



Blue Water Taskforce
San Luis Obispo County

Year One Report on Source Tracking Using eDNA August 2024 – August 2025

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Summary

This report includes data collected between August 2024 and August 2025. Water and DNA samples were collected at four sites including Pismo Beach (Pismo Creek, Pismo Beach) and Avila (SLO Creek Mouth and Avila Pier). *Enterococcus* samples were likewise collected from Bello Street bridge. Study sites were visited monthly and water samples collected for human eDNA (environmental DNA), *Enterococcus*, *E. coli*, and five additional species. *Enterococcus* concentrations were determined in house according to standard procedures. DNA samples were sent to Jonah Ventures for qPCR analysis and identification of species. Pismo Creek had the highest numbers and most consistent occurrence of human eDNA, *E. coli* and *Enterococcus*. This is consistent with historical data for *Enterococcus* from this site. *Enterococcus* results indicate that levels were lower at Bello St. bridge on Pismo Creek 0.51 miles upstream from the DNA collection site suggesting that a reservoir exists between these sites or that significant contamination input occurs between these sites. The results indicate that the water in Pismo Creek and Lagoon is not suitable for human contact. Pismo Beach ocean water had high occurrence of human eDNA and dog eDNA but bacterial levels were generally acceptable for human contact. San Luis Obispo Creek Mouth (SLO Creek Mouth) had consistently high levels of human eDNA, *E. coli*, and *Enterococcus* along with lower amounts of dog, poultry, and swine. The water at the mouth of SLO Creek is generally not suitable for human contact. Avila Beach had human eDNA in all samples collected along with four dates where *Enterococcus* levels were above safe contact values.

Concerns have been raised about privacy issues related to collection of human eDNA from the environment (Brown, et al. 2023, Whitmore, et al. 2023). The human eDNA collected in this study cannot be used to identify any individual.

Introduction

The Blue Water Task Force (BWTF) of the SLO Surfrider Foundation has been collecting water samples for bacterial contamination at 17 Central Coast sites from Arroyo Grande Creek to San Simeon. Sampling has taken place at two sites for 12 years (Avila Beach and the SLO Creek mouth), at 12 (total) sites for eight years plus the program provides supplies for the CalPoly Club which samples three sites weekly. This sampling program has been operational for 12 years using a volunteer force of trained field collectors and expendable supplies purchased with BWTF funds. When funding allows, we collect and process samples weekly throughout the year. We use an EPA-approved Enterolert process to determine an estimate of bacterial load of *Enterococcus* at each site (Dilworth, 2013). Past collections have revealed persistently high to extremely high levels of enteric bacteria at some sites. Beginning on August 22, 2024, all four of our primary sampling sites (Pismo Creek, Pismo Beach, SLO Creek Mouth, Avila Beach) were visited and Environmental DNA (eDNA) samples collected. Additional samples were collected in February following a rain event. *Enterococcus* samples were collected at the Bello St. bridge. All eDNA samples were collected by either ND or SAR. The source tracking process employed sample collection kits from Jonah Ventures (<https://jonahventures.com>). These kits include materials for water collection, filtering, and preservation of DNA in the samples. Jonah Ventures uses an analytical process called qPCR to identify target bacteria (*Escherichia coli*) and six additional species (bovine, canine, human, poultry, sheep, swine) that may be the source of the bacteria. Beginning on August 28, 2025, samples sent to Jonah Ventures were also analyzed for HF-183, an indicator of human fecal contamination. The numbers for eDNA samples presented below represent an estimate of the number of detectable DNA sequences in 100 ml of original sample. The objectives of this study were to assess the quantity, distribution, and persistence of human and other species eDNA at our four sites. Our main assumption is that when fecal indicator bacteria are present in the environment along with human eDNA, that some of these bacteria likely had a human origin.

Results

The SLO Blue Water Taskforce volunteers sample numerous sites along the Central Coast either weekly or biweekly for *Enterococcus* (depending on fund availability). Historical values for *Enterococcus* at each sample site are presented in Appendix 2-6. Samples were collected on Thursdays with eDNA samples collected on the third Thursday of each month. One collection was carried out on February 6, 2025 following a rain event. Four sites were selected for eDNA sampling based upon historical data and potential human contact with affected water. Maps of the four eDNA collection sites are shown in Figures 1-2 below. The Pismo Creek samples were collected from the Cypress St wooden bridge while the Pismo Beach samples were collected about midway between the Creek outfall into the ocean and the Pismo Beach Pier. The Bello St site is shown at the upper right of Figure 1 and is 0.51 miles upstream from the Pismo Creek site and is monitored for *Enterococcus* only. SLO Creek mouth samples were collected under the San Luis Bay Dr. overpass while Avila Beach samples were collected near the Avila Beach pier.

