Standard Operating Procedure
Aquatics Laboratory and Aquatic Animal Displays

These Standard Operating Procedure are prepared for the care of the organisms in the NMU Biology Department Aquatics Laboratory and the Aquatic Animal Display including tanks in the New Science Facility Atrium and New Science 1106. It includes fish, turtles, mudpuppies, frogs, and any other aquatic organisms in these systems, including invertebrates. These procedures are intended to be base-level standard operating procedures. Additional information may be required for animal care and personnel should refer to the relevant IACUC protocol (if applicable) and the PI for the project (or course instructor) for more details as needed.

General Policies

The Aquatics Laboratory is overseen by the Aquatics Laboratory Director who serves at the behest of the Biology Department. All individuals who wish to use the facility for teaching or research work through the Director to use the facility.

No vertebrates will be allowed to enter the Aquatics Laboratory or the Aquatic Animal Displays without coverage by an approved and active IACUC with a named responsible party.

No individuals will be allowed to work with animals within the Aquatics Laboratory or the Aquatic Animal Displays without receiving appropriate training, including IACUC-related training as appropriate.

All individuals working with organisms in the Aquatics Laboratory or providing care to the Aquatics Display must read and document their understanding and willingness to abide by this SOP.

Area Access and Security

All aquatic animals under our care must be in safe and secure housing. In the Aquatics Laboratory, a card-swipe lock is keyed to NMU ID cards. All access on this lock will be cleared once per year (September) and new lists of those with approved access loaded by the locksmith. All Biology faculty and staff will automatically receive access to this lock. All students must be approved through the Director of the Facility. Only students with a documented need for access will be admitted and faculty/staff with access without need are encouraged to restrict their own access. Note that some individuals with access may not have received IACUC training because they work with aquatic invertebrates; however, they will be trained using this general SOP and will also be instructed to not work with vertebrates unless they have received appropriate training.

All tanks/systems outside the Aquatics Laboratory must be secured in some way, typically with a padlock system. Keys to any locks must have copies such that one copy is available on the Aquatics Display key ring kept in the Biology Department Office and another must be in possession of the Aquatics Laboratory director. All tanks part of the Animal Display are currently under the supervision of the Aquatics Laboratory Director. Additional systems could be set up by other parties; however, these would not be covered by this SOP.

No individuals not involved with particular organisms should attempt husbandry or interact with any organisms in the Aquatics Laboratory or the Aquatics Display. Disturbance of tanks and other systems can cause harm to organisms and/or impact scientific/educational use. Any concerning observations should be reported to the appropriate personnel (listed on the tank card). In extreme situations, please use good judgement to handle any proximate threats (e.g. active flooding out of a tank) and then contact the appropriate personnel as soon as possible.

While it is allowable for Biology Faculty/Staff to tour a few people through the Aquatics Facility (e.g. Campus Visits), they should take great care to minimize impact on the organisms or projects and never allow any behavior that could impact the educational or scientific goals of having the animals. It is required that faculty discuss such visits with the director or particular PIs if particular organisms are of interest. Note that the Aquatics Laboratory is on a programmed light cycle and no access is allowed during the "dark period."

Any activities out of the norm should be reported to the Aquatics Laboratory director. Campus Security should be notified if there is cause.

Animal Husbandry

Animal husbandry is the responsibility of the owner/PI of the organisms or their designated personnel. The Aquatics Laboratory crew is potentially available as a backup/support for this type of husbandry, but it is not their responsibility to provide daily care of animals. All PIs working in these facilities should be aware of this responsibility and plan accordingly.

The Aquatics Laboratory is on a controlled light cycle. Generally, a 12:12 cycle is set for the room to allow access. If an alternate cycle is needed, please discuss possibilities with the Director. NO ONE should enter the Aquatics Room during the dark period except under extreme emergency. If this is needed, there is a small red light that can be triggered to give some light or a small flashlight (aimed at the floor only) could be used. HOWEVER, this is strongly discouraged since it can impact the photoperiod responses of the animals in the room. The organisms in the Aquatics Display may have timers on their lights, but they are generally more at the whim of their local environment, however these animals are not being used for scientific research and so changes in their light cycle are not considered deleterious.

A tank log (typically on a clipboard) must be used for each individual tank. Do not lump multiple tanks on a single log sheet. Log sheets are provided in the Aquatics Laboratory, although PIs may choose to use their own if they wish as long as all relevant aspects are included. This includes a means to record daily tank checks, environmental characteristics, mortalities, date, initials of person working on the system, and comments. Log sheets should also include source of the organisms, date they entered the laboratory, responsible PI and contact information. Sheets for vertebrates should also include the approved IACUC number for the animals. Logs should be kept in close proximity to the tank so that they are easily available for review. Past logs can be stored in binders in the Aquatics Laboratory by year and taxa/project or kept by the PI.

