

Course Title:	Fish Ecology and Fisheries: Conservation and Management	
Instructor(s):	Dr. Chris Elvidge (Carleton University); chris.k.elvidge@gmail.com	
Dates:	Sunday August 6 – Saturday August 19, 2023	
Location:	Queen’s University Biological Station (https://qubs.ca ; 280 Queen’s University Road, Elgin ON K0G 1E0; 613-359-5629)	
Cost:	<p>\$1350 as:</p> <ul style="list-style-type: none"> • \$350 non-refundable deposit to your home university; • \$1000 balance payable to Carleton University, required by April 28, 2023. Students with confirmed reservations will receive emailed instructions on how to pay the course balance by cheque well in advance of the payment deadline. <p>Includes: all accommodations, meals, wi-fi, field notebook, class supplies, use of boats and equipment.</p> <p>Excluded: Participants are responsible for travel costs and arrangements to and from QUBS, as well as personal facemasks and other forms of COVID-related personal protective equipment (PPE) required by the Province of Ontario, Queen’s and Carleton Universities, and all other home institutions at the time of the course.</p>	
Prerequisites:	<p>Second- or third-year course work in ecology, conservation biology, zoology, environmental science, geography, or behavioural science/psychology.</p> <p>NOTE: Students must be comfortable around water and boats. A considerable amount of our working time will be spent outdoors under variable weather conditions. All participants MUST, at some point, handle live fish following demonstrations of best handling practices.</p>	
Enrolment:	12 (3 reserved for Carleton University)	
Course Description (brief):	<p>Eastern Ontario is home to a diversity of freshwater ecosystems and fish species, providing an ideal backdrop for a field course examining the ecology, conservation, and management of freshwater fishes. This course will introduce participants to the conceptual foundations of fisheries and aquatic ecology research and provide some of the practical skills needed for experimental design, research execution, data analysis, and communication. Through lectures and hands-on activities participants will be exposed to diverse practices in contemporary fish & fisheries research. Participants will work in groups to design and execute their own research projects with the aim of generating relevant, novel data to publish in peer-reviewed journals. At the conclusion of the course participants will be able to collect, safely handle, and identify fish using a variety of sampling methods (electrofishing, seine nets, hoop nets, angling). Participants will be exposed to a variety of modern research tools used to study the behaviour, ecology, and physiology of wild fish potentially including surgical techniques, biotelemetry, archival loggers, respirometers, field physiology sampling kits, and behavioural assays.</p>	
Evaluation:	<p>Oral presentation (20 min + 10 min discussion)</p> <p>Field notebook (content)</p> <p>Participation</p> <p>Quiz (cumulative, on the second-to-last day)</p> <p>Research paper (due by September 9, 2023)</p>	<p>25%</p> <p>5%</p> <p>5%</p> <p>25%</p> <p>40%</p>

