

Synopsis of PI-Directed Wildlife Training for Electroshock Fishing, Department of Biological Sciences, University of Manitoba

Guiding Policies/Animal Use Protocol

All research is to be conducted in accordance with the guidelines set forth by the Canadian Council on Animal Care (CCAC) for the Care and Use of Experimental Animals, and with the supplementary CCAC Guidelines on the Care and Use of Wildlife.

Procedures used in the context of our research are reviewed annually by the Fort Garry Animal Care Committee (ACC) under **protocol number ***-***** "The fate and effects of microplastics in a large freshwater system". As mandated by that ACC protocol, all personnel affiliated with our research program must have completed an approved ethics and policy course. All personnel must review this protocol and the associated references each year prior to the start of the field season.

Governmental Wildlife Regulations

In addition to the guidelines described above, our field research must adhere to the conditions stipulated in the **Scientific Collection Permit** issued by the Department of Sustainable Development Fisheries Science and Fish Culture, Fisheries Branch (i.e., in terms of number of specimens collected, collection locations, and provision of a follow-up report). A copy of this permit (SCP 23-16) **must be taken with you in the field at all times**.

Potential Health Risks to Personnel

Our research requires that we work in a field setting, in and around water, using electrofishing techniques. Thus personnel must be aware of potential risks and take appropriate measures to reduce exposure to risk factors including:

Equipment/Procedural Hazards

The most significant potential health risk associated with this field research is the **risk associated with electrofishing**. Direct effects of electric shocks include electrical burns, heart failure or interference with breathing. The main sources of potential risk of electric shock during electrofishing are: contact with energized electrodes (cathode and anode); contact within water within the radius of the electric field; and shocks from damaged equipment. All personnel are trained in electrofishing best practices to ensure that they are aware of the potential risks and take appropriate measures to reduce exposure to these risk factors. Prior to start of each field season, all personnel must read the Introductory Electrofishing Training Manual prepared by the Scottish Fisheries Co-ordination Centre

(2007) and the User's Manual for the Smith-Root LR-24 Electrofisher (2007), and successfully complete a session with *** **** on the safe and effective use of this equipment for electrofishing. Copies of these manuals are stored with (and should be kept with) the electrofisher; all personnel should review these manuals often.

Rules for safe use of the electrofisher include (but are not limited to):

1. Do not electrofish if you have had any prior heart ailments or are pregnant.
2. Use only direct current (either smooth or pulsed direct current, SDC or PDC); alternating current (AC) tends to be a greater health and safety hazard than DC (and can result in high fish mortality).
3. All components of the electrical equipment must be inspected prior to each collecting trip (e.g., that electrodes are free of corrosion, that batteries are not damaged or leaking) see the User's Manual.
4. All personnel must wear, at a minimum, rubber boots in good condition (e.g., even if you are on the bank tending to the recovery tank); anyone in the water must wear non-breathable hip (or preferably) chest waders with non-slip soles, but note that water deeper than *hip height* must never be waded (due to the risk of partial buoyancy causing a loss of footing) and lifejackets should be worn when using chest waders in water greater than knee depth. Chest waders and life jackets are provided, as are rubber lineman electrical gloves for personnel using the electrofisher and hand-held nets.
5. Always wear clothing appropriate for electrofishing (e.g., clothing should not trail in the water, have buttons or buckles that could snag on cables, or exposed metallic zippers that could conduct electricity).
6. Consider stopping electrofishing if wind speed is above 25 km per hour since windy conditions can increase the chance of tripping (and reduces the efficiency of electrofishing when wind ripples decrease water visibility).
7. Do not electrofish when tired.
8. Spectators should be warned to keep away from the water and equipment. Fishing must stop if people or non-target animals come within 5 m of the electrodes. Never electrofish with unauthorized people standing on the bank; under certain conditions (e.g., in the presence of sheet piling, metal culverts, or buried pipes), the field of the electrofisher can travel long distances.

Drug or Other Procedural Hazards

Due to the hazards associated with electrofishing and working around water, drinking alcohol or partaking of any other intoxicating substances at any time during the working day is not allowed. All personnel operating motorized vehicles in commuting to or from

field sites are expected to operate those vehicles in accordance with all applicable laws governing their use. While our research does not involve drugs or chemicals that impose any health risk to humans, it should be noted that under no circumstances should individuals operate motorized vehicles when under the influence of intoxicating substances.

Predation, Parasitism or Disease Risks (Biohazards)

In most cases, rubber gloves will be worn while electrofishing so that health risks posed by contact with water-borne or other diseases will be minimal. However, since hand washing is not practical in the field, it is recommended that alcohol-based hand sanitizer (provided) be used frequently and prior to eating or drinking. Other biological hazards to be aware of include:

Lyme disease, which is caused by the bacterium *Borrelia burgdorferi* and is transferred to humans by infected ticks; only deer ticks are a real concern, however, and these are not abundant. Exposure to tick bites can be reduced by covering the arms and wearing long trousers (and chest waders, of course) and by checking yourself carefully for ticks at the end of the day. Most ticks are not infected with the *Borrelia* bacterium but it is wise to remove them as soon as possible before the ticks embed their mouthparts in your skin; grip the tick as close to the skin as you can with tweezers (provided in the First Aid kit) and gently pull, twisting counter-clockwise at the same time. A physician should be consulted if a “bullseye rash” develops around the area where a tick has embedded its mouthparts into your flesh (for more information see Field Safety Core Manual).

