FEBRUARY 10, 2022
FWRA SYMPOSIUM, Orlando, Florida

STANDARDS
in wildlife rehabilitation

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Editors, NWRA Publications Committee

Acknowledgments

The wildlife rehabilitators listed here have designed the various sections of this document. Their task was to compose a document and then reach a consensus with colleagues. This was no small task, and we thank them for their many efforts. Members of both NWRA and IWRC were encouraged to contribute; many rehabilitators sent in their suggestions, comments, and concerns, all of which helped to make this a better document. Those who made significant contributions include January Bill, Linda Bowen, Mathias Engleman, Harriet Forrester, Marge Gibson, Carol Holmgren, Patrice Klein, VMD, Emily Meredith, Anne Miller, Louise Shimmel, Laura Simon, Debbie Sykes, Marie Travers, Sallie Welte, VMD, and Diane Winn.

Contributions were also made (many anonymously) by NWRA and IWRC members through survey responses, and by Tracy Anderson, Heather Baron, DVM, Yvonne Wallace Blane, Lauren Caruso, Kim Chavez, Jennifer Convy, Rebecca Dmytryk, Elisa Fosco, Greg Frankfurter, DVM, Adam Grogan, Katie Haman, DVM, MSc, Peggy Hentz, Ashley Ihrke, Kit Lacy, MSc, Rebecca Michelin, Mark Naniot, Kyra Mills Parker, Kim Rutledge, Josie Thal, Jill Wallace, and Regina Whitman.

Subject expert reviewers included Jamie Clarke, CVT, Curtiss Clumpner, Resee Collins, Sherri Cox, DVM, Kathy Dudeck, Richard S. Funk, MA, DVM, Mandy Kamps, Jackie Kozlowski, La'Toya Latney, DVM, Carol McCorkle, Diane Nickerson, Nicki Rosenhagen, DVM, Lisa Smith, Barbara Suto, Elaine Thrune, Leslie Westerlund, and Kai Williams.

Special thanks to Jenny Schlieps for organization and management of the project, as well as editorial input. Thanks, also, to John Frink for technical support. Copy editing and indexing by Heila Hubbard. Layout and design work was done by Julissa Favela.

Partners 4 WILDLIFE

This project was funded through a grant from Partners for Wildlife: Building Excellence in Wildlife Rehabilitation.

STANDARDS

- What are they?

STANDARDS

"...a cooperative effort that represents the most current knowledge, expertise and techniques in our field...a reflection of what we have learned collectively and have successfully applied."

STANDARDS: TIMELINE

First Edition: 1989

Work began 1982-83.

33 pages.

Outline for "self-regulating"

Second Edition: 1993

Updated with a two-page insert; printed as a 35- page booklet

Third Edition: 2000

Expanded tables, added more descriptions, added criteria for euthanasia, added checklists, sample forms and references.

67 pages; adopted into Federal Regulations.

Fourth Edition: 2012

Expanded all sections. Added metric tables. Included reptiles. Added more references and forms. 116 pages.

Fifth Edition: 2021

Dropped "Minimum"

418 Pages….

STANDARDS

- Basic standards
  - Improve quality of care
  - Reduce harm
- Provide guidance
  - Enclosures
  - Record keeping
  - Safety and health

STANDARDS ARE NOT

- A series of enclosure sizes
- A comprehensive guide to rehabilitation in theory and practice
- An attempt to make everyone the same

STANDARDS

- What’s new and exciting in Standards 2021?

NARWAHLS!

STANDARDS 2021

- Layout by Julissa Favela
  - Call out boxes
  - Color photos
  - Additional tables
  - Diagrams

STANDARDS 2021

- Minimum and recommended standards
- Animal welfare in theory & practice
- Expanded information for all species
  - Housing, enrichment, environmental factors
- Expanded chapter on biosecurity

STANDARDS 2021

- New chapters
  - Animal welfare
    - Stress
  - Disaster preparedness
  - Capture & transport
  - Release
    - Criteria & decision-making tree for release, surrogacy & placement

STANDARDS 2021

- **Disposition** section expanded
  - Release preparation
  - Release criteria
    - Renesting/reuniting evaluation & standards
- **Euthanasia** criteria has been expanded
  - Keeping alive is not necessarily in the animal’s best welfare
  - Euthanasia is not a failure
- **Placement** criteria
  - Based on input from rehabilitation community, AZA guidelines, education community
  - Evaluation of animal and receiving facility

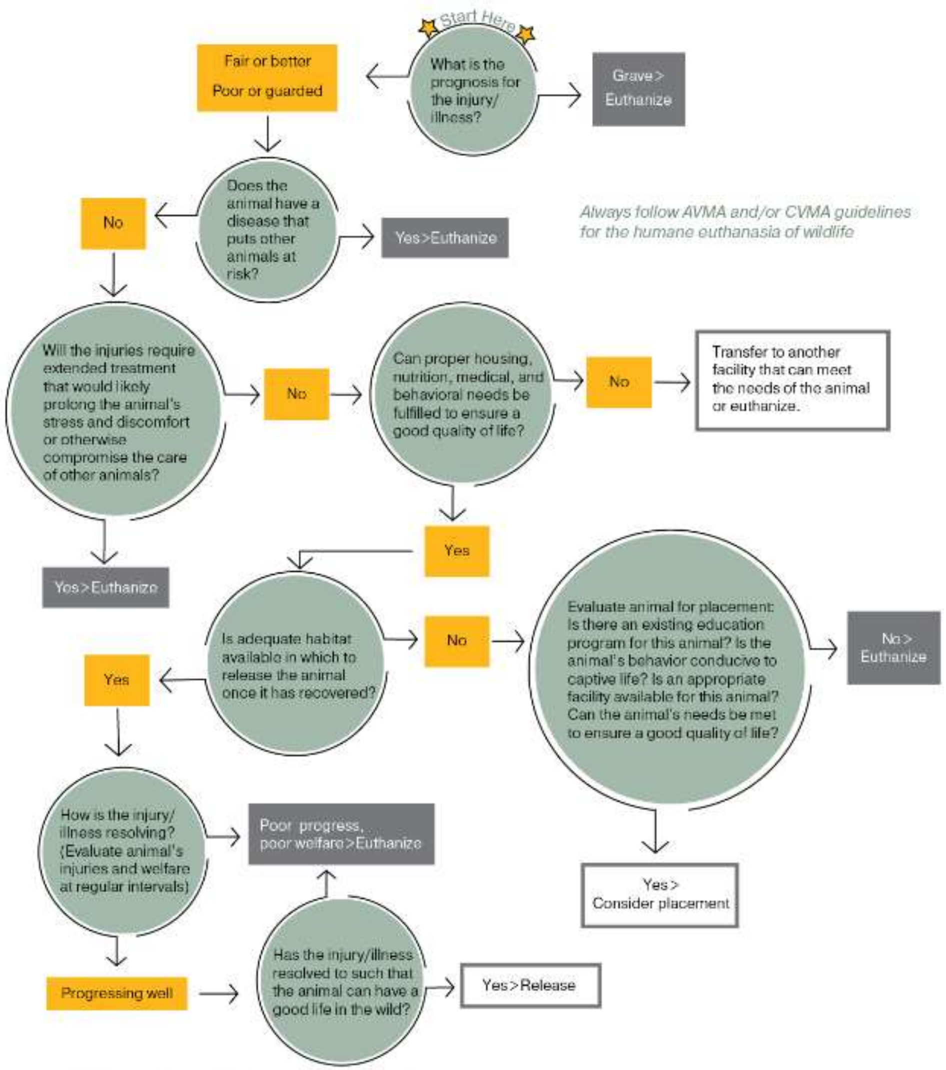

Figure 15.2 Euthanasia Assessment Process
(based on a diagram designed by Katie Haman, DVM, MSc)

Standards for Wildlife Rehabilitation

nwra
NATIONAL WILDLIFE REHABILITATORS ASSOCIATION

IWRC
International Wildlife Rehabilitation Council

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2.2 Permit Provisions for Wildlife Rehabilitation

Wildlife rehabilitation is a regulated activity in North America. Rehabilitation regulations were developed to ensure basic animal welfare needs are met, protecting both the individual animal and the populations into which healthy animals are released. Wildlife rehabilitation permits provide a foundation for the practice of rehabilitation, ensuring adequate care is provided to patients by qualified individuals. The regulation of rehabilitation falls to different state/provincial and federal agencies, depending on which species are being rehabilitated (see Table 2.1). A federal permit is required for the rehabilitation of migratory birds; state and provincial permits are also required for the rehabilitation of birds, as well as mammals and reptiles (see Section 2.3, Table 2.2, and Table 2.3 for more information).

A federal wildlife rehabilitation permit in the US (per Code of Federal Regulations (CFR) 21.31) or in Canada (per Consolidated Regulations of Canada (CRC), c.1035) authorizes the rehabilitator to:

- Take from the wild or receive from another person sick, injured, or orphaned [or displaced] migratory birds and to possess them and provide rehabilitative care for them for up to 180 days;
- Transport such birds to a suitable habitat for release, to another permitted rehabilitator's facilities, or to a veterinarian;
- Transfer, release, or euthanize such birds;
- Transfer or otherwise dispose of dead specimens; and
- Receive, stabilize, and transfer within 48 hours types of migratory bird species not authorized by your permit, in cases of emergency. If a rehabilitator authorized to care for the bird is not available within that time frame, you must contact the issuing office for authorization to retain the bird until it can be transferred.

Additional authorizations may be obtained on a case-by-case basis for possessing migratory bird specimens and surrogate (foster) parent birds for rehabilitation purposes.

The permit does not authorize the rehabilitator to use migratory birds for educational purposes, breed wildlife in captivity, or collect dead animals from the wild.

Table 2.1 Agencies Regulating Specific Taxa of Wildlife in the US and Canada
(Duerr and Whittington 2017)

Species	US Agency Responsible	Canadian Agency Responsible
Endangered species: all taxa	USFWS	CWS
Birds: migratory	USFWS, State wildlife agency	CWS, Provincial wildlife agency
Birds: nonmigratory	State wildlife agency	Provincial wildlife agency
Mammals: terrestrial	State wildlife agency	Provincial wildlife agency
Marine mammals: sea and marine otters, manatees, walrus, polar bears	USFWS	Fisheries and Oceans Canada (DFO) (except manatees)
Marine mammals: seals, sea lions, cetaceans (whales, dolphins, porpoise)	National Marine Fisheries Service (NMFS)	DFO
Reptiles: sea turtles	NMFS	DFO
Reptiles and amphibians: other	State wildlife agency	Provincial wildlife agency

Table 2.2 Permits Relating to Wildlife Rehabilitation Practices in the United States

