Policy:	SC-35-300
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Enabled by:	IACUC/AV/ ILAR
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Title: Husbandry Care of Fish

I. Purpose:

The purpose of this policy is to outline the UC Davis minimum standards of care for fish.

II. Policy:

All units providing animal care for fishes must meet or exceed these minimum requirements based on the ILAR Guide for the Care and Use of Laboratory Animals (*Guide*). Deviations or exceptions must be approved by the Attending Veterinarian and the IACUC.

III. Procedure:

Daily (365 days a year without exception):

- Observe each animal and check for health concerns (*Guide* pg. 112).
- Ensure adequate feed is available, though depending on the species and life stage this may be done less frequently (*Guide* pg. 65-68, 84-85).
- Record sick and dead animals, and report them to Campus Veterinary Services (CVS) or designated clinical veterinarian per standard operating procedure .
- Record minimum and maximum water temperatures.
    - Temperature range varies by species, but general recommendations are 5-15°C (41-59°F) for cold water fishes, 12-26°C (53.6-78.8°F) temperate water fishes, and 18-35°C (64.4-95°F) warm water fishes.
    - It is recommended to record each individual tank water temperature daily, but for large subsets of tanks minimally 10% of the tanks must be recorded on a rotational basis.
- Clean any excessively soiled tanks (*Guide* pg. 85-86).
- Clean and organize room, anterooms, and surrounding premises (*Guide* pg. 86-87).
- Record daily completion of each task, initial each task, and date the log.

Weekly (not to exceed every 7 days)

- **For static tanks**, record water quality (suggested parameters are: dissolved oxygen, ammonia/nitrite/ nitrates, pH, and conductivity) (*Guide* pg. 78-79).

    - Ranges vary by species, but zebrafish recommendations are > 6.0 mg/L dissolved oxygen, < 0.02 mg/L Ammonia (NH_3), < 1.0 mg/L Nitrite (NO_2), and < 50 mg/L Nitrate (NO_3) , pH (6.5-7.5), conductivity (500-2500 µS).
        - More frequent water quality checks may be needed when setting up a systems biologic ecosystem.
        - Minimally 10% of the tanks should be recorded on a rotational basis for all water quality measurement.
- Replace a percent of the tank (ex. 10-25%) with conditioned water as determined by ammonia, nitrite, and nitrate levels, pH, and other water quality parameters.
- **For recirculating tanks**, see above
- **For flow-through tanks**, it is recommended that dissolved oxygen levels are measured and evaluated.
- New tanks may need additional testing and water changes when building up the biofiltration system. Water changes, up to 25% of the total water volume, should be performed to help stabilize water quality. Water quality checks (ammonia, nitrite and nitrate) may need to be more frequent if outside of acceptable levels and should be rechecked daily until it has returned to normal ranges.

Biweekly (not to exceed every 14 days):

- Replace a percent of the system water (ex. 10-25%) with conditioned water as determined by ammonia, nitrite, and nitrate levels, pH, and other water quality parameters.
    - This can be split into lower volume and increased frequency as needed

Monthly (not to exceed every 30 days):

- Disinfect nets, shelves, racks, tank cleaning utensils, scrub brushes, and enrichment devices.
    - The use of certain disinfectants may be contraindicated for some aquatic species, as residues may be highly deleterious.

Semi-Annually (every 6 months):

- Flow-through tanks are recommended to have tanks and/or source water quality evaluated.
    - Since water quality is constantly changing in flow-through systems more frequent evaluation may not be necessary. If high mortality or other clinical concerns are recognized, water quality intervals may be increased.

As needed:

- Disinfect the animal room including walls, floors, and ceilings (if possible) (*Guide* pg. 86).
- Remove and replace worn or damaged equipment from primary enclosures and surrounding facility (*Guide* pg. 86).
- Pelleted feed must be discarded after 6 months of the milling date unless manufacturer guidelines recommend a shorter or longer expiration (*Guide* pg. 66). Manufacturer guidelines will be followed for frozen feed.

- Clean and sanitize feed storage containers (*Guide* pg. 67).
- For filtration system and pumps, clean or replace all filters per manufacturer's instruction.
- Each facility will develop their own best practices with sanitization typically occurring every 6 months or whenever there is a change in species but may vary with facility.

Environmental Enrichment:

- Refer to the Environmental Enrichment policy (SOC-30-102).
- Enrichment should elicit species appropriate behaviors and be evaluated for safety and utility. An example of enrichment for fish include co-housing with conspecifics for schooling species (*Guide* pg. 82-83).

Facilities:

- Temperature alarms must be installed in all rooms housing fishes (*Guide* pg. 143).
- Adequate ventilation must be provided for the health and comfort of the animal at all times, governed by thermal and moisture loads (i.e. to minimize condensation that can affect visibility for daily health checks) (*Guide* pg. 80-81, 150-151).
- Floors shall be moisture-resistant, non-absorbent, impact-resistant, and relatively smooth (*Guide* pg. 137, 150). Refer to Physical Plant SOC 50-102.
- All outlets should be rated GFCI (ground faulted conductance interrupted). (*Guide* p.150)
- Electrical components should be placed away from water and wet surfaces.
- Drains must be guarded with a fine mesh screen to prevent the escape of detrimental, restricted or transgenic species of fish. The mesh shall be fine enough to prevent release of viable gametes/embryos or untreated transgenic material (*Guide* p.150).

Housing:

- Whenever possible and depending on the species, fish should be socially housed in compatible groups (*Guide* pg. 82-83).
- Space requirements will vary by species and life stage, but zebrafish should be housed 5 adults per liter of water (*Guide* pg. 83).
- Recommendations for (optimal) stocking densities are not readily available for most fish species and life stages, so we recommend using the following parameters to determine whether a tank is overcrowded: degraded water quality, disparity in body condition or size, increased evidence of trauma to skin/fins, increased morbidity or mortality, or increased prevalence of infections requiring treatment.