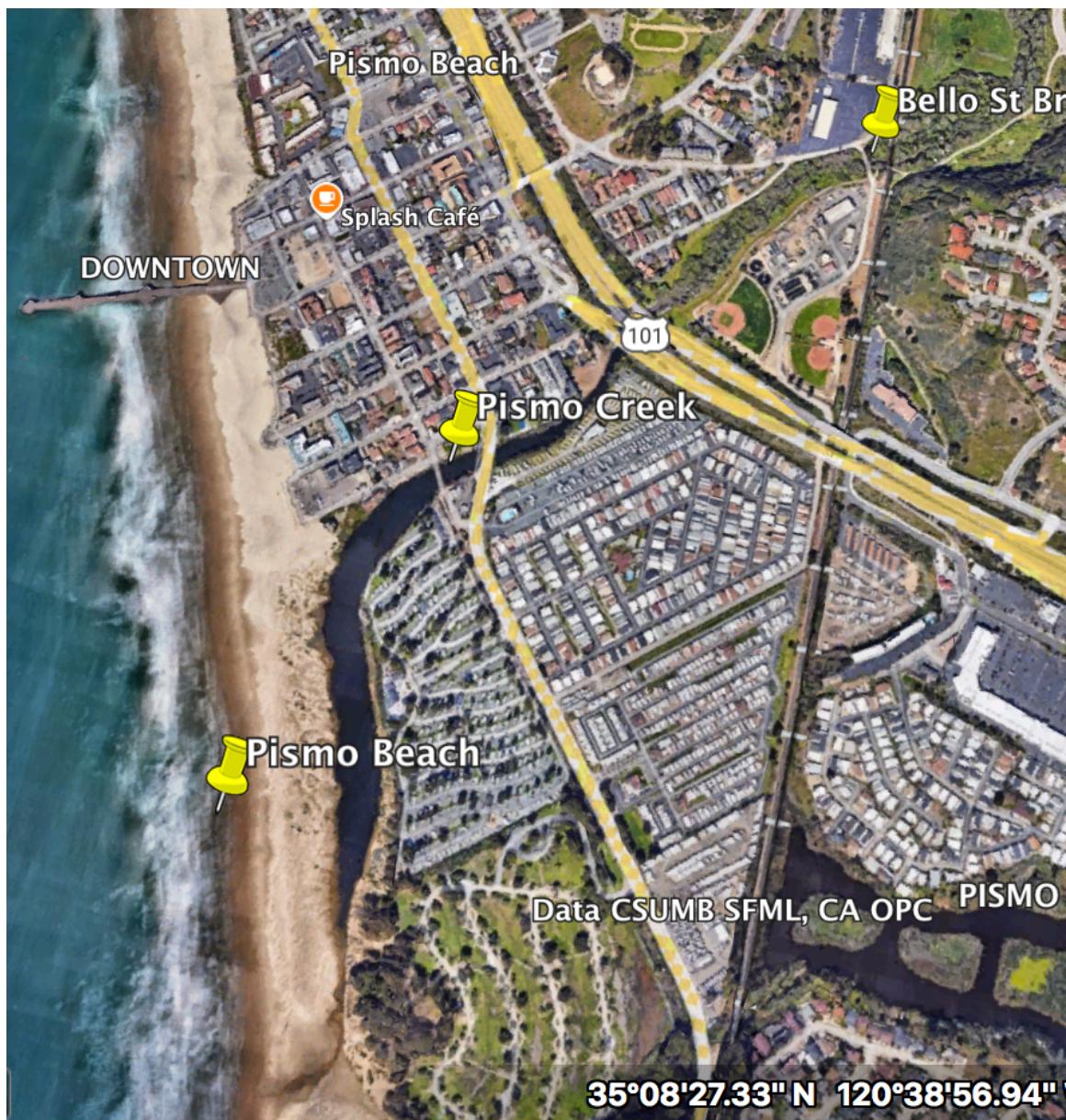


Figure 1. Pismo Beach and Bello St. collecting sites.



Figure 2. The SLO Creek Mouth and Avila Beach collection site for eDNA analysis.

Table 1 below includes all dates and sample sites used for eDNA analysis in this report. Each site was also tested for *Enterococcus* at the same time using our standard procedures (<https://slo.surfrider.org/programs/blue-water-task-force>).

JVB Kit #	Date Sampled	Sites Sampled	* Site List
3925	8/22/24	All Four Sites*	Pismo Creek
4040	9/26/24	All Four Sites*	Pismo Beach
4301	10/24/24	All Four Sites*	SLO Creek Mouth
4377	11/21/24	All Four Sites*	Avila Beach
4484	12/19/24	All Four Sites*	
4542	1/23/25	All Four Sites*	
4572	2/6/25	All Four Sites*	
4620	2/20/25	All Four Sites*	
4697	3/27/25	All Four Sites*	
4745	4/17/25	All Four Sites*	
4881	5/22/25	All Four Sites*	
5004	6/26/25	All Four Sites*	
5125	7/24/25	All Four Sites*	
5341	8/28/25	All Four Sites*	

Table 2. Percent occurrence of eDNA by species for all dates sampled between August 2024 and August 2025.

	Pismo Creek		Pismo Beach		SLO Creek Mouth		Avila Beach	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Human	14/14	100	12/14	86	14/14	100	13/14	93
E. coli	14/14	100	4/14	29	9/14	64	9/14	64
Bovine	10/14	71	1/14	7	4/14	29	1/14	7
Dog	14/14	100	11/14	79	7/14	50	7/14	50
Poultry	10/14	71	7/14	50	7/14	50	9/14	64
Sheep	0/14	0	0/14	0	0/14	0	0/14	0
Swine	3/14	21	2/14	14	5/14	36	2/14	14

Pismo Beach Sites

The following figures (Figure 3-4) represent the occurrence of human eDNA, *E. coli*, and *Enterococcus* at the Pismo Creek and Pismo Beach sites over each of the sampling dates. Pismo Creek had the highest values for human eDNA of all sites tested. Along with human eDNA, *Enterococcus* and *E. coli* were detected in each sample. *Enterococcus*, an approved indicator of fecal contamination, was above the safe limit (104 cells/100 mls) at each collection period. Salinity (parts per thousand dissolved solids, ppt) and pH were measured and recorded for Pismo Creek and Pismo Beach on each sampling date. Pismo Creek salinity varied from 0-23 ppt while pH varied from 7.2-9.1. Pismo Beach salinity varied from 34-36 while pH varied from 7.2-8.5. (Appendix 1)

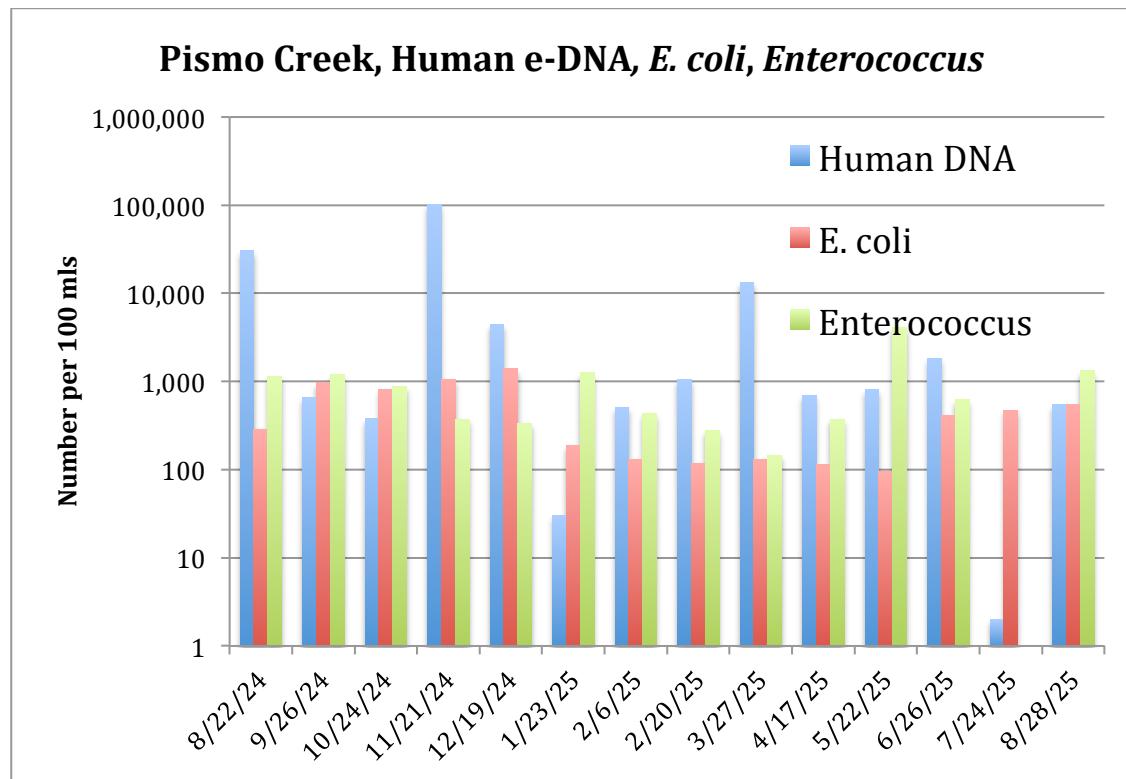


Figure 3. The numbers on the y-axis of the figure represent a best estimate of living cells in 100 ml of sample for *Enterococcus*, and for *E. coli* and human eDNA, the number of DNA fragments carrying the target sequence in 100 ml of sample.

