



Shoreline Complete™ StrainID™ Protocol 2

Lyse, Purify, & Amplify Set A (96 Barcodes)
Saliva, Swabs, and Pelleted Cells

Rapidly purify microbial DNA from low input samples (e.g., saliva, skin swabs, cell pellets) and prepare for sequencing using single-step PCR amplification of the EXTended 2500bp region (encompasses the 16S rRNA gene, the adjacent Internally Transcribed Spacer (ITS) region and part of the 23S gene) for microbial community profiling. This kit contains 96 unique barcoded primer sets for processing 96 samples. One additional kit contains unique barcoded primer sets for processing up to 16 additional samples. Every sample will have a unique barcode at the completion of the PCR reaction for sequencing all the samples together; reads will be sorted by sample after sequencing is complete.

Products

Up to 112 different DNA samples can be barcoded and combined in a single sequencing run using the two available kits.

1. Shoreline Complete™ StrainID™ Lyse, Purify, & Amplify Set Z (16 Barcodes) Cat. No. **STRAIN-Z**
2. Shoreline Complete™ StrainID™ Lyse, Purify, & Amplify Set A (96 Barcodes) Cat. No. **STRAIN-A**

Additional Items Needed for 96 Barcode Kits: (Not included; see Suggested Supplier list below)

1. Additional Items Required for Lyse and Purify
 - a. One (1) sterile 96-well PCR plate
 - b. Plate sealing film
 - c. Sterile Laboratory Grade Water
 - d. Fresh 70% ethanol
 - e. TE Buffer - 10mM Tris, 1mM EDTA, pH 8.0
 - f. 0.4M KOH Solution
 - g. Magnetic Rack ('bar' or 'post' suggested for higher DNA yield)
2. Additional Items Required for Amplify:
 - a. Qiagen MinElute® PCR Purification Kit
 - b. Sterile Laboratory Grade Water
 - c. Sterile 100% Ethanol
3. Suggested items for rapid processing
 - a. Repeater Pipette with multi-volume tips
 - b. Single Channel Manual Pipettes
 - c. Multichannel Pipette 0.5-10 µL working volume
 - d. Centrifuge with 96-well plate adaptor
4. Suggested items for sample QC
 - a. 0.8% agarose gel with ethidium bromide or other dsDNA stain
 - b. Gel loading dye to mix with samples (e.g., NEB B7024)
 - c. 2kb DNA ladder

Kit Contents for Shoreline Complete™ Lyse and Purify Protocol

1. Lysis-1 (96-well PCR plate, dried solution in each well)
2. Purification Buffer (two 8 mL bottles with **white** caps)

Kit Contents for Shoreline Complete™ Amplify Protocol

1. 96-well PCR plate with 96 barcoded primers in wells A1-H12



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2. 2X PCR Premix (**blue cap**)
3. PCR sealing film (1 sheet)

Important Considerations for Lyse and Purify:

1. Samples should be thawed and stored on ice.
2. Shoreline Biome **lysis is pH dependent**. Samples stored in buffer with pH < 6.5 should use **at most** 10 µL input volume, otherwise the risk of suboptimal lysis affecting downstream results is high.
3. Samples may contain pathogens. Handle samples using Universal Precautions. Please wear personal protective equipment and observe standard laboratory practices for handling, cleaning, and disposing of materials that come in contact with sample.
4. Shoreline Biome recommends including positive and negative controls in your project to monitor lysis and amplification efficiency as well as environmental contamination. Consider using mock microbiome cells (input=10⁹) and mock microbiome DNA (input 10-100ng) as positive controls and water as negative control.
5. Shoreline Biome lysis results in ssDNA; for quantitation, please choose an appropriate kit (e.g., Qubit ssDNA assay kit #Q12012, Promega Quantifluor ssDNA system, #E3190)