Action Desired	Permit Type/ Name	Agency Oversight	Applicable Regs	Application Form	How to Apply/Requirements, Comments, and Miscellaneous	Annual Report; Form	Renewal Period
Rehabilitation							
Learn about the framework for how permits are issued	General Provisions; General Permit Procedures	USFWS	50 CFR 10; 50 CFR 13	Varies with permit type	<https://www.fws.gov/birds/management/managed-species/migratory-bird-treaty-act-protected-species.php>	N/A	Varies with permit type
Conduct migratory bird and eagle rehabilitation	Rehabilitation	USFWS	50 CFR 21.31	3-200-10b	Must be 18 years old and have a veterinarian, a letter from a federally permitted wildlife rehabilitator, and >100 hrs of hands-on experience with migratory birds gained in one year. Facilities evaluated. State permits may be required.	Yes 3-202-4	5 years
Use nonreleasable bird as surrogate (foster) parent for raising orphans	Rehabilitation	USFWS	50 CFR 21.31	Amendment* requests	Authorization is listed on rehabilitation permit. Must send in request with demonstrated need for the surrogate. Previous annual reports must demonstrate historical admission of species.	Yes 3-202-4	N/A
Possess migratory bird specimens used in caring for orphaned and injured migratory birds admitted for rehabilitation	Rehabilitation	USFWS	50 CFR 21.31	Amendment* requests	Authorization is listed on rehabilitation permit. Must send in request with demonstrated need for specimens. Applies to all migratory bird specimens (e.g., puppets, study skins).	Yes 3-202-4	N/A
Conduct terrestrial mammal rehabilitation	Mammal Rehabilitation Permit	State agency	N/A	Varies	Specific agency and requirements vary from state to state	Yes; varies	Varies
Conduct reptile rehabilitation	Reptile Rehabilitation Permit	State agency	N/A	Varies	Specific agency and requirements vary from state to state	Yes; varies	Varies
Conduct marine mammal rescue and rehabilitation: cetaceans and/or pinnipeds	Stranding Agreement (letter of authorization)	US Dept. of Commerce (NMFS) NOAA	MMPA I:109(h), 112(c), IV: 402(a), (b)	<https://www.fisheries.noaa.gov/webdam/download/66546705>	<https://www.fisheries.noaa.gov/national/marine-life-distress/marine-mammal-health-and-stranding-response-program> <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-policies-guidance-and-regulations> (scroll down to Stranding Response and Marine Mammal Health)	Within 30 days of admit; forms online	3 years for rehabilitation facilities
Conduct marine mammal rescue and rehabilitation: walrus, sea otters, and/or polar bears	Stranding Agreement (letter of authorization)	USFWS	MMPA 109(h), 112(c)	3-200-43	<https://www.fisheries.noaa.gov/insight/understanding-marine-wildlife-stranding-and-response> <https://www.fws.gov/alaska/pages/marine-mammals/marine-mammal-stranding>	Yes; N/A	Typically 5 years
Conduct manatee rescue and rehabilitation	Stranding Agreement (letter of authorization)	USFWS and FFWCC	MMPA 109(h), 112(c)	3-200-43	FFWCC = Florida Fish and Wildlife Conservation Commission Section 109(h) and section 112(c) of the MMPA [16 U.S.C. 1379(h) and 16 U.S.C. 1382(c)] <https://www.fws.gov/northflorida/Manatee/Rescue-Rehab/manatee-rescue-rehab.htm>	Yes; N/A	Typically 5 years
Conduct sea turtle rescue and rehabilitation		USFWS and NOAA	50 CFR 17.21(c)(3), 50 CFR-17.31(a)	N/A	Turtle placement is coordinated by Sea Turtle Stranding Network coordinator. Rehab facilities must meet USFWS's "Standard Conditions for the Care and Maintenance of Sea Turtles." <https://www.fws.gov/northflorida/SeaTurtles/Captive_Forms/20191113_%20FWS_Sea_Turtle_Care_and_Maintenance_final.pdf>	Annual; form varies by region	
Raise quail or other game birds as feeder animals	Special Purpose–Game bird-propagation	USFWS	21.27	3-200-10e	Certain bird species only–listed on the permit fact sheet <https://www.fws.gov/migratorybirds/pdf/policies-and-regulations/3-200-10eFAQ.pdf>	Yes; 3-202-6	3 years
Education and Outreach							
Keep live migratory bird(s) for educational purposes	Special Purpose–Education–Live	USFWS	50 CFR 21.27	3-200-10c	Must be 18 years old and have a minimum of 240 hours of experience working with migratory birds gained over one year. Miscellaneous: variations SPPSL (live only); SPPSLD (live and dead), SPDAVE (live, dead, and salvage authorization). Must use 3-202-12 Acquisition/Transfer Form to acquire or transfer non-releasable birds <https://www.fws.gov/forms/3-202-12.pdf>.	Yes; 3-202-5	3 years
Keep live mammal(s) for educational purposes	Class C Exhibitor	State agency and USDA APHIS	Animal Welfare Act		Contact state wildlife permitting agency (requirements vary). Mammals on public display require a license and annual inspection from USDA APHIS. <https://www.aphis.usda.gov/aphis/ourfocus/animalwelfare/ct_awa_regulated_businesses>	Yes	Varies
Keep live herptile(s) for educational purposes		State agency	N/A	Varies	Contact state wildlife permitting agency, as requirements vary from state to state.	Yes	Varies

Table 2.2 Permits Relating to Wildlife Rehabilitation Practices in the United States, cont.

Action Desired	Permit Type/ Name	Agency Oversight	Applicable Regs	Application Form	How to Apply/Requirements, Comments, and Miscellaneous	Annual Report; Form	Renewal Period
Keep live sea turtle(s) for educational purposes		USFWS			Must have have permanent disabilities that are determined by the attending veterinarian and the USFWS to preclude their potential survival in the wild. See Section 10(a)(1)(A) permit.	Yes	Varies
Keep live marine mammal(s) for educational purposes	License to Exhibit	USDA APHIS	50 CFR-18, 31 9 CFR-E	3-200-43	Facility must have an education program, be open to public, keep records. With limited authority by NOAA (cetaceans, pinnipeds). Public display of polar bears, manatees, DPS N. sea otters, and S. sea otters is authorized by USFWS only if display is incidental to authorized maintenance and care of the animals via issuance of an MMPA letter of authorization under Sections 109(h) and 112(c).	Yes; N/A	Varies
Use parts of dead migratory birds for educational purposes (e.g., wing spreads, feet, bones, skulls, nests, eggs)	Special Purpose–Education-Dead	USFWS	50 CFR-21.27	3-200-10d	Miscellaneous–variations SPPSD (dead only) and SPPSDS (dead with salvage authorization)	Yes; 3-202-5	3 years
Use parts of dead migratory birds for educational purposes with authorization to collect/salvage dead birds from the wild	Special Purpose–Education-Dead with Salvage	USFWS	50 CFR-21.27	3-200-10d	Note that separate permission is required to remove dead birds from the wild for the intent of using parts for educational purposes	Yes; 3-202-5	3 years
Use parts of dead mammals or herptiles for educational purposes (e.g., pelts, feet, bones, skulls, shells, eggs)		State agency	N/A		Contact state wildlife permitting agency, as requirements vary from state to state.		
Research							
Band or mark any wild federally protected bird in any manner	Federal Bird Banding and Marking Permit	USGS; most states also require a state banding permit	50 CFR-10, 13, 21	Link to application is on BBL website	Must be 21 years old and fully trained **in banding**. Complete application; submit **research proposal**; provide a resume of banding experience. Documentation of other skills as needed; 3 letters of reference. <https://www.usgs.gov/labs/birdb-lab/science/general-permit-information?qt-science_center_objects=0&qt-science_center_objects=0#qt-science_center_objects>	Yes; Submit online via BBL "Bandit" software	3 years
Collect, transport, or possess migratory birds, parts, nests, or eggs for scientific research or educational purposes	Scientific Collecting	USFWS	50 CFR-21.23	3-200-7	Generally these permits are associated with a university or other educational institution. Includes the collection of blood from rehab birds solely for research purposes (not for diagnostics). Must provide statement of purpose, methods, and justification for proposed research.	Yes; 3-202-1	3 years
Falconry							
Falconry	Falconry (state permit, but must meet federal regulations)	State agency	50 CFR-21.29	Check with state agency	Form 3-186A used to report bird acquisition and disposition; online database for reporting at <https://epermits.fws.gov/falcp/Default>. ***Note:*** *Rehabilitation regs allow transfer of a rehab raptor to a falconer for conditioning; falconer must have appropriate/current permits; bird stays under rehabilitator's permit; provide falconer with a copy of rehab permit and a letter designating them a subpermittee to rehabilitate that bird.*	State report only	Check with state agency
Falconry with golden eagles	Eagle Falconry	State agency	50 CFR-22.24	Check with state agency	Eagle falconry authorizes use of golden eagles only; must be master falconer to qualify.	No	Check with state agency
Bald and Golden Eagle Protection Act (BGEPA)							
Obtain an eagle, feathers, or other eagle parts for religious purposes	Eagle Parts –Permit Application/Order	USFWS	50 CFR-22.22	3-200-15A	Must be a federally recognized tribe member (Bureau of Indian Affairs' certification). Can order whole bird, feathers, or parts.	No	N/A Lifetime permit
Keep nonreleasable bald eagles and/or golden eagles for the purpose of feather collection for religious ceremony	Live Eagle Possession for Native American Religious Purposes	USFWS	50 CFR-22.22	3-200-78	Must be a Native American tribe. Rehabilitators can transfer nonreleasable bald eagles to these permitted facilities but must first contact their regional USFWS permit office to do so.	Yes; 3-202-14	Yes
Keep a nonreleasable eagle for educational purposes	Eagle Exhibition–Live and Live/Dead	USFWS	50 CFR-22.21	3-200-14	Applicant must be a zoological park, scientific society, or museum open to the public and is either a governmental service or a private not-for-profit.** Must be at least 18 years old and have minimum of 300 hours eagle experience gained over the course of 2 years.	Yes; 3-202-13	3 years
Use a taxidermied eagle, feathers, or other eagle parts for educational purposes	Eagle Exhibition–Dead	USFWS	50 CFR-22.21	3-200-14	Same eligibility requirements as above for live birds. Same fact sheet, application, and annual report for live/dead eagles.	Yes; 3-202-13	3 years

*Amendment: substantive change to current permit, such as updated address, add subpermittees, etc.

**Authorization may also extend to educational institutions in the future; check on the permit FAQ or call permit office.

Chapter 3

Animal Welfare in Wildlife Rehabilitation

Overview

The term "animal welfare" has several definitions that vary from one organization to another. It is generally used to reflect how an animal is experiencing its life, including both physical and mental states. Welfare is generally considered good if an animal is healthy, its basic needs are met, and it is not subjected to harm or stress with which it cannot cope.

Other definitions of animal welfare include:

> "the physical and mental state of an animal in relation to the conditions in which it lives and dies."
> (OIE 2019)

> "a human responsibility that encompasses all aspects of animal well-being, including proper housing, management, nutrition, disease prevention and treatment, responsible care, humane handling, and, when necessary, humane euthanasia."
> (AVMA 2019a)

It is of primary importance that animal welfare be assessed from the animal's perspective. The American Veterinary Medical Association (AVMA) definition, for example, focuses more on the animal's physical condition, but it does not address the psychological or behavioral needs of the animal, which are equally important aspects of welfare.

Good welfare equates to good health and, therefore, good rehabilitation success. Every aspect of the rehabilitation process impacts animal welfare.

When wild animals enter rehabilitation, their entire well-being is at the mercy of the wildlife rehabilitator. Good welfare equates to good health and, therefore, good rehabilitation success. Whether the rehabilitator is consciously aware of it or not, every aspect of the rehabilitation process impacts animal welfare. Animals with good welfare are likely to heal more quickly, have better survival to release, and consequently be in care for less time and be more likely to then survive in the wild (Detillion et al. 2004; Glasper and Devries 2005).

3.2.4 Avoid or Mitigate Stress

All wild animals in rehabilitation will experience stress—they are in a strange environment, handled regularly by predators (humans), and may have a pre-existing illness and/or injury. Rehabilitators can work to reduce these stressors by using processes to limit interactions with animals in order to reduce their stress and improve welfare. A clear link exists between enriched environments and good welfare, as many enriched environments provide opportunities for the animals to express certain natural behaviors.

The ability to demonstrate natural behaviors provides positive welfare states and improves the patient's well-being, aiding its recovery.

From a medical point of view, there are two types of stress. Acute stress (limited in duration and usually not fatal, unless the animal is severely compromised), and chronic stress, which occurs over long periods of time. The animal's body responds to acute stress by producing glucose, which it does by breaking down fats and proteins. The animal's body responds to chronic stress by producing corticosteroids in the adrenal glands; these hormones affect nearly every chemical reaction in the body, including suppression of the immune system. The physical effects of stress are summarized in Figure 3.1 and further explained in Orendorff (1998).

Each animal is an individual whose response to stress has been formed by natural history, individual experience, and inherited stressors. It can be difficult to predict what stimuli might be stressful to any individual patient; human senses are limited in comparison with many other species, and individuals differ widely in their vulnerability to stress. Rehabilitators can, however, use natural history to identify the most acute senses and sensitivities of their patients to guide them in reducing patient stress.

Table 3.2 presents common stress factors for wildlife in rehabilitation. "Practice controls" offer means to mitigate stress factors through direct actions taken during rehabilitation. "Administrative controls" offer indirect means of mitigation by providing the structure and context to support practice controls, making the combined methods more effective than either method used alone.

Table 3.2 Mitigating Captive Stress in Wildlife

Means to Reduce Stress–Practice Controls	Means to Reduce Stress–Administrative Controls
Proximity to humans	
Use peripheral vision/avoid direct eye contact	Foster a work culture that is focused on stress reduction and patient advocacy
Provide visual barriers	Be mindful of the experience the patient is having at all times
Provide species-appropriate ambient sound	Educate all staff, volunteers, and visitors about stress and stress-reduction practices
Provide hides/retreat spaces	Develop written policies about talking, answering phones, or otherwise attempting to multitask while caring for patients
Avoid placing enclosures in high traffic areas	Develop written media guidelines for rescue or release (see Appendix C4)
Reduce time in captivity when it no longer benefits the patient	Have policies in place regarding appropriate behavior around patients
Set rules for media interaction	

Chapter 5

Veterinary Medicine and Wildlife Rehabilitation

Overview

A veterinarian can improve a wild patient's welfare through surgical care, advanced pain relief, and the diagnosis, treatment, and prevention of disease.

