

1. PURPOSE

The intent of this Standard Operating Procedure (SOP) is to describe an appropriate environmental enrichment program for amphibians.

2. RESPONSIBILITY

Facility Animal Care Committees (FACC), veterinarians, principal investigators (PIs), animal care staff

3. CONSIDERATIONS

- 3.1. The purpose of environmental enrichment is to provide amphibians with opportunities to express basic behavior needs, to promote species-typical, non-injurious, behavior and to promote physical and mental health thus enhancing animal welfare. Environmental enrichment should be biologically relevant, i.e., hiding, socializing, searching, so that it does not lose its enriching value over time.
- 3.2. The environmental enrichment program must be approved by a veterinarian. This includes enrichment provided within the animal facility, provided as part of an Animal Use Protocol (AUP), or provided in Alternative Locations for Procedures and Housing of Animals (ALPHA) locations.
- 3.3. Deviation or exemption from this environmental enrichment program must be scientifically justified in the AUP and approved by the FACC, or prescribed for medical reasons by a veterinarian.

4. PROCEDURES

- 4.1. Social Contact:
 - 4.1.1. Some amphibians tend to be solitary except during breeding, while others prefer to be in groups; therefore, it is important to know what is optimal for the species of interest
 - 4.1.2. Whenever possible, pair- or group-house amphibians.
 - 4.1.3. Exceptions for pair or group-housing must include strong scientific, welfare, or medical justification:
 - 4.1.3.1. Incompatibility (aggression). Any means of reducing aggression must have been provided before isolation, e.g., hiding space through shelters, plants, etc.
 - 4.1.3.2. Medical reasons as approved by a veterinarian
 - 4.1.3.3. Specific protocol approved by FACC
- 4.2. Housing System:
 - 4.2.1. Animals should be housed with the goal of maximizing species-specific behaviors, minimizing stress-induced behaviors, providing opportunity for social contact and locomotor and exploratory behaviors.
 - 4.2.2. House amphibian species according to their natural habitat; the shape, color, depth, and volume of tanks should be appropriate for the species and life stage being held, unless specifically described in the animal use protocol and approved by the FACC.
 - 4.2.3. Housing system should meet or exceed the most recent minimal space recommendations established by the Canadian Council on Animal Care (CCAC).
 - 4.2.4. House *Xenopus laevis* in tanks with darkened sides and floor.
- 4.3. Dietary Enrichment:
 - 4.3.1. Feed animals to meet current National Research Council (USA) recommendations for amphibian nutrition.
 - 4.3.2. The food supply should come from a reliable and regular source to prevent the introduction of pathogens and other variables.

4.4. Environmental enrichment devices:

- 4.4.1. The benefits of enrichment can be species specific, and it is important to understand the natural requirements of the species. Environmental enrichment must be evaluated with respect to the particular species and life stage.
- 4.4.2. All objects must be safe and non-toxic, purchased from reputable vendors, cleaned, sanitized, or replaced regularly. These items can be naturalistic, such as rocks, plants, lily pads, or artificial such as PVC piping.
- 4.4.3. Shelters or other opportunities to hide must be provided.
- 4.4.4. Ramps and perches should be provided for variety. Boxes in which frogs can hide and places they can go to dry out when needed should also be provided (species-specific).
- 4.4.5. Any structures added for enrichment should have smooth surfaces and rounded edges to reduce the risk of injury to the animals and must not result in problems in water flow or cleaning that could be detrimental to the health of the animals.
- 4.4.6. Xenopus:
 - 4.4.6.1. Floating objects on the water, e.g., commercially available plastic 'lily pads' or black bin liners cut into various floating shapes, provide Xenopus with cover from above and hiding places.
 - 4.4.6.2. Medium-to-large stones or rocks can add variety to a tank, particularly if placed at a sufficient distance from the walls to allow frogs to pass through the space between the rock and the tank wall.

5. REFERENCES

- 5.1. Canadian Council on Animal Care (CCAC) guidelines: [Amphibians, August 2021](#).
- 5.2. Holmes, A.M., Emmans, C.J., Jones, N., Coleman, R.C., Smith, T.E., & Hosie, C.A. (2016). Impact of tank background on the welfare of the African clawed frog, *Xenopus laevis* (Daudin). *Applied Animal Behaviour Science*, 185, 131-136. <https://doi.org/10.1016/j.applanim.2016.09.005>