

1. PURPOSE

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

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 fish species 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. Whenever possible, pair- or group-house fish.
 - 4.1.2. Exceptions for pair or group-housing must include strong scientific, welfare or medical justification:
 - 4.1.2.1. Incompatibility (aggression). Any means of reducing aggression must have been provided before isolation (ex: hiding space through shelters, plants, etc.)
 - 4.1.2.2. Medical reasons as approved by a veterinarian
 - 4.1.2.3. Specific protocol approved by FACC
 - 4.1.3. When single-housing is necessary, social contact can be simulated by housing animals next to conspecifics or adding mirrored paper to the side of their enclosure.
- 4.2. Housing System:
 - 4.2.1. Animals should be housed with the goal of maximizing species-specific behaviors, minimizing stress-induced behaviors, and providing opportunity for social contact and locomotor and exploratory behaviors.
 - 4.2.2. House fish 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).
- 4.3. Dietary Enrichment:
 - 4.3.1. Feed animals to meet current National Research Council (USA) recommendations for fish nutrition.
 - 4.3.2. Certain species of fish may benefit from nutritional enrichment provided by supplementary food sources such as bloodworms or brine shrimp .

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.
- 4.4.2. Before introducing enrichment objects to a tank, careful planning and consideration should be given to the relevance of the object to the species, the potential effect on water quality (i.e. disruption of water flow, overgrowth of algae, or accumulation of food or feces), the method and frequency of cleaning the objects, the potential for chemicals to leach into the water, and the ability of animal care staff to observe and assess the welfare of the animals.
- 4.4.3. 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.
- 4.4.4. All objects must be safe and non-toxic, purchased from reputable vendors, cleaned, sanitized, or replaced regularly. These items can be naturalistic, such as new rocks, shells, plants, lily pads, or artificial such as PVC piping.
- 4.4.5. Shelters or other opportunities to hide such as plants should be provided.
- 4.4.6. Novel items are important because they allow fish to encounter different objects to explore, defend, or swim through on a random basis.
- 4.4.7. Some species show a preference for tank floor substrates such as sand or gravel. As some substrates can disrupt water flow in certain systems negatively impacting water quality, an acceptable substitute is to affix a laminated photograph of natural substrate to the exterior bottom of the tank

5. REFERENCES

- 5.1. Canadian Council on Animal Care ([CCAC](#)) [guidelines: Zebrafish and other small, warm-water laboratory fish](#), December 2020.