Federal migratory bird rehabilitation permits (50 CFR 21.31(e)(6) and CA CRC, c. 1035–19) and most state wildlife rehabilitation permits require rehabilitators to have a veterinarian of record (Casey and Casey 2006). A veterinarian of record does not simply mean that a veterinarian writes a letter of recommendation for the individual receiving a rehabilitation permit—the veterinarian of record agrees to assist the rehabilitator with diagnostics, surgical care, medical care, pharmaceutical prescriptions, attaining and maintaining biosecurity, and ensuring that healthy, disease-free animals are returned to the wild.

5.1 Veterinary Policy

In most states and under most circumstances, the legal prescription of medical care for wildlife patients is the responsibility of a veterinarian. The veterinarian may delegate a portion of this responsibility to a rehabilitator by means of a mutually agreeable, written protocol wherein these responsibilities are clearly defined, and the veterinarian should provide appropriate training to the rehabilitator to carry out these responsibilities. Often referred to as the Veterinary-Client-Patient-Relationship (VCPR), this arrangement allows the veterinarian to prescribe a specific treatment protocol for a specific type of injury without having to see each individual patient (e.g., the veterinarian may prescribe a certain antibiotic to be given at a specific dosage, frequency, and duration for all wildlife that have cat bite injuries). Likewise, the veterinarian should rely on the rehabilitator to best address the husbandry needs of the animal (e.g., diet, housing). This agreement should provide a clear mutual understanding of the division of responsibilities consistent with state or provincial laws regarding the practice of veterinary medicine. This agreement may be in the form of a job description in the case of a rehabilitation center employing a veterinarian, or a simple written contract in the case of a rehabilitator working with a private practitioner (see sample in Appendix A8). This type of arrangement also requires that an appropriate VCPR exists and has the following components:

1. The veterinarian has sufficient knowledge of wildlife medicine to provide a general or preliminary diagnosis. This knowledge may be obtained from various sources including prior experience or specific wildlife-related training, the completion of continuing education courses related to wildlife species, and consultation with wildlife veterinarians, as well as medical references specific to wildlife care.
2. Furthermore, the veterinarian has recently seen and is acquainted with the general conditions and care of the wildlife patients through medically appropriate and timely

5.3 Veterinary Evaluation of Wildlife Patients

The veterinarian plays several important roles throughout the rehabilitation of the wildlife patient. In some situations, the veterinarian may perform the initial assessment, diagnosis, and treatment of the animal, but in most situations the rehabilitator conducts the initial assessment and stabilization, consulting with or involving the veterinarian on an as-needed basis. Either situation is acceptable, as long as rehabilitators (who are not licensed veterinarians) are not practicing veterinary medicine as defined by their state or provincial veterinary practice act, the animal receives the appropriate medical care when needed, and the animal is provided appropriate ongoing husbandry and rehabilitative care.

Specific roles that should be conducted directly by a veterinarian or under the supervision of or in consultation with a veterinarian (depending on the training and abilities of the rehabilitator) include the following:

- Any invasive procedures (diagnostics such as biopsies, deep wound debridement, surgical procedures).
- Evaluation or interpretation of diagnostic results (e.g., blood work, radiographs, ultrasound).
- Determination of appropriate medications and dosages.
- Determination of appropriate course of treatment.
- Post-treatment evaluation for resolution of disease or injury.
- Post-treatment evaluation for placement potential (if deemed nonreleasable and appropriate for that species).

5.3.1 Evaluation of Suitability for Treatment

The veterinarian, together with the rehabilitator, should examine the medical condition of the animal and the natural history of the species to determine if the animal has a good prognosis for return to a healthy status, capable of surviving in the wild. Some factors to consider include:

- The extent of injury (and the veterinarian's ability to treat it);
- The amount of time needed and the potential pain and stress the animal would endure during recovery;
- The ability of the caregivers and the animal to successfully manage the post-surgical care;
- The prognosis for full recovery without residual pain or physical impairment;
- The risk of disease transmission to other patients in the rehabilitation facility;
- The age and species of the animal (young animals heal more quickly but have less survival experience; some species manage time in captivity better than others); and

- The age of the injury and the overall condition of the animal (e.g., a robust animal with a fresh fracture has a better prognosis than an emaciated animal with a similar but older fracture).

The veterinarian and rehabilitator should work together to establish criteria for which injuries and diseases they can and cannot treat for each age of each species, and develop protocols for treatment and euthanasia, respectively.

5.3.2. Evaluation for Release

The rehabilitator should work in consultation with the veterinarian to determine that an animal is ready for release from a health and physical viewpoint. Because the veterinarian is unlikely to be available to evaluate every animal, the veterinarian and rehabilitator should establish release criteria suitable for each species handled (general criteria provided in Chapter 15), similar to the treatment/euthanasia criteria used at intake. Included in the evaluation for release should be confirmation that the animal is not carrying a transmissible disease (through blood work, if necessary) and that the animal has completely recovered from the presenting injuries (through radiographs, if necessary).

5.3.3 Evaluating Nonreleasable Animals for Long-term Placement

Animals that are not suitable for release may be evaluated by a veterinarian to determine suitability for long-term medical health in captivity. This evaluation is required by the USFWS when migratory birds are being considered for placement (50 CFR 21.31 (e)(4)). A licensed veterinarian must submit a written recommendation letter that the bird should be kept alive, including an explanation of why the bird is not expected to experience the long-term problems that typically occur in birds with these injuries and a commitment (from the veterinarian) to provide medical care for the bird for the duration of its life, including complete examinations at least once a year. A template for this letter can be found in Appendix A3–USFWS Veterinary Letter for Animal Placement, or a fillable form can be found on the USFWS website (USFWS 2019). While this regulation only applies to migratory birds that otherwise meet the regulatory criteria for euthanasia, the same considerations should be applied when evaluating any animal for placement in captivity. See Chapter 16 for additional information.

A veterinarian must evaluate each animal for suitability for placement and commit to providing medical care for the duration of its life, including annual exams.

Minimum Standards for Veterinarians in Wildlife Rehabilitation

- A formal, written agreement is established between the wildlife rehabilitator and the veterinarian.
- The veterinarian provides appropriate diagnostics and treatments to cases when available.
- The veterinarian does not keep any wildlife longer than 24 hours, except when the need for prolonged veterinary care can be justified.
- The veterinarian remains current in the knowledge of veterinary medicine.
- The veterinarian prescribes responsible use of medications in wildlife, following FARAD recommendations for withdrawal times and avoiding the misuse and overuse of antibiotics and vaccines.
- Wild animals housed or treated in a domestic animal clinic are kept separate from other animals and people.

Recommended Practices for Veterinarians in Wildlife Rehabilitation

- The veterinarian provides appropriate diagnostics and treatments to all cases requiring medical care, within an acceptable time period, and arranges for a colleague to be available during their absence.
- The veterinarian remains current in the knowledge of wildlife medicine.
- The veterinarian respects the rehabilitator's knowledge of wildlife husbandry.
- The veterinarian works with the rehabilitator to fully evaluate treated animals for return to the wild, euthanasia, or placement, being respectful of the animal's long-term physical, mental, and behavioral needs.

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STANDARDS 2021

- Enclosure sizes for nestlings & juvenile birds
- Max # birds/enclosure
- Additional “codes” relating to furnishings, enrichments, and other recommendations

10.2.2a Nestling to Fledgling Housing

Nestlings of songbirds and their allies are altricial, requiring supplemental heat and appropriate "nests" to provide the natural containment and comfort they would receive in the wild. Whenever possible, healthy nestlings should be renested (see Section 14.2.1). When this is not possible, or until renesting can be arranged, nestlings or hypothermic fledglings may initially need to be housed in an incubator and kept there until rehydrated and thermoregulating on their own. Nestlings should never be raised alone; conspecifics and/or compatible species provide necessary warmth and social interaction (see Table 3.1, Sections 9.1, and Section 14.2.3), and as fledglings, conspecifics of the same age provide necessary competition with whom they learn and practice survival skills (Bowers and Madison-Kennedy 2020).

Figure 10.4 The size of the nest cup is dictated by the size and number of nestlings. Photo courtesy of Tri-State Bird Rescue & Research, Inc.

In the nestling stage, young should be kept in species-specific nest cups of appropriate size (see Table 10.4 and Figure 10.4), lined with textured

Table 10.2a Minimum Housing Size Guidelines for Young Songbirds and Miscellaneous Avian Orders (US Customary Units)

This table is not intended to be used independently; it should be used only in conjunction with the information in Chapter 10, Sections 10.1 and 10.2.
All sizes here are depicted as MINIMUM and use rectangular area for ease of calculation. Larger sizes and/or alternative shapes may be more suitable.

Order / *Family* / Species	Length of Bird as Adult	Neonate/Nestling* W x L* x H	Neonate/Nestling* Max #	Neonate/Nestling* Codes	Pre-release Conditioning W x L x H	Pre-release Conditioning Max #	Pre-release Conditioning Codes	Release Conditioning W x L x H	Release Conditioning Max #	Release Conditioning Codes
Columbiformes										
Pigeons, doves	> 9 in	3–6 in x 2–3 in	3	Ns	14 in x 20 in x 14 in	2 pigeons 3 doves	Q*, X	8 ft x 16 ft x 8 ft	10 pigeons 14 doves	P, Pi, Q*, Ss, X
Cuculiformes										
Cuckoos	< 12 in	6–8 in x 3 in	3	No, Q	2 ft x 3 ft x 3 ft	3	P, Q, Wp	8 ft x 8 ft x 8 ft	6–8	P, Q, Wp, X
	> 12 in	8–12 in x 3–4 in	3	F, No, Q	3 ft x 3 ft x 3 ft	3	F, Ih, P, Q, W	8 ft x 16 ft x 8 ft	6–8	F, P, Q, S, W
Caprimulgiformes										
Nighthawks, nightjars	~ 9 in	6 in x 8 in x 8 in	4	F, Ns, Q	2 ft x 3 ft x 3 ft	4	C2, F, Nw, Q	8 ft x 16 ft x 8 ft	6–8	C2, F, Q
Apodiformes										
Apodidae										
Swifts	< 9 in	3.5–4.5 in x 2 in	8	B, G, Nc	20 in x 20 in x 24 in	8–10	B, Ch*, G	16 ft x 16 ft x 8 ft	15–20	A, B, Ch, G
Trochilidae										
Hummingbirds	< 5 in	2–4 in x 2 in	2	No	16 in x 30 in x 24 in	3–4	E, P, Z	2 ft x 4 ft x 6 ft	4–6	A, E, P, Z
Coraciiformes										
Kingfishers	< 9 in	3–5 in x 3 in	1*	Nc, X	2 ft x 3 ft x 3 ft	3	C2, F, Pi, S	8 ft x 16 ft x 8 ft	6–8	C2, F, Pi, S
Piciformes										
Woodpeckers	< 9 in	3–5 in x 3 in	4–6	Nc	2 ft x 2 ft x 3 ft	4–6	C, H, Ih, Ws, Z	4 ft x 8 ft x 8 ft	4–6	C, D, H, W
	= 9–12 in	4–6 in x 4 in	4–6	Nc	3 ft x 3 ft x 3 ft	4–6	C, H, Ih, Ws	8 ft x 8 ft x 8 ft	6–8	C, D, H, W
	> 12 in	6–8 in x 6 in	3–4	Nc	3 ft x 3 ft x 6 ft	3–4	C, H, Ih, Ws	8 ft x 16 ft x 8 ft	4–6	C, D, H, W
Passeriformes										
Perching songbirds	< 5 in	2.5–5 in x 2 in	4–6	Nv	2 ft x 2 ft x 2 ft	4–6	H, P, Z	4 ft x 4 ft x 8 ft	6	H, P, S, X, Z
	> 5 in	5–7 in x 3 in	3–4	Nv	3 ft x 4 ft x 3 ft	3–6	H, Ih, P, X, Z	4 ft x 8 ft x 8 ft	6–8	H, P, S, W, Z
Hirundinidae										
Swallows	< 9 in	3.5–4.5 in x 2 in	5	H, Nc	3 ft x 4 ft x 3 ft	5–8	P, R, Wp	8 ft x 16 ft x 8 ft	15–20	A, P, R, S, Wp
Corvidae										
Jays, crows, ravens, magpies	< 9 in	6–8 in x 3 in	4–6	No, Q	3 ft x 4 ft x 3 ft	3–4	E, Ih, P, Q, W, X	8 ft x 8 ft x 8 ft	6–8	E, P, Q, S, W, X
	= 9–17 in	6–8 in x 3 in	4–6	No, Q	3 ft x 4 ft x 3 ft	3–4	E, Ih, P, Q, W, X	8 ft x 16 ft x 8 ft	6–8	E, P, Q, S, W, X
	> 17 in	8–12 in x 5 in	4–6	No, Q	3 ft x 4 ft x 4 ft	2–4	E, G, Ih, P, Q, W, X	10 ft x 20 ft x 8 ft	4–6	E, G, P, Q, S, W, X
Galliformes										
Quail, grouse, pheasants	< 20 in	16 in x 20 in x 20 in	6–12	F, Ns, Q*, X	2 ft x 2 ft x 3 ft	6–12	F, H, Ih, It, Q*, W, X	8 ft x 8 ft x 8 ft	8–10	It, H, Q*, S, W, X
	> 20 in	16 in x 20 in x 20 in	6–8	F, Ns, X	3 ft x 4 ft x 3 ft	6–8	F, H, Ih, It, W, X	8 ft x 16 ft x 8 ft	6–8	It, H, S, W, X
Galliformes, large										
Wild turkeys	> 30 in	16 in x 20 in x 20 in	4–6	F, Ns, X	4 ft x 4 ft x 4 ft	4–6	F, H, Ih, It, W, X	12 ft x 20 ft x 8 ft	6–8	It, H, S, W, X

This table is not intended to be used independently; it should be used only in conjunction with the information in Chapter 10, Sections 10.1 and 10.3. All sizes here are depicted as MINIMUM and use rectangular area for ease of calculation. Larger sizes and/or alternative shapes may be more suitable.

