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eDNA Expeditions 2026-2028

Field sampling guide

Detailed instructions
on how to use the sampling kits

ednaexpeditions.org

eDNA Expeditions 2026-2028 mobilizes environmental DNA observations to advance the development of a global biomolecular observatory for marine life, an essential step to better monitor and understand ocean biodiversity. For three years, the project will carry out repeated sampling campaigns conducted by local teams at 25 marine sites worldwide.

Powered by the Intergovernmental Oceanographic Commission (IOC) of UNESCO's Ocean Biodiversity Information System (OBIS) and supported by Minderoo Foundation in collaboration with Wilderlab, eDNA Expeditions is local by impact and global by design: Data from samples flows back to sites as decision-ready insights via co-designed pipelines that take into account local context. These insights can support local marine management and conservation, as well as advance our global knowledge of the ocean.

eDNA Expeditions 2026-2028 is a project endorsed by the UN Decade of Ocean Science for Sustainable Development 2021–2030.

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1. OBJECTIVES

This Field Sampling Booklet contains the information required to perform sampling in the field during the sampling day. The instructions are also available in video format through the sample registration app (see page 4), and in an infographic on the sample information sheets provided with the sampling kits.

The citizen science environmental DNA (eDNA) sampling will be based on filtering seawater samples collected from the sample locations:

- The goal is to collect **14 samples** from each participating marine site, including **two negative control samples** (clean, bottled drinking water), one at the beginning and one at the end of each sampling event.
- Using the sampling kits, the objective will be to **filter one litre** of water with each filter and to preserve the DNA in the filters.
- Each sample should be taken by at least two people, and the same people can collect multiple samples. While one person is performing the sampling, the other(s) should write down the collected information, assist the sampler, and make sure that all sampling materials are collected in a clean way into the sampling kit bag.

The project uses two different sampling methods based on the same protocol. Both sampling methods use the same sampling kit:

- **Method 1, manual eDNA sampling:** This method uses the syringe sampling kits for filtration. This method is dedicated to sampling events involving citizen scientists.
- **Method 2, pump eDNA sampling:** This method uses a handheld peristaltic pump for the water filtration step. These pumps allow for a more rapid sampling of eDNA, and are meant to facilitate/accelerate the repeated sampling. This second version does not use a sampling syringe but a tube provided in separate pump adapter kits.

2. CHOICE OF THE SAMPLING LOCATION

- Each marine site has determined two to four sampling locations depending on their monitoring questions, and will take **a minimum of three replicate samples** at each location. Replicates are samples taken at the same time and at the same location. It is recommended to take replicate samples within 5-10 metres of each other.
- The total water depth of the sampling locations should be shallower than 15 metres to ensure that the eDNA collected at the surface is representative of the sample location.
- Each sample will provide a snapshot of marine biodiversity at that location. The objective is to take all samples during one day across the chosen locations. If this is not possible, the remaining samples should be taken on the next day.

WARNING: Avoid contamination sources, e.g., contamination from human activity, including the bilge pumps of vessels, fishery landing and cleaning stations, or port areas.
The sampling bottles should also be closed in between filtrations, to minimize contamination from the air.

3. SUMMARY OF THE SAMPLING INSTRUCTIONS

In preparation for the sampling day
What needs to be done before going into the field

Sampling kits
The contents of your sampling kits and other equipment required

Step 0
Decontamination
Bleach-clean the sampling bottles before heading out and between each replicate or location.

Step 1
Sample information
Start by recording the sample and additional information.

Step 2
First negative control
The first filter is used for a negative control of clean, bottled drinking water.

