct inspections to ensure that regulated facilities comply with the law, are responsible for documenting violations in inspection reports. Their findings may lead to letters of warning or other enforcement actions, administrative enforcement actions by filing administrative complaints to be heard before the Office of the Administrative Law Judge, and referral of serious violations to the Department of Justice if criminal charges are appropriate (Animal Welfare Act, as amended, 1966).

Among other things, the Animal Welfare Act required that the USDA Secretary promulgate standards governing the humane handling, care, treatment, and transportation of animals by research facilities. Standards specifically relevant to this analysis require that a licensed veterinarian issue a health certificate for nonhuman primates shortly before transportation ensues, unless the USDA Secretary has provided an exemption<sup>10</sup> to the health certificate requirement. (The primary purpose of a health

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<sup>9</sup> The Animal Welfare Act, along with the final Animal Welfare Regulations at 9 CFR Parts 1-4, apply to certain “animals” (defined to include nonhuman primate mammals) used in biomedical research or transported commercially. As a result, the chimpanzees owned or supported by the NIH, specifically their housing, treatment, and care within “research facilities” and transportation by any “carrier,” is regulated by USDA under the Animal Welfare Act and its regulations.

<sup>10</sup> The Animal Welfare Act at 7 USC §2143(f) states that the Secretary [of the USDA] “may by regulation provide exceptions to this certification requirement, under such conditions as he may prescribe in the regulations, for animals shipped to research facilities, testing or experimentation requiring animals not eligible for such certification.” Animal Welfare Regulations at 9 CFR Part 2 §2.38(h) provide an address for where exemptions for health certificates for research purposes can be addressed.

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certificate is to control communicable diseases by detecting carriers before new animals are exposed to them (Zeilenga, 1988).)

## Federal Animal Welfare Regulations and Policy

### Licensed Veterinarian

The Animal Welfare Regulations at 9 CFR Parts 1-4 specify the roles, among other things, of the responsible parties in satisfying the Animal Welfare Act. Important to this analysis is the role of the licensed veterinarian<sup>11</sup> in carrying out his/her responsibilities with respect to nonhuman primates<sup>12</sup> selected for transportation in commerce<sup>13</sup>. The regulation at 9 CFR Part 2 §2.38(h)(1) “Health certification” states:

No research facility<sup>14</sup>, including a Federal research facility, shall deliver to any intermediate handler<sup>15</sup> or carrier<sup>16</sup> for transportation, in commerce, or shall transport in commerce any ... nonhuman primate unless the ... nonhuman primate is accompanied by a health certificate<sup>17</sup> executed and issued by a licensed veterinarian. The health certificate shall state that:

- The licensed veterinarian inspected the ... nonhuman primate on a specified date which shall not be more than 10 days prior to the delivery of a ... nonhuman primate for transportation; and

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<sup>11</sup> “Licensed veterinarian” means a person who has graduated from an accredited school of veterinary medicine or has received equivalent formal education as determined by the Administrator, and who has a valid license to practice veterinary medicine in some State. See Animal Welfare Regulations at 9 CFR Part 1 §1.1.

<sup>12</sup> “Nonhuman primate” means any nonhuman member of the highest order of mammals including prosimians, monkeys, and apes. See Animal Welfare Regulations at 9 CFR Part 1 §1.1.

<sup>13</sup> “Commerce” means trade, traffic, transportation, or other commerce: (1) Between a place in a State and any place outside of such State, including any foreign country, or between points within the same State but through any place outside of, or within any territory, possession, or the District of Columbia; or (2) affects the commerce described in this part. See Animal Welfare Regulations at 9 CFR Part 1 §1.1. It is important to note that the United States Fish and Wildlife Service interprets “commerce” in the Endangered Species Act differently than the USDA. Transportation to the Sanctuary System constitutes “commerce” under the Animal Welfare Act but not “commerce” under the Endangered Species Act per discussions with the U.S. Fish and Wildlife Service (National Institutes of Health and U.S. Fish and Wildlife Service, 2014) because the chimpanzees are not for sale or sold, and neither the research center or research reserve receives an in-kind benefit or benefits from the chimpanzee transfer in the future.

<sup>14</sup> “Research facility” is defined to include any school, institution, organization, or person that uses or intends to use live animals in research, tests, or experiments and that receives funds under a grant, award, loan or contract from a department, agency, or instrumentality of the United States for the purpose of carrying out research, tests, or experiments. See Animal Welfare Regulations at 9 CFR Part 1 §1.1 for the complete definition.

<sup>15</sup> “Intermediate handler” is defined to include any person who is engaged in any business in which he receives custody of animals in connection with their transportation in commerce. See Animal Welfare Regulations at 9 CFR Part 1 §1.1 for the complete definition.

<sup>16</sup> “Carrier” means the operator of any airline, railroad, motor carrier, shipping line, or other enterprise which is engaged in the business of transporting any animals for hire. See Animal Welfare Regulations at 9 CFR Part 1 §1.1.

<sup>17</sup> Policy #18 from the USDA Animal Care Resources Guide from the Animal Care Policy Manual (Issue Date October 1, 2017) clarifies that nonhuman primates transported within the State and in the licensee’s/registrant’s private vehicle may be transported without a health certificate (United States Department of Agriculture, 2017).



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- When so inspected, the ... nonhuman primate appeared to the licensed veterinarian to be free of any infectious disease or physical abnormality which would endanger<sup>18</sup> the animal(s) or other animals or public health.

#### Intermediate Handlers and Carriers

Animal Welfare Regulations at 9 CFR Part 2 §2.78 “Health certification and identification” places specific requirements also on intermediate handlers and carriers, who are prohibited from accepting nonhuman primates for transportation without a properly executed health certificate.

(a) No dealer, exhibitor, operator of an auction sale, broker or department, agency, or instrumentality of the United States or of any State or local government shall deliver to any intermediate handler or carrier for transportation, in commerce, or shall transport in commerce any ... nonhuman primate unless ... nonhuman primate is accompanied by a health certificate executed and issued by a licensed veterinarian. The health certificate shall make the statements [captured above under 9 CFR Part 2 §2.38(h)(1)].

(b) The Secretary may provide exceptions to the health certification requirement on an individual basis for animals shipped to a research facility for purposes of research, testing, or experimentation when the research facility requires animals not eligible for certification. Requests should be addressed to the Animal and Plant Health Inspection Service, Animal Care, 4700 River Road, Unit 84, Riverdale, Maryland 20737-1234.

(c) No intermediate handler or carrier to whom any live ... nonhuman primate is delivered for transportation by any dealer, research facility, exhibitor, broker, operator of an auction sale, or department, agency, or instrumentality of the United States or any State or local government shall receive a live ... nonhuman primate for transportation, in commerce, unless and until it is accompanied by a health certificate issued by a licensed veterinarian in accordance with paragraph (a) of this section, or an exemption issued by the Secretary in accordance with paragraph (b) of this section.

9 CFR Part 3 §3.86 also require carriers and intermediate handlers to obtain from the consignor before a nonhuman primate is accepted for transport information about pre-trip feeding and watering, temperature acclimation, among other things. Examples of relevant requirements are as follows:

- A statement from the consignor that the nonhuman primate was offered food and water during the 4 hours before delivery to the carrier or intermediate handler (9 CFR Part 3 §3.86(c)), including the time and date the animal was last fed and watered and the specific instructions for the next feeding(s) and watering(s) for a 24-hour period (9 CFR Part 3 §3.86(c)(3)). The statement must bear the consignor’s signature and date of signature (9 CFR Part 3 §3.86(c)(4)).
- A signed statement by a veterinarian dated no more than 10 days before delivery of the animal to the carrier or intermediate handler certifying that to the best of his or her knowledge, each of the nonhuman primates contained in the primary enclosure is acclimated to air temperatures

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<sup>18</sup> Animal Welfare Regulations at 9 CFR Part 1 §1.1 do not define all words used within the regulations. Instead, it states: “Words undefined in the following paragraphs shall have the meaning attributed to them in general usage as reflected by definitions in a standard dictionary.” This is relevant to interpreting “endanger.”

