



Health and Safety Manual

Contents

1	Health and safety when you are working near water.....	1
2	Biological hazards	1
2.1	Cyanobacteria (blue-green scum)	1
2.2	Leptospirosis (Weil's disease)	1
2.2.1	Why does leptospirosis happen?.....	1
2.2.2	When to see your doctor.....	2
2.2.3	Who is affected?	2
2.3	Campylobacteriosis.....	2
2.4	Ascariasis	2
2.5	Schistosomiasis.....	2
2.6	Hepatitis.....	3
2.7	Cholera	3
2.8	Insect bites	3
3	Environmental risks	6
4	Physical risks.....	7
4.1	Bank stability	7
4.2	Distance to water.....	7
4.3	Water depth and speed.....	7
4.4	Slips/trips and falls	8
4.5	Weather	8
5	Emergency procedure	8

Figures and Tables

FIGURE 1 DISTRIBUTION OF SCHISTOSOMIASIS WORLDWIDE. SOURCE: HTTPS://TRAVELHEALTHPRO.ORG.UK/FACTSHEET/28/SCHISTOSOMIASIS	3
TABLE 1 COMMON OR NOTABLE INSECT BORNE DISEASES (PLEASE NOTE THIS IS NOT AN EXTENSIVE LIST, PLEASE CHECK YOUR LOCAL AREA FOR RISK SPECIES).	4
TABLE 2 SUMMARY TABLE OF KEY NON-NATIVE INVASIVE SPECIES, WITH SUGGESTED ACTIONS TO MINIMISE IMPACTS WHEN SAMPLING.	6

1 Health and safety when you are working near water

When undertaking any kind of activity near water, it is of vital importance that you consider the local health and safety risks and develop an emergency procedure, prior to undertaking your activity. Your health and safety is more important than any water sample, and if you ever feel unsafe during sampling for FreshWater Watch, always cease sampling and remove yourself from an unsafe environment. Below are some suggestions of hazards you may come across when working near water. This is not an extensive document and you should always check your local area, conditions and risks before undertaking FreshWater Watch sampling.

2 Biological hazards

Biological hazards include illnesses you could catch from the water, as well as animals and plants which can cause illness. The prevalence of the biological hazards listed below varies across the world, so you should always follow local advice. Most of these hazards can be minimised by making sure that you wear gloves when sampling to avoid coming into direct contact with the water.

2.1 Cyanobacteria (blue-green scum)

Some species of cyanobacteria (blue-green scum) produce toxins that affect animals and humans and represent a potential hazard if ingested. If you spot blue-green algae in your area you should avoid drinking or bathing in contaminated water. You can still take samples (using your gloves as usual) but be really careful, do not touch your face with the gloves and, after you have sampled, clean all the materials that have been in contact with water. Please inform your team leader or local authorities so they can take action. You can record the sighting in your FreshWater Watch record. More information can be found [here](#).

2.2 Leptospirosis (Weil's disease)

Leptospirosis is a type of bacterial infection spread by animals. It's caused by a strain of bacteria called *Leptospira*. In 90% of cases, leptospirosis only causes mild flu-like symptoms, such as a headache, chills and muscle pain. However, in some cases the infection is more severe and can cause life-threatening problems, including organ failure and internal bleeding. In its most severe form, leptospirosis is known as Weil's disease. Leptospirosis is very rare, with the number of human cases per year ranging from 0.1 per 100,000 in the temperate zones to 10 per 100,000 in the tropics. It is easily prevented by following some basic safety measures (see 'Why does leptospirosis happen?' below). More information on Leptospirosis can be found [here](#).

2.2.1 Why does leptospirosis happen?

Leptospirosis can be caught by touching soil or water contaminated with the urine of wild animals infected with the *Leptospira* bacteria. Animals known to be carriers of the *Leptospira* bacteria include cattle, pigs, dogs and rodents, particularly rats. Although the condition is rare, you may be at a higher risk if you frequently come into contact with rivers and lakes. It's incredibly uncommon for it to spread between humans. You can reduce your risk of coming into contact with the bacteria by ensuring you wear your gloves, covering any skin cuts or abrasions, and taking care not to get water into your eyes, nose or mouth.