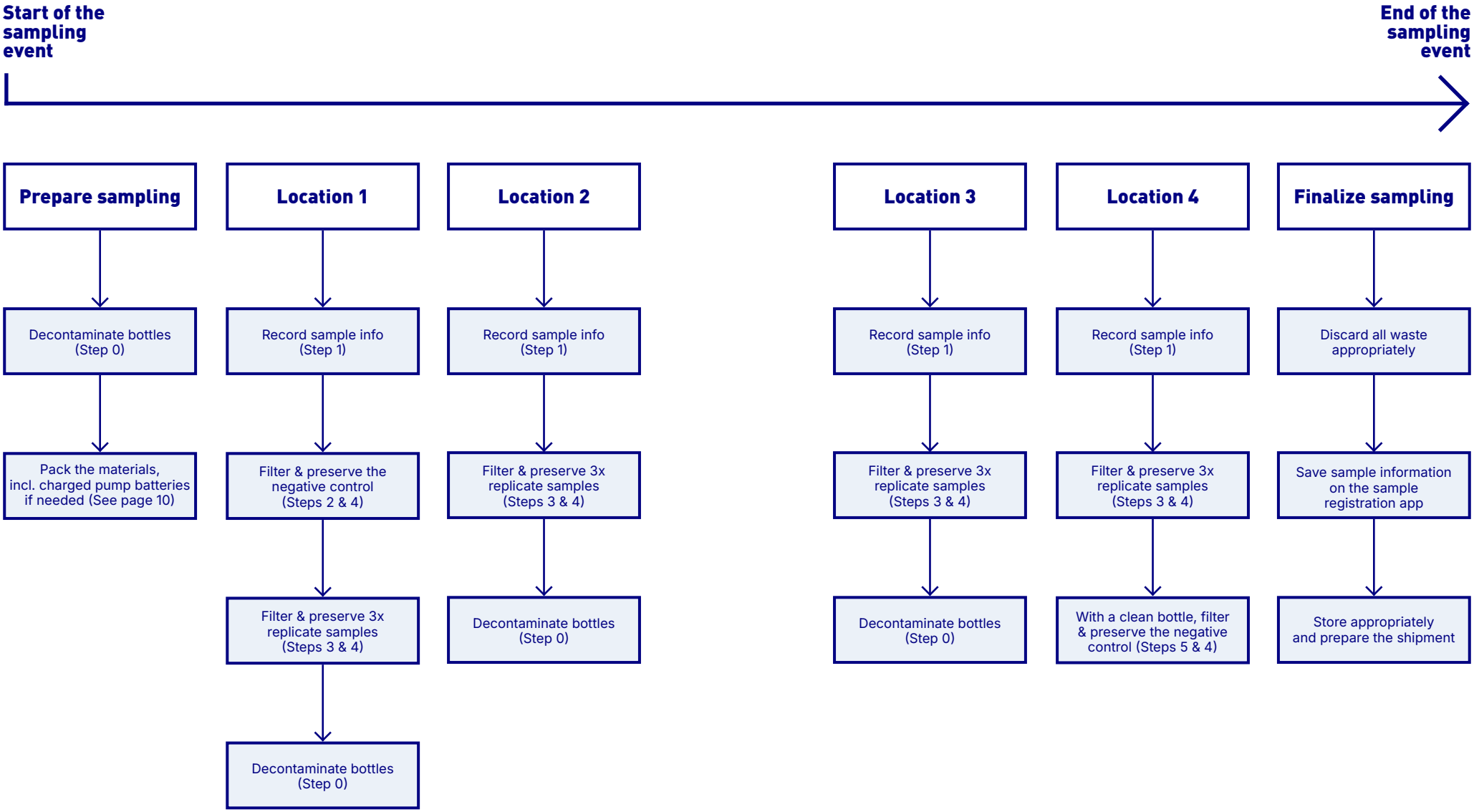
Step 3
eDNA sampling
Collect the seawater samples and filter them with the sampling kits provided, following either the manual or pump eDNA sampling protocol.

Step 4
Sample preservation
Add the preservation solution so that the sample can be kept at room temperature.

Step 5
Filtering the negative control
Collect the second and last negative control of clean, bottled drinking water.

Step 6
At the end of the sampling campaign
Keep samples at room temperature (~21°C) and send them to the laboratory in New Zealand as soon as possible.

Avoiding contamination and cross-contamination of the samples is crucial! Wear gloves at all times when manipulating the sampling kit content. Photo: IOC / OBIS



Overview of a typical eDNA Expeditions 2026-2028 sampling event.

4. PREPARATION FOR THE SAMPLING DAY

SAFETY FIRST: Only go out sampling if the weather conditions permit, and make sure everyone has the required safety equipment (e.g., lifejackets, weather protection).

4.1 Download the sample registration app:

1. Go to **https://app.ednaexpeditions.org/** on your mobile phone
2. Add the app to the home screen of your phone, for easy access.
3. Allow location services for the app to register the exact location where samples were taken. Information gathered is strictly used in the context of this project.
4. You are ready to fill the sample registration app!

