

Decontaminate your equipment between ponds

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With a variety of infectious organisms (fungus, virus, bacteria), how to minimize or eliminate researchers as disease vectors has been a topic of much discussion. As wildlife biologists, we need a higher level of awareness of disease problems and how we might spread disease. We potentially act as vectors that could cause the very species we are trying to protect great harm. There is a need for more information on disease-causing organisms, their natural history, their potential and actual threats to amphibians and aquatic ecosystems, and the role of people and animals in spreading these organisms. In lieu of this much needed information, we will present the knowledge that has been accumulated thus far.

Below is a compilation of general guidelines and practices to mitigate the potential threat of our activities. We present them here not only to provide information but to spark discussions about taking precautions seriously.

1. Any equipment that was in the water needs to be disinfected.
2. Mechanical cleaning (e.g. scrubbing with a stiff brush) is extremely important. Equipment must be clean and free of all debris before being disinfected. The best disinfectants are not cleaning solutions and thus will not penetrate mud or other debris.
3. Once the equipment is free of debris it needs to be disinfected with a bleach solution. Contact time is very important with bleach, it takes time for it to effectively kill all the potentially threatening organisms, but it is effective in killing all of them — fungus, virus and bacteria.
4. If you are working close to the front country, it is recommended to soak equipment in a diluted bleach solution (~10%, 1:9 bleach to water ratio, although some recommend a 1:16 bleach to water ratio) for at least 20 minutes (although others recommend 5, 10, or 15 minutes). If you are able to carry a tub and water for soaking into backcountry sites, make sure you dump the used solution at least 40 meters from a water source, to prevent impacts to the system. If carrying a tub and extra water into the backcountry is not feasible, you should carry a spray bottle, with a higher concentration of bleach (25-30%, 3:7 bleach to water) and spray all exposed surfaces of the equipment until thoroughly wet with bleach solution.
5. Do not rinse bleached equipment. The bleach continues to disinfect after the items have been removed from soaking tubs or after sprayed. It is this additional “contact” time that allows lower concentrations of bleach to be used and still be effective. Bleach generates free radicals more slowly than other disinfectants, and it is the free radicals that actually kill the pathogens. If possible, allow for the bleach sprayed items to dry, insuring enough contact time has passed. While some organisms will be killed

by desiccation alone, others are highly tolerant to it, making a disinfection solution necessary.

6. While some recommend disinfecting equipment after leaving areas with known contaminants, USFWS currently recommends disinfecting equipment between each separate water source to prevent potential unknown contamination or spread of diseases we are not currently monitoring. At a minimum, equipment should be disinfected between watersheds/drainages. You should not take the stance “It is too difficult to disinfect while working in the field”. This kind of lackadaisical nature leads to the spread of disease and demise of the very populations you are trying to study/protect.
7. Sodium hypochlorite (bleach) has a tendency to evaporate. This is a positive “design” feature, in that by the time you reach your next study site most of the chemical is gone and what remains poses little if any threat to the next aquatic system where you will sample. However, it also means that bleach sitting on a shelf in a previously opened container also evaporates, which decreases its ability to kill pathogens. The warmer the climate you live in the faster the evaporation. Consequently, bleach should be replaced at a minimum each season (and probably more often) to insure its disinfectant qualities. Currently, there is not a simple way of testing the concentration of an open container. Bleach is very cheap, so if you are in doubt, throw it out and start a new bottle.

Some concerns have been raised about the bleaching of equipment causing it to wear more quickly forcing biologists to replace equipment more often. The general consensus was that bleaching did not noticeably increase wear on the equipment. The other comment typically tagged on to this was, even if it did cause additional wear, disinfecting the equipment to prevent the spread of disease was well worth the increased cost.

Two other chemicals have been proposed as possible disinfectants for aquatic work: Roccal and iodophore. Iodophore does not require long contact times to be effective like bleach, its color indicates a fresh and working solution (becomes clear when worn out), and it's much less reactive (corrosive) than bleach and generally less harsh (doesn't irritate skin like a bleach solution will). Iodophore is diluted to 3-5 cc per gallon of water for Food Service Industry uses. However, it appears that it has not been tested to determine any potential impacts to amphibians and should not be used until these studies can be conducted.

Roccal is the trade name for a quaternary ammonium/organotin detergent disinfectant that is also highly effective. The concentrate of roccal is a potent eye irritant, and thus it is more hazardous to use than household bleach as a starting solution (it is diluted before use like bleach). Concerns have been raised on roccal acting as an irritant to aquatic animals and whether it would be more likely to leave a significant residue on equipment than hypochlorite from bleach. It contains an organotin detergent and there is concern about how friendly these are in aquatic ecosystems despite their common use as marine fungicides/biocides. Because roccal is a quaternary ammonia, it works by attacking cell walls/membranes, so questions have been raised about its effectiveness on viruses. Thus,

at this point in time, bleach remains the recommended disinfectant for use on aquatic equipment.

Many of the biologists have the pleasure of working with amphibians and aquatic ecosystems. We hope you find this information interesting and valuable. These guidelines are based upon the work of many dedicated unnamed herpetologists. (One hazard of using email and listserv is acknowledgments are not always passed along with the information). Much gratitude is given to the nameless authors of these guidelines.