Algoma University Animal Care Committee	
AU #0040 Swim performance in small-bodied fishes	
Issue date: March 18, 2025	Last revised: November 2025

1. Purpose

In fisheries and aquatic sciences research, swimming ability can be used as an overall metric of fish performance, providing information for investigations focused on muscle energetics, swimming mechanics, gas exchange, temperature, pollution, hypoxia, disease status, and cardiac physiology. Using a swim flume (tunnel), the flow velocity of water can be increased in a stepwise manner to assess fish swimming performance based on time to fatigue. Critical swimming velocity (Ucrit) is the most common metric assessed, but flumes can also be employed to determine acceleration ability and burst swimming performance.

2. Policy

CCAC guidelines and regulations

3. Responsibility

It is the responsibility of the Principal Investigator to ensure that this SOP is followed and that those handling fish are appropriately trained to do so.

4. Training Required

Animal Research Ethics
Handling/training in the relevant species
Bio-methodology training in the relevant technique and species

5. Materials Required

Swim tunnel appropriate for size of fish
Flow meter
Dechlorinated water
Dish soap
Paper towels or cloth towels
Nitrile gloves

6. Procedures

1. Put on nitrile surgical gloves.

2. Fill the reservoir of the swim tunnel with dechlorinated/aquarium water matched to the temperature of the home tank until the water is covering the entire swim tunnel.

3. For the first trial, allow water to sit at the desired temperature for 30-45 minutes. This process will help to avoid the formation of air bubbles.

4. Collect one fish from its holding tank using a net. Minimize chasing and capture time as much as possible.

5. Gently introduce the fish into the inner chamber of the swim tunnel. If possible, introduce the animal tail-first so that the animal is swimming away from the propeller.

6. Quickly insert the PVC stopper using a twisting and pushing motion. Be careful to ensure that the animal is not caught in the stopper.

7. Allow the fish to acclimate for 30 minutes in the chamber.

8. Slowly increase the flow speed to a rate that allows the fish to rest on the bottom of the chamber while barely swimming. For a small dace or minnow, a flow rate of 10 cm/s is often reasonable, but the literature or a preliminary trial can be used to determine this speed.

9. If testing sustained swimming ability (Ucrit), the following steps should be used:

   a. Increase the flow speed in increments of 5 cm/s every 5 minutes.

   b. When the fish can no longer beat their tail and swim forward for a sustained period of greater than 10 seconds, end the trial.

   c. Record the speed of the last trial and the length of time the fish spent in the last speed interval.

10. If testing burst swimming, the following steps should be used:

   a. Rapidly increase the flow speed to twice that of Ucrit. This value will need to be calculated on a subset of fish, or determined from the literature for the species, if available.

   b. Record the duration of swimming (i.e., the amount of time swimming before the fish no longer maintains station in the flow). The number of bursts and their distance can also be recorded, if relevant to the study.

11. Slowly turn off the flow of water. Allow the fish to recover in the chamber or transfer the fish to another container to observe recovery.

12. After full recovery, return the fish to its home tank.

13. Following each day's trials, remove all water from the flume and dry off all parts.

14. Following the completion of a full set of experimental trials (or if the flume will not be used again for a period of multiple days), use mild dish soap to clean the component parts. Flush all parts with tap water. Dry completely.

15. On a yearly basis, check for wear in the bearings and pressure seals, and check the propeller for any damage. Replace if necessary.
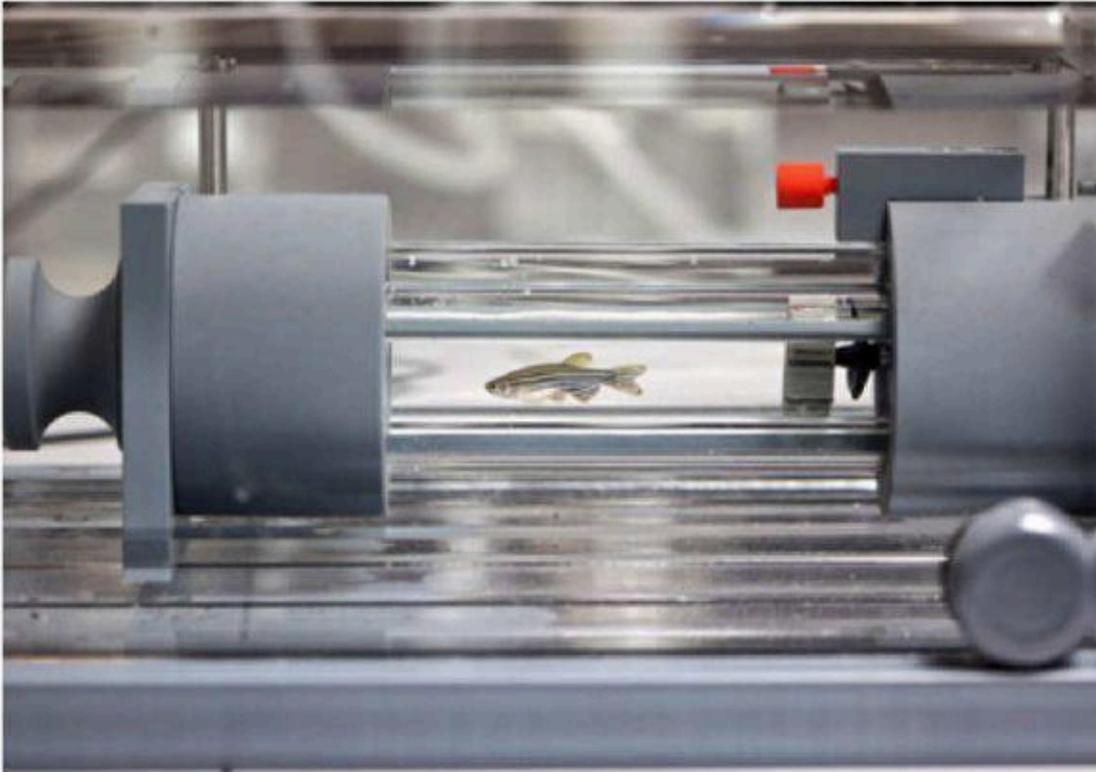
Figure 1. Zebrafish in swim tunnel.

REVISION HISTORY		
Revision #	Revision Date	Summary of Changes
1	March 18, 2025	Submitted to ACC committee for review