Once downloaded, the sample registration app will work without internet access. After adding the sample information, press the "Submit sample" button. If you don't have an internet connection, the information will be kept in the app and can be uploaded once your mobile phone regains access to the internet. To ensure that all information is uploaded after sampling, make sure to open the sample registration app and synchronize the submissions after your internet connection has been restored.

The app includes an electronic version of this Field Sampling Booklet, and the video with sampling instructions (internet access required).

A view from the eDNA Expeditions 2026-2028 sample registration app. Once saved on your phone's home screen, the app can be accessed offline. Photo: IOC / OBIS

4.2 Gather your equipment provided by eDNA Expeditions:

Both the manual sampling (method 1) and pump sampling (method 2) follow the same protocol and use the same sampling kits.

- ☐ 15 sampling kits for each sampling event (2 sampling kits for negative controls, 12 kits for actual sampling, one spare kit)

→ **Note:** You will receive 30 kits for the first two sampling events with the first shipment. Be sure to only use 15 kits at your first sampling event, and keep the remaining 15 kits for the second sampling event.

⚠ **WARNING:** Do not open the sampling kits until you are at the sampling location, ready to collect and filter your sample.

- ☐ 15 sample information sheets
- ☐ Pencils to write down sample information
- ☐ Two clipboards as a support for writing
- ☐ A telescopic sampling rod (95-280 cm) with a bottle holder attachment
- ☐ A 700 mL bottle to contain the bleach solution (see Step 0)
- ☐ Four 1000 mL sampling bottles
- ☐ Two pairs of safety glasses to use when pushing the preservation liquid into the filter

4.3 For the use of the handheld pump (sampling method 2), you will additionally receive:

- ☐ One handheld pump with two rechargeable batteries
- ☐ 15 adaptor kits (flexible tube) for the pump
- ☐ One graduated beaker of 1000 mL to measure the volume of filtered water

→ **Note:** If you are sampling with the pump, before heading out, remember to fully charge both batteries that are provided with the pump kit.

⚠ **WARNING:** Before each sampling event (and in between samples), make sure the sampling bottles are cleaned thoroughly following the decontamination procedure detailed in Step 0.

A view of the sampling rod, with the 1000 mL sampling bottle attached. Photo: IOC / OBIS

The handheld sampling pump. Photo: IOC / OBIS

The charger (left) and a battery (right) for the sampling pump. Photo: IOC / OBIS

4.4 In addition, local teams will need to bring:

- ☐ 500 mL of 10 % household bleach for rinsing the sampling bottles (for each sampling event)
- ☐ Five litres of sealed, bottled, drinking water:
  Two litres of bottled water required for taking the negative control samples; three litres for rinsing the bottles after bleach cleaning
- ☐ A cooler or box to store the collected samples (i.e. the filters with the preservation liquid) and protect them from direct sunlight (UV radiation will degrade the DNA).

→ **Note:** The preservation liquid is effective at temperatures between 4°C and 30°C. If you foresee temperatures outside that range during your sampling event, you will need to store the samples in a temperature-protected container.

- ☐ If possible, bring additional laboratory-grade gloves to minimize risks of contamination during sampling
- ☐ A mobile phone with the eDNA Expeditions app installed.

→ **Note:** Frequently asked questions will be available in the sample registration app.

Take pictures during your sampling day!

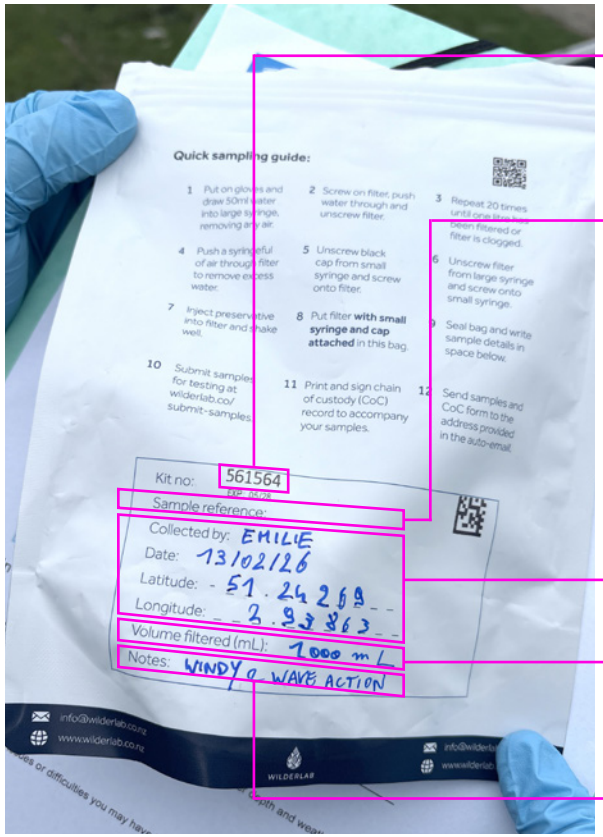
Document your sampling day in pictures: from the landscape to portraits of participants, take photos throughout the day. You can upload them directly in the app, share them on social media (using the project hashtag #eDNAExpeditions), or send them to the project team. Please ensure that everyone in the pictures has given their consent for their image to be published on social media.

