Policy:	SC-35-300
Date:	7/9/15
Enabled by:	PHS/Guide
Supersedes:	10/07/2013

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 departments providing animal care for fish must meet or exceed these minimum requirements which are based on the Public Health Service Policy and the ILAR ***Guide for the Care and Use of Laboratory Animals***.

The selection of appropriate fish housing systems requires professional knowledge and judgment and depends on the nature of species and age of fish used, and the design of the experiments.

III. Procedure:

Daily: (**365 days a year without exception**)
Observe each tank and check fish for health issues. Signs to look for include abnormal swimming behavior, discoloration of the water or fish, and failure to feed properly. Contact Campus Veterinary Services to report sick fish. Check all automatic feeders and clean when necessary. Disinfect nets after each use. Check that each tank has an individual identification and adjust fish count as needed. Document all transfers, deaths and euthanasia of fish. Check and record water temperature which should be maintained at either 10 - 28º C., or the recommended temperature for the specific species being housed (cold water fishes 5-15ºC, temperate water fishes 12-26ºC, and warm water fish 18-35ºC). Document parameters listed above in addition to room activities on room log sheet (feeding, animal number, room temperature).

Weekly Procedures:
Fish should be housed in primary enclosures that meet their general needs (i.e. proper size tank for species-specific requirements and for maintaining appropriate densities for group housed fish). Primary enclosure requirements will be based on species needs, behavior, and goals of the study. Feed containers must also be cleaned on a weekly basis.

Standing/Static water tanks:
Siphon solid wastes from tanks as needed. Remove algae by scraping tanks, so that algal growth does not interfere with daily observation of animals. Replace at least 10% of system water volume or as appropriate. Check and record water quality (dissolved oxygen,

ammonia/nitrite/nitrates) and pH (6.5-7.5) and conductivity (500-2500 µS). For new tanks measurements may need to check more often. If water quality values are out of the normal range contact your supervisor or PI to correct the issue. Document tank checks on room log sheet.

Suggested values listed below are for zebrafish and may be altered for other fish species:

- *80-200 mg/L Hardness ($CaCO_3$)*
- *> 6.0 mg/L Dissolved Oxygen*
- *< 0.02 mg/L Ammonia (NH_3)*
- *< 1.0 mg/L Nitrite (NO_2-N)*
- *< 50 mg/L Nitrate (NO_3-N)*

Recirculating systems with central filtration:
Siphon solid wastes from tanks as needed. Back-flush and/or clean mechanical filtration systems as needed; monitor biological filtration system media levels. Monitor and record water quality data (dissolved oxygen, ammonia/nitrite/nitrate). Replace at least 25% of system water volume or as appropriate with conditioned water as determined by nitrate levels, total ammonia nitrogen, and/or pH. Control algae growth, if any, as with the procedure in static tanks above. Clean tanks in place with a brush to remove mild algae accumulation on an "as needed" schedule.

Flow-through water tanks:
Clean tanks in place with a brush to remove mild algae accumulation on an "as needed" schedule. Check water quality (dissolved oxygen, ammonia/nitrite/nitrates) weekly or more frequently based on fish density, or when changes are made to the system

Facilities housing fish where water source is different than campus water (such as the ocean) and are using the flow through system will have specific procedures for each species being housed, and may be further defined in specific IACUC approved protocols or Standard Operating Procedures.

Biweekly Procedures:
Replace at least 25% of the tank water volume or as appropriate using conditioned water. Clean all filters at least every two to three weeks or as required to maintain optimal function of filtration system and pumps. Follow the UCD Housekeeping Policy.

Monthly Procedures:
Disinfect (for example using 10% bleach solution) and sanitize shelves, racks, tank cleaning utensils and floors. Scrub brushes, sponges and enrichment devices. Check and record water quality (ammonia/nitrite/nitrates) on a subsample of tanks that have had their filters cycled - such that each tank is measured at least every three months. Log monthly tank checks on room log sheet.

Feeding:
Can range from continuous (i.e. automatic feeders which should be checked regularly to ensure proper functioning) to 2-3 times per week. This depends on the nutritional quality and quantity of the food fed. **Feeding interval should be based on fish species, life stage, and specific feeding behavior.** All feedings should be recorded in room logs.

Identification:
Each tank should be individually identified and have an approximate fish count.

Environmental Enrichment:
Enrichment should elicit species appropriate behaviors (schooling, substrates for reproduction, etc.) and should be evaluated for safety and utility. Refer to the Environmental Enrichment policy.

Facilities & Monitoring:
Floors should be moisture-resistant, nonabsorbent, impact-resistant, and relatively smooth. Floors should have adequate drainage. Walls should be moisture resistant, and have GFI electrical outlets that are properly positioned to eliminate possible safety hazard. Adequate storage space should be available to help facilitate cleaning and storing of tanks and supplies. Tanks must not be housed directly on floors.

Temperature, Humidity and Illumination:
Humidity does not directly impact aquatic animals. However the unavoidably high levels of humidity in fish rooms can be detrimental to electronic equipment and necessitates meticulous care/cleaning of automatic feeders. Regular monitoring of the HVAC system is important and is best performed at the room level. Room temperature should be recorded on a room log sheet and close to the temperature of the tank water to prevent having to adjust tank water temperatures as a result of fluctuations in room temperatures. Illumination schedules should be of a duration that will not compromise the well-being of the species being housed.

Husbandry:

FEED:
Fish should be fed palatable, non-contaminated, and nutritionally adequate food daily or according to their particular requirements, unless the protocol under which they are being used requires otherwise. Feed should be stored in properly labeled vermin controlled containers. It should be discarded either 6 months after being received or opened or at the manufacture's expiration date or (when properly stored) when feed is no longer of nutritional value. It is important to not over feed aquatic species as excess food can clog filters, system components and encourages mold growth and bacterial infections.

References:

1. **American Association for Laboratory Animal Science.** Animal Care and Use Courses. Aquatic Animal Husbandry and Management. https://www.aalas.org/
2. **Institute for Laboratory Animal Resources.** 1974. Amphibians. *In*: Guidelines for the breeding, care and management of laboratory animals. National Academy of Sciences, Washington, D.C.
3. **Institute for Laboratory Animal Resources.** 1991. Recommendations for the care of amphibians and reptiles in academic institutions. National Academy of Sciences, Washington, D.C.
4. **Scientists Center for Animal Welfare.** 1992. The care and use of amphibians, reptiles, and fish in research. Schaeffer, D. O., K. M. Kleinow, L. Krulisch (eds.). Scientists Center for Animal Welfare, Greenbelt, MD.

5. **American Society of Ichthyologists and Herpetologists, American Fisheries Society, American Institute of Fisheries Research Biologists.** 1987. Guidelines for the use of fishes in field research. Fish. J. 13(2):1-14.