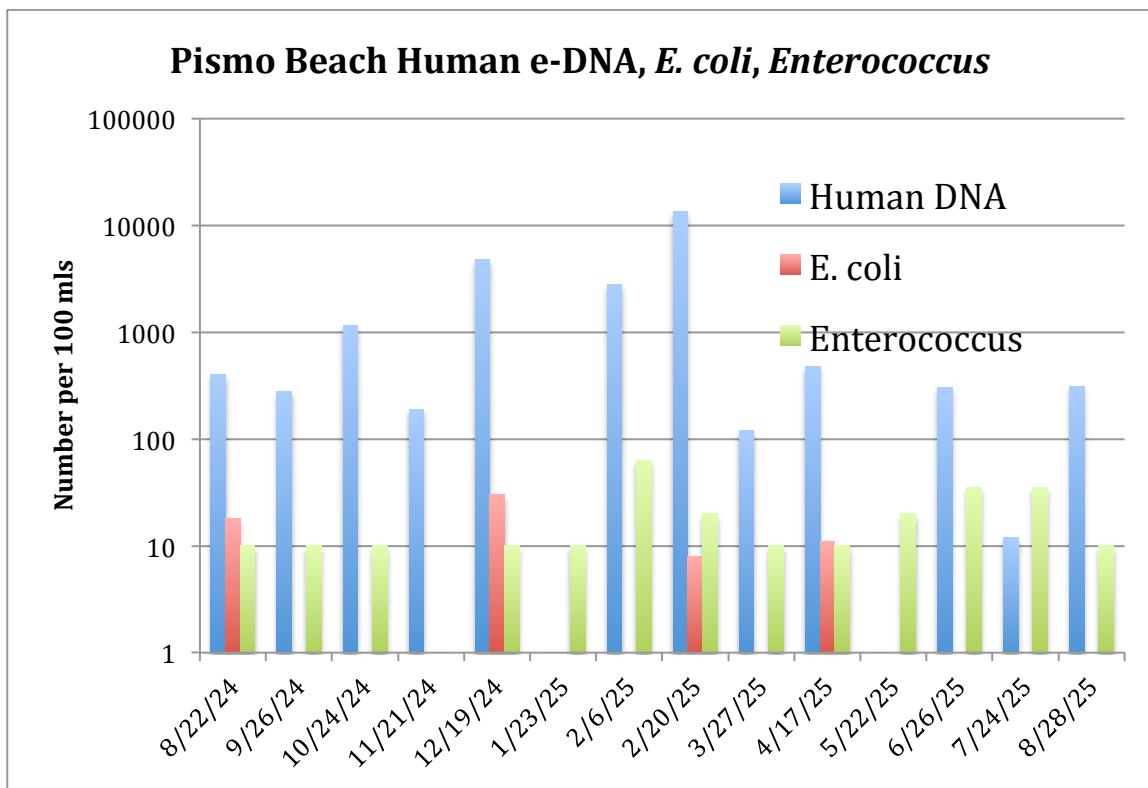


Figure 4. The numbers on the y-axis of the figure represent a best estimate of living cells in 100 ml of sample for *Enterococcus*, and for *E. coli* and human eDNA, the number of DNA fragments carrying the target sequence in 100 ml of sample.

At the Pismo Beach site, human eDNA was detected in all but two samples. The number of sequences detected was lower than Pismo Creek. *E. coli* and *Enterococcus* concentrations were also lower at Pismo Beach than at Pismo Creek. *E. coli* was detected in four samples while *Enterococcus* was detected in all samples except for 11/21/24 at the Pismo Beach site although no Pismo Beach *Enterococcus* values were above the established safe level.

A comparison of *Enterococcus* values collected at Pismo Creek and Bello Street (Figure 5) suggests that either, 1) the source of fecal indicator bacteria and human eDNA is located in the 0.51 mile creek section between the two sample sites, or 2) the Pismo Creek site serves as a reservoir for these substances. Both possibilities could be true.

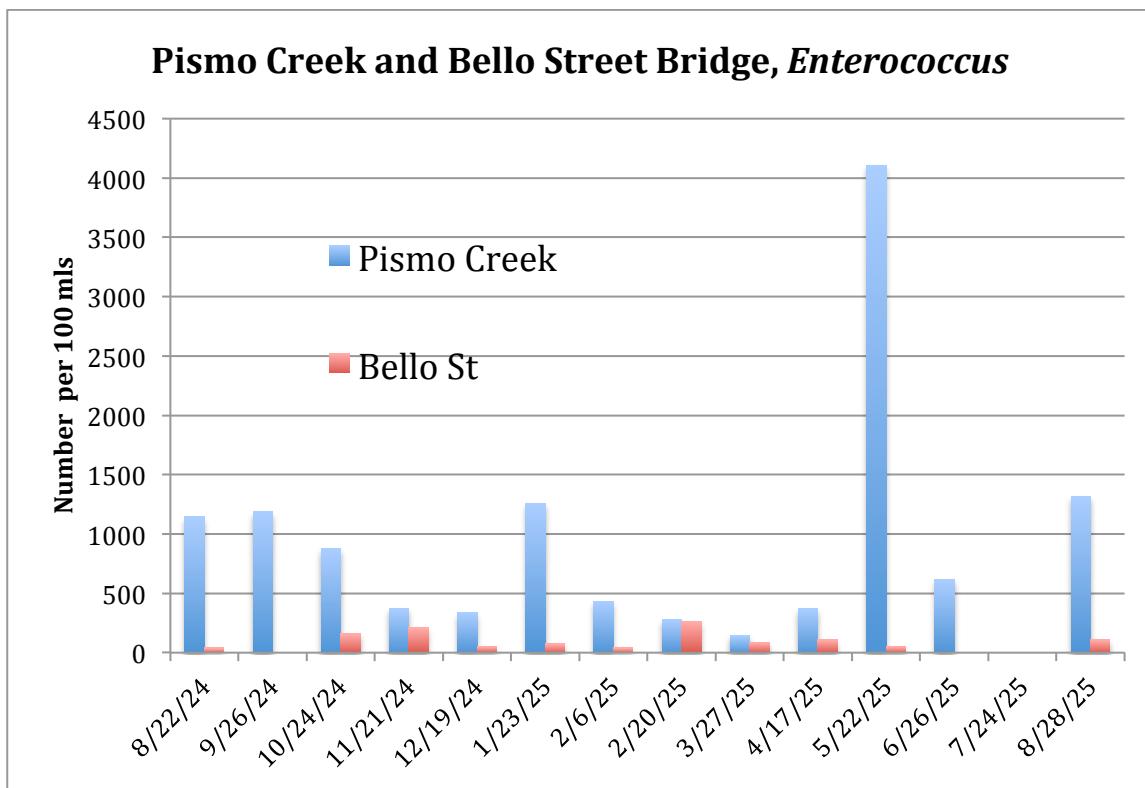


Figure 5. Comparison of *Enterococcus* values at Pismo Creek and at the Bello Street bridge. The Bello St site is 0.51 miles upstream from the Pismo Creek site. The numbers on the y-axis of the figure represent a best estimate of living cells in 100 ml of sample for *Enterococcus*, and for *E. coli* and human eDNA, the number of DNA fragments carrying the target sequence in 100 ml of sample.