5. SAMPLING KITS

Ahead of each sampling event, make sure to go through the instructions and understand each step that needs to be taken to collect, filter, and preserve your samples. The sampling kits that are provided come pre-packaged in a sterilized, sealed package.

WARNING! Please do not open them until you are at the sampling location, ready to collect and filter your sample.

On the label at the back of the sampling kit bag, you will find:



Kit number: The unique sample ID of your filter, printed on each kit (e.g. 561586)

Sample reference: write a code that uniquely identifies your samples (e.g. Exp01-Loc01-Rep01). We recommend to use the same naming protocol for all your samples.

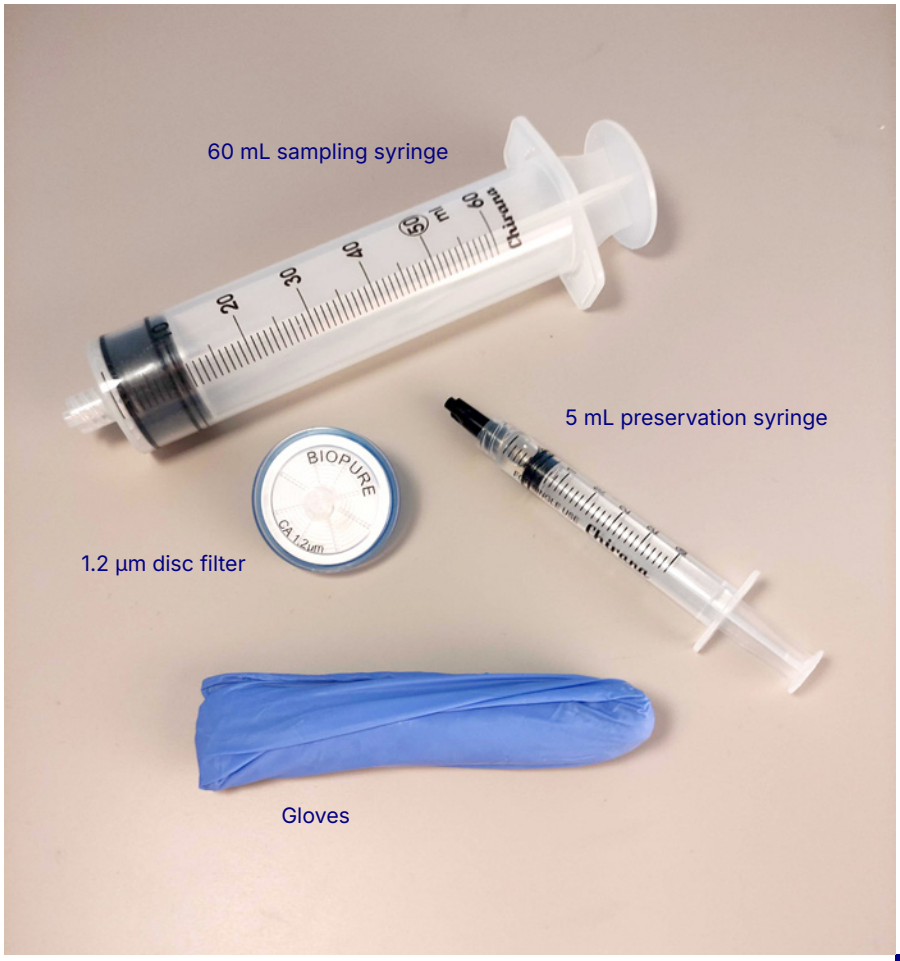
Name of the person doing the sampling; Date of the sample; Coordinates in decimal degrees