Order Species	**Length* of Bird as Adult**	**Temporary Confinement/Restricted Activity**[d]				**Release Conditioning**							
		Enclosure			**Water/Pool Size and Time**	**Enclosure**			**Water/Pool**		**Gallons**	**Max # per pen**	**Codes**
		W	**L**	**H**		**W**	**L**	**H**	**Diameter**	**Depth**			
Gaviiformes													
Loons		**15** in	**30** in	**30** in	100–400 gal at least 1 x/day	Pool only			**8** ft	**2** ft	590	2	FP, N, PP, PT, SO
Podicipediformes													
Small grebes (eared, horned, pied-billed)		**12** in	**12** in	**12** in	25–400 gal at least 1 x/day	Pool only			**6** ft	**2** ft	330	4 Col/Sol	FP, H, N, ON, PP, PT, SO
Large grebes (western, Clark's, red-necked)		**18** in	**18** in	**18** in	40–400 gal at least 1 x/day	Pool only			**6** ft	**2** ft	330	4	FP, N, PP, PT, SO
Procellariiformes													
Northern storm petrels		**12** in	**12** in	**12** in	25–150 gal at least 1 x/day	Pool only			**45** in	**8** in	45	4–5 Col	AG, N, PP, PT, SO
Large petrels, fulmars, shearwaters		**18** in	**18** in	**18** in	40–400 gal at least 1 x/day	Pool only			**6** ft	**3** ft	115	2	AG, ON, PP, PT, SO
Albatrosses		**3** ft	**3** ft	**3** ft	150–400 gal at least 1 x/day	Pool only			**10** ft	**18** in	695	2	AG, N, PP, PT, SO
Pelecaniformes													
Pelicans (brown)		**3** ft	**3** ft	**3** ft	150–400 gal at least 1 x/day	**12** ft	**30** ft	**10** ft	**10** ft	**2** ft	925	6 Gre	AP, PT, SO
Pelicans (white)		**4** ft	**4** ft	**4** ft	150–400 gal at least 1 x/day	**12** ft	**30** ft	**10** ft	**10** ft	**2** ft	925	4	AP, PT, SO
Gannets, boobies, anhinga, cormorants, tropicbirds		**3** ft	**6** ft	**3** ft	100–400 gal at least 1 x/day	**8** ft	**16** ft	**10** ft	**8** ft	**2** ft	590	4–6 Col/Terr	AP, PT, SO, ST
Frigatebirds		**3**ft	**6** ft	**8** ft	None	**12** ft	**30** ft	**12** ft	None			1 Sol	FP, ST
Ciconiiformes													
Bitterns, herons, egrets	< **20** in	**18** in	**18** in	**18** in	Shallow wading pool if/when standing	**4** ft	**12** ft	**8** ft	**2–3** ft	**6–10** in	9–33	2	AG, AW, H

Codes

Codes for Tables 10.3a–d Minimum Housing Size Guidelines for Waterbirds

- AG These birds can be extremely aggressive, even with conspecifics. Use caution and observe the birds' interactions when first introduced.
- AP These birds require pre-release conditioning (unlimited activity) aviaries that contain pools to swim in and standing/perching surfaces.
- AW These birds require shallow wading pools and a variety of perches, especially up high, in their conditioning (unlimited activity) aviaries.
- FD These birds benefit from a feather duster to decrease stress and provide a place of security so they can sleep (see Section 10.3.2c for more information).
- FP These birds have very sensitive feet. Wading areas of pools should have mud or sand substrates on the bottom, and land surfaces should have various types of padding.
- GW These birds require graduated shallow pools in their conditioning (unlimited activity) aviaries, with the depth proportionate to their size.
- H Hides; provide natural vegetative material or human-devised areas for cover.
- HO Should be given a haul-out for easy egress from a pool.
- N Should be housed on tightly stretched, suspended netting as a substrate whenever bird is not in water.
- ON Conditional net-bottom. When an individual of these species is housed inside and is emaciated (with a pronounced keel) or not standing, it should be kept on net-bottomed housing until standing normally and of normal weight. At that time, housing substrate is solid and covered with toweling or matting.
- PC Precocial; needs room to exercise at a young age.
- PP These species, during conditioning, require only pool space. Prior to release, individuals must be able to stay in pool, without a haul-out area, for a minimum of 48 hours without compromise to their waterproofing.
- PT During recovery, bird should be allowed pool time as long and as often as medical condition allows (minimum 3 ft [90 cm] diameter). This may include cold or warm water pools as appropriate.
- SAF (Swim at Feeding) for species that need to swim when they are fed so that they defecate and get water time.
- SO Surface overflow of pool required to maintain water quality (this can be achieved by constantly running a hose or by overflowing pool, filtering, and recirculating water).
- SP Semiprecocial; more mobile than altricial or semialtricial young, but do not require as much exercise room as precocial young.
- ST As soon as they are standing, these stiff-tail-feathered birds should have a stump or stump-like perch tall enough to avoid feather breakage and soiling.

release. Note that torpor in the common poorwill (*Phalaenoptilus nuttallii*) can be triggered by cold weather and by weight loss (Hufford 2020).

Figure 10.8 An "artificial chimney" in the enclosure can serve as a feeding station or roost for fledglings. Photo courtesy of Tri-State Bird Rescue & Research, Inc.

Swifts (*Apodidae*), once out of the nest cup, cling to vertical surfaces throughout their life span. Housing for nestlings and confinement/recovery housing for injured birds must be completely lined with an appropriately textured material that enables birds to cling vertically without ensnaring toenails or abrading tail feathers. Two or more walls of conditioning housing must be constructed of, or covered with, a roughly textured material such as cork, rough-textured siding, or fiberglass window screening. An "artificial chimney" in the center can serve as a feeding station or roost for fledglings (see Figure 10.8); young birds can cling to the sides when they are placed there for feeding and will develop the useful habit of flying into the chimney to be fed (Kyle and Kyle 1995; Neville and Bowers 2020).

Chimney and Vaux's swifts (*Chaetura pelagica* and *C. vauxi*, respectively) require a large, open flying space for adequate conditioning, with a height less than 8 ft (2.5 m) to facilitate reaching clinging birds (Neville and Bowers 2020). Alternative shapes to housing (nonrectangular) are strongly encouraged, such as L-shaped or round/oval enclosures that encourage more flight than just the rectangular measurements—e.g., a 16 ft (5 m) diameter octagonal aviary has a perimeter of 49 ft (15 m) providing one lap of at least 40 ft (12 m), and the birds can (and do) fly multiple laps (see Figure 10.9; Diane Winn, Avian Haven Wild Bird Rehabilitation Center, Freedom, ME, personal communication). Because the larger white-throated swifts (*Aeronautes saxatalis*) fledge fully-flighted and capable of hunting with their parents, an aviary is needed to assess flight ability but is not necessary for conditioning (Neville and Bowers 2020). These birds must be hand-fed throughout

Figure 10.9a & b Alternative shape to rectangular housing. This 16 ft (5 m) diameter octagonal aviary has a perimeter of 48 ft (14.5 m) providing one lap of at least 40 ft (12 m). Drawing and photo courtesy of Avian Haven Wild Bird Rehabilitation Center.

Haul-outs

Haul-outs provide a place for wet or weak patients to get out of the water, perhaps saving the bird's life. However, a bird that spends lengthy periods on a haul-out is not deriving the benefits of the pool and is exposed to the risk of keel, hock, and foot lesions. Persistent use of a haul-out may signal a problem that needs to be addressed.

A haul-out should be large enough to accommodate the patient but small enough not to occupy too much pool space. For all but very small pools, a haul-out of 16 x 18 in (41 x 46 cm) is appropriate for most species. Multiple small haul-outs can be provided for larger groups of birds. The cumulative haul-out size should not cover more than one-quarter of the pool area to encourage birds to spend time in the water.

For alcids and other cliff-perching seabirds, a haul-out can be built with stacked rocks erected in the pool before filling with water (see Figure 10.28).

For heavy-bodied birds that do not stand easily, such as grebes, loons, and mergansers, a floating haul-out is most easily constructed using a PVC frame covered with knotless netting.

For species that are more capable of standing and walking, such as many duck, goose, and gull species, a perch haul-out can be used. These birds will benefit from a narrow perch that lets them rest on their feet with their keels counterbalanced over the water, minimizing the chance of developing a keel lesion. A perch can be made from a narrow tree limb, a 2-in (5-cm) round pole, or a 2 x 4 in (5 x 10 cm) board covered in antifatigue mat, mountain bike tires, or Daisy mat (see Figure 10.27). This type of perch can also be used for birds in treatment for keel lesions. For haul-out instructions, see Bill et al. (2012). Species benefiting from a haul-out are indicated by the code "HO" in Tables 10.3a–d.

Figure 10.28 Haul-outs for alcids and other cliff-perching seabirds can be built with stacked rocks erected in the pool before filling with water, or by placing rocks on platforms as in this photo. Photo courtesy of Focus Wildlife and PAWS Wildlife Center.

10.3.6 Species-specific Waterbird Housing Needs

Pelagic Birds (Alcids, Murres, Gannets, Loons, Grebes, Albatross, Shearwaters, Petrels, Fulmars, Northern Storm Petrels, and Sea Ducks)

Pelagic birds have many anatomical adaptations to a life spent primarily on the water, including dense feather plumage, and many have legs caudally positioned on the body.

enclosures if appropriate for the bird's medical condition (e.g., a bird with foot wraps or a wing wrap should not have a bathing/water pan in any enclosure). Place water pans away from perches or out of range of slicers to keep the water from being soiled. Birds without access to drinking water should receive additional water injected into their food. Drinking water, when available, should be easily accessible to minimize disturbance when cleaning/refilling. Pools must be a minimum of 2–6 inches (5–15 cm) deep and wider than the length of the raptor.

Figure 10.41 A food hatch allowing food to be placed into the enclosure without the bird seeing a human. Photo courtesy of Carolina Raptor Center.

Food hatches can reduce the contact time with young raptors and reduce the chance of birds associating humans with food (see Figure 10.41).

Species such as swallow-tailed kites (*Elanoides forficatus*) that do not naturally feed off the ground should have food presented on elevated feeding platforms or tree branches.

10.4.6 Species-specific Raptor Housing and Enrichment Needs

High-stress raptors, such as kites, falcons, ospreys, and accipiters, should be housed in facilities adequate for the climate and designed to eliminate or minimize visual and auditory stress. Solid-sided walls and/or vertical slats with no more than 1 in (2.5 cm) gaps may be advisable. "Crash" barriers made by hanging soft but heavy plastic strips behind each high perch can reduce the force of impact when birds consistently overshoot perches (see Figure 10.42). When secluded enclosures are not available, or when additional visual occlusion is necessary, translucent material (e.g., bed sheets or shade cloth) may be hung on the outside of slatted enclosures. These materials allow some light to enter the enclosure, and slits or holes in the material allow for better ventilation than solid-sided enclosures.