All tanks must be clearly labeled with a filled-out Tank Card that is physically affixed to the tank (separate from the tank sheet). These are provided in the Aquatics Laboratory. Any empty tanks should have old tank cards removed, be emptied of water and equipment, cleaned and disinfected, and left empty for the next user.

Occupied tanks should be visited by a keeper daily. All husbandry need not be done daily, but the expectation is that every tank should be checked on a daily basis. This check should be noted on the tank log. Checks should include visual inspection of the tank and its organisms (for leaks, unusual behavior or environmental conditions, mortalities, etc.)

Water level should be maintained at the appropriate level in the tanks at all times. Evaporation is common and water should be added as necessary. Note that while fish tanks are commonly kept full, amphibians and other taxa may have less than full tanks. It is recommended that a "normal water level" tape be placed on tanks that are maintained at less than full levels.

Feeding and cleaning regimes should be established for each tank and recorded on the tank card and the log. This should include type of food, amount of food, frequency of feeding, and frequency and magnitude of cleaning (e.g. 1/3 water change once per week). This information may also be posted on the bulletin board as long as the posting location is noted on the tank card.

Hands should be washed with soap before and after any contact with the tank environment (this includes feeding organisms and cleaning of any tank components) to avoid any cross contamination or disease transmission. When handling any of the aquatic animals (live or dead), take care to either wear gloves or, if this is not feasible, wash your hands well as soon as possible with soap. Some aquatic organisms, particularly turtles, have the risk of carrying *Salmonella*. Also, be aware that it is possible to transfer toxic substances to organisms (e.g. hand lotion, suntan lotion, salt, etc.)

Tap water from the New Science facility contains chlorine which can be lethal to aquatic organisms. For water changes use dechlorinated water from the water storage areas in the Aquatics Laboratory or NSF 1208. Water must be held under freely aerating conditions for at least 24 hours before it can be considered dechlorinated; please refer to the clipboard that lists the last time the tank was filled with chlorinated water. Alternatively, a commercially available dechlorination product can be used; this may also be obtained from the director or the Aquatics Lab crew. If a dechlorination product is used, it is critical that the product directions are followed closely. In the case of an emergency a small amount of chlorinated tap water (<10% of total volume) can be added to the tanks of most organisms if water is needed immediately. This may not, however, be tolerable to some species (e.g. mudpuppies) and care should be taken with this practice. Standard practice should be the use of dechlorinated water.
A major water change (>50% of total volume) should occur at least every semester for all tanks, and in most cases more frequently. More frequent water changes should be determined by water quality which will vary with number of animals in the system, feed types, and temperature. Typically, these water changes should be of ~1/3 the total volume of the tank.

Water quality should be assessed each time a keeper visits the systems. Water should be clear (not cloudy) and not stained (i.e., not colored) and should not have a strong odor (e.g., of ammonia). If any of these conditions is noted, a water change is likely warranted. Additional testing procedures for ammonia and other water quality parameters (pH, etc.) are also recommended on a regular basis. See the director if you have questions about water quality in tanks.

In addition to water quality, make sure that the lighting, filtration, and aeration systems for each tank are functioning properly at each visit. This includes good water flow through the filters, good bubbling from the air stones, etc. If air stones are not bubbling, check the air source (pump or building air) and also consider changing the air stone. If there is water spillover as a result of too much air, please adjust to prevent this leakage. If water flow in the filter is impeded, remove the filter and clean it and its components. Components can be replaced and spares should be available. If any conditions are noted that cannot be immediately remedied, report these conditions to the Director. If the Director is not available, report these conditions to the Department Head.

Animals should be fed according to individual needs. Typically, animals should be fed at least twice a week, however this may vary depending on the project or species. Foods should be appropriate for the species and may include dried flake, pellets, frozen mix, or live food. If food is getting low (less than a two week supply), it should be replenished. Food should not be allowed to accumulate in the tank. If excess food is found in the tank, remove it immediately and adjust the amount of food provided.

Remove any dead animals that are found immediately. Carcasses should be stored in a freezer in the Aquatics Laboratory designated for carcasses. Never store carcasses in the refrigerator/freezer used for food. Mortalities should be recorded on the tank log sheet. Unusual mortalities should be reported to the PI immediately.

Any sick or injured organisms should be reported to the PI and/or the Aquatics Lab Director. Sick organisms can be identified by abnormal behaviors such as spinning, inability to maintain normal attitude, lack of feeding, skin lesions or bleeding, etc. Injuries may include scrapes or swellings. Also be aware of external parasites which may appear as spots on the animal.

Cleanliness and containment of disease is critical in aquatic systems. PIs and personnel should use dedicated or freshly disinfected nets and other equipment to prevent transmission of microbes between tanks.