Total volume filtered in mL (aim for 1000mL)

Notes: additional remarks related to the sampling conditions

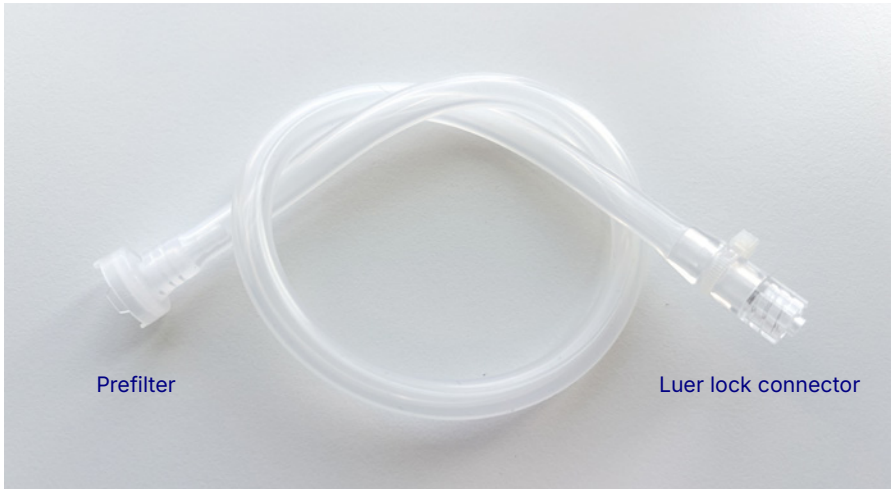
5.1 Inside each of the sampling kits, you will have:

- ☐ One pair of gloves for clean sampling, size M
- ☐ One empty, sterile 60 mL syringe for sampling
- ☐ One blue 1.2 µm disc filter
- ☐ One small 5 mL syringe, with a cap, containing the preservation liquid



5.2 In the pump adaptor kits, you will have:

- ☐ Tube with a prefilter (larger end) on one end and a Luer lock connector (smaller end) on the other end.



6. SAMPLING PROCESS

Step 0: Decontaminate your equipment

The project will provide four plastic sampling bottles of 1000 mL to the sites to collect water samples. These bottles should be reused between locations and sampling events. To avoid contamination between sampling events and locations, the sampling bottles need to be cleaned using the strict decontamination procedure and kept closed until sampling. This means that the bottles should be cleaned before heading out to the sampling location, and after each sampling, before moving to the next location.

Before sampling:

1. Pour 10% bleach into the four bottles.
2. Close the bottle caps and shake each bottle for about one minute, so that all surfaces of the bottle have come in contact with the bleach. If you have time, the bottles can be filled with bleach and left to soak for 24 hours.
3. Collect the bleach: it can be reused again if needed during the same day. Do not discard the bleach in the environment; it is toxic!
4. Pour clean drinking water into the bottles to rinse them: Close the bottle caps and shake each bottle for about one minute to ensure that all the surfaces have come in contact with the water.
5. Collect the rinsing water and dispose of it safely through an appropriate collection system where it can be properly treated. Do not release the mixture into the environment. This mix should not be reused for rinsing.

6. Repeat steps 4 and 5 another two times, to rinse the bottles three times in total.

7. Pack at least 0.5 litres (500 mL) of 10% household bleach securely with you to the sampling event. You will need it to decontaminate the bottles between your sample locations.

8. Before starting the actual sampling, rinse each bottle with sample water (marine water or a control water) three times before filtering.

Pouring a 10% diluted water and bleach solution into a sampling bottle to decontaminate it between samples on location. Photo: IOC / OBIS

At the site, between samples:

1. Distribute the bleach you have packed with you across the four sampling bottles.

2. Close the bottle caps and shake each bottle for about one minute, so that all surfaces of the bottle have come in contact with the bleach.

3. Return the bleach to the bleach bottle. This bleach can be reused for the next cleaning.

4. Take clean water and distribute about half a litre across the four sample bottles.

5. Close the bottle caps and shake each bottle for about one minute, so that all the surfaces of the bottle have come in contact with the water.

6. Collect the water and bleach mixture and dispose of it safely through an appropriate collection system where it can be properly treated. Do not release the mixture into the environment.