Figure 10.42a & b Crash barriers between perch and wall. **a)** (left) Suspended strips of soft plastic prevent birds from colliding with the wall if they over-shoot the perch. **b)** (below) Close-up view. Photos courtesy of Carolina Raptor Center.

STANDARDS

- What’s new for mammals?

STANDARDS 2021

- Enclosure sizes for young mammals separate from adults
- Max # mammals/enclosure
- Additional "codes" relating to furnishings, enrichments, and other recommendations

Codes

Codes for Tables 11.1a–d Minimum Housing Size Guidelines for Mammals

*	One adult per enclosure.
+	See species-specific text in section 11.6 For more information.
B	Needs substrate suitable for burrowing/digging.
Bp	Needs a bath pan (large enough to enter; need not be large enough to swim in).
Br	Needs fresh browse.
C	Needs branches, logs, or other suitable climbing material.
D	Needs a den or hide box.
E	Needs solid floor or welded wire beneath substrate to prevent digging out of enclosure.
F	Feeding dishes should be placed off the ground, attached to the wall or otherwise positioned higher in the enclosure.
G	Ground should be planted with forbs or other nontoxic native plants.
H	Needs supplemental heating first few days out of the incubator (see Sections 11.2.1 and 11.6).
L	Benefits from leaves or other greenery hung in the enclosure or distributed for hiding.
N	Needs nesting substrate (e.g., towels, blankets, dried leaves, shredded paper).
P	Needs artificial pouch (e.g., material pouch, security blankets).
R	Benefits from rocks for climbing.
S	High stress—needs privacy and quiet.
Sm	Needs smooth lower walls to prevent climbing (and falling).
Su	Need options for suckling (e.g., fruit) or else is likely to suckle on cagemates causing genital injury.
T	Needs artificial tunnels (e.g., PVC pipe, buried boxes).
W	Semiaquatic—needs pool large enough for swimming and/or defecating.
Z	Great care must be taken to seal off small openings or cracks that can act as traps or escapes.

Table 11.1a Minimum Housing Size Guidelines for Young Mammals (US Customary Units)

This table is not intended to be used independently; it should be used only in conjunction with the information in Chapter 11.
All sizes here are depicted as MINIMUM and use rectangular area for ease of calculation. Larger sizes and/or alternative shapes may be more suitable.

Order / *Family* / Species	Neonate/Infant W x L x H	Max #	Codes	Pre-release Conditioning W x L x H	Max #	Codes	Release Conditioning W x L x H	Max #	Codes
Marsupialia									
Opossums	**10** in x **20** in x **12** in	10	H, P	**3** ft x **3** ft x **3** ft	10	P	**10** ft x **12** ft x **8** ft	10	C, D, N, T
Eulipotyphla									
Shrews, moles	**10** in x **20** in x **12** in	6	H, P, S	**12** in x **24** in x **16** in	6	B, P, S	**2** ft x **2** ft x **2** ft	6	B, D, N, S, T, Z
Chiroptera									
Bats (crevice-dwelling)	**6** in x **8** in x **6** in	4	H, P, S	**12** in x **18** in x **12** in	4	F, P, S	**8** ft x **16** ft x **8** ft	4	F, S, Z
Bats (foliage-roosting)	**6** in x **8** in x **6** in	4	H, P, S	**12** in x **18** in x **12** in	4	F, L, P, S	**10** ft x **20** ft x **8** ft	4	F, L, S, Z
Carnivora									
Ursidae									
Black bears	**16** in x **28** in x **24** in	3	H, N, S	**3** ft x **6** ft x **3** ft	3	N, S	**20** ft x **36** ft x **8** ft	3	Bp, Br, C, D, G, L,N, R
Procyonidae									
Raccoons, coatis, ringtails	**12** in x **24** in x **16** in	4	H, P, Su	**3** ft x **3** ft x **3** ft	4	D, N, Su	**12** ft x **16** ft x **8** ft	4	Bp, C, D, E, N
Mustelidae									
Martens	**10** in x **20** in x **12** in	4	H, P, S	**3** ft x **3** ft x **3** ft	4	D, N, S	**4** ft x **8** ft x **8** ft	4	B, C, D, E, S, W
Fishers	**10** in x **20** in x **12** in	4	H, P, S	**3** ft x **3** ft x **3** ft	4	D, N, S	**6** ft x **8** ft x **8** ft	4	B, C, D, E, S, W
Weasels, minks	**10** in x **20** in x **12** in	6	H, P	**3** ft x **3** ft x **3** ft	6	D, N	**6** ft x **8** ft x **8** ft	6	B, C, D, E, F, S, Sm, T, Z
River otters	**12** in x **24** in x **16** in	3	H, P	**6** ft x **12** ft x **6** ft	3	D, N, W	**10** ft x **20** ft x **8** ft	3	B, D, E, T, W
Wolverines	**12** in x **24** in x **16** in	3	H, S	**3** ft x **3** ft x **3** ft	3	D, S	**20** ft x **36** ft x **8** ft	3	B, C, D, E, S
Badgers	**12** in x **24** in x **16** in	3	H, P, S	**3** ft x **3** ft x **3** ft	3	D, N, S	**12** ft x **16** ft x **8** ft	3	B, C, D, E, S, T
Mephitidae									
Skunks	**12** in x **24** in x **16** in	6	H, P, S	**2** ft x **4** ft x **3** ft	6	D, N, S	**10** ft x **12** ft x **8** ft	6	B, C, D, E, F, L, S, Sm, T
Canidae									
Coyotes	**22** in x **32** in x **26** in	6	H, P	**3** ft x **6** ft x **3** ft	6	C, D, L, S, Sm	**16** ft x **24** ft x **8** ft	6	B, C, D, E, L, R, S,Sm
Wolves	**22** in x **32** in x **26** in	4	H, P	**3** ft x **6** ft x **3** ft	4	C, D, L, S, Sm	**16** ft x **24** ft x **8** ft	4	B, C, D, E, L, R, S,Sm
Foxes	**22** in x **32** in x **26** in	6	H, P	**3** ft x **6** ft x **3** ft	6	C, D, L, S, Sm	**16** ft x **24** ft x **8** ft	6	B, C, D, E, L, R, S,Sm
Felidae									
Mountain lions	**22** in x **32** in x **26** in	3	H, P, S	**3** ft x **6** ft x **3** ft	3	N, S	**20** ft x **36** ft x **8** ft	3	+, B, C, D, E, S
Bobcats, lynxes	**22** in x **32** in x **26** in	4	H, P, S	**3** ft x **6** ft x **3** ft	4	N, S	**16** ft x **24** ft x **8** ft	4	B, C, D, E, S

Table 11.1c Minimum Housing Size Guidelines for Adult* Mammals (US Customary Units)

This table is not intended to be used independently; it should be used only in conjunction with the information in Chapter 11.
All sizes here are depicted as MINIMUM and use rectangular area for ease of calculation. Larger sizes and/or alternative shapes may be more suitable.

Order / *Family* / Species	Temporary Confinement/Restricted						Release Conditioning					
	W	x	L	x	H	Codes	W	x	L	x	H	Codes
Marsupialia												
Opossums	**3** ft	x	**3** ft	x	**3** ft	D, N	**10** ft	x	**12** ft	x	**8** ft	C, D, N, T
Eulipotyphla												
Shrews, moles	**20** in	x	**10** in	x	**12** in	D, N	**2** ft	x	**2** ft	x	**2** ft	B, D, N, S, T, Z
Chiroptera												
Bats (crevice-dwelling)	**12** in	x	**18** in	x	**12** in	P, S	**8** ft	x	**16** ft	x	**8** ft	F, S, Z
Bats (foliage-roosting)	**12** in	x	**18** in	x	**12** in	P, S	**10** ft	x	**20** ft	x	**8** ft	F, L, S, Z
Carnivora												
Ursidae												
Black bears	**8** ft	x	**12** ft	x	**8** ft	B, S	**20** ft	x	**36** ft	x	**8** ft	Bp, Br, C, D, G, L, N, R
Procyonidae												
Raccoons, coatis, ringtails	**2** ft	x	**3** ft	x	**3** ft	B, D	**12** ft	x	**16** ft	x	**8** ft	Bp, C, D, E, N
Mustelidae												
Martens	**3** ft	x	**3** ft	x	**3** ft	B, D, S	**3** ft	x	**6** ft	x	**3** ft	B, C, D, E, S, W
Fishers	**3** ft	x	**6** ft	x	**3** ft	B, D, S	**6** ft	x	**8** ft	x	**8** ft	B, C, D, E, S, W
Weasels, minks	**3** ft	x	**3** ft	x	**3** ft	B, D	**6** ft	x	**8** ft	x	**8** ft	B, C, D, E, F, S, Sm, T, Z
River otters	**3** ft	x	**6** ft	x	**3** ft	+, B, D, W	**10** ft	x	**20** ft	x	**8** ft	B, D, E, T, W
Wolverines	**3** ft	x	**6** ft	x	**3** ft	B, D, S	**20** ft	x	**36** ft	x	**8** ft	B, C, D, E, S
Badgers	**3** ft	x	**6** ft	x	**3** ft	+, B, D, S	**12** ft	x	**16** ft	x	**8** ft	B, C, D, E, S, T
Mephitidae												
Skunks	**3** ft	x	**3** ft	x	**3** ft	B, D	**8** ft	x	**10** ft	x	**8** ft	B, C, D, E, F, L, S, Sm, T
Canidae												
Coyotes	**3** ft	x	**6** ft	x	**3** ft	B, D	**16** ft	x	**24** ft	x	**8** ft	B, C, D, E, L, R, S, Sm
Wolves	**8** ft	x	**12** ft	x	**8** ft	B, D	**16** ft	x	**24** ft	x	**8** ft	B, C, D, E, L, R, S, Sm
Foxes	**3** ft	x	**6** ft	x	**3** ft	B, D	**16** ft	x	**24** ft	x	**8** ft	B, C, D, E, L, R, S, Sm
Felidae												
Mountain lions	**8** ft	x	**12** ft	x	**8** ft	+, B, D, S	**20** ft	x	**36** ft	x	**8** ft	+, B, C, D, E, S
Bobcats, lynxes	**3** ft	x	**6** ft	x	**3** ft	B, D, S	**16** ft	x	**24** ft	x	**8** ft	B, C, D, E, S

allow for natural behaviors. Open-roofed (five-sided) enclosures should have a cantilevered angle or hot wire at the top, or be of sufficient height to prevent escape (GFAS 2013). All outdoor enclosures require the use of hot wire along both bottom and top to keep bears from climbing enclosures; living trees in outdoor enclosures that are not appropriate for climbing (e.g., too close to the perimeter or too small) also require hot wire or other protection from bears.

Ideally, ground should be planted/covered with regional native grasses and plants. A combination of denning areas, open spaces, safe and sturdy climbing structures, and water features should be offered. Water features such as small creek beds, in-ground shallow water areas, or small Rubbermaid-type pools work well for water features for bears to play, cool off, and forage in for food. Planting bushes and providing adequate places to hide will also reduce stress (Young 2003). Large indestructible tubs/pools, heavy climbing logs and rotting logs for food-caching, indestructible balls, hammocks, and items typically used for enrichment in bear settings at zoos and sanctuaries are useful in rehabilitation settings as well (see Figure 11.14a & b).

Raccoons, Coatis, and Ringtails (*Procyonidae*)

Because of the prevalence of *Baylisascaris procyonis* throughout much of North America, all enclosures used for raccoons (*Procyon lotor*) (as well as their feeding dishes, bedding, enrichment items, handling gloves, etc.) should be designated for raccoons only and should not be used with other species (Kazacos 2001; Spickler 2013) (see Figure 11.15). Raccoons should be isolated from conspecifics and other carnivores (including marine mammals) for a period of 10–14 days, pending clinical symptoms of distemper or parvovirus (Schott 2020). Raccoons suspected of having canine distemper or parvovirus should be humanely euthanized. Vaccinations for both viruses should be given if large numbers of raccoons are rehabilitated, as both diseases can spread rapidly through rehabilitation facilities and result in high mortality (McRuer 2011).

Figure 11.15 Using plastic pet carriers as indoor raccoon enclosures with a sheet over the front provides a visual barrier (top carrier); cards are used to designate animals in each container, and their feeding needs are listed on the orange notes. Carriers are labeled "for raccoon use only" to prevent accidental transmission of raccoon roundworm to other species. Photo courtesy of Mercer County Wildlife Center.

