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Headlands Environmental Remediation Education

Mussel Sampling Collection, Preparation and Delivery to Testing Laboratories

Summary

- Three sites in Mendocino County, CA were selected for mussel collection to test for dioxins, furans, and PCBs. Two sites were located in Soldier Bay, near Fort Bragg, California, while the third site was located at Bruhel Point, approximately 12.5 miles (~20 km) north of Fort Bragg. Two sampling events occurred at each site: one set October 8-9, 2025, and the second set on February 26-27, 2026. Both sampling events took place within two (2) days of the lowest low tide of each month. The habitat type targeted for sampling was the lower rocky intertidal zone in areas of high wave action, which is often inhabited by *Mytilus californianus*, a sentinel species for indication of marine contaminants. Collection was conducted under a CDFW Scientific Collecting Permit and took place outside of any state or national park, MPA, or area with other protections in place.
- Mussels collected in October, 2025 were dissected to remove the hepatopancreatic organ. The frozen dissected tissue from the three sites were sent to Enthalpy Analytical, El Dorado Hills, CA for analysis.
- Mussels collected in February, 2026 were frozen whole and sent to Cape Fear Analytical, Wilmington, NC for analysis.
- Chain-of-custody records were completed and accompanied every sample and sample shipment to the analytical laboratory to establish necessary documentation to trace sample possession from the time of collection.

For more information, visit; <https://www.project-here.org>

Please reach out to us with questions or concerns at
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Oct 8-9, 2025

California mussels *Mytilus californianus* were collected by hand from rocky substrate in the intertidal zone from three (3) sites near Fort Bragg, CA. All organisms attached to the mussels (acorn barnacles, smaller *Mytilus* spp, various small anemones, various limpets) were carefully removed *in situ* by hand. Collected mussels were placed in a zipper-seal style 1-gallon plastic baggie while in the field, then placed on ice upon arrival at the vehicle before leaving the field site. Data on weather conditions, sea state, and water quality (dissolved oxygen, salinity, and temperature using a YSI water quality meter) were also recorded at each site. Collection took place on the days of the lowest diurnal tide of the month.

- **Bruhel Point (Reference Site):**

Mytilus californianus were collected from Bruhel Point, a non-impacted rocky intertidal habitat with similar exposure and substrate conditions to Soldier Bay sites on October 8, 2025, at 5:01 p.m. (low tide of -1.0 ft at 6:56 p.m., NOAA tide table for Noyo Harbor). Site coordinates were 39.603, -123.789. A total of thirty-five (35) mussels were collected by hand using hand gloves and an oyster knife

- **Soldier Bay Sampling Area (Test Sites):**

Mytilus californianus were collected from two (2) sites in Soldier Bay, located in the rocky intertidal zone directly adjacent to the mill site brown field area called OU-E (Operable Unit-E).

- Soldier Bay South was accessed from public land by water on October 9, 2025, at 4:30 p.m. (low tide of -1.2 ft at 7:47 p.m.). Site coordinates were 39.441, 123.443. A total of twenty-four (24) mussels were collected in the same manner described above.
- Soldier Bay North was accessed on the same day (Oct 9, 2025) at 5:18 p.m. Site coordinates were 39.443, -123.813. A total of twenty-six (26) mussels were collected.

- **Handling and Transport:**

All samples were placed on ice in a sealed cooler upon arrival at the vehicle and transported to the Mendocino College Coast campus lab the following morning (approximately 15-16 hours after collection in the field).

- The reference site (Bruhel Point) mussels were dissected on the morning of October 9, between 9:30 a.m. to 11:30 a.m. The hepatopancreatic organs of fourteen (14) individuals were removed for contaminant analysis. The dissection kit tools, including the tray, were labeled for use

with reference site mussels only. Hepatopancreatic tissue mass from the 14 dissected mussels was 64.9 grams (g) out of a total wet weight mass of 666.0 g (not including shells). The dissected tissue was put in a labeled container provided by Enthalpy Analytical and placed on ice in a cooler. The sample was transferred from the cooler to a freezer [-18°C (0°F)] within several hours of dissection. The remaining tissue was disposed of. Shells were measured to the nearest millimeter (mm) using calipers and retained for age analysis at a later date.

- The Soldier Bay mussels were processed on the morning of Oct 10 between 9:30 a.m. and 1:30 p.m. using the same protocol as above. The Soldier Bay South site and Soldier Bay North site mussels were dissected on separate lab benches, using dissection tools labeled for use specific to each site to avoid cross-contamination. 25.2 g of hepatopancreatic tissue was obtained from a total mass of 171.2 g (wet weight, no shell) from the South site, and 56.1 g of hepatopancreatic tissue out of a total mass of 586.1 g (wet weight, no shell) from the North site. As before, the dissected tissue was immediately placed in labeled containers and put on ice. These two samples were frozen as described above, and the remaining tissue disposed of. Shells were measured to the nearest mm with calipers and retained for age analysis at a later date.
- The three (3) frozen hepatopancreatic tissue samples were placed on ice and sent overnight to Enthalpy Analytical (1104 Windfield Way, El Dorado Hills, CA) on October 14th for analysis of dioxins, furans, and PCBs (EPA 1613, EPA 1668, and WHO-12). Enthalpy Analytical acknowledged receipt of the samples on October 15, noting the temperature of the samples at 5.60°C (42.08°F).

Feb 26-27, 2026

Field protocol for the February sampling event followed the same field protocol as the October sampling event. Mussel samples were collected from an area within 100 meters (m) of their respective October sampling site. Water quality measurements dissolved oxygen, salinity, and water temperature were again taken once at each mussel collection site using a YSI water quality reader, and information about weather, sea state, and substrate was recorded. Sampling events took place on the two days just before the lowest diurnal tide of the month.

- **Bruhel Point (Reference Site):**

Twenty-four (24) mussels were collected by hand at Bruhel Point on February 26, 2026 at 1:01 p.m. The tide at Noyo Harbor (NOAA tide table) was -0.2 ft at 1:20 p.m. on this date of collection.

- **Soldier Bay Sampling Area (Test Sites):**

Twenty-five (25) mussels were collected on February 27, 2026 at 2:15 p.m. at Soldier Bay South and twenty-four (24) mussels were collected at 3:02 p.m. at Soldier Bay North. The tide was -0.4 ft at 2:27 p.m. on this date of collection.

- **Handling and Transport:**

All mussels collected from the February sampling event were stored in labeled zipper-seal style 1-gallon plastic baggies (one for each site) on ice in a cooler upon arrival at the vehicle in the field until transport to a location where they could be frozen. These mussels were placed intact immediately upon arrival at said location. For expediency, to avoid cross-contamination, and to conform with the general procedures utilized by the NOAA Mussel Watch program, the team elected to freeze and ship the samples as whole mussels in shell and undisturbed to the testing laboratory, Cape Fear Analytical. No dissections took place in February, nor was the tissue removed from the shell.

- All mussels were frozen whole to -18°C (0°F) and sorted into two equal groups for each site. One half of the mussels from each site were placed on ice in a sealed cooler and shipped overnight to Cape Fear Analytical Laboratories (3306 Kitty Hawk Road, Suite 120, Wilmington, NC). The other half of the samples are currently retained at -18°C (0°F), as a contingency if further analysis is necessary. The samples shipped to Cape Fear Analytical were placed on chemical ice packs at -18°C (0°F) on March 2, 2026 for analysis of dioxins, furans, and PCBs (EPA 1613, PCBs 209 full list, and WHO-12). Cape Fear Analytical acknowledged receipt on March 4, 2026 noting the sample temperature at 6°C (42.8°F).