



Guidelines for the Husbandry of Amphibians and Reptiles

I. PURPOSE

- A. Amphibians and reptiles differ from other animals used in biomedical research in several ways. Therefore, it is very important to understand their physical and biological requirements in captivity. ULAM has established the following guidelines to implement proper husbandry practices that are required when working with these animals in a captive laboratory setting.

II. AMPHIBIANS

- A. **Husbandry requirements vary between amphibian species.** *Species-specific requirements must be determined before establishing husbandry practices.*

B. Primary Enclosures

1. Animals can be housed singly or in groups as long as sanitation is maintained. However, aggressive or territorial species should be housed individually.
2. Glass aquaria, plastic boxes, stainless steel, plexiglass, or fiberglass tanks are acceptable.
3. Lids should be used for species that can jump or climb and should provide adequate ventilation (e.g., holes or screens). *Note: Metal screen lids can be abrasive for frogs that readily jump, especially new arrivals. Smooth lids with adequate ventilation and cages with more height can prevent the frog from abrading itself.*
4. Enclosures should be easily sanitized and be able to withstand cage or hand washing.
5. Species-specific enclosure requirements
 - a. The height of the cage should allow room for the normal climbing or jumping behavior of some species.
 - b. Moist habitats should be provided for terrestrial species (e.g., sphagnum moss, misting, etc.).
 - c. Species-appropriate hiding places should be provided in the form of bark, PVC pipes, or other similar options.
 - d. Water should be made available for terrestrial species for percutaneous absorption (through the skin) or drinking.
 - e. Semi-aquatic species should be allowed easy access in and out of the water.

C. Water Quality for Aquatic Amphibians (e.g., *Xenopus* spp.)

1. Water source:
 - a. Water from **municipal sources** must be dechlorinated with a commercial water conditioning product according to manufacturer's directions. *Allowing water to age for 24 hours without treatment will not allow all toxic products (e.g. chloramines) to dissipate and is not sufficient.*



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- b. Facilities that utilize **well water** may not need to condition water prior to use if water quality is deemed sufficient upon testing.
2. Water pH:
 - a. Water pH should be species appropriate.
3. Conductivity & hardness:
 - a. Water conductivity refers to the volume of electrolytes and minerals dissolved in the water. Water hardness refers to the concentration of calcium carbonate and magnesium.
 - b. Conductivity and hardness should be species appropriate.
4. Heavy metals:
 - a. Heavy metals such as copper and zinc are toxic to amphibians. Avoid copper pipes and fixtures.
5. Routine testing:
 - a. Water quality parameters should be routinely measured and documented. Water quality should be measured more frequently when an enclosure is first established or if dictated by health concerns.
 - b. The following parameters should be measured and documented routinely:
 - i. pH
 - ii. Ammonia, nitrate, and nitrite levels
6. Biofilter
 - a. If present, the biofilter must be an appropriate size to handle waste load produced in an enclosure.

D. Temperature

1. In general, **tropical species** require ambient temperatures of 70 - 85° F.
2. In general, **temperate species** require ambient temperatures of 65 - 72° F and may need seasonal decreases of 10 - 15° F.
3. Some aquatic species may require the addition of supplemental heat to water.

E. Lighting

1. Animals should be kept in species appropriate lighting conditions unless an approved variation is described in the animal use protocol. 12 hrs light and 12 hrs dark are generally acceptable for most species. *Note: Other lighting cycles may be required for breeding.*
2. Some species may require full spectrum lighting or heat lamps.
3. Shelter from the light should be provided. Examples include opaque primary enclosures, hiding spaces, or lids.



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F. Airflow/Humidity

1. Humidity requirements vary between species.
2. The standard air change rate for mammals (10-15/hour) can rapidly desiccate amphibians. The reduction of airflow rates or the installation of humidifiers can help prevent desiccation.
3. Air handling systems need be able to compensate for additional thermal and moisture loads present in aquatic amphibian environments.

G. Sanitation

1. Frequency:
 - a. **Singly housed terrestrial** animals with ample floor space should have their cages cleaned **every 2 weeks** with spot cleaning as needed.
 - i. Excessive cleaning or sterilization may disrupt territorial pheromone marking and stress animals.
 - b. **Aquatic species** in static housing require tank cleaning as often as needed to maintain water quality. For more details regarding *Xenopus* spp., please see the *Xenopus laevis* Care Husbandry SOP.
 - c. Tanks should be disinfected every three months.
2. Methods:
 - a. Cleaning solutions with phenolics and cresol disinfectants (e.g. Lysol) and surfactants should be avoided as they are extremely toxic. *Note: If these compounds NEED to be used they must be thoroughly rinsed off of the caging before re-use.*
 - b. Hand washing: Wash tanks with hot water and a dilute sodium hypochlorite (bleach) solution, then rinse thoroughly with hot tap water. A final rinse with conditioned water is recommended. Let tanks air dry for 24 hours before placing animals back into tanks.
 - c. Cage wash: Caging and equipment that has passed through mechanical cage wash should be rinsed again by hand with conditioned water prior to contact with animals.