Neonatal and infant raccoons can be housed in incubators for their first week. Neonates should be maintained around 90°F (32°C) with 55–65% humidity for the first few days of age, with temperatures dropped gradually to 70°F (21°C) by the time the kits are 500 g (17.5 oz) (Schott 2020). As they become furred, the heat can be gradually decreased and they can be moved to a plastic tub/tote or a small crate. Once their eyes open, they will need a hide box; they are still in their den at this age in the wild.

Raccoons housed singly become very lonely and will often cry; they are very susceptible to habituation. A single raccoon should be given a plush animal toy and fleece or soft receiving blankets for security until it has gone through the 10-day quarantine period and can be housed with a conspecific. Hammocks hung in vari-kennels provide a more natural atmosphere, since raccoons in the wild generally sleep above ground (DeGhetto et al. 2002).

Raccoons utilize communal latrine areas in the wild and will sometimes use kitty litter in captivity. Hammocks can be hung near the rear of the crate, with a litter box underneath the hammock. The food and water dishes should be secured at the front of the crate. Raccoon enclosures must be cleaned throughout the day, usually in conjunction with each feeding to minimize disturbance. Self-feeding dispensers often work well for raccoons, provide enrichment, and may be helpful in reducing habituation to humans.

These species are very intelligent and require complex, well-furnished enclosures (Schott 2020). Furnishings for outdoor enclosures should include hammocks made of ½ in (1 cm) square wire mesh, fire hose, or burlap sacks attached to walls or the roof (see Figure 11.16). Numerous elevated hiding spaces (plastic igloos, barrels, hollow logs) should be provided with some on shelves or suspended from the ceiling (see Figure 11.17). Additionally, tree limbs and logs should be placed at various heights to promote climbing. A wading pool or other water container appropriate for the animal's size should be provided to allow bathing and food handling (see Figure 11.17). Outdoor enclosures should allow 36 ft² (3.3 m²) per animal when raccoons are group housed; for example, a 12 x 18 ft (3.5 x 5.5 m; or 216 ft² or 20 m²) enclosure could house six raccoons (White and Marcum 1979) (see Figure 11.18).

Figure 11.16 (above) Examples of furniture in a raccoon enclosure: fire hose hung for climbing and loafing, and suspended buckets and tires for climbing and hiding. Photo courtesy of Mercer County Wildlife Center.

Figure 11.17 (above) Additional examples of furnishings appropriate for raccoons: barrel for hiding suspended from ceiling, logs suspended from walls, and pool. Photo courtesy of PAWS Wildlife Center.

Outdoor enclosures should have a designated latrine area and a floor drain or suitable substrate to facilitate cleaning (Schott 2020). Raccoon housing should be constructed of a material that enables it to be flamed or steam-cleaned in order to destroy parasites after each use (Spickler 2013).

Badgers, Martens, Weasels (*Mustelidae*), and Skunks (*Mephitidae*)

Neonatal and young infant skunks and mustelids can be housed in incubators or dark plastic containers/tubs with supplemental heat and bedding free of strings and holes (that is not so thick that the heat is ineffective). These species spend their infancy in their den and do best in a darker, den-like environment. Hairless neonates should be maintained at 85–90°F (29–32°C) and 50–60% humidity for the first few days of age (Meier 1986). As they become furred, the heat can be gradually decreased. Plastic crates, tubs, or totes can be used for healthy infants once they have visible fur (see Figure 11.3a & b). Once their eyes

STANDARDS

- What’s new for herps?

STANDARDS 2021

- Enclosure sizes for reptiles AND amphibians
- Max # mammals/enclosure
- Expanded information on environmental care (temperature, humidity, substrates)
- Emerging Disease Concerns
- Enrichment ideas

12.2 Indoor Housing

After herptiles recover from initial injuries, their caging must be large enough for their normal daily behaviors. A naturalistic enclosure encourages activity and provides physical and psychological conditioning (Warwick and Steedman 1995; Shepherdson et al. 1998; Case et al. 2005; Thompson 2010; Warwick et al. 2013).

At this point in the rehabilitation process, every herptile—no matter how small—must be housed in an enclosure at least 30 x 12 x 12 in (76.2 x 30.4 x 30.4 cm). It is impossible to provide sufficient room for exercise or proper temperature, lighting, and humidity gradients in anything smaller (see Figure 12.1). Large and/or active species require larger enclosures to provide for behavioral needs. For arboreal species, the vertical dimension should measure at least 39 inches (100 cm) high (Warwick et al. 2018).

Herptiles in larger enclosures have fewer self-inflicted injuries and better body condition. Larger enclosures reduce the accumulation of bacteria, decrease the frequency of substrate changes, and provide room for microhabitats to be created using temperature, light, and humidity (Frederick et al. 2004; Barten and Simpson 2019; Rossi 2019).

Figure 12.1 Injured/restricted activity indoor housing for chelonians. Each opaque bin has a temperature gradient provided by a heat lamp over one end, and a second lamp provides necessary UV lighting. Photo courtesy of Mercer County Wildlife Center.

Tables 12.4 and 12.5 show minimum herptile enclosure sizes proposed by veterinarians and herpetoculturists (Divers 1996; Rossi and Rossi 2000; O'Malley 2008; Divers 2018; Barten 2019; Rossi 2019; Warwick 2019). Some research suggests that the minimum size be even larger–at least 39 inches (100 cm) long by 15 inches (40 cm) wide (Warwick et al. 2018).

To avoid stress, enclosures must be placed in an area with minimal disturbance. Noise, vibration, constant external activity, and erratic light cycles disrupt normal behavior and cause stress, which may delay healing (De Voe 2010).

12.2a Hatchlings and Infants

Juvenile reptiles require the same or very similar housing as adults. Water levels and enclosure sizes will vary with shell width (for turtles) and overall size for others. Amphibian young require a completely aquatic environment initially, but due to their rapid growth rates, easy egress to a dock or other nonwater surface should always be available.

Figure 12.6 A bamboo bridge provides tactile sensation, exercise, and mental stimulation for reptiles. Photo courtesy of La'Toya Latney, DVM.

Codes

Codes for Table 12.4 Minimum Housing Size Guidelines for Reptiles			
Substrates: See also Table 12.1 and Section 12.2.5		**Furnishings:** See also Section 12.5	
B	Bioactive	Ap	Aquatic plants
C	Coco fiber	Bp	Basking platform
G	Gravel	Br	Branches
L	Leaf litter	H	Hides
M	Modified orchid substrate	Lo	Logs
PS	Mix of play sand, soil, and pebbles	P	Plants
R	Rocks	PVC	PVC pipe burrows
S	Soil	R	Rock piles
SM	Sphagnum moss	V	Vines
T	Dry or moist towels (depends on species) for injured reptiles		

Codes for Table 12.5–Minimum Housing Size Guidelines for Amphibians			
Substrates: See Table 12.1 and Section 12.12.2e		**Furnishings:** See Section 12.5 and Section 12.12.5	
B	Bioactive	Ap	Aquatic plants
C	Coco fiber	Br	Branches
G	Gravel or stones	H	Hides
L	Leaf litter	Lo	Logs
M	Modified orchid substrate	P	Plants
PS	Mix of play sand, soil, and pebbles	PVC	PVC pipe burrows
R	Rocks		
S	Soil		
SM	Sphagnum moss		
T	Towels (moist towels for injured amphibians)		

Table 12.4 Minimum Housing Size Guidelines for Reptiles

This table is not intended to be used independently; it should be used only in conjunction with the information in Chapter 12, Sections 12.1–12.7 and 12.12. All sizes here are depicted as MINIMUM, are for single animals, and use rectangular area for ease of calculation. Larger sizes and/or alternative shapes may be more suitable.

Species	Length	Width	Height	Water Depth	Substrate Codes (See Table 12.1)	Furnishing Codes	Notes
Snakes							
Terrestrial	1.5 x body length	¾ body length	¾ body length measured above substrate	Shallow bath pan	Woodland species: B, C, L, M, S, SM, T Desert species: PS, T	Br, H, Lo, R	Though considered terrestrial, most of these snakes have the ability to climb into low branches or shrubs.
Semiarboreal	1.5 x body length	¾ body length	1 x body length measured above substrate	Shallow bath pan	Woodland species: B, C, L, M, S, SM, T Desert species: PS, T	Br, H, Lo, R, V	
Burrowing	1.5 x body length	¾ body length	¾ body length measured above substrate	Shallow bath pan	Woodland species: B, C, L, M, S, SM, T Desert species: PS, T	H, Lo, PVC, R	It is extremely important to provide a very deep substrate (at least 5 in/12.7 mm) so these snakes can burrow. Artificial PVC burrows can also be used (see Section 12.2.5).
Semiaquatic	1.5 x body length	¾ body length	¾ body length measured above substrate	Depth of ⅓ body length	Land area: B, L, S, T Water area: G	Land area: H, Lo, R Water area: Ap	Semiaquatic habitats are ⅓ land and ⅔ water.
Humidity and temperature ranges for snakes: humidity gradient of 40–65%; for temperate zone species, air temperature 70°F–85°F (21.1°C–29.4°C) with a basking zone of 88°F (31.1°C) (often higher for desert zone species and subtropical zone species) (see Section 12.8).							
Lizards							
Woodland	3 x body length	2 x body length	2 x body length measured above substrate	Shallow bath pan	B, C, L, M, S, SM, T	Br, H, Lo, PVC, R	Lizards are generally secretive, so multiple hiding areas are essential.
Desert	3 x body length	2 x body length	2 x body length measured above substrate	Shallow bath pan	PS, T	Br, H, Lo, PVC, R	Lizards are generally secretive, so multiple hiding areas are essential.
Humidity and temperature ranges for lizards: humidity 50% (lower for desert zone species; higher for tropical zone species and subtropical zone species); for temperate zone species, air temperature 70°–85°F (21.1°–29.4°C) with a basking zone of 88°F (31.1°C) (air and basking temperatures often higher for desert zone species and subtropical zone species) (see Section 12.9).							
Chelonians							
Box turtles	5 x body length	3 x body length	2 x carapace length measured above substrate	Shallow bath pan	Eastern: B, L, S, SM, T Florida and Ornate: PS with L, and T	H, Lo, P, R	No glass aquariums. Large plastic storage bins work well.
Aquatics: Diamondback terrapins	5 x body length	3 x body length	2 x carapace length measured above substrate	Depth at least 1.5 x carapace width	Land area: T Water area: G	Ap, Bp	Must have access to both brackish and fresh water. See Section 12.10.2a. Aquatic plants must be compatible with salt water.
Aquatics: Snapping turtles	5 x body length	3 x body length	2 x carapace length measured above substrate	Deep enough to submerge and still extend head to surface	Land area: T Water area: G (large gravel can be used)	Bp	No glass aquariums for adults. Glass tanks or plastic storage bins can be used for small hatchlings and juveniles. Large adults can be housed in pre-formed ponds or stock tanks with tops that prevent escape.
Aquatics: Softshell turtles	5 x body length	3 x body length	2–3 x carapace length measured above substrate	At least 1.5 x carapace width	Land area: T Water area: soft sand or mud	Bp	No glass aquariums for adults. Glass tanks or plastic storage bins can be used for small hatchlings and juveniles. Large adults can be housed in pre-formed ponds or stock tanks with tops that prevent escape.

Table 12.5 Minimum Housing Size Guidelines for Amphibians (US Customary Units and Metric Units)

This table is not intended to be used independently; it should be used only in conjunction with the information in Chapter 12, Sections 12.1–12.7 and 12.12. All sizes here are depicted as MINIMUM, are for single animals, and use rectangular area for ease of calculation. Larger sizes and/or alternative shapes may be more suitable.