Other Species at Pismo Creek and Pismo Beach

In Pismo Creek samples, dog eDNA was detected in all 14 samples while bovine and poultry eDNA was detected in 10 of 14 samples (Figure 6). At Pismo Beach, dog eDNA was detected in 11 of 14 samples, poultry eDNA was detected in 7 of 14 samples and bovine eDNA was detected in 1 of 14 samples (Figure 7). Swine eDNA was detected in 3 of 14 samples collected in Pismo Creek and 2 of 14 samples collected from Pismo Beach (not shown on Figure 6).

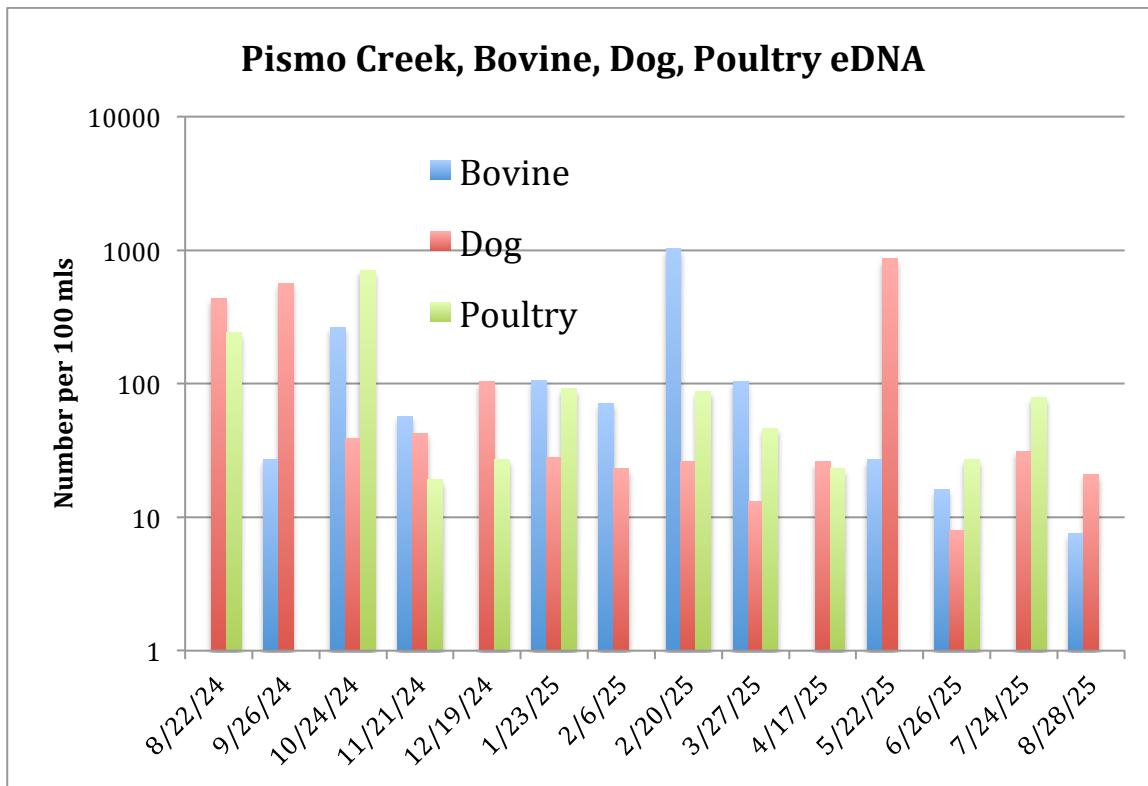


Figure 6. The numbers on the y-axis of the figure represent a best estimate of the number of DNA fragments at Pismo Creek carrying the target sequence in 100 ml of sample.

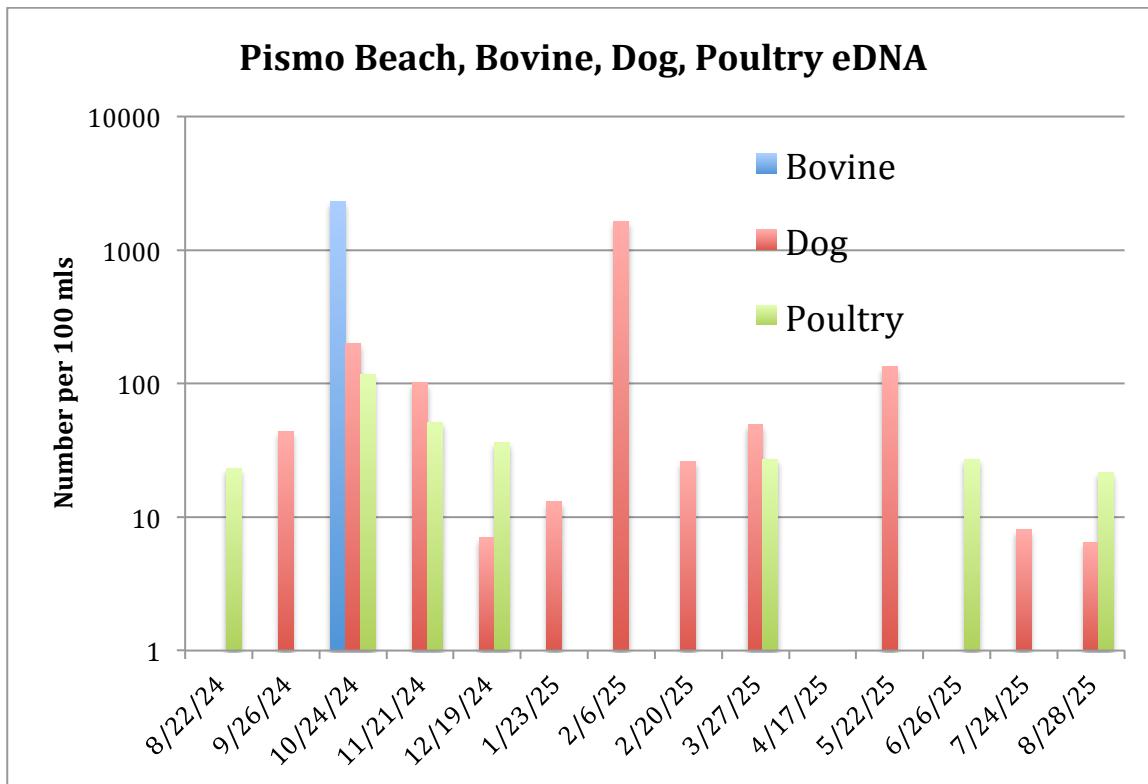


Figure 7. The numbers on the y-axis of the figure represent a best estimate of the number of DNA fragments at Pismo Beach carrying the target sequence in 100 ml of sample.

SLO Creek Mouth and Avila Beach Sites

SLO Creek Mouth had human eDNA detected in all samples. The human eDNA concentrations were generally lower than those reported from Pismo Creek and Pismo Beach (Figures 3 & 4). *E. coli* was not detected at SLO Creek mouth on five sampling dates. *Enterococcus* concentrations were above safe contact levels on six occasions. Salinity and pH were measured and recorded for SLO Creek Mouth and Avila Beach. SLO Creek Mouth salinity varied from 5-35 ppt while pH varied from 7-8.6. Avila Beach salinity varied from 7-35 ppt and pH varied from 7.2-8.6 (Appendix 1).