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lower than 50 degrees F, but not lower than a minimum temperature specified on the certificate based on the generally and professional accepted temperature range for the nonhuman primate, considering age, condition, and species. See 9 CFR Part 3 §3.86(e).

Importantly, 9 CFR Part 3 §3.90(c) states: “If a nonhuman primate is obviously ill, injured, or in physical distress, it must not be transported in commerce, except to receive veterinary care for the condition. In addition, 9 CFR Part 3 §3.90(a) requires the operator transporting the chimpanzee to observe the animal at least every 4 hours.

### Louisiana State Law

Certain Louisiana State laws and regulations govern the Sanctuary System because it is operated out of Keithville, Louisiana<sup>19</sup>. Although it has been illegal to import or possess nonhuman primates in Louisiana<sup>20</sup> since 2006, the Sanctuary System for chimpanzees is expressly exempt from that ban. When NIH-owned or -supported chimpanzees are relocated to the Sanctuary System from research centers in Texas or the research reserve in New Mexico, the company that operates the Sanctuary System must comply with the State of Louisiana Department of Agriculture and Forestry animal import rules and federal requirements (Coate, 2011). The Veterinary Health Division, part of the Department of Agriculture and Forestry, regulates the importation of animals to prevent the introduction of infectious diseases (Veterinary Health Division, Louisiana Department of Agriculture and Forestry) (La. Rev. Stat. § 36:621, 2016) (La. Rev Stat § 3:2093).

For purposes of this analysis, the State of Louisiana does not require import permits for apes or other exotic or wild animals entering the state because Louisiana’s Wildlife and Fisheries Commission permitting requirements do not apply to accredited zoos, research facilities, and the operator of the Sanctuary System, Chimp Haven (La. Admin Code. tit. 76, pt. V, § 115, 2006). However, the Louisiana Department of Agriculture and Forestry regulations require anyone importing wild or semi-wild animals into the State to: (a) file a report with the State Veterinarian within 10 days of the date of shipment, (b) make the animals immediately available for examination by the Livestock Sanitary Board to determine the health status of the animals (La. Admin. Code tit. 7, pt. XXI, §581), and (c) provide with the animals an official health certificate<sup>21</sup> stating that they are free from signs of infectious or contagious diseases<sup>22</sup>

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<sup>19</sup> Health certificates used to move live animals inter-state must be completed in alignment with requirements of the destination state. <https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/nvap/NVAP-Reference-Guide/Animal-Movement/common-problems>

<sup>20</sup> Louisiana’s Wildlife and Fisheries Commission, which is responsible for controlling and supervising the state’s wildlife, finalized regulations in 2006, making it illegal to import, possess, purchase, or sell any species of nonhuman primate within the state except for permitted entities. This regulation specifically exempts Chimp Haven, Inc. (the nonprofit organization that runs the Sanctuary System from the permitting and other requirements of Louisiana’s Administrative Code 76 pertaining to nonhuman primates (La. Admin Code. tit. 76, pt. V, § 115, 2006).

<sup>21</sup> “Official Health Certificate” means a legible record of an animal’s health recorded on an official form. These certificates for valid for 30 days only.

<sup>22</sup> A list of contagious diseases includes tuberculosis, paramyxovirus infections (e.g., RSV), and other conditions (La. Admin. Code tit. 7 § XXI, 121).

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and signs of internal and/or external parasites<sup>23</sup> (La. Admin. Code tit. 7, pt. XXI, § 501; La. Admin. Code tit. 7, pt. XXI, § 101; See also, La. Rev. Stat. Ann. § 3:2137).

## Section 2. Who has authority to decide which chimpanzees are relocated? Can these decisions be overturned or vetoed if there is disagreement? Which parties, if any, could be subject to civil, criminal, or other penalties for failing to adhere to applicable laws?

Several decisionmakers are involved in determining whether a particular chimpanzee will be transported. Among them are the owners of the animal, the Sanctuary System, the licensed veterinarian of the research center or research reserve, and the carrier or intermediate handler. Although this review considers the role of the animal's owner (e.g., the NIH for many animals), it emphasizes the role of the other parties.

### Quick Summary

- Chimpanzee owners, the Sanctuary System, licensed veterinarians, and the carrier or intermediate handler have a role in deciding which chimpanzees are transported to the Sanctuary System.
- The licensed veterinarian and carrier or intermediate handler have specific authorities under the Animal Welfare Act and Regulations. These authorities permit the licensed veterinarian to not sign a health certificate necessary for inter-state transport and require a carrier or intermediate handler to refuse to transport an animal if specific requirements are not met.
- If an animal is obviously ill, injured, or in physical distress, no one can authorize its transportation except for veterinary care purposes.
- Violations of the Animal Welfare Act or its regulations or Louisiana State law or regulations may be subject to civil and criminal penalties and other enforcement actions.

### Who has authority to decide which chimpanzees are relocated?

#### Chimpanzee Owners: NIH and Southwest National Primate Research Center

The NIH owns 230 chimpanzees (Oct 1, 2017 census data) that reside in research centers or the research reserve while the Southwest National Primate Research Center owns 80 chimpanzees that are partially supported by the NIH (National Institutes of Health, Office of Research Infrastructure Programs, 2017). As the owner of these animals, the NIH and Southwest National Primate Research Center have authority to determine the placement of these animals and the timing of relocation. For example, should the Southwest National Primate Research Center decide against relocating its chimpanzees to the Sanctuary System, there is no law requiring them to do otherwise. Similarly, the NIH elected to cancel the relocation of six chimpanzees in 2015 to the Sanctuary System (United States Government Accountability Office, April 2016), demonstrating the agency's ability to authorize movement.

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<sup>23</sup> Among other things, Federal regulations (9 CFR Part 71 §71.3) and the state of Louisiana prohibit the importation of livestock affected with, or carrying the contagion of, screwworms. <http://www.ldaf.state.la.us/animal-health/veterinary-health-division/health-certificate-requirements/>

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### Operators of the Sanctuary System

Other than for capacity, finances, and staffing reasons, the operators of the Sanctuary System, Chimp Haven, Inc., have authority under Louisiana State law (La. Admin. Code tit. 7, pt. XXI, § 501; La. Admin. Code tit. 7, pt. XXI, § 101; See also, La. Rev. Stat. Ann. § 3:2137) to refuse entry of a chimpanzee into its sanctuary if the animal harbors a contagious or infectious disease (e.g., tuberculosis) or has signs of internal or external parasites, particularly screwworm. The Sanctuary System may also reject a chimpanzee for several reasons, including males that are capable of reproducing, and lack of information regarding the health screening and the screener (National Institutes of Health, Office of Research Infrastructure Programs, 2017).

### Licensed Veterinarian(s) at the Research Center or Research Reserve

Other than for temperature acclimation and time of the last feeding and watering, the consignor's licensed veterinarian(s) has the authority *to not issue* the health certificate if the subject chimpanzee: 1) is obviously ill, injured, or in physical distress (9 CFR Part 3 §3.90(c); or 2) has any infectious disease or physical abnormality which would endanger<sup>24</sup> the animal(s) or other animals or public health (9 Part 2 §2.38(h)(1)).