Taxa	Length in. and (cm)	Width in. and (cm)	Height in. and (cm)	Substrate Codes (See Table 12.1 on page 246)	Furnishing Codes	Notes
Frogs (Anura)						
Terrestrial species	30 (76.2)	12 (30.5)	12 (30.5)	B, C, L, M, S, SM, T	H, Lo, P	20 gallon (75 L) long aquariums are suitable
Arboreal species	30 (76.2)	30 (76.2)	18 (45.7)	B, C, L, M, S, SM, T	Br, H, Lo, P	30 gallon (113 L) aquariums provide needed height
Semiaquatic species	36 (91.4)	12 (30.5)	16 (40.6)	Land area: B, C, L, M, S, SM, T Water area: G	Land area: H, Lo, P Water area: Ap	30 gallon (113 L) aquariums are suitable; habitat should be 1/3 land and 2/3 water
Toads (Anura)						
Small toad species (1–3 in; 2.5–7.6 cm)	30 (76.2)	12 (30.5)	12 (30.5)	Woodland species: B, C, L, M, S, SM, T Desert species: PS, T	H, Lo, P, R	20 gallon (75 L) long aquariums are suitable
Medium toad species (4–6 in; 10–15 cm)	36 (91.4)	12 (30.5)	16 (40.6)	Woodland species: B, C, L, M, S, SM, T Desert species: PS, T	H, Lo, P, R	30 gallon (113 L) aquariums are suitable
Large toad species (>6 in; >15 cm)	36 (91.4)	18 (45.7)	18 (45.7)	Woodland species: B, C, L, M, S, SM, T Desert species: PS, T	H, Lo, P, R	50 gallon (190 L) aquariums provide needed width and height; substrate should be >5 in (13 cm) deep for burrowing
Humidity and temperature ranges for frogs and toads: humidity >70%; for temperate zone species, 65–75°F (18–24°C); for subtropical zone species, 70–80°F (21–27°C); for tropical zone species, 75–85°F (24–20°C) (see Section 12.12.6a).						
Salamanders (Urodela)						
Terrestrial species	30 (76.2)	12 (30.5)	18 (45.7)	B, C, L, M, S, SM, T	Br, H, Lo, P	30 gallon (113 L) aquarium provides more height for climbing species
Fossorial species	36 (91.4)	12 (30.5)	16 (40.6)	B, C, L, M, S, SM, T	H, Lo, P, PVC	Substrate should be >5 in (13 cm) deep for burrowing; 30 gallon aquariums are suitable
Semiaquatic species	36 (91.4)	12 (30.5)	16 (40.6)	Land area: B, C, L, M, S, SM, T Water area: G	Land area: H, Lo, P Water area: Ap	30 gallon (113 L) aquariums are suitable; semiaquatic habitats are 1/3 land and 2/3 water
Aquatic cold-water species	Large, pre-formed ponds; size depends on size of animal			G	Underwater hides: Ap	Require water temperature 50-60°F (10–15°C); require fast-moving, oxygenated water
Humidity and temperature ranges for salamanders: humidity >70%; most species will be comfortable with a temperature range of 50–68°F (10–20°C) (see Section 12.12.6b).						

The sizes provided in this table are the minimum sizes necessary to provide proper temperature, lighting, and humidity gradients. The natural history of the species in care must be considered before choosing and designing any enclosure (Pramuk and Gagliardo 2012).

Each amphibian in rehabilitation—no matter how small—must be housed in an enclosure at least 30 x 12 x 12 in (76.2 x 30.4 x 30.4 cm). It is impossible to provide proper temperature, lighting, and humidity gradients, as well as room for exercise, in any smaller enclosure.

All enclosures must be escape-proof. For more information on frog and toad housing, see Section 12.12.6a. For more information on salamander housing, see Section 12.12.6b.

Water: Amphibians are sensitive to water quality, so water is the most crucial element for housing amphibians. See Section 12.12.2a to understand water requirements.

Lighting: All amphibians must have 12–14 hours of natural light outdoors or low-intensity UV lighting indoors. See Section 12.12.2b for more information.

Temperature gradient: A 10–15°F (6–8°C) temperature gradient between warmest and coolest areas in an enclosure is suggested. See Section 12.12.2c for more information.

Humidity: Humidity above 70% is suitable for most amphibians; however, a humidity gradient must be provided. See Section 12.12.2d for more information.

12.10 Housing for Chelonians

Housing for turtles and tortoises varies by species and behavior; ideas can be found on the *Tortoise Trust* website.

12.10.1 Housing for Box Turtles

Four subspecies of the common box turtle (*Terrapene carolina*) and two of the western box turtle (*Terrapene ornata*) are found in North America. Box turtles occupy a variety of habitats from woodlands to wet marshes to prairies and deserts.

Injured box turtles with open wounds can be kept in a bin with a dry towel on the bottom, a water bowl, a dry hide box, and a moist hide area made of a pile of dampened towels (see Figure 12.10). Recovering box turtles with no open wounds can be kept in enclosures with natural substrates such as a mix of soil, sphagnum moss, and leaf litter (see Section 12.2.5).

Figure 12.10 Injured box turtles with open wounds can be kept in a bin with a dry towel on the bottom, a water bowl, a dry hide box, and a moist hide area made of a pile of dampened towels. Photo courtesy of Mercer County Wildlife Center.

Box turtle enclosures should have temperature and moisture gradients and be enriched with plants, hiding places, and differences in terrain. Hides should be provided via brush or leaves located on the floor of the enclosures or boxes containing a moist substrate (Pavia 2012).

Box turtles require a temperature gradient of 70–85°F (21–29°C) with an 88°F (31°C) basking zone (Boyer and Boyer 2019; Rossi 2019). Florida, Gulf Coast, and ornate box turtles require slightly warmer temperatures to maintain their higher body temperatures (Ernst and Lovich 2009).

Figure 12.11 Water presented in an easily entered bowl that is big enough for the turtle's entire body, but prevents bandages from getting wet. As the animal improves and becomes more active, water bowls should be large enough for the turtle to stretch out fully and dip its head in the water to drink. Photo courtesy of Nashville Wildlife Conservation Center.

Box Turtle Guidelines

- Box turtles require a ***minimum*** relative humidity of 51% to maintain activity and health (Ernst et al. 2009). A higher humidity gradient of 60–80% is better.
- A deep substrate of moist (not wet) soil, sphagnum moss, and leaf litter will raise the ambient level of moisture in the air and provide a place for the turtle to dig.

12.12.6 Species-specific Amphibian Housing and Enrichment Needs

12.12.6a Housing for Frogs and Toads (Anura)

Due to the immense diversity in these amphibians' sizes and habitats, housing and furnishings must vary accordingly. The rehabilitator must be familiar with the specific requirements of the species in care.

Frog and Toad Housing Guidelines

- Terrestrial frogs and toads need various hides including caves, tree roots, rock crevices, logs, and rocks. Tree frogs use arboreal retreats.
- Enclosures of arboreal, terrestrial, and semiaquatic species should be lightly misted on a regular basis. Between mistings, the substrate should remain moist, but not waterlogged (Pollock 2012).
- All terrestrial frogs and toads should have access to a large, shallow water dish or pool (see Figure 12.15a–b). Semiaquatic species require larger pools that cover 40–60% of the enclosure space (Pollock 2012)(Figure 12. 16).
- For burrowing species such as the gopher frog (*Lithobates capito*), PVC tubes can be partially buried in the substrate to simulate a burrow.
- Arboreal frogs such as the gray treefrog (*Hyla versicolor*) rarely come down to soak in pools on the floor of the enclosure, so enclosures must be misted to supply water and keep substrate moist.
- If an arboreal species is debilitated due to injury or illness, only low branches or platforms should be provided.

Figure 12.15a & b Enclosure for a toad. **a)** (left) A shallow pool for partial immersion. **b)** (right) In addition to the pool, enclosure contains artificial plants and hides. Photos courtesy of Blue Ridge Wildlife Center.

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- Methods of introduction
- Monitoring afterwards

Photo © Kim Steininger

Prosthetics

A note on prosthetics in wildlife:

Especially with the advent of 3D printing, the idea of creating prosthetics for captive wildlife is initially attractive. Attempts at leg prosthetics for birds have all resulted in pressure sores, constant need for readjustment as the bone remodels, failure of the prosthetic device, and/or injury to the contralateral limb (Galicia et al. 2018; Rush et al. 2012; Ritcher 1990). Beak prosthetics for birds have met with similar results—in all cases, use by the bird and growth of the natural beak caused the prosthesis to dislodge, causing discomfort to the bird and requiring frequent replacements (Crosta 2002; Coles 2007; Blake et al. 2019; Song et al. 2017). In addition, prosthetic beaks were not able to function like natural beaks (they cannot generate the force required for natural food prehension), so dietary modifications were needed (Coles 2007). Furthermore, as with humans, most animals appeared to be more comfortable without the prosthetic (Coles 2007; Mark Pokras, Tufts Wildlife Clinic, N. Grafton, MA, personal communication). For these reasons, the use of prosthetics in captive wildlife is discouraged, and the use for animals being returned to the wild is inappropriate.

Appendices

Appendix A6–Sample Form: Nonreleasable Animal Acquisition

Acquisition Form—Non-releasable Raptor Acquisition Evaluation

Institution Aquiring Bird

Institution Contact ____________________

Institution Name ____________________

Primary Contact ____________________

Phone Number ____________________

Email ____________________

Address ____________________

City, State, Zip ____________________

Institution Placing Bird

Identification ____________________

Species ____________________

Proposed Management

What will you use the bird for (i.e., programs, on-the-fist, display bird, etc.)?

Proposed Housing

How will the bird be housed (cage, flight pen, free-lofted, tethered, etc.)?

Will the bird be housed indoors, outdoors, or both?

Do you have other birds at your facility (please attach a list)?

Will the bird be housed with other birds (Please elaborate)?

Medical

Is your facility capable of any ongoing medical care (i.e., medications, procedures, etc.) required by this bird (Please elaborate)?

Does your facility have access to a veterinarian (if yes, please list name and contact information)?

Food Source

Does your facility have a safe, reliable source of whole prey items? □Yes □ No

Do you supplement the diet (if yes, with what, how much, how often, etc.)?

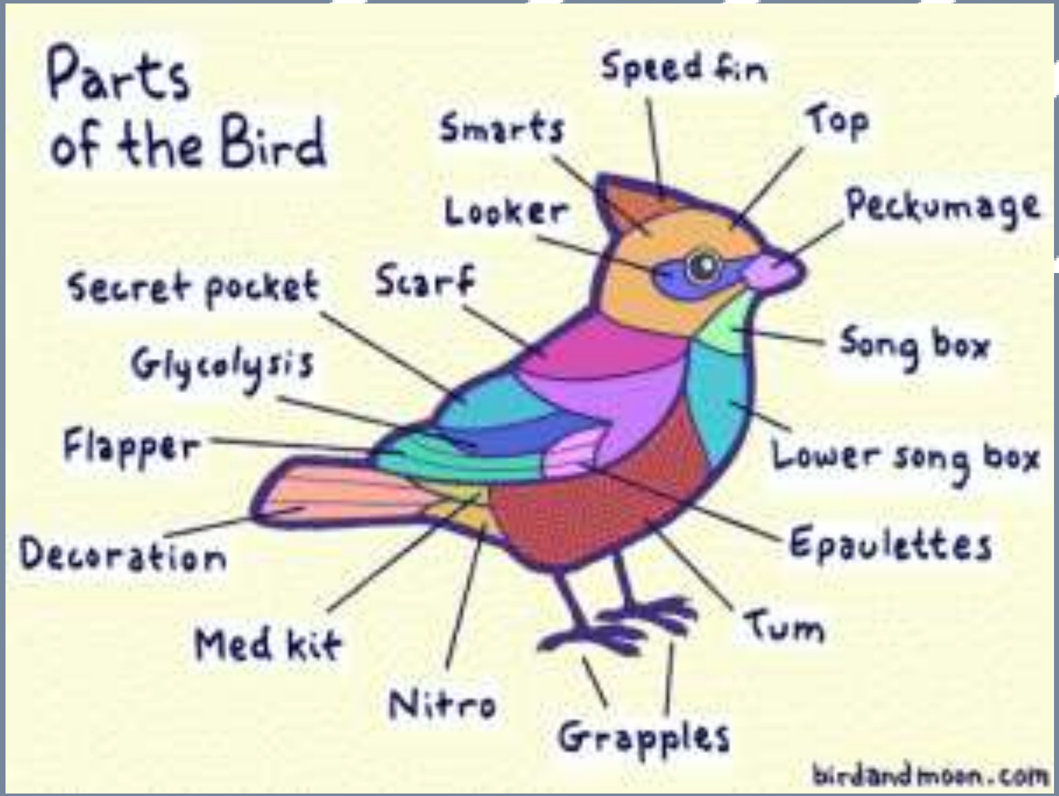
Experience Level

What is the experience level of the facility's bird trainer/handler (how many birds have been trained 'from scratch' by this person)?

Form used by permission, Buhl, G. 2018. *Wildlife in Education: A Guide for the Care and Use of Program Animals*, 2nd edition (G. Buhl, J. Schlieps, and L. Smith, editors). National Wildlife Rehabilitators Association: St. Cloud, MN.