Any experiments using potentially contaminating substances or toxins should be discussed IN ADVANCE with the facility director to ensure containment so that there is no effect on other organisms.

Animals brought in from the wild are allowed, but should be kept in isolation from other organisms for at least two weeks.

Facility Maintenance

The Aquatics Lab work crew is responsible, under the guidance of the director, for general care of the facility. PIs and other works should also take care to clean their areas and provide maintenance of equipment as needed. Repairs and renovations may be done by this group or may require involvement of the Facilities Department, depending on scale of the project.

The Aquatics facility should be kept clean and tidy at all times. Equipment left out or clutter can be a safety hazard to people and potentially a health hazard to organisms.

The water dechlorination tanks should be maintained at a relatively full level; however it is best to not continuously add, but rather fill the tank, let it dechlorinate, use it to a modest level, and then refill. Continuous addition of small amounts of water risks maintaining chlorine levels in the tank which could impact organisms given new water.

A list of Aquatics Crew tasks, personnel schedule, and SOPs should be posted and continuously updated as needed.

Water on the floor should be promptly pushed into the drain and wet floors marked with a Wet Floor sign.

Carcasses that are not otherwise needed should be disposed of at least monthly during the cold season (they may be stored over the summer). Most species can be discarded directly into the dumpster unless they are considered a biohazard in which case they should be autoclaved and discarded. Contaminated carcasses must be discarded as required based on their contamination. Carcasses to be retained should be placed in dedicated containers (bags, etc.) and clearly labeled with date and who they belong to. They should not be kept indefinitely in the Aquatics Laboratory freezers.

All electrical wiring and equipment should be kept off the cement floor. Ideally, wiring should drop from above and be set up to have drip loops to keep water away from junctions. Only wiring appropriate for outdoor/wet conditions should be used.

Tanks and equipment should be cleaned when wet (if empty) and then left to dry. In most cases, it is required to also disinfect them either with immersion in the disinfectant bucket or by filling with a bleach solution. See the director for guidance on this issue.

The Aquatics Lab floor should be cleaned and disinfected weekly.

The main Aquatics sump should be cleaned out annually (early Fall). The undersink sump should be cleaned out at least once per semester.

In winter, winterize the bay “garage” door with insulation. See the director for guidance.

No wood should be used in the Aquatics Laboratory or with the display fish that is not sealed, in order to prevent mold and rot. Care should be taken to ensure that tanks are placed on racks sufficient for their weight. Be aware of spatter from tanks, particularly from marine tanks since the salt may lead to rapid rusting. Rusty equipment should be cleaned and repaired. Overly rusty equipment should be discarded since it is no longer sealed and may be an electrical risk or at risk of failure.

In case of a water leak, immediately try to determine the source of the water, taking care to be cautious of any risk of electrical hazard. Water may wick along airlines or electrical wires – this can be remedied quickly by moving the line to a new position. If the leak results from a true tank leak, assess whether you have time to contact the director. If possible, do so immediately. If water is rapidly being lost, assess whether the animals will run out of water soon. If so, transfer them with some tank water to a safe, temporary holding container such as a bucket or another tank. Make sure to give them aeration and a lid. Water can then be removed from the leaking tank either by using a siphon system or buckets. Place "water on floor" signs in area if necessary to warn passersby (these are available in the Aquatics Laboratory). Once the animals are safe and the leak has been temporarily dealt with, clean up the area as soon as possible. Make sure that the director is contacted as soon as possible in this process. Other personnel may also be able to assist.

Be mindful of equipment considerations including changes in noise or smell. PIs are also advised to be aware of the response of their organisms to equipment noise and operation. PIs are welcome to use Aquatics Laboratory equipment, but are expected to clear its use with the director and to replace it if damaged. Not all equipment may always be available depending on other users of the facility, so it is advisable to plan ahead.

Training Requirements and Oversight

Care for different species should vary to fit the needs of that species. These guidelines imply that additional information that is specific to each species is provided to keepers by the party responsible for the organisms. Training using the CITIProgram must be undertaken for those working with vertebrates including "Working with the IACUC" and any modules that may be available for specific taxa.

IN CASE OF ANY OTHER CONCERNS, CONTACT THE AQUATICS LABORATORY DIRECTOR IMMEDIATELY.

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IF YOU HAVE ANY CONCERNS REGARDING THE CARE OF THESE ANIMALS, YOU MAY REPORT THIS TO THE BIOLOGY DEPARTMENT HEAD, THE NMU INSTITUTIONAL ANIMAL CARE AND USE COMMITTEE (IACUC) OR TO THE ASSOCIATE PROVOST FOR GRADUATE STUDIES AND RESEARCH.