### Carrier or Intermediate Handler

Carriers or intermediate handlers may refuse to transport a chimpanzee for a number of reasons, including unsafe enclosures, but those pertinent to this analysis include a lack of appropriate documentation, such as: 1) a properly executed health certificate (9 Part 2 §2.38(h)(1)), 2) a signed and dated statement with respect to last time of feeding and watering and instructions for the next feeding(s)/watering(s) (9 CFR Part 3 §3.86(c)); 3) a signed and dated statement by a veterinarian certifying that the chimpanzee is acclimated to air temperatures lower than 50 degrees F, but not lower than a minimum temperature specified on the certificate based on the generally and professional accepted temperature range for the nonhuman primate, considering age, condition, and species. See 9 CFR Part 3 §3.86(e). Carriers or intermediate handlers may also refuse to transport a chimpanzee, even if the aforementioned requirements are met, if the chimpanzee is obviously ill, injured, or in physical distress (9 CFR Part 3 §3.90(c)).

### Can these decisions be overturned or vetoed if there is disagreement?

The decision-making parties can veto or overturn certain decisions with respect to chimpanzee transportation for relocation purposes, as discussed above. See Table 1.

### USDA Secretary

Although not available for transportation to the Sanctuary System for chimpanzee retirement, the USDA Secretary has authority to make exceptions to the health certificate requirement on an individual basis for animals shipped to a research facility for purposes of research, testing, or experimentation when the research facility requires animals not eligible for certification (9 CFR Part 2 §2.38(h)).

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<sup>24</sup> "Endanger" according to Merriam-Webster means to bring into danger or peril.

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*Table 1 Sample Scenarios with Respect to Decisions Against Transportation for Relocation*

Scenario preventing transportation	Decision-making Party Authority to Overturn/Veto <sup>25</sup>				
	Owner	Sanctuary System	Licensed Veterinarian	Carrier or Intermediate Handler	USDA Secretary
Obviously ill, injured, or physically distressed animal unless for veterinary care	No – cannot require transportation	No – cannot require transportation	No – cannot require transportation	No – cannot require transportation	No – cannot require transportation
Health certificate not issued	No – cannot require transportation	No – cannot require transportation	No – cannot require transportation	No – cannot require transportation unless with USDA Secretary-issued exception	No – cannot for retirement purposes.
Health certificate issued within 10 days of shipment	Yes – can cancel the decision and timing of relocation	Yes – can cancel the decision and timing of relocation	N/A	Yes – among other things, can refuse transport if animal appears obviously ill, injured, or physically distressed.	N/A

### Which parties, if any, could be subject to civil, criminal, or other penalties for failing to adhere to applicable laws?

A number of penalties may apply for violations of Federal or State laws or regulations.

USDA enforcement of the Animal Welfare Act includes letters of warning or other enforcement actions, administrative enforcement actions by filing administrative complaints to be heard before the Office of the Administrative Law Judge, and referral of serious violations to the Department of Justice if criminal charges are appropriate (Animal Welfare Act, as amended, 1966). Penalties for a research facility, carrier, or other regulated entity for violating the Act or its rules, regulations, or standards may be assessed:

- A civil penalty of up to \$10,000 for each violation and subsequent penalties for failing to obey a cease and desist order
- Criminal penalties for violation, including up to 1 year of imprisonment, a fine of up to \$2,500, or both

Additional penalties are assessed for failure to maintain appropriate records. For example, Animal Welfare Regulations require animal-specific information to be recorded, complete, and current. This information includes, but is not limited to, the species of the animal, its offspring, and the number of

<sup>25</sup> In the case of the USDA Secretary exception, it should not be viewed as a veto. Instead, it is another option for transporting chimpanzees for research purposes if a health certificate cannot be issued. Exceptions to the health certificate are not issued for purposes of transporting a chimpanzee to the Sanctuary System for retirement purposes.

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animals in a shipment. See §2.75(b)(1) of the Animal Welfare Regulations for additional requirements. The State of Louisiana also may impose penalties for failing to comply with the State of Louisiana animal importation rules. Violators may be fined between \$300 - 1,000 dollars, imprisoned between 30-60 days, or both (La. Rev. Stat. Ann. § 3:2139). In addition, veterinarians may lose their accreditation or license to practice veterinary medicine (9 CFR Part 161).

### Section 3. What health documentation is completed to transport a chimpanzee to another state? What information is necessary or could be consulted to complete the health certificate? How might a veterinarian determine if a chimpanzee or others will not be “endangered”?

The USDA provides a specific form to record the transportation of nonhuman primates and requires additional certifications from a licensed veterinarian and consignor before inter-state transportation ensues. Determining that a chimpanzee is eligible for transportation involves a physical examination of the chimpanzee, a review of the animal’s veterinary history, serology if available, tests for contagious diseases (e.g., tuberculosis), and other factors that assist a licensed veterinarian in determining if the chimpanzee or others will be endangered by the transportation. In addition, veterinarians comply with Institutional Animal Care and Use Committee-approved protocols and guidelines.

#### Quick Summary

- APHIS Form 7020 (optional) and the health certificate (required), unless otherwise excepted by the USDA Secretary, are completed shortly before transportation ensues.
- The health certificate must state, among other things, that nonhuman primate appeared to be free of any infectious disease or physical abnormality which would endanger the animal(s) or other animals or public health.
- Although Federal and State laws and regulations do not dictate how veterinarians arrive at a decision to issue a health certificate, a review of relevant literature suggests that they use a combination of objective measures and subjective judgment to determine that the transportation will not endanger the animal or others.
- The extent to which these factors are considered appear to be left to the judgement of the licensed veterinarian and culminate in a decision about whether or not to issue a health certificate.

#### What health documentation is completed to transport a chimpanzee to another state?

Animal-Specific Details from APHIS Form 7020 (form use is optional; information is required)  
Animal Welfare Regulations at 9 CFR Part 2 §2.75(b) require the “dealer” who is in possession or control of the chimpanzee (i.e., the research centers or research reserve) to make or create forms which fully and correctly disclose specific information about the animals for transport. The USDA makes available APHIS Form 7020 Record of Acquisition, Disposition or Transport of Animals (Other Than Dogs and Cats) (United States Department of Agriculture, APHIS Form 7020) for this purpose. APHIS Form 7020 requests specific information about each animal for transport, including information about its weight and



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condition<sup>26</sup> prior to shipment. Although APHIS Form 7020 is not required for transportation, the information that the form captures is required and can be recorded using alternative forms of documentation.

### Health Certificate (required)

The Animal Welfare Act and Regulations prohibit a research facility from delivering to any intermediate handler or carrier for transportation any nonhuman primate unless it is accompanied by a health certificate<sup>27</sup> executed and issued by a licensed veterinarian.

### What information is necessary or could be consulted to complete the health certificate?

The health certificate issued for transportation has two purposes: the primary purpose is to control communicable diseases by detecting carriers through inspection and examination before other animals are exposed to them (Zeilenga, 1988). Another purpose is to ensure the subject animal will not be endangered by the transportation (United States Department of Agriculture, 2017). As described in the literature, the process of deciding whether to issue a health certificate requires decision-making based on an analysis of subjective and objective information by an experienced veterinarian (Zeilenga, 1988) since the USDA does not describe detailed quantitative metrics.