7. Repeat steps 4 and 5 another two times; rinse the bottles a total of three times.

8. Before sampling, rinse with sample water (seawater) three times before filtering.

Step 1:
Fill out the sample information

To ensure that the sample information is safely stored, you need to fill in the sample information in two places:

1. In the eDNA Expeditions app (this automatically gives you the time, latitude, and longitude of your sample)

2. On the provided paper sample information sheet.

To be valid, a sample should come in its bag with its information sheet and its information fully registered in the sample registration app. When you have arrived at the sampling location, open the sample registration on the eDNA Expeditions app and start filling it:

1. Write down the name and email of the person(s) sampling.

2. Record the sample ID (the code printed on the back of the kit bag, e.g., “558447”).

3. Record the sampling time and location coordinates by tapping on the app, and write down the same information on the sample information sheet.

4. Write down any notes on the sampling location, if you have this information: What is the total water depth, weather conditions, and water temperature? Are there any noticeable organisms?

5. You can also add photos of the location and of the sampling to the app: This will be helpful in determining how the conditions were at the location, and in communication about the project.

6. Take a blank sample information sheet and start filling it with the same information you entered in the sample registration app on your phone.

Step 2:
Filter the first negative control

WARNING: Wear gloves at all times during sampling. Do not touch anything other than the sampling equipment to avoid contamination. Also, consider where to store the sampling equipment, as it should be kept as clean as possible.

Two negative controls will be collected with each sampling event. One before the collection of the first sample, and one after the collection of the 12th (and last) sample. The protocol for the two negative controls is the same as for an actual sample (see detailed process in the following section “Step 3 - eDNA Sampling”. The first negative control will be taken from a pre-cleaned bottle. The second negative control will be taken from an on-site cleaned bottle (see Step 0).

1. Start by recording the sample ID and indicating on the sample information sheet and in the notes in the app that this is the first negative control. There is no need to collect environmental metadata.

2. Rinse the sample bottle three times with approximately 250 mL (one glass) of bottled drinking water.

3. Pour one litre of the sealed, bottled drinking water into the sample bottle. You are ready for taking the first negative control!
   You can now follow Steps 3 and 4.

Step 3:
Filter an eDNA sample

WARNING: Wear gloves at all times during sampling. Do not touch anything other than the sampling equipment to avoid contamination. Also, consider where to store the sampling equipment, as it should be kept as clean as possible.

The manual sampling kits are provided for citizen science sampling events (Method 1: Manual eDNA Sampling). For repeated sampling, you can use the sampling pump with the tube adaptor kit (Method 2: Pump eDNA sampling). Both protocols are given below.

Step 3 - Method 1: Manual eDNA sampling
(see visual guide p.26-27 for actions 6-9)

1. Note down the sample ID and remaining information in the sample collection sheet (see Step 1).

2. Have a team member mount a clean, one-litre sampling bottle onto the bottle holder of the sampling rod and collect the water sample. If you are close to the shore, aim to take samples as far away from land as possible with the rod, to avoid runoff from land or contamination from yourself.

3. Use the rod to submerge your sampling bottle and collect seawater. Pour out the seawater and repeat this a total of three times to rinse the sampling bottle with water from the sampling location.

4. Collect one litre of seawater for your sample by submerging the bottle below the surface.

   → **Note:** If you are in an area with a sandy bottom, let the sample water stand for a few minutes before filtering, to allow the sand to settle at the bottom of the bottle.

5. Open the sampling kit bag and put on the pair of gloves. Only then take out the sampling syringe and the disc filter. Don't throw away the sampling bag: you will need it to store and send your sample.

6. Fill the sampling syringe with 55 mL of the water from your sampling bottle.

7. Screw the disc filter onto the filled sampling syringe.

8. Push the water out from the sampling syringe through the filter. Leave approximately 5 mL of water in your sampling syringe to avoid pushing any air bubbles into your filter.

   → **This is the step where you filter your seawater sample.** Be careful and proceed slowly, as the filtering will require some effort and patience: you will need to filter your entire sampling bottle, 50 mL at a time! You can have multiple participants take turns filtering the water from the sampling bottle. Make sure that all participants wear gloves when filtering the water sample.