TERMINOLOGY

- Glossary
- Acronyms



Glossary

Appendix G–Glossary of Terms

Altricial: hatched or born in an undeveloped state and requiring care and feeding by the parents (eyes closed, little or no down/fur, cannot leave the nest/den, and is fed by the parent(s).

Analgesia: absence of pain; the relief of pain.

Analgesics: compounds that relieve pain by altering perception, without loss of consciousness.

Animal: individual of the mammalian, avian, reptilian, and/or amphibian classes; used as a general term in this text.

Animal welfare: (1) how an animal is coping with the conditions in which it lives (OIE Terrestrial Code, 20th edition, 2011. Section 7: Animal Welfare, Article 7.1.1); (2) a human responsibility that encompasses all aspects of animal well-being, including proper housing, management, nutrition, disease prevention and treatment, responsible care, humane handling, and, when necessary, humane euthanasia (AVMA Policy on Animal Welfare).

Animal Medicinal Drug Use Clarification Act (AMDUCA): federal act that allows veterinarians to use approved animal and human drugs and in an extralabel manner (see Chapter 4).

Antiseptic: a substance that inhibits growth of infectious agents that can be used safely on living tissue.

Bacterial and fungal spores: the resting or vegetative stage of certain bacteria (especially *Bacillus* and *Clostridium*) and fungi characteristically very resistant to many chemical disinfectants that can survive for long periods in the environment.

Biosafety: the prevention of large-scale loss of biological integrity, focusing on both ecology and human health.

Biosecurity: the collection of preventive measures taken to reduce the risk of transmission of infectious diseases from one human, animal, or place to others.

Brancher: a young raptor that is mostly feathered but not yet capable of flight.

Bumblefoot: any degenerative or inflammatory condition of a bird's foot.

Code of Federal Regulations (CFR): the codification of the general and permanent rules by the departments and agencies of the US federal government.

Consolidated Regulations of Canada (CRC): the codification of the general and permanent rules by the departments and agencies of the federal government of Canada.

Conspecifics: individuals of the same species.

Cytotoxic: having the characteristic of killing cells.

Detergent: a cleansing substance to emulsify and remove organic debris.

Diluent: a substance used to make a concentrated solution more dilute. Sterile water and saline are common diluents for medications, and tap water is a common diluent for disinfectants.

Disinfectant: a substance that destroys infectious microbes or renders them inactive on inanimate objects. Cannot be used safely on living tissue.

Acronyms

Appendix F–Acronyms

AMDUCA (Animal Medicinal Drug Use Clarification Act)

AVMA (American Veterinary Medical Association)

AZA (Association of Zoos and Aquariums)

BGEPA (Bald and Golden Eagle Protection Act)

CCTV (closed-circuit television)

CDC (Centers for Disease Control and Prevention)

CFIA (Canadian Food Inspection Agency)

CFR (Code of Federal Regulations)

CMU (concrete masonry unit; a concrete block)

CNS (central nervous system)

CRC (Consolidated Regulations of Canada)

CVMA (Canadian Veterinary Medical Association)

CWD (chronic wasting disease)

CWS (Canadian Wildlife Services; under ECCC)

DEC (Department of Environmental Conservation)

DEP (Department of Environmental Protection)

DFO (Fisheries and Oceans Canada)

DNA (deoxyribonucleic acid)

DNR (Department of Natural Resources) or (Division of Natural Resources)

ECCC-CWS (Environment and Climate Change Canada–Canadian Wildlife Services)

FARAD (Food Animal Residue Avoidance Depletion program;
Food Animal Residue Avoidance Databank)

FFWCC (Florida Fish and Wildlife Conservation Commission)

FVMA (Federation of Veterinarians of Europe)

GPS (global positioning system)

IAATE (International Association of Avian Trainers and Educators)

IC (intracardiac)

IH (intrahepatic)

IP (intraperitoneal)

Facility Review Checklist

Appendix B–Facility Review Checklist

This checklist is intended to be used in conjunction with *Standards for Wildlife Rehabilitation* to help wildlife caregivers ensure that wildlife receives appropriate housing and medical treatment, and to protect both wildlife and humans from disease and contamination. **The items in bold are intended to help state, provincial, and federal agency personnel inspect facilities.** Section numbers refer to the section of *Standards* that has information about this topic. **Not all items contained in the form will apply to everyone; the form is meant to provide an easy reference to be sure important considerations are not overlooked, especially when changes occur such as facility growth or unexpected species or numbers are admitted.** Above all, the rehabilitator needs to first abide by all local or regional codes that may apply (e.g., if radiograph equipment is on site, proper licensing and registration for that equipment must be obtained and maintained according to local regulations; all waste material must be disposed of according to local regulations).

Background

Organization/Rehabilitator: Date:__________

Fed Rehabilitation PRT #____ Exp. Date___ State Rehabilitation PRT #_______ Exp. Date _______

Fed Special Purpose Possession/Education permit __________ Exp. Date __________

State Education PRT#__________ Exp. Date __________

Species rehabilitated: birds mammals reptiles amphibians

Name of Permit Holder: ____________________

Number of paid staff: __________ *Number of volunteers on site:* __________

Number of individuals rehabilitating off site under authorization of above permits: __________

Names: ____________________

Addresses: ____________________

(use additional sheet if necessary)

Are outreach/education programs conducted on site? Y/N off-site? Y/N

Is veterinary care available on site? Y/N off-site? Y/N

Name of vet(s): ____________________ *Phone:* __________

____________________ *Phone:* __________

In what capacity do you network with other rehabilitators (e.g., flight enclosures)?

____

(use additional sheet if necessary)

Who are the rehabilitators you network with?

____

Have you given written permission to federal and/or state agencies allowing them to refer calls concerning sick or injured wild animals to you? Y/N

I. Safety and Administration

A. Safety (see Sections 6.3, 6.4.2, 7.1.2, 8.2, and 8.3; Table 3.1)

1. Is there a fire alarm?
2. Is there a fire extinguisher(s)?
3. **Are eating, drinking, smoking, etc., restricted to designated areas?**
4. **Are first-aid kits and eye-wash stations available for staff/volunteers?**
5. Are safety data sheets (SDSs) readily available/easily accessible for those chemicals used at the facility (e.g., disinfectants, cleansers, certain drugs)?
6. Are capture, handling, and restraint procedures safe for animals and humans?
7. Are the people handling wildlife trained in safe handling techniques?
8. Are capture and handling equipment easily accessible and in good working order? Are they used safely?
9. **Are there written zoonotic disease and biosecurity plans or policies?**
10. Is there a written emergency evacuation plan?
11. Is there a written disaster plan?

B. Organizational Standards (see Sections 2.1, 2.2, 2.4, and 2.6; Tables 2.2 and 2.3)

1. Does the individual or organization comply with local ordinances and have current state or provincial and federal permits for the work being done?
2. **Does the organization have operational policies available to staff members and volunteers (e.g., operations manual, rules derived from Board decisions, or training materials)?**
3. Are there continuing training opportunities for staff (paid and volunteer) who have completed basic skills training (e.g., staff training sessions, IWRC and NWRA programs)?
4. **Is there a grievance policy for staff/volunteers?**
5. **Is there a workers' compensation policy for employees?**
6. What after-hours services are available for emergency cases (e.g., on-call person, emergency veterinary clinic services)?
7. Are there written policies to instruct the volunteers regarding rules of the organization as they relate to animal care, reporting procedures, and rules of conduct?

C. Continuing Education and Professional Development (see Sections 1.5 and 2.1)

1. Is there a continuing program for acquisition of pertinent publications on wildlife rehabilitation?
2. Does the permittee's organization collect such information and share it with other members?
3. Are resources available that describe each species and its natural history?
4. Is information and expertise shared between rehabilitators/organizations to improve care?
5. **Are resources for training and continuing education made available to staff and volunteers?**
6. Does the permittee and/or others in the organization attend continuing education classes or conferences on wildlife rehabilitation?

C. Initial Care Facilities (see Sections 9.3 and 9.4; Chapters 10–12)

1. Do the enclosures meet housing standards for the species handled?
2. **Are they constructed so that they can be cleaned and disinfected (e.g., stainless steel, fiberglass, sealed wood, coated port-a-pets)?**
3. **Are the enclosures cleaned regularly (as appropriate for the species and enclosure type)?**
4. **Are isolation facilities available (on site, at a veterinary clinic, elsewhere)?**
5. Are intensive nursing care facilities available, either on site or at a veterinary facility?
6. **Is the area adequately ventilated in an appropriate manner?**
7. **Is there adequate lighting (full-spectrum light at the appropriate hours)?**
8. Are incubators, heat lamps, or heating pads available for use when necessary?
9. **Is the area away from the main flow of human activity?**
10. **Is access to the area by domestic pets/animals restricted?**
11. **Are different species adequately separated (e.g., predator/prey species)?**
12. **Are visual barriers or hiding areas provided for the animal?**
13. **Are food and water presented in an appropriate manner for each species?**

E. Conditioning Enclosures (see Section 9.5; Chapters 10–12)

1. Do they meet housing standards for the species being handled?
2. **Are they cleanable?**
3. **Is there a regular cleaning schedule?**
4. **Are they safe to the handlers and animals being held (e.g., no loose or sharp wires or nails, double-doors)?**
5. **Are they secure (e.g., locking, sturdy, safe from predators)?**
6. **Do the enclosures provide protection from the elements (e.g., wind, rain, snow, excess heat)?**
7. **Are they appropriately distanced from enclosures of incompatible species or individuals?**
8. **Do they provide visual barriers (e.g., shade cloth, hide boxes) to minimize stress?**
9. **Do they have a double-door entry system?**
10. **Do they provide appropriate ventilation, sun, and shade?**
11. **Do all aviaries have the appropriate perches for the species housed?**

III. Veterinary Medical Services

A. Veterinary Services (see Sections 5.1 and 5.2)

1. **Are veterinary services provided for the animals being held?**
2. Do those services include, when necessary, the following?
   - examination
   - diagnostic

Index

A

STANDARDS 2021

- On-line access to an electronic version
  - Must be active member
  - Must have internet
- Everyone will have access to the information in some form
- Print version available for purchase
- E Book available for purchase

10:10

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Table 10.3c Minimum Housing Size Guidelines for Adult Waterbirds (US Customary Units)

This table is not intended to be used independently; it should be used only in conjunction with the information in Chapter 10, Sections 10.1 and 10.3. All sizes here are depicted as MINIMUM and use rectangular area for ease of calculation. Larger sizes and/or alternative shapes may be more suitable.

Order Species	Length[*] of Bird as Adult	Temporary Confinement/Restricted Activity[†]: Enclosure W x L x H	Temporary Confinement/Restricted Activity[†]: Water/Pool Size and Time	Release Conditioning: Enclosure W x L x H	Release Conditioning: Water/Pool Diameter x Depth	Gallons	Max # per pen	Codes
Gaviiformes								
Loons		**15** in x **30** in x **30** in	100–400 gal at least 1 x/day	Pool only	**8** ft x **2** ft	590	2	FP, N, PP, PT, SO
Podicipediformes								
Small grebes (eared, horned, pied-billed)		**12** in x **12** in x **12** in	25–400 gal at least 1 x/day	Pool only	**6** ft x **2** ft	330	4 Col/Sol	FP, H, N, ON, PP, PT, SO
Large grebes (western, Clark's, red-necked)		**18** in x **18** in x **18** in	40–400 gal at least 1 x/day	Pool only	**6** ft x **2** ft	330	4	FP, N, PP, PT, SO
Procellariiformes								
Northern storm petrels		**12** in x **12** in x **12** in	25–150 gal at least 1 x/day	Pool only	**45** in x **8** in	45	4–5 Col	AG, N, PP, PT, SO
Large petrels, fulmars, shearwaters		**18** in x **18** in x **18** in	40–400 gal at least 1 x/day	Pool only	**6** ft x **3** ft	115	2	AG, ON, PP, PT, SO
Albatrosses		**3** ft x **3** ft x **3** ft	150–400 gal at least 1 x/day	Pool only	**10** ft x **18** in	695	2	AG, N, PP, PT, SO
Pelecaniformes								

STANDARDS

- How can it be used by Rehabilitators?
- How can it be used by USFWS/State Agencies?

STANDARDS

- Read the whole text, then refer back to sections
- Honest assessments
- Center on animal needs and health
- Guidance for rehabilitators and regulators

STANDARDS

in wildlife rehabilitation

There are always ways to

IMPROVE