### Animal Health History

The literature recommends that the chimpanzee's clinical and experimental history should be reviewed when determining its suitability for transportation, including anesthesia events (Popilskis SJ, 2008) (Zeilenga, 1988). A health history review may include, among other things (Lamont, 2002):

- Symptoms or history of organ system disease, diarrhea, vomiting, excessive thirst or urine production, seizures, behavior change, exercise intolerance, coughing, labored breathing, weight loss, and body condition.
- Concurrent medications
- Previous anesthesia
- Allergies
- Recent feeding

### Pre-Anesthesia Evaluation

The literature suggests that chimpanzees require an anesthetic event for a veterinary exam and may require anesthesia or sedation before loading onto the truck for transportation, and before offloading at the Sanctuary System (Bloomsmith, 2006) (Schapiro, 2012). Anesthesia in great apes can be challenging due to their large size, physical strength, agility, intelligence, and common medical conditions such as cardiomyopathy, which can complicate anesthetic events (Lammey ML, 2008) (Cervený, S. and Sleeman, J., 2014). A preanesthetic assessment is vital but can be further complicated because significant diseases may go unrecognized and because body weight estimates in chimpanzees can be inaccurate – in one

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<sup>26</sup> Boxes H and L on APHIS Form 7020

<sup>27</sup> Additional clarity about the contents of the health certificate (also called interstate certificate of veterinary inspection) can be found in regulations specific to tuberculosis (9 CFR Part 77 §77.2 "Interstate certificate of veterinary inspection"), the Animal Welfare regulations, and guidance from APHIS. (United States Department of Agriculture, Veterinary Services, 2012)

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study, by as much as 28 percent (Kumar S, 2017) (Adams WA, 2003). There are, however, suggested anesthetic preparations in the literature for animals considered to be at “high-risk”, such as identifying potential problems in chimpanzees with cardiac conditions, hepatic disease, or renal disease (Cornick-Seahorn JL M. S., 2001). In addition, the literature suggests that categorizing an animal according to its risk of cardiopulmonary emergency during the anesthetic period<sup>28</sup> (Table 2) can assist the veterinarian in selecting an anesthetic protocol (Cornick-Seahorn JL M. S., 2001) although Institutional Animal Care and Use Committees likely have specific protocols (National Academy of Sciences, Institute of Laboratory Animal Research, 2011).

Table 2 Classification of Physical Status

Category	Physical Status	Examples
I	Normal healthy patient	Patient presented for elective procedure
II	Patient with mild systemic disease	Skin tumor, fracture without shock
III	Patient with severe but not incapacitating systemic disease	Fever, dehydration, anemia, cachexia, early renal or cardiac disease
IV	Patient with severe life-threatening systemic disease	Uremia, cardiac decompensation, septicemia, emaciation
V	Moribund patient not expected to survive with or without intervention	Profound shock, terminal malignancy, severe trauma
E	E is added to category to designate that anesthesia is being performed on an emergency basis.	

Adapted from the American Society of Anesthesiologists.

### Bloodwork and Other Laboratory Tests

The literature suggests that routine laboratory tests (e.g., hematology, blood chemistries, and select serology), on occasion, may be performed as part of a pre-anesthesia evaluation and/or physical exam (Lamont, 2002) to assess if values are outside the normal range for the species (Howell S, 2003) (Ihrig M, 2001) or abnormal for the particular animal.

### Physical Examination

A licensed veterinarian must also complete an inspection of the chimpanzee within 10 days before shipment (United States Department of Agriculture, 2017). Per the Animal Welfare Regulations, the inspection, and any subsequent examination, determines if the chimpanzee harbors an infectious or

<sup>28</sup> The purpose of decision support models for preanesthetic evaluation is to reduce anesthetic risks and mortality rate. Table 2 was adapted from previous scales developed by the American Society of Anesthesiologists (American Society of Anesthesiologists, 2014) but is intended for veterinary use. Other models and information exist to inform a preanesthetic evaluation in humans but generally all suggest that a lower the physical status score (e.g., ASA I, II, or III) equates to better health and lower risk of anesthetic complications (Sobrie O, 2016) (Daabis, 2011).



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contagious disease that would endanger other animals or public health and assesses if transportation would endanger the subject chimpanzee. The literature suggests that the veterinarian uses objective measures, such as tests and health records, and subjective information in this assessment (Zeilenga, 1988) (Cervený, S. and Sleeman, J., 2014).

The literature suggested that important signs of illness, such as unusual posture or behavior, anorexia, and abnormal urine or feces, are readily identifiable and could influence a decision about transportation (Popilskis SJ, 2008) (Zeilenga, 1988). The exam includes obtaining body weight and temperature and observation of the animal's color and perfusion (Popilskis SJ, 2008) plus a physical exam of organ systems (Lamont, 2002):

- Cardiovascular: heart rate and rhythm, murmurs, blood pressure, echocardiogram, electrocardiogram
- Pulmonary: respiratory rate, depth and effort, presence of wheezing or crackles, percussion
- Nervous: seizures, stupor, syncope, vision, hearing
- Gastrointestinal: diarrhea, vomiting, abdominal distension, presence of gut sounds
- Hepatic: presence of jaundice, bleeding abnormalities
- Renal: kidney palpitation, urinary bladder palpitation, urine production
- Integument: neoplasia, trauma, parasite infestation, hair loss
- Musculoskeletal: weakness, lameness, fractures, muscle mass

How might a veterinarian determine if a chimpanzee or others will not be “endangered”?

Will the Transportation Endanger Other Animals or Public Health?

A review of the literature suggests that the following are questions to consider when a veterinarian determines if a chimpanzee will endanger other animals or public health through transportation.

- Has the chimpanzee received “standard vaccinations<sup>29</sup>” (e.g., against measles, polio, tetanus, and possibly rabies (extra-label)? (Gamble, Kathryn C. and Backues, Kay A., 2006) (Ross, Steve and McNary, Jennie, 2009) (National Institutes of Health, Office of Research Infrastructure Programs, 2017)
- Is the animal free of parasites, particularly screwworm? (La. Admin. Code tit. 7, pt. XXI, § 501) (9 CFR Part 71 §71.3)
- Does the animal have a negative skin test for tuberculosis? (La. Admin. Code tit. 7 §105)
- Does the chimpanzee display signs of an infectious or contagious disease, such as fever, watery diarrhea, or dysentery? (Zeilenga, 1988)

Will the Transportation Endanger the Chimpanzee to be Relocated?

- Is the chimpanzee obviously ill, injured, or in physical distress? (9 CFR Part 3 §3.90(c))

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<sup>29</sup> “Standard vaccinations” are included as part of the provision of veterinary care within the Sanctuary System Statement of Work.

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- Are there anesthetic concerns after a pre-anesthesia evaluation? (Cervený, S. and Sleeman, J., 2014), such as a score of IV or higher on the physical status chart for anesthesia purposes? (Table 1) (Cornick-Seahorn JL M. S., 2001)
- Would the chimpanzee's health history (e.g., recovery from a recent surgery, trauma, or illness) prevent or delay a decision about transportation?
- Does the animal have a condition that requires it to be monitored more frequently than every 4 hours<sup>30</sup>, e.g., uncontrolled diabetes requiring frequent glucose monitoring? (9 CFR Part 3 §3.90(a))
- Are there concerns after the veterinary examination or laboratory tests?

## Section 4. Does guidance exist elsewhere to inform these decisions?

In addition to the information considered by the licensed veterinarian at the research centers and the research reserve, guidance from zoos and international organizations may further inform the decision to transport chimpanzees for relocating purposes.

### Quick Summary

- Limited guidance exists from zoos and other countries to help inform the transportation of NIH-owned or -supported chimpanzees to the Sanctuary System.
- Some guidance is specific to chimpanzees while other, less specific information could inform development of future guidance. Initial helpful sources are the Association of Zoos and Aquariums, the World Organisation for Animal Health, and the United Kingdom.
- These sources offer additional perspectives on chimpanzees that may require frequent monitoring during transportation, raise anesthesia concerns, and have conditions that may otherwise disfavor the relocating process.