An Average Day – What to Expect

(a) Daily timeline	In general, we will structure our days around the meal schedule at QUBS. QUBS usually serves meals three times per day (breakfast at 7:30-8:30, lunch at 12:00-13:00, dinner at 17:30-18:30). A typical day will involve starting in the field or the classroom at 8:30, breaking for lunch, working until dinner, and then reconvening for group or classroom activities from 19:00-21:00. These details may change as opportunities present themselves, e.g. fishing at 05:00 or night sampling at 00:00. Replacement sleep/rest time will be allocated as needed. Meal times are subject to COVID-related modifications, e.g. reduced seating capacity and eating in cohorts.
(b) Work habitat & Physical exertion	We will be working in and around water, on small vessels (boats) of varying sizes, as well as wet and dry labs and a seminar room. Being comfortable around water is a must. Personal flotation devices (PFDs) will be present at all times, and chest waders will be available for shallow-water sampling. Working with animals involves keeping them healthy and in good condition – in the case of fish, this means carrying lots of buckets and coolers full of fresh water. Electrofishing will involve wading in hip-deep water with a heavy backpack for a short period of time. Warm August water temperatures will allow swimming/snorkeling for fish & habitat surveys for those who choose to participate.
(c) Common activities	We will be capturing and handling fish by a variety of methods that can involve minor jabs from hooks and fish spines. Boat work always comes with the risks of slipping, docks can give splinters, working in water can lead to dry skin, sun exposure can cause sunburn, etc., so being cognizant of these minor hazards and working to avoid them as much as possible are imperative. In addition, seasickness may be an issue for some participants (Opinicon Lake is relatively small, but it is still possible). All students MUST handle live fish at some time, and some fish may be lethally sampled. No one will be required to swim although opportunities may arise. Activity-specific risks and appropriate mitigating steps will be covered when relevant.
(d) Weather, dehydration, & biting insects	At this time of year (mid-late August), temperatures are generally warm and summery but can range from lows of below 10C at night to highs above 30C during the day. A wide range of clothing suitable for working outdoors (everything from summer clothes/bathing suits to rain gear and some warm layers) including some quick-dry clothing (trekking, camping, running gear) are suitable for aquatic work. Sun exposure will require sunscreen, hats, and polarized sunglasses. Lightweight long-sleeve garments and neck gaiters are excellent alternatives to chemical sunscreens. Biting insects (e.g. mosquitoes) are generally not too bad at this time of year but insect repellent is suggested for anyone susceptible to bites. This area of Ontario has large deer tick populations and while we generally will not be in areas prone to high tick density, everyone should perform daily tick checks in the mirror. QUBS provides visual guides on tick identification and inspection throughout the facilities.
(e) Toxic/poisonous, wildlife/ plants	This area of Ontario has very high abundance of ticks, and new Lyme disease cases are reported every year. Participants need to visually inspect themselves daily, and QUBS provides visual guides on tick identification and inspection throughout the facilities. Most of our outdoor activities will be in or on the water, but vigilance is still needed. Chances of encountering poisonous plants (e.g. poison ivy) are low.
(f) Sleeping, washroom & laundry facilities	Accommodations in 2023 will likely be limited to one person per bedroom (but has been shared with two per bedroom in the past). QUBS provides single-width beds with mattresses but participants must bring their own pillow(s) and bedding (sheets, blankets, sleeping bag, etc.). Water is hot and potable, and if a particular tap does not provide potable water, it will be clearly marked and large blue jugs of drinking water will be available instead. Participants will need to bring their own soap and toiletries, and more than one towel (one for showering, one for drying off after lake work) is recommended. There are kitchen facilities in many of the cabins including fridge, freezer, and microwave for personal items. There are coin-operated laundry facilities on site, and the kitchen staff can make change during their operating hours. The kitchen staff are also responsible for the sale of QUBS-branded merchandise (hats, shirts, mugs). All washrooms are equipped with running water and flushing toilets. While we are on-land at QUBS, washrooms will always be available and nearby. When we are not at the station, boat excursions will be limited to <4 hours and we will be close enough to the station to return quickly in case of emergencies. We will generally have enough flexibility in the activity schedule to accommodate everyone's needs in this area.
(g) Meal plans & food allergies	QUBS serves three meals per day (usually 7:30-8:30, 12:00-13:00, 17:30-18:30). Outside of meal times, snacks (fruit, bread, jams, peanut butter, cereal and milk) and beverages (tea, coffee, milk, hot chocolate) are usually available 24 hrs. The kitchen can accommodate most food allergies (dairy, gluten, seafood, nut-free) and requirements (vegan/vegetarian). Note that there is peanut butter present - so are epi-pens for students with nut allergies. Religious diets (Halal, Kosher) usually default to the vegetarian option; strict religious diets (particular foods not cooked in the same facilities) cannot be accommodated. Participants will have access to refrigerator and freezer space to store personal foods and beverages and access to additional cold storage space (e.g. for medications) can be easily accommodated upon request.
(h) Non-academic responsibilities	Participants are required to keep their living spaces (bedrooms and shared areas like kitchens and living rooms) clean, and to leave these areas clean at the end of the course. Other QUBS users will be present and on their own schedules, so mutually respecting spaces is important. There is no regular housekeeping service, so participants are asked to monitor levels of bathroom tissue, soap, dish detergent, etc., to keep them replenished.

(i) Degree of isolation	<p>QUBS has full electricity and abundant power outlets for charging, potable water, WiFi, and cellular coverage (although you might have to stand outside to get good reception and parts of the site do not have reliable coverage). It is less than an hour from Kingston, about 90 minutes from Ottawa, and Smith's Falls is about 40 minutes away, so we are not dealing with remote conditions. In fact, the area is very much in the Rideau Lakes cottage country. QUBS is well-connected, covered by 911 service, and several people on site will have both basic and wilderness first aid training.</p> <p>There is a convenience store/marina/LCBO-Beer Store outlet a few kilometers away in Chaffey's Lock, with more substantial grocery options and pharmacies ~30km from the station, if needed.</p> <p>QUBS is used by researchers from several Canadian and international universities, and course participants will likely constitute only a portion of QUBS residents while we are there.</p> <p>It is entirely possible to remain electronically connected to personal lives and the outside world while at QUBS, but participants are encouraged to take this time as an opportunity to "unplug" and be present.</p>
(j) Alcohol & drugs	<p>QUBS is part of the Queen's University campus, so their policies apply. Alcohol is only permitted inside the private residences (cabins) and forbidden in shared common spaces like the dining hall. Smoking (tobacco and cannabis) is not permitted on Queen's property. Participants are encouraged to engage in responsible conduct.</p>
(k) Vaccinations/ Insurances	<p>This course is offered on a university campus in Ontario. As such, no special insurance or vaccinations are required beyond the policies of the province, Queen's, Carleton, and any other home institutions of course participants. We are within 911 coverage in the case of emergencies. Participants are reminded to bring their provincial health care cards and to have any proof(s) of vaccination(s) required in the Province of Ontario at the time of the course.</p>
(l) Social Situations	<p>Participants will be spending 2 weeks together in fairly close quarters and working together in group activities and research projects. We plan to have access to a firepit at night, and everyone is encouraged to mingle with other QUBS users as permitted by provincial and institutional COVID protocols during the course.</p> <p>Harassment of, or violence towards, any user of the facilities including course participants will not be tolerated. Any incidents should be immediately reported to your instructor, another instructor present at QUBS, or the station management. Appropriate actions will be determined by QUBS management to ensure the safety, security, and privacy of all present.</p>
(m) Final comments	<p>This course has been very well received by past participants, and while we do have academic components to cover, we will also spend as much time as possible outside learning, practicing, and applying fish-related research techniques. Participants will have the opportunity to develop and conduct their own group research projects during the second week based on questions and activities of shared interests. Some past projects have been published in peer-reviewed journals, so beyond information on fish, this course has the potential to provide participants with experience in the full research process (conception-design-execution-analysis-publishing).</p>