H. Feeding

1. Animals should be provided a nutritionally balanced diet from commercial sources or prey items that provide appropriate nutrients.
 - a. Invertebrates often lack important vitamin and mineral nutrients. These prey items should be gut loaded (fed) or coated with vitamin and mineral supplements before feeding to amphibians.
2. Frequency:
 - a. Frequency of feeding should be age and species appropriate.



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I. Enrichment

1. Enrichment is recommended for all species.
2. Environmental enrichment strategies vary with species and should be evaluated for safety and elicitation of species-specific behaviors prior to use.

III. REPTILES

A. Husbandry requirements vary between reptilian species. *Species-specific requirements must be determined before establishing husbandry practices.*

B. Primary Enclosures

1. Glass aquaria, plastic boxes, or fiberglass, plexiglass, or stainless steel tanks are acceptable.
2. Enclosures should be easy to sanitize and able to withstand washing methods (cage or hand washing).
3. Secure lids are essential as these species are prone to escape. These lids should be ventilated and secured with latches or weights.
4. Substrate:
 - a. Shredded newspaper, packing paper, artificial turfs, and indoor/outdoor carpet are suitable substrates. These are easy to spot clean and some provide opportunities for burrowing. If necessary, natural substrates (e.g. sand, stones) can be used but should be cleaned and/or changed regularly.
 - b. Corn cob bedding or kitty litter should be avoided as they are easily swallowed and may cause impactions.
5. Terrestrial species may require a source of environmental moisture such as a water bowl (large enough for submersion of the animal) or misting.
6. Accessories may include hide boxes, branches for climbing or basking platforms.

C. Water Quality

1. Dechlorination is not necessary.
2. Depth of the water should be at least as deep as the width of the shell for turtles.

D. Temperature

1. Requirements are species-specific, but range from 70 – 85° F.
2. A thermal gradient should be provided including areas for basking and areas for retreat from heat and light.
3. Avoid hot rocks or direct heating sources in the cage as there is a risk of thermal burns.



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E. Lighting

1. Lighting requirements vary with species. 12 hrs light and 12 hrs dark are generally acceptable unless an approved variation is described in the animal use protocol.
2. Certain species may require full spectrum UV lighting.

F. Airflow/Humidity

1. 30 - 70% humidity is generally acceptable however humidity requirements vary between species.

G. Sanitation

1. Cage washing may be performed with quaternary ammonium compounds or dilute sodium hypochlorite (bleach) solution. Cages and equipment should be thoroughly rinsed with water prior to contact with animals.
2. Phenolics and cresolics should be avoided because they are extremely toxic to reptiles.
3. Cages should be sanitized as often as needed to prevent build up of organic debris (feces, shed skin, etc.) and offensive smells (generally at 1-2 week intervals). Spot clean between sanitations as needed.

H. Feeding

1. Diet and feeding frequency are species-specific.
 - a. Animals should be provided with a nutritionally balanced diet from commercial sources or by prey species that provide appropriate nutrients.
 - b. Invertebrates often lack important vitamin and mineral nutrients, therefore these prey items should be gut loaded (fed) or coated with vitamin and mineral supplements before feeding.

I. Enrichment

1. Enrichment is recommended for all species.
2. Environmental enrichment strategies vary by species and should be evaluated for safety and elicitation of species-specific behaviors prior to use.

IV. RELATED DOCUMENTS

- A. *Xenopus laevis* Care
- B. University of Michigan OSEH recommendations for personal protective equipment:
<http://www.oseh.umich.edu/research/equipment.shtml>



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V. REFERENCES

- DeNardo, Dale. Amphibians as Laboratory Animals. ILAR Journal: Volume 37(4) 1995: Fish, Amphibians, and Reptiles.
- Fox, JG, Anderson LC, Loew FM, Quimby. Laboratory Animal Medicine. 2nd Ed. 2002.
- Poole, Trevor. The UFAW Handbook on the Care and Management of Laboratory Animals. 7th Ed. Volume 2. 1999.
- Pough, F. Harvey. Recommendations for the Care of Amphibians and Reptiles in Academic Institutions. National Academy Press: Washington, DC.
- Mader, Douglas R. Reptile Medicine and Surgery. 1996. W.B. Saunders: Philadelphia, PA. p 9-19

VI. ADDITIONAL RESOURCES

- Amphibians: Guidelines for the breeding, care, and management of laboratory animals. <http://books.nap.edu/html/amphibian>. A report by the subcommittee of amphibian standards. Institute of Laboratory Animal Resources. National Research Council.
- Amphibian and Reptile Care Sheet and Information. <http://www.wnyherp.org/care-sheets>. IACUC website has a link to the Animal Welfare Information Center. Under the zoo, circus, and marine animals there is the link to the amphibian and reptile care sheet from the Western New York Herpetological Society