### The Association of Zoos and Aquariums (AZA)

The AZA issues its own accreditation standards (Association of Zoos and Aquariums, 2018) and animal care manuals to facilitate chimpanzee management and care (Ross, Steve and McNary, Jennie, 2009). These standards do not apply to the research centers and the research reserve that house NIH-owned and -supported chimpanzees, although other accreditation standards<sup>31</sup> apply. Institutions that have achieved AZA accreditation and care for chimpanzees must comply with all relevant local, state, and federal wildlife laws and regulations. In addition, these institutions also must meet AZA accreditation standards that are more stringent than these laws and regulations (AZA Standard 1.1.1). Several elements of the AZA Chimpanzee Care Manual may wish to be considered when transporting NIH-owned or -supported chimpanzees that may be a higher risk of harm through the relocation process.

#### Chimpanzees Requiring Frequent Monitoring

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<sup>30</sup> Animal Welfare Regulations require that the operator of the surface transportation observe the chimpanzees not less than once every 4 hours to ensure sufficient air for normal breathing, ambient temperature is within regulatory limits, and compliance with all other applicable standards. See 9 CFR Part 3 §3.90(a) Conditions or diseases that require more frequent monitoring than every 4 hours may disfavor transportation for relocating purposes.

<sup>31</sup> AAALAC standards apply to the research centers, the research reserve, and the Sanctuary System. AAALAC stands for the Assessment and Accreditation of Laboratory Animal Care.

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The AZA Chimpanzee Care Manual Section 3.1 advises that two individuals who are “very familiar” with the chimpanzee’s personality and history accompany the chimpanzee in transit plus a veterinarian. At least one person should monitor the chimpanzee visually or via monitor “at all times.” For chimpanzees that require observation more frequently than every 4 hours (Animal Welfare Regulation requirement) constant monitoring may help identify animals that would otherwise be endangered by transportation due to insufficient monitoring.

#### Concerns with Administering Anesthesia to Chimpanzees

Up to 4 anesthetic events may occur when relocating a chimpanzee (examinations, pre-trip, and post-trip). Veterinarians concerned that the physical status of the chimpanzee contraindicates anesthesia may already have protocols for these situations, but the AZA Chimpanzee Care Manual section 6.6 provides additional specificity:

“Revision of the induction protocol should be considered for animals with cardiac disease or risk factors for cardiac disease, such as obesity, advanced age (>30 years), or undocumented cardiac health in adjust. Possible revisions that should be considered include: using the lowest dose of the anesthetic agent; the use of ketamine alone as a primary induction agent; avoiding the use of alpha-2 agonists...; or discontinuing elective sedations in known cardiac disease patients.”

#### World Health Organisation for Animal Health

The World Health Organisation for Animal Health issues standards to improve terrestrial animal health and welfare and veterinary public health worldwide (World Health Organisation for Animal Health, 2011). Although the standards address nonhuman primates specific to quarantine procedures, zoonoses, and some research, the standards add “Transport of Animals by Land” generally for livestock and limited other animals but exclude wild animals for example. However, their “fitness to travel” section (Article 7.3.7) provides information that may be useful for NIH-owned or -supported chimpanzees potentially eligible for relocating.

#### Deselection Criteria for Transportation

Under Article 7.3.7 Fitness to travel:

c) Animals that are unfit to travel include, but may not be limited to:

- those that are sick, injured, weak, disabled or fatigued;
- those that are unable to stand unaided and bear weight on each leg;
- those that are blind in both eyes;
- those that cannot be moved without causing them additional suffering;
- those whose body condition would result in poor welfare because of the expected climatic conditions.

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e) Animals at particular risk of suffering poor welfare during transport and which require special conditions (such as in the design of facilities and vehicles, and the length of the journey) and additional attention during transport, may include:

- large or obese individuals;
- very young or old animals;
- excitable or aggressive animals;
- animals subject to motion sickness;
- animals with a history of exposure to stressors or pathogenic agents prior to transport;
- animals with unhealed wounds from recent surgical procedures such as dehorning.

#### United Kingdom Relocation Decision Trees

Article 19 of the European Union Directive 2010/63/EU discusses the relocation of animals if a) the state of the health of the animal allows it; b) there is no danger to public health, animal health or the environment, and c) appropriate measures have been taken to safeguard the well-being of the animal (European Parliament, Council of the European Union, 2010). Guidance suggests that selecting an animal for rehoming<sup>32</sup> (or discharge) is carefully timed and planned with the animal's fitness for rehoming, as assessed and certified by a veterinarian (Prescott, 2006) (Home Office, United Kingdom, 2014).

The United Kingdom views relocation as nonmandatory; it instead is an ethical choice when it is in the best interests of the individual animal and poses no danger to the public, animal health, or environment (Animals in Science Regulations Unit, United Kingdom, 2015). The Animals in Science Regulations Unit also discusses health and other factors that could affect rehoming as well as a rehoming decision tree. See Figure 1 and Figure 2.

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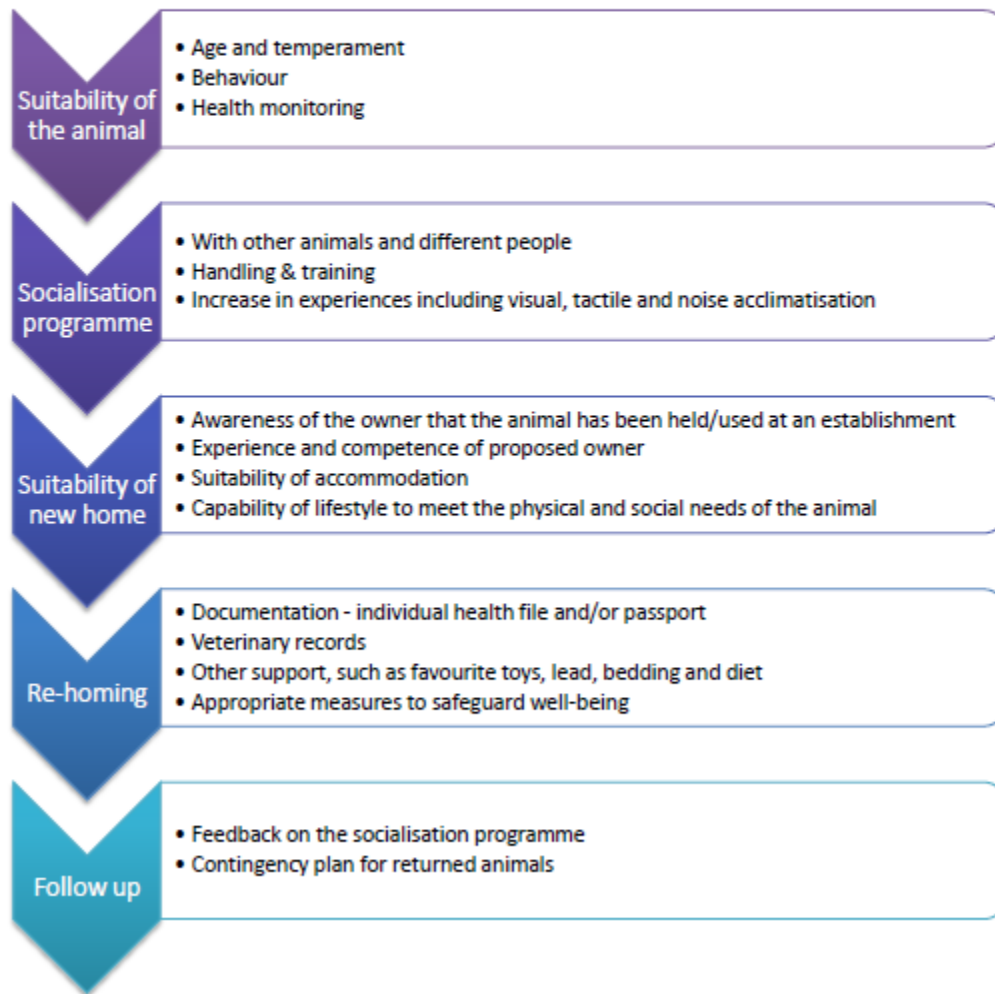
<sup>32</sup> "Rehoming" means the movement of a relevant protected animal from an establishment to any other place that is not another establishment under the Animals (Scientific Procedures) Act. Relocating is distinguished from "Setting free," which is defined as setting free into the wild outside the control of man. See (Animals in Science Regulations Unit, United Kingdom, 2015)