Shoreline Complete™ Lyse and Purify Protocol

1. **Make 0.4M KOH.** Measure 0.135g KOH into 15 mL tube, then add 6 mL H₂O. 0.4M KOH expires after 7 days.
2. **Make 70% Ethanol.** Add 17.5 mL 100% ethanol to 7.5 mL sterile laboratory grade water
3. Bring Purification Buffer (**white** capped bottle) to room temperature.
4. Remove film covering the 96-well PCR plate containing dried Lysis-1.
5. **Sample Type:**
 - 5.1. **Saliva:**
 - 5.1.1. Centrifuge saliva samples at 5500 RCF for 10 minutes to pellet cells.
 - 5.1.2. Remove and discard supernatant.
 - 5.1.3. Re-suspend in 50 µL of Molecular Biology Grade water, TE, or PBS.
 - 5.1.4. **Transfer 50 µL** of cell suspension (between 10⁶ and 10⁸ cells) to Lysis-1 plate. Do not mix.
 - 5.2. **Skin swabs:**
 - 5.2.1. Moisten swab with buffer containing Tris-EDTA and 0.5% Tween 20.
 - 5.2.2. Collect sample from skin. Place swab in 1.7 ml microcentrifuge tube. Break the swab handle off at designated location.
 - 5.2.3. Centrifuge tube with swab for 5 minutes at 10000 rpm.
 - 5.2.4. Remove swab and transfer supernatant to a clean 1.7 ml tube.
 - 5.2.5. Centrifuge tube with swab second time for 5 minutes at 10000 rpm.
 - 5.2.6. Remove swab and combine supernatant with the first supernatant. Discard spent tube and swab.
 - 5.2.7. **Transfer 50 µL** of the supernatant (between 10⁶ and 10⁸ cells) to Lysis-1 plate. Do not mix.
 - 5.3. **Pelleted cells:**
 - 5.3.1. Reconstitute the cell pellet by adding 50 µL Molecular Biology Grade water, TE, or PBS and pipetting up and down to re-suspend cells.
 - 5.3.2. **Transfer 50 µL of cell suspension** (between 10⁶ and 10⁸ cells) to Lysis-1 plate. Do not mix.
6. **Add 50 µL 0.4M KOH** to each well position in the 96-well plate. Do not mix. Use of a repeater or multichannel pipette is recommended to save time. A precipitate will form in the wells.

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7. **Cover the sample plate with PCR film**, load the sample plate into the PCR machine, close and lock the lid, and **heat samples to 95°C for 5 minutes**. Precipitate will dissolve.
8. **Place sample plate on ice for 2 minutes**. Precipitate will re-form.
9. Vortex Purification Buffer bottles (**white cap**) to re-suspend any brown magnetic beads that may have settled.
10. Remove sample plate from ice and carefully remove PCR film.
11. Add **100 µL of Purification Buffer** to each well of the 96-well sample plate and **pipette to mix**.
12. **Cover the sample plate with a new PCR film**, load sample plate onto the PCR machine, close and lock the lid, and **incubate solution for 3 minutes at 50°C** to allow DNA to bind to beads
13. After incubation, place plate on magnetic rack to pellet beads with bound DNA (~60 seconds), carefully remove PCR film.
14. Once all beads are pelleted, **remove all supernatant SLOWLY and discard**. Avoid aspirating beads.
15. **Remove plate from magnet, add 100 µL 70% ethanol** (at room temperature) to each well, and re-suspend beads by pipetting gently up and down.
16. **Return plate to magnet and allow beads to pellet** (~30 seconds)
17. **Pipette off residual ethanol and let air dry for 2 - 3 minutes**. Over-drying will make eluting DNA more difficult, so watch to ensure ethanol is mostly gone but bead pellet does not begin to shrink and crack.
18. **Remove plate from magnet**.
19. Add **20 µL of 1X TE buffer** to each well and briefly pipette up and down to re-suspend beads. Solution should turn brown in color to reflect beads mixed homogeneously throughout.
20. **Incubate plate at room temperature for 2 minutes**.
21. Place plate on magnetic rack for 30 - 60 seconds to **pellet magnetic beads**. **DNA is now in solution**.
22. **Transfer supernatant containing eluted DNA** into a **clean** PCR plate on ice, avoiding pelleted beads.
23. **Remove plate with pelleted beads from rack**.
24. **Add another 20 µL 1X TE buffer** onto bead pellets, gently pipette up and down to suspend beads.
25. **Incubate plate for 2 minutes at room temperature**.
26. Return to magnetic rack. Allow beads to pellet to sides for 30 - 60 seconds.
27. **Remove supernatant containing DNA** and combine with first eluate in clean plate, avoiding pelleted beads.
28. **Store eluted DNA at +4°C**. This is your **Shoreline Biome Lysis Mix**.