2.2.2 When to see your doctor

The common mild symptoms mean most leptospirosis infections are hard to diagnose. Diagnosis is easier if the infection causes more serious problems. **See your doctor if you are experiencing symptoms of leptospirosis between 2 and 21 days since carrying out your water sample.** A diagnosis of leptospirosis can be confirmed by running a series of blood and urine tests to check for specific antibodies.

2.2.3 Who is affected?

Leptospirosis is rare in the UK, with less than 40 cases reported in England and Wales every year. Leptospirosis is more common in tropical and subtropical areas of the world.

2.3 Campylobacteriosis

Campylobacteriosis is an infection of the gastrointestinal tract. Symptoms of the infection include diarrhoea (often including the presence of mucus and blood), abdominal pain, malaise, fever, nausea and vomiting. The illness usually lasts 2 to 5 days but may be prolonged by relapses, especially in adults. More information can be found [here](#).

2.4 Ascariasis

Ascariasis is an infection of the small intestine caused by *Ascaris lumbricoides*, a large roundworm. Infection is most common after contact with contaminated soil, however, it is transmitted in water when untreated effluent is present.

The first sign may be the passage of a live worm, usually in the faeces. In a severe infection, intestinal blockage may cause abdominal pain, particularly in children. People may also experience coughing, wheezing and difficulty in breathing, or fever. More information can be found [here](#).

2.5 Schistosomiasis

Schistosomiasis is caused by three main species of flatworm; *Schistosoma haematobium*, *S. japonicum*, and *S. mansoni*. Infection occurs when a person enters infected waters and free-swimming larvae penetrate human skin. The signs following infection are rashes or itchy skin. Two months after infection, fever, chills, cough and muscle aches may occur. Areas affected are Africa, the Americas (Brazil, Suriname and Venezuela, as well as several Caribbean islands); the Eastern Mediterranean (Islamic Republic of Iran, Iraq, Saudi Arabia, Syrian Arab Republic and Yemen); and eastern Asia (Cambodia, China, Indonesia, Japan, Lao People's Democratic Republic and the Philippines). If you are sampling in an affected area, avoid skin contact with the water, wash and dry skin after sampling, and if you are concerned that your skin was wetted during sampling there is evidence that applying a product containing 50% DEET after showering is effective. If you are concerned about infection, visit a healthcare professional where infection can easily be treated using a short course of medicine. More information can be found [here](#).