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Figure 1 Rehoming: General health considerations offered by the Animals in Science Regulations Unit, UK

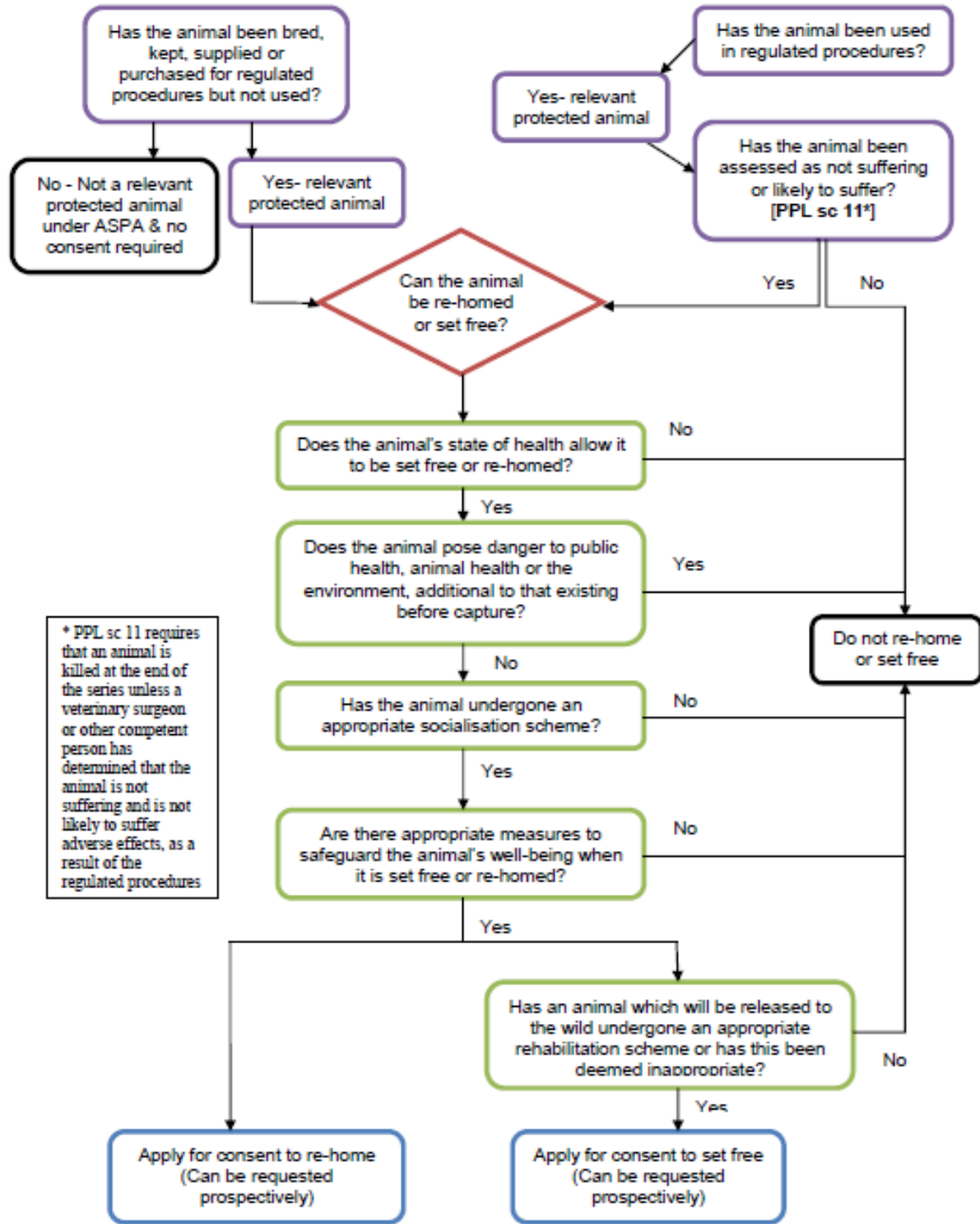
Animals should only be re-homed if it would be beneficial for the welfare of the individual animal. Careful individual assessment should be undertaken on the suitability of the animal for re-homing and its ability as an individual to adapt to a new environment. Younger animals usually acclimatise more easily to new situations; however, this should not preclude the re-homing of older animals, as a structured socialisation scheme may be adjusted to assist them in adapting to their new circumstances.

Figure 3: Factors to consider in an effective re-homing programme



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Figure 2 Rehoming and setting free decision tree offered by the Animals in Science Regulations Unit, UK



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## Concluding Remarks

The authority to relocate NIH-owned or -supported chimpanzees from research centers or the research reserve to the Sanctuary System largely rests with the licensed veterinarian(s) at the sending site. Those individuals are the most familiar with the chimpanzees, and therefore, are best positioned to complete the USDA-required health certificate for transportation. The health certificate attests that the animal is free of contagious disease and will not be endangered by the transportation.

Veterinarians rely on a combination of objective information and subjective judgment to determine whether the transportation should occur. The review includes the animal's records, health history, and lab work, as well as a physical exam to determine whether the individual chimpanzee or others will be endangered by the transportation and overall relocation process (e.g., anesthesia). Federal and State laws and regulations also require the carrier or intermediate handler to decline to transport a chimpanzee that lacks the necessary certifications or that is ill, injured, or physically distressed. Federal regulations also require carriers and intermediate handlers to provide humane care in transit, which include monitoring at least every 4 hours.

NIH-owned or -supported chimpanzees are increasingly becoming geriatric and may have experimentally-induced diseases as well as chronic cardiac or other natural pathologies that complicate the relocation process due to the animal's frailty or a condition that must be monitored frequently. Although this analysis did not uncover a definitive list of diseases, conditions, or disabilities that would automatically disqualify the chimpanzee from transportation, there should be sufficient information from U.S. and international sources to further a dialogue within the Council of Councils Working Group on the physiological and welfare considerations of transporting at-risk chimpanzees.