WARNING: Avoid air bubbles in the filter as this will cause the filter to malfunction. To prevent air from being pushed in, always keep the sampling syringe with the filter upright, and do not fully empty the syringe. Always leave a small volume of approximately 5 mL of water in the syringe. If, by accident, an air bubble is pushed into the filter, don't panic: they can easily be removed! You can tell if there is an air bubble trapped in your filter for example, when the filtering becomes difficult after fewer than 10 cycles. **See below: "Troubleshooting: In case of an air bubble".**

9. Stop filtering when you have 5 mL of sample water still left in your syringe. **Carefully remove the filter from the syringe by holding it from the sides** without touching the inlet and outlet of the filter. Be very careful not to drop the filter on the ground, and do not put it down on any surface.

10. Repeat steps 6 to 9 a total of 20 times, until your sampling bottle is empty and you have filtered one litre of seawater.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11. Important: Filters can get clogged or saturated before you have filtered all the water from your sampling bottle. Count the number of times you filter a full syringe to count the total volume of water filtered. Report this number in the sample registration app and write it down on the sample information sheet.

    → **Tip:** If you are in an area with a lot of sediment, let the sampling bottle sit for a few minutes before filtering, to allow the sediment particles to settle.

12. After repeated filtration, the filter will become gradually saturated with material, and the filtering will become more difficult. The total amount of water that can be filtered will depend on local conditions; Stop if the filtering becomes too difficult, too slow, or takes too long (e.g., more than 30 minutes). The filter is then clogged and you can stop.

13. Once finished, **continue to Step 4: Preserve your sample (p. 32)**

Step 3 - Method 2: Pump eDNA sampling

1. **Before sampling, fully charge both drill batteries.** Ensure that the pump is running in the right direction by pushing the red arrow button.

2. Note down the sample ID and remaining information in the sample collection sheet (see “Step 1: Fill out the sample information”).

3. Have a team member use the rod to collect your seawater sample. First, rinse the sampling bottle three times with water from the sampling location. Then collect one litre of seawater for your sample by submerging the bottle below the surface.

4. Open the sample bag and put on the pair of gloves. Open the drill pump adapter kit and take out the tube.

5. Move the top lever of the pump to the left (white arrow) and push the switches on both sides of the peristaltic pump upwards to open the pathway (pink arrows). Insert the tube into the open pathway with the prefilter (larger end) on the left, and the Luer lock connector (smaller end) on the right.

6. Push both switches down to the closed position and move the lever to the right to lock the tubing in place.

7. Wearing gloves, take the disc filter out of the sample bag and screw it onto the Luer lock connector (smaller end)

8. Ensure that the water flows out into the graduated beaker to measure the filtered water volume.

9. To sample, hold the prefilter just below the water surface in your sampling bottle, and gently press the trigger of the drill to start pumping at a low speed. Continue pumping until one litre is filtered. The flow rate at full speed is about 0.75 L per min.

10. Once finished, continue to Step 4: Sample preservation.

Troubleshooting: In case of an air bubble

WARNING: Only perform these steps if you suspect you have an air bubble clogging the filter

Air bubbles block the filter membrane and have a negative effect on the filter capacity. These air bubbles are easy to remove from the capsule by pulling them out with the syringe upright, or, when using a drill pump, by briefly reversing the flow of water.

1. While there is still some sample water in the syringe, turn it so that the filter is pointing towards the ground.

2. Gently pull the piston up and allow any air bubbles to travel upwards.

3. Try this a few times to dislodge potential air bubbles from the filter.

4. Remember to always leave at least 5 mL of sampling water in your syringe when filtering, to avoid additional air bubbles.

Step 4:
Preserve your sample

WARNING: This step should be performed under adult supervision, with active participants wearing gloves and safety glasses.

1. **Important: After filtering one litre of water, unscrew the filter and fill the syringe with air. Rescrew the filter and push the air through it to remove any remaining water and ensure proper sample preservation. If you are using the pump, take the tubing out of the water while the pump is running to evacuate the remaining water from the filter.**

2. You will now preserve the sample. Wear the safety glasses and be very careful with the preservation liquid. Do not swallow it, avoid contact with skin and eyes, and do not discard it in the environment.

3. Take the cap off from the preservation syringe and use it to close the outlet (blue side) of the disc filter. Be careful to keep the preservation liquid in the syringe (keep it upright).

4. Remove the filter from the sampling syringe by holding it from the sides. Make sure not to drop the filter, and do not let the filter touch any surface. The sampling syringe you just used can now be disposed of. For your next sample, you will use a new sampling syringe. Syringes are made of plastic: please dispose of them in the appropriate bin, and recycle them when possible.

5. Screw the preservation syringe on the filter (white side), and push all the preservation liquid from the syringe into the filter.