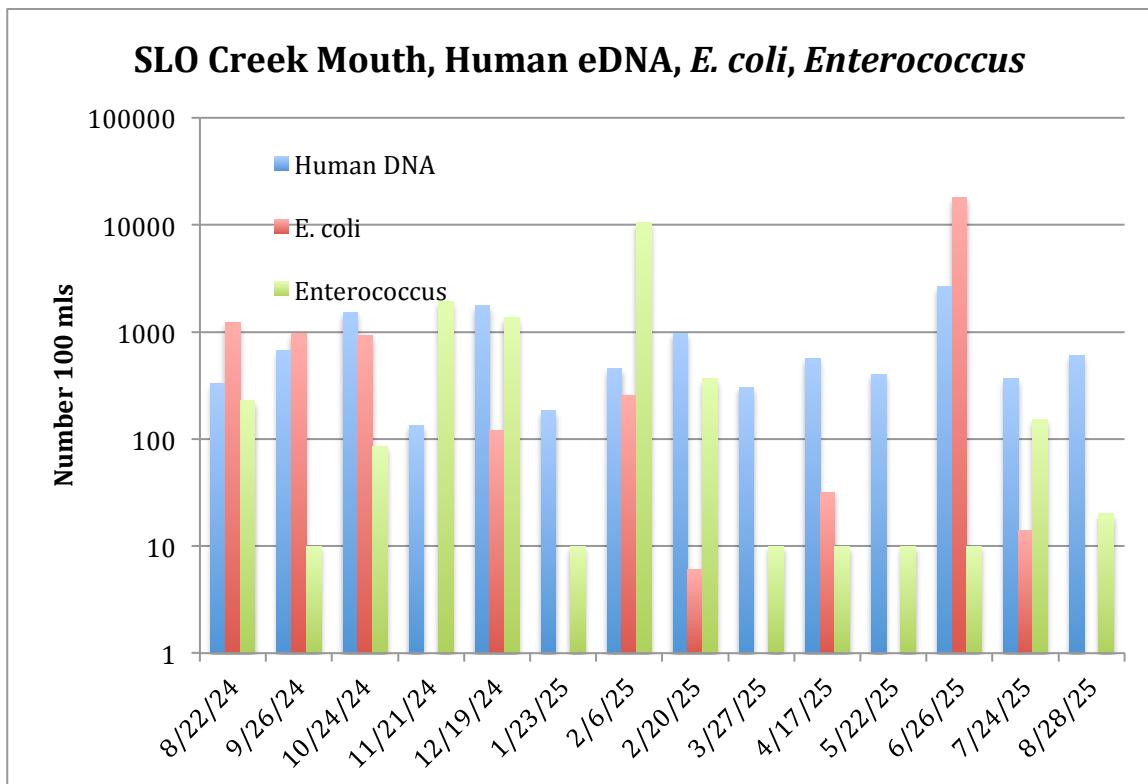


Figure 8. The numbers on the y-axis of the figure represent a best estimate of living cells in 100 ml of sample for *Enterococcus*, and for *E. coli* and human eDNA, the number of DNA fragments carrying the target sequence in 100 ml of sample.

Avila Beach had human eDNA on every sampling date except for samples collected on July 24, 2025. *E. coli* was detected at Avila Beach on eight sampling dates but concentrations were generally lower than SLO Creek Mouth. *Enterococcus* concentrations were above safe contact levels on four dates at Avila Beach.

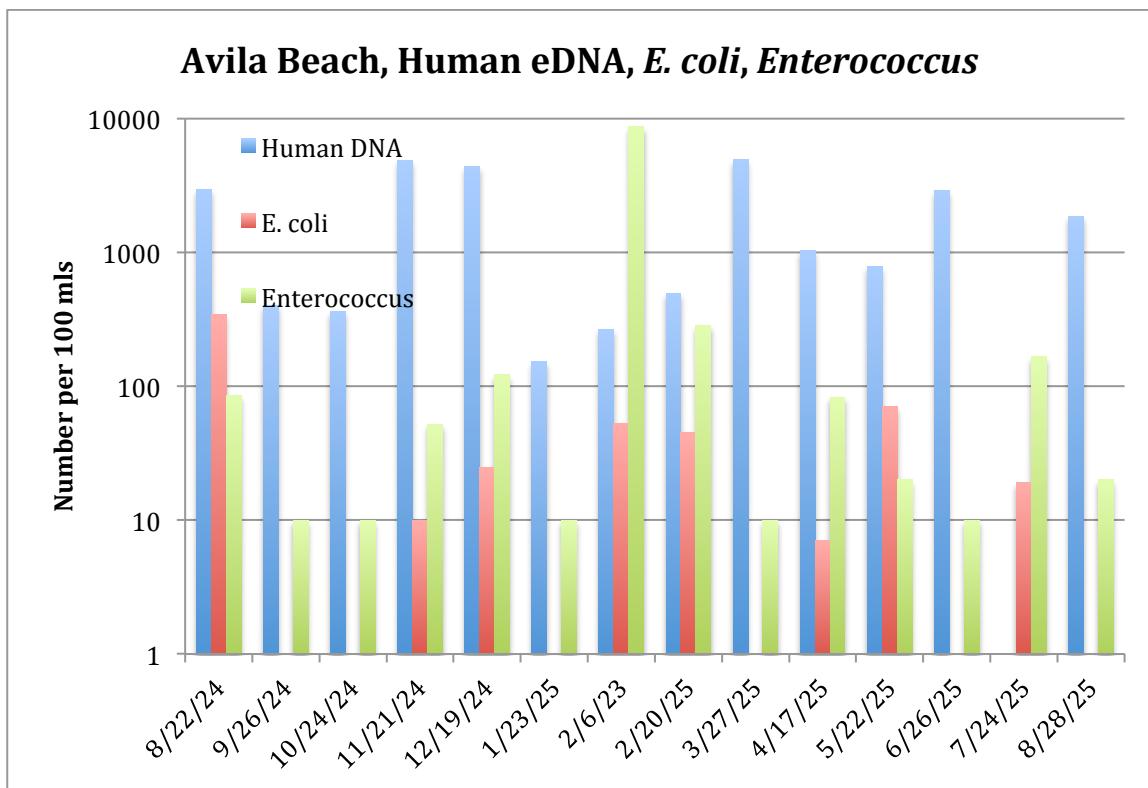


Figure 9. The numbers on the y-axis of the figure represent a best estimate of living cells in 100 ml of sample for *Enterococcus*, and for *E. coli* and human eDNA, the number of DNA fragments carrying the target sequence in 100 ml of sample.

Other Species at SLO Creek and Avila Beach

Bovine eDNA peaked at SLO Creek mouth on February 6, 2025 following a rain event. Dog and poultry eDNA was detected in seven samples. Swine eDNA was detected in six samples (not shown in Figure 10).

At Avila Beach, bovine eDNA was detected in one samples following a rain event. Poultry eDNA was present in nine samples while dog eDNA was found in eight samples (Figure 11).