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# **Appendix H. Physiological and Welfare Concerns of the At-Risk Chimpanzee Population—A Literature Review**

**Department of Health and Human Services  
National Institutes of Health (NIH)  
Division of Program Coordination, Planning, and Strategic Initiatives  
Office of Research Infrastructure Programs (ORIP)**

Physiological and Welfare Concerns of the *At-Risk* Chimpanzee Population—  
A Literature Review

## **Executive Summary**

## BACKGROUND

Chimpanzees (*Pan troglodytes*) are our closest relatives in the animal kingdom and their use in NIH-supported behavioral and biomedical research has over the decades provided significant insights into the causes and treatments of a range of devastating human diseases. Much of what scientists know regarding the pathogenesis and the correlates of immunity against hepatitis A, B, C, D, and E viruses stem from studies using chimpanzees. Research on these animals has led to the development of diagnostic tests and vaccines against hepatitis A and B, along with monoclonal antibody therapies. These animals served as experimental models for several other diseases and recently have been shown to display markers of Alzheimer's disease. Despite these scientific advancements, there are important factors to consider when using chimpanzees for research purposes that create uncertainty or difference in opinions regarding the justification for using chimpanzees. To address this, the National Institutes of Health (NIH) enforced a moratorium on chimpanzee breeding in 2007 resulting in a decline of laboratory research using these animals. In 2013, the NIH declared its decision to reduce significantly the use of these animals in NIH-supported research and to retain only a small number of animals for projects that meet certain animal welfare and bioethical criteria. Subsequent to this, NIH Director Dr. Francis Collins announced in November 2015 that the NIH had "phased out all previously active biomedical research protocols using chimpanzees...no new biomedical research projects have been approved." Therefore, all NIH-owned chimpanzees are eligible for retirement in accordance with the Chimpanzee Health Improvement, Maintenance, and Protection Act (CHIMP Act). The discontinuation of biomedical research protocols using chimpanzees, and in particular a ban on breeding these animals, has created an increasingly aging population of chimpanzees.

The population of captive, federally owned chimpanzees residing at non-sanctuary facilities requires relocation to the NIH-supported federal sanctuary operated by Chimp Haven. The NIH has devised a plan (1) for the safe relocation of retirement-eligible chimpanzees into the sanctuary system, while ensuring their long-term welfare. Many of these animals experience age-related ailments, which will complicate the transport and relocation process. Aging chimpanzees experience among other conditions cardiovascular and renal disease, obesity, diabetes and arthritis, which may be exacerbated by relocation. Conducive measures for managing stress, weight, and overall health are needed for successful relocation, acclimation to novel surroundings, and long-term care. As the chimpanzee population ages, the successful diagnosis and management of diseases are necessary. An important focus of the NIH is to provide direction for the relocation and overall welfare for the retirement-eligible chimpanzees.

NIH will create a Working Group of the Council of Councils to assess factors that put chimpanzees at risk during relocation to the Federal Sanctuary. The Council of Councils provides advice to the Division of Program Coordination, Planning, and Strategic Initiatives which includes the Office of Research Infrastructure Program which is responsible for management of the chimpanzee program and relocation of chimps to the Sanctuary. An essential part of this process requires a review of literature related to the physiological and general health considerations for chimpanzees that might put them at-risk during relocation. At-risk chimpanzees have a greater risk of experiencing severe adverse events during the transfer and relocation process. If safety factors are not considered, the relocation process may take a fatal toll on older frail animals. Trained staff at each facility are available to address the health

concerns of each animal, therefore minimizing the incidence of mortality and ensuring the success of quarantine and socialization with other animals at the sanctuary. The goal of this literature review is to facilitate discussion among scientific experts with knowledge in veterinary medicine and animal welfare to inform the scientific community on how to relocate these retirement-eligible chimpanzees and maintain their long-term care. Based on the literature, it is important to develop (i) a risk assessment of the various medical conditions for transfers and introductions of aging populations of chimpanzees to another facility and (ii) general guidelines addressing the types of medical conditions that warrant more careful consideration for transfer.

## EXECUTIVE SUMMARY

Chimpanzees are phylogenetically the closest living relative to human beings and they experience similar age-related ailments in the wild and in captivity (2). Scientists have long studied behavioral and biological changes in captive chimpanzees however not much has been comprehensively reported regarding guidelines for and the consequences of relocating these animals to new facilities. Within the last few years, increased reporting about chimpanzees has helped scientists to not only understand human disease, but also identify physiological and welfare considerations for these animals. A systematic review of relevant chimpanzee literature from the last 20 years highlights *cardiovascular and renal diseases, stress, obesity, osteoarthritis, and immune status* as important considerations for the relocation of retirement-eligible chimpanzees into sanctuary facilities.

Scientists agree that cardiovascular disease (CVD) is the leading cause of death in captive chimpanzees (3–10). The primary etiological agent for CVD in chimpanzees is believed to be the formation of diffuse interstitial myocardial fibrosis (4). Death in chimpanzees as a result of CVD often occurs without warning, and is believed to be caused by sudden cardiac arrhythmias (10, 11). Several cases of arrhythmia in captive chimpanzees have been reported and are linked to the progression of myocardial fibrosis. In one article (9), cardiac arrhythmias and myocardial fibrosis were observed in 42 and 81 percent of captive adult chimpanzees, respectively. This along with other studies demonstrates that there is a high prevalence of these conditions in captive chimpanzees. It has been discovered that age is a major risk factor for the development of arrhythmias. Also, the risk of CVD in chimpanzees may be determined in part by using reference blood pressure values (12). Therefore, prophylactic cardiac monitoring may help manage CVD and reduce the incidences of sudden death in aging captive chimpanzees before and after transfer.

C-reactive protein is an important biological marker for cardiac-related diseases in humans. It has been shown that this protein is not a predictor of CVD in adult captive chimpanzees (13). This supports the idea that there are different mechanisms causing CVD in chimpanzees. Also, pathogen-related co-infections (i.e., hepatitis, human immunodeficiency virus) that are present in these animals do not influence the incidences of cardiac diseases (11). These data suggest that there are other factors predicting CVD in captive chimpanzees.

Because of the prevalence of CVD in captive chimpanzees, scientists have established efforts toward the antemortem diagnosis of cardiac dysfunction. Scientists have created cardiographic reference ranges for normal adult chimpanzees to serve as a recommended baseline for monitoring cardiac function in these animals (14, 6). Electrocardiogram (ECG) readings outside of these reference ranges can provide a basis for long-term treatment of captive chimpanzees. To support this idea, scientists discovered that ECG can diagnose certain forms of CVD (pulmonary arterial hypertension and atrial fibrillation) in an adult captive chimpanzee (15). This diagnosis led to treatment with therapeutic drugs that at least, temporarily improved the quality of life. In another study (16), the congestive heart failure discovered in an adult captive chimpanzee was successfully managed for at least 2 years by the administration of a triple diuretic therapy that included *hydrochlorothiazide*, spironolactone, and furosemide. The early evaluation, diagnosis,



and intervention for animals perceived or confirmed to have heart arrhythmias are needed. Using published reference values for cardiac function (14, 6) is an integral part of this process.

Because of the confounding factors associated with using anesthesia for traditional ECG testing, some scientists recommend the use of an implantable form of an EKG monitor to measure cardiac function in captive chimpanzees (4, 8). The use of an implantable loop recorder (ILR) has enabled researchers to evaluate and diagnose arrhythmias in non-anesthetized adult captive chimpanzees that were considered high risk because of previous cardiac related-events (8). These cardiac events included the formation of *ventricular premature complexes*. An advantage of an ILR is the capture of intermittent arrhythmias, which are rarely measured by standard EKG methods. However, ILRs are unable to store long-spans of continuous data (e.g., limited to 24 hours).

Although it is unclear whether ECG and related cardiac testing (i.e., echocardiography) will improve the relocation process, it is recommended that cardiac monitoring should be a compulsory part of the routine care of captive chimpanzees. Presumably, CVD-related mortality may be avoided if animals are diagnosed and medically treated prior to transport. However, animals with end-stage CVD may be at too great of a risk for transport. This suggests that the severity of CVD may be a criterion to determine whether relocation is feasible. The CVD disorder along with other conditions should be considered for the relocation process. It is predicted that veterinary staff at non-sanctuary facilities will approve or disallow transport based on the severity of cardiac disease and/or the possible presence of co-morbidities. Because of the complex nature of CVD and other diseases that differ between animals, veterinarians must decide on transport based on each individual animal's health status.