NOTES: DNA is **denatured**, due to KOH treatment during lysis. Although Lysis Mix may retain contaminants, the Shoreline Complete™ Amplify protocol is designed to work in the presence of these contaminants. Store Lysis Mix at +4°C for up to 10 days, or frozen at -20°C for 3 months. Avoid repeated freeze/thaws.

Shoreline Complete™ Amplify Protocol

1. Remove the plate seal from the Amplicon Primer plate.
2. **Add 10 µL 2X PCR Premix (blue cap)** to each position in the 96-well plate. (Use a Repeater pipette.)
3. **Add 10 µL Shoreline Biome Lysis Mix** to each of the 96-wells.
4. Using the PCR sealing film provided with the kit, cover the plate and seal tightly with no gaps.
5. Primers will dissolve off the bottom of each well. Observe that blue color is uniformly distributed throughout 20 µL reaction, if not, tap plate gently until uniform blue color is achieved in each well.
6. Spin plate briefly if reaction mix is not completely at the bottom of the wells.

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7. Transfer the plate to PCR machine; close and lock the lid. Run PCR protocol:

95°C, 3:00	Denaturation
Repeat 34X	{ 95°C, 0:30
	{ 59°C for 0:45 (Ramp speed 4°C/sec)
	{ 72°C, 2:00
72°C, 3:00	Final extension

8. Check reactions on gel: Run 1.5 µL of sample with 5 µL diluted gel loading dye on 0.8% agarose gel in TBE, 150V for approximately 45 minutes, with DNA ladder. Band should be present at ~ 2500bp.

Qiagen MinElute® PCR Purification Protocol

1. Follow MinElute instructions for adding Ethanol (96% - 100%) to PE buffer, and label tubes.
2. Pool 5 µL of each amplified sample from the 96-well plate (*when pooling 96 sample well plate and 16 sample tubes, pool 5 µL of each amplified sample from all plates/tubes*) into a clean 1.5 ml microcentrifuge tube. (**Save 2 µL of pooled unpurified DNA for gel comparison with purified DNA in the last step below**)
3. Combine **80 µL** of pooled sample with 400 µL of Qiagen PB buffer.
4. Transfer **all** of the resulting solution into the MinElute column with provided 2 mL collection tube.
5. Centrifuge the MinElute column at 17,900 RCF for 1 minute or until solution has passed through the column. Discard the flow-through in the collection tube and return the column into the empty tube.
6. Add 750 µL Buffer PE to the MinElute column and centrifuge at 17,900 RCF for 1 minute; discard flow through and return MinElute column to the collection tube. Centrifuge for 1 minute at 17,900 RCF to remove residual Ethanol.
7. Place MinElute column in a clean 1.5 ml microcentrifuge tube.
8. Add 50 µL EB Buffer (10mM Tris-Cl, pH 8.5) or water directly onto center of the MinElute membrane. Incubate column for 1 minute at room temp, and then centrifuge column at 17,900 RCF for 1 minute.
9. Run 2 µL of purified DNA with 5 µL of diluted gel loading dye next to 2 µL pooled unpurified DNA with 5 µL gel loading dye on 0.8% agarose gel for 60 minutes at 100V to verify the purity of the DNA sample with no primer carry-over or contaminating gDNA.
10. This is your purified amplicon pool ready for PacBio SMRTbell™ library prep

Suggested Suppliers

Copan: Regular FLOQSwabs® Sterile Collection Swabs 30mm Peel Pouch, Cat #520CS01

~ OR ~

Fisher Scientific: HydraFlock 6" Sterile Elongated Flock Swab w/Polystyrene Handle, 30mm Breakpoint Cat No. 22-029-507

Dot Scientific Inc.: 96-well plate, #353-PCR or #354-PCR

Fisher Scientific: Biotech Grade Water BP24854; Potassium Hydroxide P250; TE BP24731

Thermo Fisher: Invitrogen Dyna Mag 96 side magnetic rack, #12331D or Magnetic stand-96 #AM10027

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