6. **Important: Keep the preservation syringe attached to the filter, and put it into the sample bag as such.**

7. Take a picture of the sample information sheet with the app, and upload it.

8. Add the sample information sheet to the sample bag and close the sample bag securely.

9. Save the sample information collected in the eDNA Expeditions app, and hit the “Submit sample” button.

WARNING: Keep the filters sheltered from direct sunlight at all times, as UV radiation will degrade the collected DNA.

When finished with the sampling kit, remember to also save the sample information on the sample registration app on your phone by pressing “Submit sample”.

Dispose of any waste sustainably.


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Step 5:
Filter the second negative control

WARNING: Wear gloves at all times during sampling.

Two negative controls will be collected with each sampling event. One before the start of sampling (see Step 2), and one after the last sample. In each case, the protocol should be followed exactly the same as with a real sample.

1. Start by recording the sample ID, and indicating on the sample information sheet and in the notes in the app, that this is the negative control. There is no need to collect environmental metadata.

2. Follow the decontamination procedure in Step 0 to make sure your sample bottle is clean.

3. Rinse the sample bottle three times with approximately 250 mL (one glass) of bottled drinking water.

4. Pour one litre of the sealed, bottled drinking water into a sample bottle for the negative control, and proceed with filtering as a regular sample (detailed above).

5. Proceed with the sample preservation steps as detailed above, and seal the sampling bag.

Step 6:
Storing and sending the samples

When all 12 samples and two negative controls are collected, you are finished with sampling. Congratulations! All the samples should be collected and stored together at temperatures between 4°C and 30°C and protected from direct sunlight (UV radiation will degrade the DNA). If you foresee temperatures outside that range during your sampling event or back at your institution, you will need to store the samples in a temperature-protected container.

To ensure a rapid turnover of the results, the samples should be sent to the partner laboratory, Wilderlab, as soon as possible. The package which will be shipped back to Wilderlab should contain 14 sample bags (12 true samples and two negative controls), each containing:

- One collected eDNA filter (preserved and capped) connected to its preservation syringe with the preservation liquid inside the filter
- One completed sample information sheet

In addition, you need to attach the “Manufacturer’s Declaration Form” to the outside of the package, which is needed for importing the samples into New Zealand, as well as the safety data sheet for the preservation liquid. Both documents will be provided by the project team, when the samples are ready to be sent, along with the prepaid labels for shipping. The return address is:

Wilderlab NZ Ltd
ATTN: TISO ROSS
Level 2, 129 Park Rd
Miramar
Wellington 6022
New Zealand

PHONE: +64 4 380 7000
EMAIL: Orders@wilderlab.co

IMPORTANT: Please also make sure that any form or declaration necessary from your country is included in the package, following your local regulations.

Checklist 1
Before leaving to your sampling location

- [ ] Clean the sampling bottles with 10% bleach
- [ ] Charge the two batteries of the handheld pump
- [ ] Pack 15 sampling kits
- [ ] Pack 15 adapter kits if you use the handheld pump
- [ ] Pack the sampling equipment
  - [ ] Sampling rod with bottle holder
  - [ ] Four sampling bottles
  - [ ] Safety glasses
  - [ ] Sample information sheets, pencils, and clipboards
  - [ ] If you are sampling with the pump: Handheld pump
  - [ ] If you are sampling with the pump: Graduated beaker
  - [ ] Extra pairs of gloves
  - [ ] 10% household bleach
  - [ ] Clean, sealed, bottled drinking water
  - [ ] Cooler or box
  - [ ] Mobile phone with the eDNA Expeditions app

Checklist 2
Summary of the sampling steps

- [ ] Take the first negative control
- [ ] Bleach-clean sampling bottles
- [ ] Rinse three times with sample water
- [ ] Collect a one-litre water sample
- [ ] Filter the water sample 20 times to filter one litre OR filter 1 litre continuously with the pump.
- [ ] Add the preservation liquid to the filter using the preservation syringe
- [ ] Return the sample and sheet to the sample bag
- [ ] Bleach-clean sampling bottles in the field before the next sampling location
- [ ] End with the second negative control

After filtering

- [ ] Make sure each filter is returned with the preservation syringe and preservation solution still attached. If no preservation solution is added to the sample, all the DNA will be lost.
- [ ] Make sure the sampling sheets are included in each sample bag.

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