Stress management also should be considered for the transport and relocation of chimpanzees. Deciphering the environmental and social factors that are linked with long-term stress levels is crucial for managing stress and improving overall animal welfare. Social housing structures and hierarchal status, sex, and rearing history are all factors that affect stress levels. In the wild, chimpanzees have a predilection toward multiple female and male social groups and the disruption of this structure results in diverse abnormal behaviors, such as self-injury (17). Modeling wild-type social conditions for captive animals may cause elevated levels of male aggression and surplus (isolated) males. Therefore, selecting the right type of social group for relocation of animals is significant. How the animals were reared also is significant. The time of separation from the mother (late or early) and the location of rearing (captive vs. wild) greatly influences stress levels in chimpanzees. The social dynamic between chimpanzee and human is noteworthy. Human to animal interaction, depending on the circumstances, may be quite unpredictable and contribute to stress. The relocation of captive chimpanzees to a new environment causes inherent stress that is coupled with human-derived alterations of social groups to minimize aggression. Quantifying stress levels in animals before and after relocation provides a marker for assessing welfare.

Circulating levels of glucocorticoids, steroid hormones produced by the adrenal gland, play an important role in the stress response of an organism and may serve as an indicator of both short- and long-term stress. Cortisol, the primary glucocorticoid in primates, is also present in many biological fluids and tissues, including hair. Hair cortisol (HC) is considered a marker for long-

term stress and overall animal welfare (17, 18, 19). Scientists have developed an *in vitro* assay to measure accumulated cortisol levels in the hair of captive chimpanzees (18, 19), which is an alternative method than fecal (20) or salivary measurements (21). In one study, anesthesia correlated with elevated fecal cortisol (20), suggesting that anesthesia administration is a stressful event. Interestingly, compared to the levels measured at the former institution, HC levels in captive chimpanzees change after relocation. Overall, males experience greater changes in stress cortisol than females. In one study (17), HC levels were elevated in a group of captive chimpanzees during the first year of relocation to a new environment and then decreased in the second year. In the same report, increased HC levels were associated with aggression from alpha males toward subordinate males. These results are similar to findings that show increased aggression in the form of wounding among all male groups (22). Regarding the influence of rearing history, late-deprived (separated from their biological mothers after 333 days and reared by humans) animals showed lower levels of HC than other groups of chimpanzees. The stress-related literature outlines important recommendations such as: (i) selecting correct social groups for initial transport and relocation, (ii) minimizing aggression incidences after relocation by periodically adjusting the membership of social groups, and (iii) performing routine behavior monitoring.

In addition to stress, obesity is another important parameter to consider for the long-term welfare of captive chimpanzees. Obesity is considered a major health concern for captive primates. Obesity can be defined by several parameters—body mass index (BMI), total body weight, waist-to-hip ratio, abdominal skin folds, and waist circumference in non-human primates (23, 24). Waist circumference can be used as an index for total body fat in these animals. Obesity increases the risk of developing CVD, type 2 diabetes mellitus, hepatic dysfunction, and hypertension. Therefore, it is important to understand the effect of and how to diagnose obesity in chimpanzees for their long-term welfare. In one report, scientists developed guidelines for defining obesity in chimpanzees by assessing weight and various metabolic parameters (24). They discovered that BMI and skin fold measurements positively correlated with elevated levels of blood glucose and triglycerides, which were predictors of obesity in the female animals. In the clinical setting, CVD is linked with increased triglycerides, blood glucose, and hypertension. Therefore, the animals tested in the aforementioned study (24) may have had undiagnosed compromised cardiac function.

Further supporting the idea that obesity is linked with alterations to metabolic markers is another finding that showed a positive association between triglyceride levels and waist circumference in male and female chimpanzees (23). Also in this study was an apparent link between body weight, systolic/diastolic blood pressure, and serum glucose in female animals. Some evidence suggests that these metabolic changes in overweight animals are chronic. In one study (7), approximately 43 percent of geriatric female chimpanzees experienced chronic metabolic syndrome (i.e., elevated blood glucose, obesity). Further highlighting the prevalence of obesity in female chimpanzees, captive females that were group-housed over a 5-year period and experienced strokes also were overweight (25). In another finding (26), obese females displayed elevated systolic blood pressure levels. Taken together, these reports demonstrate a strong link between obesity and metabolic conditions that can be chronic and predispose captive animals to serious diseases. Implementing an obesity monitoring system and intervention strategies (i.e., diet regimes, blood glucose testing, increased physical activity, and reducing high blood

pressure) by using published guidelines (26, 12, 27, 24) can reduce the risk for obesity and other related conditions for chimpanzees. Because status hierarchy is essential to maintaining chimpanzee social groups and affects access to food, obesity monitoring should include attention to status.

Aging is a risk factor for inflammatory-based diseases, which are identified as ailments that present with elevated levels of pro-inflammatory cells and proteins in the blood. Although inflammatory responses are a normal reaction to infection or injury, dysregulation of these responses can lead to chronic inflammation causing illnesses, such as rheumatoid arthritis, systemic lupus, and some forms of cancer. Chronic inflammation is a risk factor for developing aging-related diseases. It has been shown that various components of the immune system are altered in a population of older chimpanzees rescued from illegal trafficking and captivity. In one report (28), higher neutrophil cell counts and platelet microparticles were observed in older captive male chimpanzees. Interestingly, these animals had an elevated BMI. There is indication that the link between increased neutrophils and age in captive chimpanzees may occur in the absence of obesity. In one article (29), clinically normal older chimpanzees displayed higher levels of neutrophils, but had a reduced overall lymphocyte count compared to younger animals. These results suggest that there may be alterations in the immune system that are part of the normal aging process, but may be exacerbated by overweightness. Managing BMI in aging chimpanzees may be important for reducing inflammatory disease risk.

Assessing the immune status of chimpanzees before and after transport is important for their successful relocation. In one finding (30), clinically normal captive chimpanzees experienced increased total white blood cell counts, interferon gamma production, red blood cell numbers, and segmented neutrophils, along with a decrease in total lymphocytes and natural killer cells immediately after transport. These immune alterations lasted up to 12 weeks post transport. There are likely a variety of reasons why these physiological changes occurred, such as stress. Nonetheless, these data support the need for allowing sufficient periods of acclimation time. The observed differences in immunological profiles between studies may be a result of unidentifiable factors (e.g., testing methods). However, the studies do agree that there are several factors that may affect the blood chemistry and immunological profile of captive chimpanzees. These changes may affect the relocation process and have a long-term effect on animal welfare. Trained veterinary staff must determine the course of treatment, if necessary, for those animals with an altered immune status.

Based on the reviewed literature, the health status of captive chimpanzees is not only important for transfer and relocation, but also for the socialization and maintenance of social groups. Regarding animal health, it is necessary to implement an up-to-date evaluation of cardiac function, appropriately manage stress and total body weight, and conduct blood component measurements. These approaches, in combination with other intervention strategies, are important for the overall health and welfare of chimpanzees as well as forming and maintaining social groups at the sanctuary. Considerations for immediate transport and relocation include mitigating stress during the transport by housing animals in familiar groups. The NIH acknowledges that in some instances, the stress of relocation may be fatal for the more frail animals.

NIH-supported facilities have trained veterinary staff to implement the aforementioned recommendations. However, it is important to note that these recommendations are incumbent on the individual animal's health status, which will likely vary between animals. Health monitoring on a case-by-case basis is necessary to ensure the successful relocation and welfare, as well as reduced mortality of chimpanzees. Veterinarians will be consulted to perform a health assessment and issuance of a health certificate of individual chimpanzees to determine if relocation is possible or to ensure safe relocation.

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