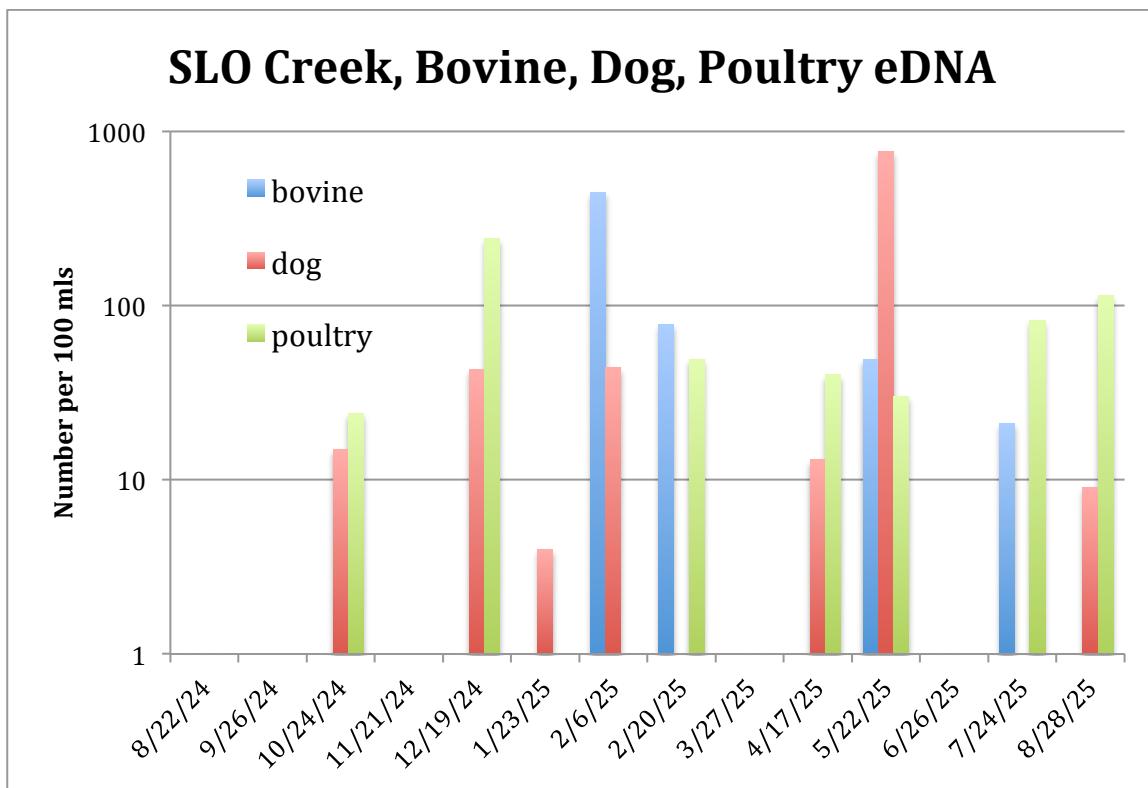


Figure 10. The numbers on the y-axis of the figure represent a best estimate of the number of DNA fragments at SLO Creek Mouth carrying the target sequence in 100 ml of sample

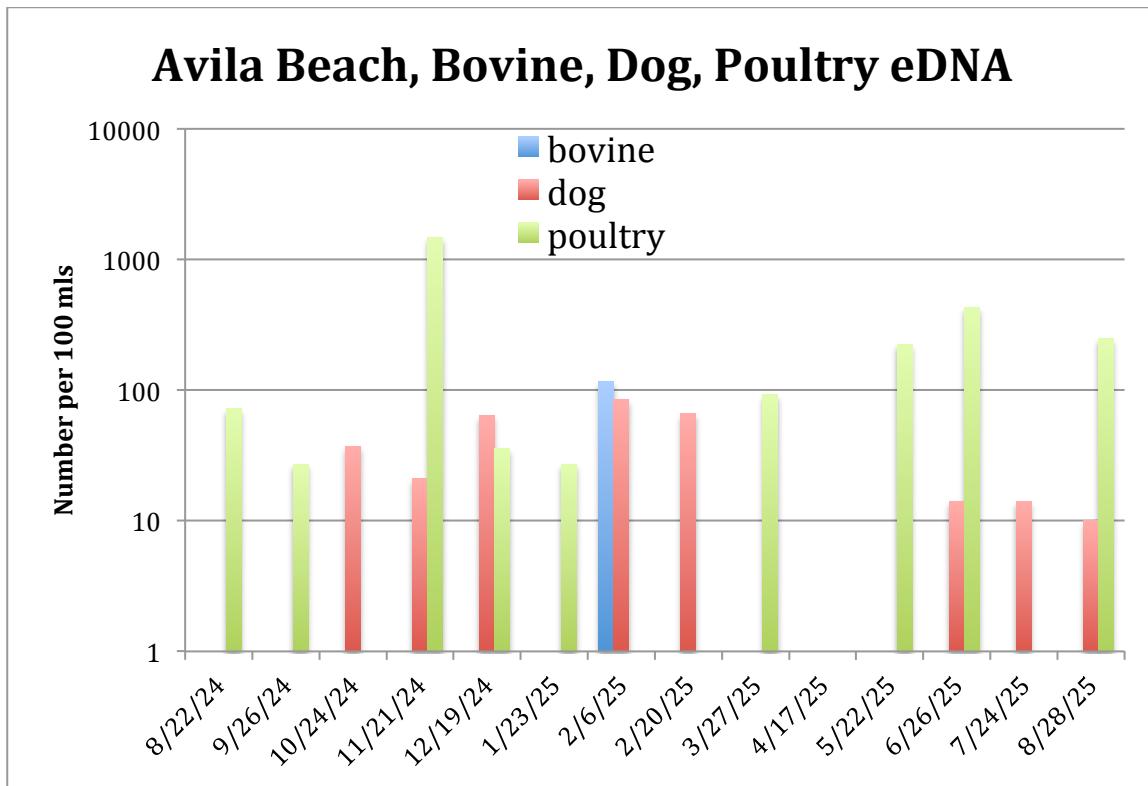


Figure 11. The numbers on the y-axis of the figure represent a best estimate of the number of DNA fragments at Avila Beach carrying the target sequence in 100 ml of sample.

Discussion

Collection of eDNA for species identification or for other purposes is a relatively new technique and has only recently been applied to water quality testing. Little data are available on “normal” background levels of human eDNA in water bodies. The second national workshop on marine eDNA was held in 2020 and among the conclusions reached were that “This diverse collection of attendees assembled with the goal of achieving cross-sector collaboration and working together to identify the necessary next steps to move eDNA methods into the management application mainstream” (Stepien, et al. 2022) This article clearly shows that eDNA is a new and novel indicator that may have numerous applications. Keeping in mind that our sampling regime employs monthly collections of “snapshot data”, we still managed to detect human eDNA at every sample site on most of the dates. The basis for using human eDNA as an indicator of fecal contamination is that *E. coli* and *Enterococcus* are historically associated with fecal contamination and when present along with human eDNA, indicate that at least some of the bacteria detected are of human origin. This suggests that other human pathogens may be present in the water bodies tested as was found by Kitts, et al. (2010) in Pismo Beach. Kitts, et al. (2010) found seven bacterial pathogens and two protozoan pathogens in Pismo Creek and Pismo Lagoon. Some of the bacterial species are more common in birds (*Aeromonas* spp., *Pseudomonas* spp., and *Campylobacter*) while others are associated with human pathogens (*Salmonella* spp., *Shigella* spp. *Vibrio parahaemolyticus*, *Vibrio vulnificus*). The protozoan pathogens, *Giardia* and *Cryptosporidium*, were likewise detected in this study and are known to infect humans. With the current spread of Bird Flu H5N1 and its transfer to humans, the abundant bird populations in Pismo Creek and Pismo Lagoon represent a possible threat.