Distribution of schistosomiasis, worldwide, 2012

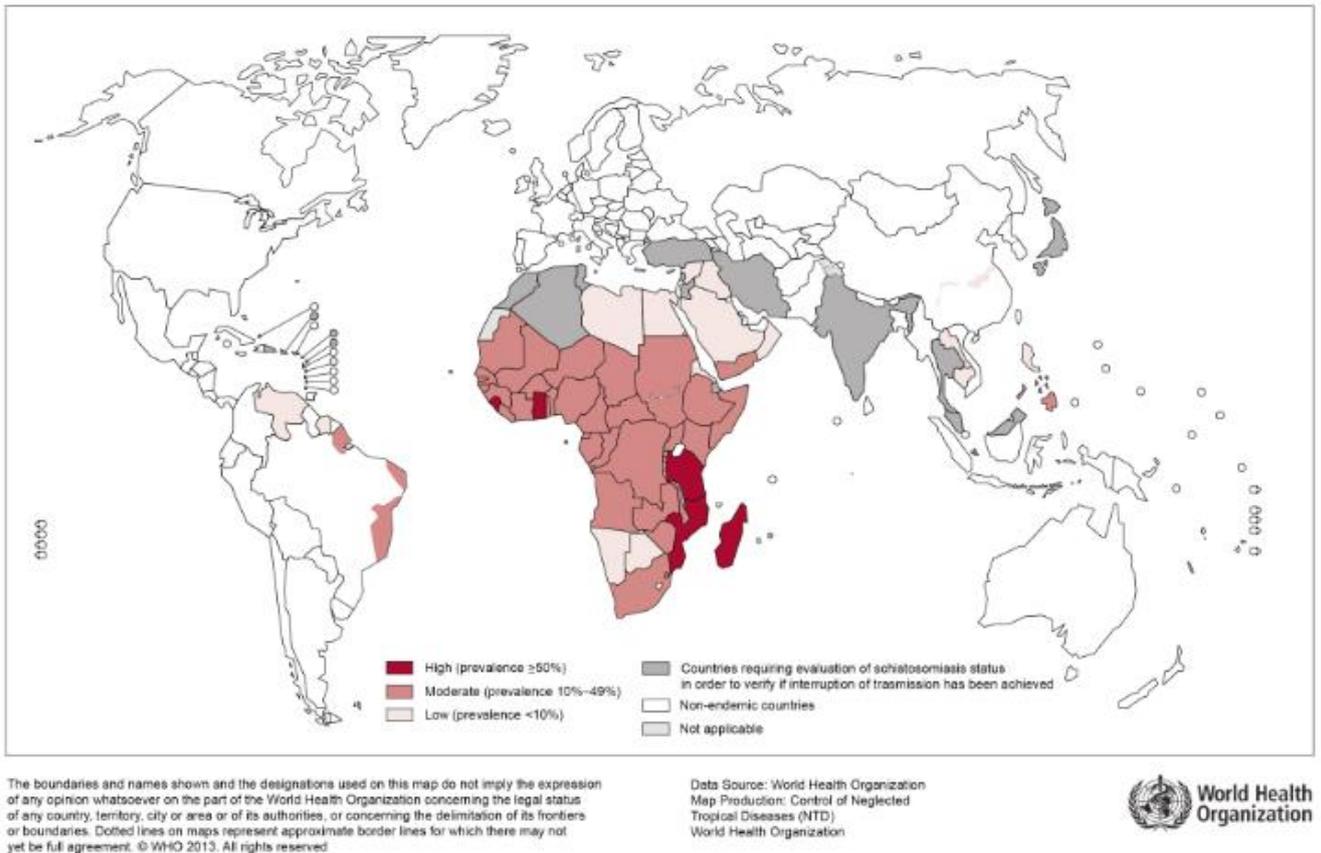


Figure 1 Distribution of schistosomiasis worldwide. Source: <https://travelhealthpro.org.uk/factsheet/28/schistosomiasis>

2.6 Hepatitis

Hepatitis is a catch all term for liver inflammation. Hepatitis A and E viruses, while unrelated to one another, are both causes of hepatitis and are most often contracted through contaminated water and from person to person. The illness starts with an abrupt onset of fever, body weakness, loss of appetite, nausea and abdominal discomfort, followed by jaundice within a few days. Vaccines are available for some strains of hepatitis. More information can be found [here](#).

2.7 Cholera

Cholera is an acute infection of the intestine, which begins suddenly with painless watery diarrhoea, nausea and vomiting. Most people who become infected have very mild diarrhoea or symptom-free infection. Severe cholera cases present with profuse diarrhoea and vomiting. Severe, untreated cholera is rare in most of the world, but can lead to rapid dehydration and death. More information can be found [here](#).

2.8 Insect bites

Freshwater environments and the woodland, heath, and grassland areas that often surround them provide an ideal habitat for a variety of different biting insects including mosquitoes, ticks, and flies. Most insect bites cause nothing more than an annoying itch, but you should be aware of the potential for more severe allergic reactions and the transmission of insect-borne diseases. The best way to prevent any of these conditions is to be aware of the risks

that are relevant to the area you are visiting and to take sensible precautions. You can reduce risk of infection by taking measures to avoid insect bites such as keeping to footpaths, avoiding long grass, wearing appropriate clothing and footwear, and using insect repellent. If you do develop any of the early symptoms after being bitten, be sure to contact your doctor and inform them that you have been outdoors in areas where insects are common. Additionally, vaccines and/or prophylaxis are available for yellow fever, Japanese B encephalitis, and malaria, and you should seek these out from your doctor if your sampling efforts will take you to areas where these diseases are prevalent.

Table 1 Common or notable insect borne diseases (please note this is not an extensive list, please check your local area for risk species).