West-Nile virus, which is carried by mosquitoes. It is essentially impossible to avoid mosquitos, but commercially-available insect repellents containing DEET are effective in reducing mosquito bites; occasional use of these repellents is generally considered safe but repeated exposure is not recommended. Mosquito-proof hooded jackets are provided with the field gear to protect your face and torso; chest waders and rubber gloves will protect the rest of your body (for more information see the Field Safety Core Manual)

Other Environmental Hazards

Fieldwork can be physically strenuous; notify Dr. **** in advance if you feel that you are unable to participate in this research due to physical limitations or if you are ever feeling unwell during the course of this research. Fieldwork also involves exposure to temperature extremes and sometimes unpleasant weather. While individuals are responsible for adjusting their attire to fit the conditions at hand, it will prove useful to have access to the following items of clothing (in addition to specific gear for electrofishing, such as chest waders and rubber gloves): gloves and other warm clothing (particularly early in the season; it can get very cold on and around the water); brimmed hat (to prevent excessive exposure to solar radiation leading to sunstroke), sunglasses (to provide UV protection for your eyes), full length pants (keeping legs covered reduces exposure to UV and other biohazardous substances, while tucking pant cuffs into socks can facilitate tick detection),

and gloves (to keep your hands warm on cold days). The brimmed hat and sunglasses (particularly polarized sunglasses) will also help you see the target fish on sunny days. Individuals are responsible for providing their own sunscreen (one with an SPF of 20 or higher is recommended to reduce exposure to UV radiation which can lead to skin cancer), and must ensure that they remain hydrated (drink lots of water) when in the field for long periods. Working near or in water, there is always a risk of drowning so please take precautions as described in Equipment/Procedural Hazards.

Potential Impacts on Animals or Field Sites

Capture

All personnel will be trained by *** **** prior to the start of the field season so that they can electrofish effectively with minimal harm to both the target and non-target species.

However, in all cases, it should be noted that electrofisher settings should be determined by observing fish behaviour and recovery times, not by voltage or current measurements. In general, if it takes more than 5 seconds for a fish to recover, it has likely been shocked too much; reduce the frequency, duty cycle, or output voltage of the electrofisher.

Personnel must be aware that the effects of electrofishing vary with fish species and size, distance of the fish from and its orientation to the anode, water temperature and conductivity, and other factors. For example, at low temperatures (e.g., below 7°C), fish become immobilized more easily by electric fields and sampling may be less effective while in warmer water, fish may become more difficult to catch due to their higher activity capability. Personnel will be taught that non-target fish should be removed from the electrical field as soon as possible (i.e., either removed from the water and allowed to recover onshore in a bucket containing cool, well-aerated stream water or the electrodes should be moved to ensure that the fish are not within the radius of the electric field); the fish should not remain in the water where they will receive multiple or prolonged shocks. Personnel should review Schedule 4 to be aware of the possible harmful effects of electrofishing on fish, when not conducted properly.

Restraint, Marking, Manipulation of Animal's Environment, Medical/Surgical Procedures, Housing

Our research involves no restraint and handling (apart from that described during capture, transport, and euthanasia), marking, housing, manipulation of the animal's environment, or surgical procedures.

Transport/Holding

Any non-target fish captured be held in a recovery bucket containing cool, well-aerated stream water and released upon recovery at least 5 m downstream of the area to be electrofished or where captured once electrofishing has ceased. Following sampling, target

fish will be euthanized using MS-222, and be transported to the University of Manitoba (by car or truck) in coolers containing ice. A small amount of MS-222 should be kept with the field supplies in case nontarget species need to be euthanized in the field.

Euthanasia

Target fish will be overdosed with MS-222 (>400 ppm) in the field, and frozen for later dissection; carcasses will be disposed of by incineration.

Emergency Veterinary Care

Emergency veterinary care will not be required. We will euthanize any animals that show unexpectedly severe signs or complications (see Schedule 4 of Protocol ***_***) with an overdose of MS-222.

Environmental Impact

All personnel are expected to respect the environment around them; they will not be allowed to leave any refuse behind, trample the areas around the field sites or stir up sediment within the streams unnecessarily.

Emergency Preparedness

On arrival at each field site, it **must be confirmed that cell phone communication is possible** and, if not, the location of the nearest working telephones during the course of the day's work should be noted (e.g., at what point, cell phone reception is possible). In case of an accident while electrofishing, **immediately turn off power to the electrofisher**. Do not touch the person with your bare hands until the power is turned off. A severe electrical shock from electrofishing gear may result in the need for artificial respiration or cardiopulmonary resuscitation. At least two people on each team should know how to administer artificial respiration. Any personnel receiving an electric shock while electrofishing must receive medical attention, even if he or she has no obvious signs or symptoms. For minor incidents, a first aid kit containing alcohol swabs, antiseptic and bandages is provided and should be kept in the field vehicle used to commute to and from the site at all times. All incidents involving injury to personnel must be reported immediately to Dr. ***, who can be reached at the telephone numbers below if he is not present in the field at the time of the incident.

Contact numbers:

Dr. ***: Office: ***_***_****, Cell: ***_***_****