



MUDSKIPPER STANDARD OPERATING PROCEDURES



April 1, 2003 - Revised Dec. 2005

HOUSING:

Mudskippers may be held in a variety of tanks as long as they meet the following criteria:

- 1) The tank size is suitable for fish to be group housed with enough space to prevent aggression between fish (ten 5 g fish in a 15 gallon aquarium). Mudskippers should be monitored closely for dangerous or aggressive behaviour and if circumstances arise, the most dominant fish should be separated.
- 2) Terrain should be created so that a gradual slope is present in the tank with one end containing 5-10 cm of water and the other an elevated moist area where they can haul out of the water. (If mudskippers are forced to remain submerged in the water they will drown)
- 3) Sufficient area must be present (ie. sand, rocks, logs, plants etc.) in the tank so that each animal has enough space to sit out of the water without invading each others territory.
- 4) A lid or cover (or some other lip like obstacle which they can't climb over) should be placed on the tank to prevent escapees. Mudskippers can climb virtually any surface using their modified pelvic fins, as well as they are capable of jumping approximately 3 times their length.

ENVIRONMENTAL CONDITIONS:

■Light: Lights are kept at a minimum to simulate natural lighting conditions. Photoperiod may be determined by the individual researcher (12 hours light/12 hours dark is standard).

■Air temperature: the air temperature in the tank should be warm and humid to simulate their natural environment 25-35°C.

■Water: Water from campus wells is pumped into the building where it is filtered prior to being supplied to each room. Animals should be kept in a recirculating salt water system, equipped with a gravel bed filter, to prevent the accumulation of wastes in the water. Saltwater (10-30 ‰) should be made up periodically (remember when making up saltwater for the tanks that it should be made up with well water and NOT tap water) and aerated for at least a couple of hours before being added to the tank.

■Water Temperature: water temperature should be between 24-28°C.

■Aeration: Light aeration is required.

WATER QUALITY:

When the tank(s) is first put into use, water quality testing should be carried out frequently (ie. every 2-3 days) and periodic water changes will be necessary to prevent toxins such as ammonia and nitrite from reaching dangerous levels. Once the gravel bed filter (biofilter) accumulates enough beneficial bacteria a stable state will be reached and water testing will only be required every couple of weeks. The speed with which this state can be reached is accelerated by adding bacteria to the system such as Cycle™. Testing should be done at approximately the same time of the day, as diurnal fluctuations do occur in the production of nitrogenous wastes and the utilization of oxygen.

Tests should include salinity, dissolved oxygen, pH, ammonia, nitrite, nitrate. The first three tests can be carried out using hand held metres. These metres can be located either in the lab or the Aqualab Office. Aqualab has a Hach DR2000 portable spectrophotometer for the analysis of nitrogenous compounds. Procedures for the use of this instrument may be found in the Dry Lab (room 166).

In a tank with a functioning biofilter and adequate water replacement, ammonia and nitrite should be near zero, with nitrate levels below 10 mg/L. Oxygen should be above 7 mg/L with 9-11 mg/L as optimal. pH should be between 7.5 and 8.5. Other tests that could be performed are copper, hardness, total suspended solids and phosphate, however these tests are generally not necessary in this system.

FEEDING:

Mudskippers are carnivorous and will eat a variety of live foods including wingless fruit flies, white worms and black worms (the size of the food is dependant on the size of the fish). They seem to prefer live food although they will also consume frozen bloodworms, freeze-dried krill etc.

Fish should be fed three to five times a week depending on their size (smaller animals require more frequent feeding). Mudskippers should be fed by placing flies, worms etc. on any surface above the water level. Food should be spread out on many different exposed areas so that all fish have a chance to eat and are not threatened by the dominant animals

in the tank. Uneaten food stays in the system and causes deterioration of water quality therefore fish should be fed slowly to satiation.

Mudskippers will be weighed monthly to ensure that they are not losing weight and to monitor growth.

SANITATION:

Disinfectants or detergents are not used in the routine cleaning of tanks. Tanks are scrubbed with brushes or abrasive pads and clean water to remove accumulations of algae, faeces, bacteria and light build-ups of calcium.