Disease	Vector	Location	Early symptoms
Lyme disease	Ticks	Europe (including UK), USA, Australia, China, and Japan	<ul style="list-style-type: none"> • Distinctive circular “bullseye” rash at the site of the tick bite (not always present) • Flu-like symptoms • Check https://www.lymediseaseaction.org.uk/ for more information and a full list of symptoms
Tick-borne encephalitis	Ticks	Central and eastern Europe, Scandinavia, and former USSR	<ul style="list-style-type: none"> • Flu-like symptoms • Possible nausea and vomiting • Stiff neck
West Nile virus	Mosquitoes	Africa, West Asia, the Middle East, and USA.	<ul style="list-style-type: none"> • Mild flu-like symptoms • Occasionally a skin rash can develop on the trunk of the body • In severe cases, stupor, disorientation, tremors and convulsions
Dengue fever	Mosquitoes	Tropical Africa, Southeast Asia, South America, and Pacific.	<ul style="list-style-type: none"> • Sudden onset fever, headache, and severe muscle and joint pains • Skin rash consisting of small white spots
Yellow fever	Mosquitoes	Tropical areas of Africa and Central and South America	<ul style="list-style-type: none"> • Fever, headache, abdominal pain, vomiting • Heavy bleeding • If allowed to develop, kidney and liver failure can occur
Sleeping sickness	Tsetse flies	Sub-Saharan Africa	<ul style="list-style-type: none"> • Bite is often painful and may be associated with a boil-like swelling • Fever, headache, muscle and joint aches, swollen lymph nodes • If left untreated, leads to neurologic symptoms including daytime drowsiness, problems with balance, and personality changes
Japanese B Encephalitis	Mosquitoes	Far East and Southeast Asia	<ul style="list-style-type: none"> • Quick onset headache, high fever, neck stiffness, stupor, disorientation

Malaria	Mosquitoes	Global tropical and subtropical areas	<ul style="list-style-type: none"> • Severe flu-like symptoms
Onchocerciasis	Black flies (Simulium)	Parts of Africa, Central and South America and in the Arabian Peninsula.	<ul style="list-style-type: none"> • Fly larvae are passed on via bites from an infected fly, these migrate through the skin and, upon death, cause intense itching and depigmentation of the skin ("leopard skin"), lymphadenitis resulting in hanging groins and elephantiasis of the genitals, serious visual impairment, and blindness when they reach the eye.

3 Environmental risks

If you are sampling in different rivers or ponds you should do your best to clean and dry your clothing, Secchi tube, sampling device and sampling cup between locations. This is important because it helps to stop the spread of invasive species, which can do damage to the environment. You should wash your equipment even if you can't see anything, as the eggs and resistant forms of many aquatic organisms are microscopic. For more information see <http://www.nonnativespecies.org/checkcleandry/>. In addition, some non-native plant species can pose a risk to both the environment and personal health. The most common are listed below. For a full list please consult the Environment Agency or the Non-Native Species Secretariat (UK), or the Global Invasive Species Database.

Table 2 Summary table of key non-native invasive species, with suggested actions to minimise impacts when sampling.

Species	Scientific name	Risk	Mitigation
Emergent / bankside vegetation			
Himalayan balsam	<i>Impatiens glandulifera</i>	Riverbank erosion and displaces native species.	Minimise disturbance, particularly whilst in seed. Look for volunteer opportunities for removal activities.
Japanese knotweed	<i>Fallopia japonica</i>	Easily spread through small fragments. Riverbank erosion and displaces native species.	Minimise disturbance. Check, clean and dry sampling equipment.
Giant hogweed	<i>Heracleum mantegazzianum</i>	Riverbank erosion and displaces native species. Can cause blistering of skin.	Avoid areas where this species is present.
Giant reed	<i>Arundo donax</i>	Can be spread through fragments, displaces native species, increases fire risks and interferes with flood control.	Minimise disturbance. Check, clean and dry sampling equipment.
Acacia palida	<i>Leucaena leucocephala</i>	Renders extensive areas unusable and inaccessible and threatens native plants.	Minimise disturbance. Check, clean and dry sampling equipment.
Purple loosestrife	<i>Lythrum salicaria</i>	Displaces native species, blocks waterways.	Minimise disturbance. Check, clean and dry sampling equipment.
Mimosa	<i>Mimosa pigra</i>	Renders extensive areas unusable and inaccessible and threatens native plants.	Minimise disturbance. Check, clean and dry sampling equipment.
Common cord grass	<i>Spartina anglica</i>	Displaces native species, leads to the loss of feeding habitat for wildfowl and waders.	Minimise disturbance. Check, clean and dry sampling equipment.
Submerged vegetation			