Kitt, et al. (2010) also collected data on the physical characteristics of Pismo Beach and Pismo Creek.. They reported significant correlations between *E. coli* abundance and 1) time since last tidal wash of beach, 2) salinity, 3) onshore wind, 4) wave height, and 5) mean wave period. *Enterococcus* abundance likewise correlated with 1) time since last tidal wash, 2) mean sea level, 3) onshore wind, and 4) rain:turbidity. They also explored the dilution of effluent from the combined sewer outfall in San Luis Bay and found that effluent was not detected beyond 500m from the source. In general, of the sites sampled, Pismo Creek and Pismo Lagoon had the highest levels of *E. coli* and *Enterococcus* suggesting that during rain events when the Lagoon fills or flows into the ocean, this may be a significant source of fecal indicator bacteria.

In the present study, Pismo Creek had the highest numbers and most consistent occurrence of human eDNA, *E. coli* and *Enterococcus*. A second site on Pismo Creek 0.51 miles upstream from the Cypress St bridge was sampled for *Enterococcus* but not for eDNA (Bello St. bridge). This site had *Enterococcus* concentrations much lower than the Cypress St. site with 5/11 samples showing bacterial levels above the safe contact limit at Bello St. while all samples had an *Enterococcus* level above the safe contact limit at Cypress St. It seems that much of the fecal indicator bacteria (and likely the human eDNA) are concentrated in the lower section of Pismo Creek where the water deepens and slows. This may provide a reservoir of accumulated bacteria and eDNA that could enter the ocean during high-flow rain events. It is likewise possible that the high numbers of bacteria that we see in the lower Creek could have been added to the Creek water downstream of the Bello St site.

Residential and commercial development along the lower Creek should be examined for possible contributions to the bacterial load.

In the Pismo Beach samples, human eDNA was detected on all but two occasions (January 23 and May 22, 2025) while *Enterococcus* and *E. coli* concentrations were consistently below the safe contact limit. In times of heavy Creek flow into the ocean, there may be times when bacterial and eDNA concentrations are much higher but environmental factors such as wind, waves, and currents may dissipate the pollutants quickly. More intensive sampling would be necessary to address this idea. During low creek flow times, human eDNA and bacteria could be entering the ocean from a variety of sources such as 1) humans in the water, 2) dogs on the beach, and 3) horses on the beach. In a recent study on human genomic bycatch (Whitmore, et al. 2023), the authors reported recovering human eDNA from footprints in the sand as well as other sources. Many residents and tourists walk the shoreline at Pismo Beach leaving abundant footprints in the sand. Any human eDNA left behind would likely be washed into the ocean during high tides and could help explain the relatively high values recorded in this study for human eDNA. Onshore winds and wave action could concentrate the human eDNA near the shore where we collect samples.

SLO Creek Mouth had the second highest concentrations of bacteria and human eDNA of the four sites sampled. *Enterococcus* was detected at each sampling date while *E. coli* was detected on eight of fourteen sample dates. Human eDNA was detected on all fourteen sample dates. *Enterococcus* concentrations were above safe contact limits on six of fourteen dates. SLO Creek has a long and complex drainage basin leading to high variability in water quality (Appendix 4). SLO Creek has a relatively continuous flow rate and sources of fecal contamination and human eDNA may originate upstream where the Creek flows through residential, commercial, and urban environments. Other species detected at SLO Creek Mouth include dog (50% of samples), poultry (50% of samples), swine (36% of samples), and bovine (29% of samples).

Avila Beach samples were collected near the Avila Beach pier, not far from the outfall of SLO Creek Mouth. *Enterococcus* and human eDNA were identified in all samples collected near the pier. *E. coli* was detected in eight of fourteen collected samples. Dog DNA was detected in 50% of samples collected at Avila Pier but this is expected considering that this is a “dog beach” each morning until 10:00 AM. Bovine (7% of samples), poultry (64% of samples) and swine (14% of samples) DNA were detected on occasion (see Table 2). In addition to input from SLO Creek, Avila Beach should experience similar environmental condition as Pismo Beach with respect to concentration of bacteria and DNA along the shoreline.

An issue about privacy has been raised in the literature (Whitmore et al. 2023) and in the press (Brown, 2023) with regard to collection of human eDNA from the environment. Concerns include identification of individuals without their consent and potential tracking of individuals. Human DNA has been collected from water, sand, and air in sufficient quantities to link to specific individuals. In the present study, small segments of mitochondrial DNA that are specific to *Homo sapiens* but not to individuals were amplified using qPCR. Identification of individual humans requires much larger sequences and numerous individual-specific loci. Our human eDNA samples could never be used to identify a specific individual.

Final Notes

1) Pismo Creek typically curves South before reaching the ocean and forms a lagoon (Pismo Lagoon) that extends down the upper beach several hundred meters before flowing into the ocean (Figure 1). In the late summer of 2025, the sand berm along the beach blocked the lagoon outflow into the ocean and the lagoon expanded down the beach for an additional hundred meters or so. This enlarged lagoon was shallow and warm (compared to the ocean) forming an attractive play area for families and small children. Since the lagoon was filled with essentially the same water as Pismo Creek, we collected a lagoon water sample adjacent to our regular Pismo Beach site on October 23, 2025. The *Enterococcus* value for this lagoon sample showed 5,475 cells per 100 mls while the Pismo Creek sample, collected on the same day showed 860 cells per 100 mls. This suggests that the Pismo Lagoon water is not safe for human contact.

2) Beginning in August 2025, we have requested that Jonah Ventures test our source tracking samples for HF-183 in addition to the regular seven species. HF-183 refers to a DNA sequence that is found in a bacterial genus (*Bacteroides*) and is reported to be a human-specific indicator of fecal contamination (Shanks and Korajkic, 2020). The US EPA has issued guidelines for testing water samples for HF-183 but acceptable standards have not been published yet by the EPA (Method 1696: Characterization of Human Fecal Pollution in Water by HF183/BacR287 TaqMan® Quantitative Polymerase Chain Reaction (qPCR) Assay. US EPA, March 2019). Several literature reports have suggested risk-based thresholds (RBT) for HF-183. Schoen, et al. (2020) determined an RBT for HF-183 at 910-930 copies per 100 mls of sample. Lowry, et al. (2025) suggested an RBT of 100 copies per 100 mls for HF-183. Our samples were tested for HF-183 on August 28 and October 23, 2025. Pismo Creek had 10,622 hits per 100 mls on 8/28/25 and 24,650 hits on 10/23/25. The remaining three source tracking sites did not show detectable levels of HF-183.