- daily -** All tanks must be inspected daily to ensure fish are healthy and that there is no visible problem with their water quality (water should be clear NOT cloudy)
- monthly -** All tanks must be partially drained so the sides can be well scrubbed. Tanks are then rinsed and refilled with aged, room temperature salt water.
- net care -** Nets are stored dry between uses and dipped for at least 10 minutes and rinsed between tanks in a solution of A-33™ at a concentration of 12mL/L or Westcodyne™ at a concentration of 25 mL/L.
- disinfection -** At the completion of each experimental use of a room or tank the user is required to disinfect the room and tanks. Failure to do this will result in Aqualab's staff being responsible for the disinfection of the room and tanks. This will result in a bill to the primary researcher for time and materials. All tanks, lids, water hoses and outflows must be scrubbed and disinfected with A-33™ disinfectant at the manufacturers recommended concentration. Calcium may also be removed by acid washing with a 50% solution of Airkem Brawn™ lime remover and descaler or 50% solution of Muriatic acid. The tanks must be properly rinsed afterward to ensure removal of excess disinfectant or acid.

Note: It is important to ensure that disinfected and rinse water is not mixed with system water. Contamination of system water may result in fish death as well as biofilter death.

ANIMAL IDENTIFICATION:

- A card identifying species, primary and associate researcher, and emergency contact person are to be posted on the room door or the tank if more than one species is contained in a room.
- A record must be kept of species, supplier, numbers, arrival date and disposition.

Hagen Aqualab

Animal Utilization Record

Researcher:

Species	Nº	Arrival Date	AUP Nº	Supplier	Disposition
Mudskipper	10	Jan 5, 2003	03R000	Big Al's Aquarium Services	2 euthanized Sept , 2004
					8 euthanized Nov 2, 2004

VETERINARY CARE:

- **All mortalities in the Aqualab must be reported to the manager** and recorded on a mortality record sheet
- Dead fish are to be transported to dead stock containers located in the freezer using a bucket. (NO FISH ARE TO BE TRANSPORTED USING NETS AND DRIPPING WATER ON THE FLOORS)
- Any fish that dies of unknown causes or is suspected of dying of a disease related problem must be bagged, tagged and taken immediately for a post mortem examination, the results of which must be reported to the manager. It is of vital importance that PM's be done on animals that die of unknown causes in this facility, there are several users and an unknown infection has the potential to cause wide spread disease problems not only for the individual researcher but also to other users. Reports including diagnosis, numbers of mortalities, treatment and success or failure of treatment are required for all outbreaks of infection and disease.
- Veterinary care is on a consultative basis only. Advice for the treatment of diseased fish may be sought from the OVC Fish Pathology Lab (x 54640 / 52566), the Fish Health Lab in Microbiology (x 52517), or the Staff Veterinarian (Dr. Marcus Litman X 58856). Dr. John Lumsden in the Fish Pathology Lab (X54519) is also available. Prescriptions for the treatment of disease can be received from Dr. Lumsden or Dr. Litman.

ENVIRONMENTAL ENRICHMENT:

- Tanks are covered and lights are kept at a minimum to decrease ambient light levels thus providing more natural lighting conditions.
- Ample rocks, logs, sand and plants are provided to prevent aggression and simulate natural habitat.



TECHNICAL PROCEDURES:

- **Euthanasia:** Fish are to be euthanised in a 0.1% solution of 2-phenoxyethanol or via extended exposure to an anaesthetic dose of 0.1% MS-222. After the animal is dead all waste tissue must be placed in the containers in the dead stock freezer. Waste water is disposed of down the sink.

- **Body weight:** changes may be monitored on a monthly basis. All fish should be weighed by placing them in a beaker containing a small amount of water on an electronic balance.

WEEKEND RESPONSIBILITIES: Fish held in Aqualab must be monitored 7 days-a-week. Weekend and weekday tank care are similar. An individual in each lab must be identified to be on call to deal with extra-ordinary problems which might occur overnight or on weekends. Procedures for contacting the person(s) responsible is to be posted on the tank card or on a poster on the door.