Parrot's feather	<i>Myriophyllum aquaticum</i>	Blocking waterways / light. Displace native species.	Check, clean and dry sampling equipment between sites.
New Zealand Pigmyweed	<i>Carssula helmsii</i>	Blocking waterways / light. Displace native species.	Check, clean and dry sampling equipment between sites.
Curly waterweed	<i>Lagarosiphon major</i>	Blocking waterways / light / easily spread. Outcompete native species.	Check, clean and dry sampling equipment between sites.
Floating vegetation			
Water lettuce	<i>Pista stratiotes</i>	Blocking waterways / light.	Check, clean and dry sampling equipment between sites.
Floating pennywort	<i>Hydrocotyle ranunculoides</i>	Blocking waterways / light / easily spread. Outcompete native species.	Check, clean and dry sampling equipment between sites.
Water fern	<i>Azolla filiculoides</i>	Blocking waterways / light / easily spread.	Avoid areas where this species is present. Check, clean and dry sampling equipment between sites.

4 Physical risks

When identifying where to sample you need to consider the potential physical risks involved with collecting the sample. Before you take your first sample, you should assess the site for its safety and suitability for sampling. Check the:

4.1 Bank stability

Make sure that where you will be walking to get to your sample point and the place you will be sampling from are safe and stable. If the area you will be sampling from is natural (i.e. not a manmade walkway or pathway) it is a good idea to bring some sort of pole or stick with you, which you can use to check the stability before you step onto a potentially unsafe area. If you do become stuck in mud or sand, spread your weight as evenly as possible, and call for professional help. If someone without proper equipment comes to rescue you they could also become stuck, so wait for professional help.

4.2 Distance to water

Water level can vary quite substantially so you need to check that you can safely access the water when it is at its lowest level, or that you will only survey when the water level is high enough to safely reach the water itself from a safe and stable position. You can use a pole attached to your water sampling container, for easier and safer access, but must be careful of yourself and others when carrying and using the pole.

4.3 Water depth and speed

The depth of the water needs to be deep enough to successfully sample, but if the water is deep, and/or the current is strong, you need to be extra careful to ensure you do not enter the water. Consider wearing a life jacket, and/or, if you are working with another person, carrying a throw rope, and knowing how to properly use it. Wading

into fast moving water can cause you to be unsteady on your feet, even when the water is very shallow. Always have an emergency procedure in place.

4.4 Slips/trips and falls

The banks of watercourses can often be unstable, overgrown with vegetation, or otherwise difficult to access. When assessing your sample point for access, have a look at obstacles which could trip you, snag your clothes, or otherwise harm you. If there are plants covering where you would step, make sure you use a pole to test the level of the ground before stepping onto vegetated areas, as they could be covering holes or dips in the ground. Bear in mind that plant growth will be different throughout the year, and if plants have grown up making sampling unsafe, do not sample.

4.5 Weather

The weather can have a huge impact on the safety of your sampling. If there was recent heavy rain, water levels may be high, or water may be more swift flowing than usual. Heavy storms, including lightening can pose a dangerous risk if you are outside in these conditions. Rain and snow can reduce visibility and make it more difficult to see and avoid water edges. Extremely hot weather can cause water to recede, exposing unstable sediments which may not be safe to tread on. Hot or cold weather can also pose a health risk, causing hyper or hypothermia. Always check the weather forecast before you leave to sample, and make sure weather conditions are not unusual. Wear appropriate clothing, bring water with you and make sure you have sun protection if the weather is hot, and warm clothing if the weather is cold. When you arrive at a site make sure that weather conditions do not make it unsafe to sample, and always abandon a sampling effort if unsafe conditions present themselves.

5 Emergency procedure

Do not sample if weather or water conditions are unsafe, or if there are changes to your sample site which could put you at risk. Always put your safety first.

Having a set of steps to take in an emergency is important as it can help you act quickly and sensibly in an emergency. Here are some ideas of things to do to keep yourself safe in an emergency. You should put together a plan appropriate to your site which will detail (as a minimum):

- How you will get to and from the site safely
- Any site-specific risks
- How you will safely access the water
- What you will do in an emergency
- Who is sampling, their contact details and info, and who they can call if needed.