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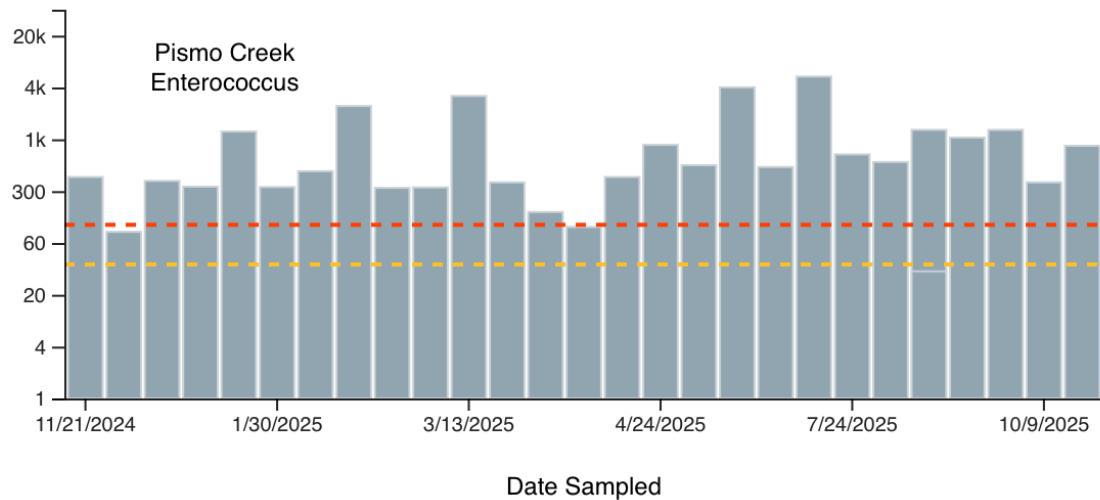
Whitmore, Liam, Mark McCauley, Jessica A. Farrell, Maximillian R. Stammnitz, Samantha A. Koda, Narges Mashkour, Victoria Summers, Todd Osborne, Jenny Whilde and David Duffy. 2023. Inadvertent human genomic bycatch and intentional capture raise beneficial applications and ethical concerns with environmental DNA. *Nature Ecology & Evolution* 7:873-888.

US EPA. Method 1696: Characterization of Human Fecal Pollution in Water by HF183/BacR287 TaqMan[®] Quantitative Polymerase Chain Reaction (qPCR) Assay. US EPA, March 2019

Appendix

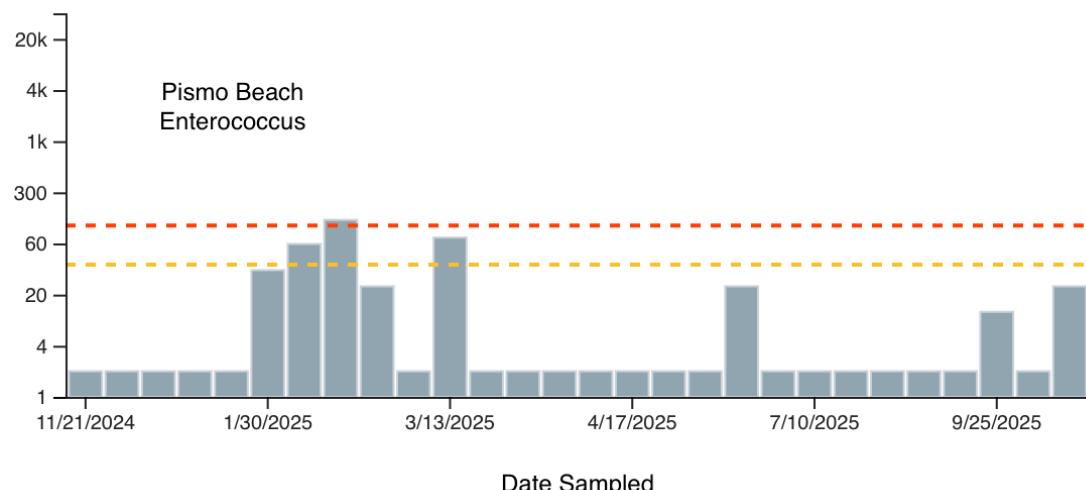
Salinity	8/22/24	10/24/24	11/21/24	12/19/24	1/23/25	2/6/25	2/20/25	3/27/25	4/17/25	5/22/25	6/26/25	7/24/25	8/28/25
Pismo Creek	0	8	23	19	6	2	0	0	0	0	0	0	0
Pismo Beach	35	35	36	34	36	35	35	35	35	35	35	35	35
SLO Creek Mouth	25	27	34	17	35	6	5	35	15	35	25	25	28
Avila Beach	34	35	35	34	35			7	35	35	35	34	34
pH													
	8/22/24	10/24/24	11/21/24	12/19/24	1/23/25	2/6/25	2/20/25	3/27/25	4/17/25	5/22/25	6/26/25	7/24/25	8/28/25
Pismo Creek	8.5	8.6	7.9	8.1	7.2	8.1	8.2	8.7	8.5	9.1	9.1	9.15	8.71
Pismo Beach	8.2	8.2	7.5	7.9	7.2	8.1	8	8.3	8.4	8.5	8.4	8.17	8.1
SLO Creek Mouth	8.1	8.2	7.5	7.6	7	7.9	8.2	8.4	8.3	8.6	8.2	8.11	8.4
Avila Beach	8.1	8.2	7.5	7.7	7.2			8.1	8.4	8.4	8.6	8.2	8.04

Appendix 1. Salinity (parts per thousand) and pH at each site



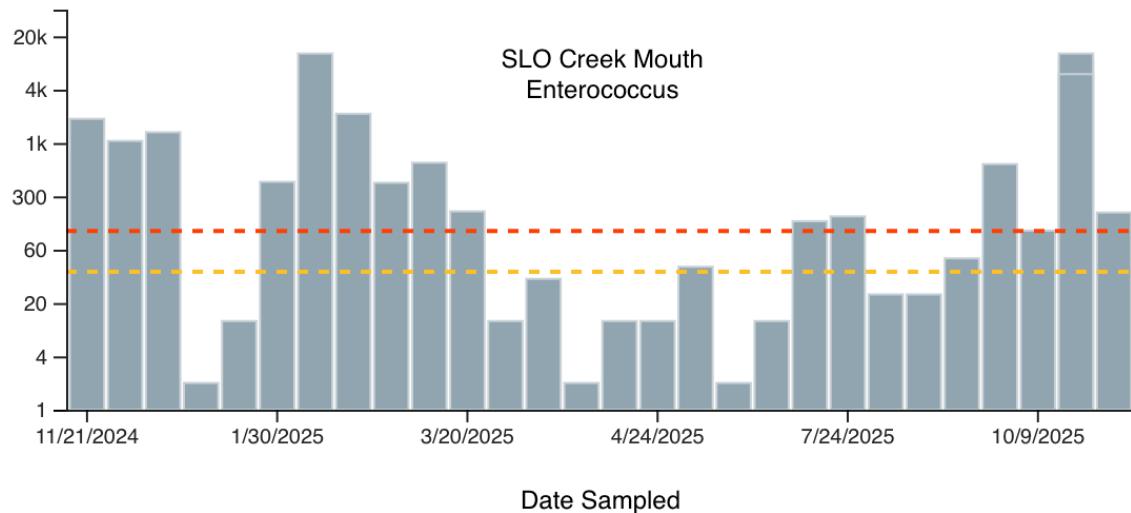
Appendix 2. Historical data for *Enterococcus* abundance at Pismo Creek.

y-axis values represent Most Probable Number (MPN) for *Enterococcus*



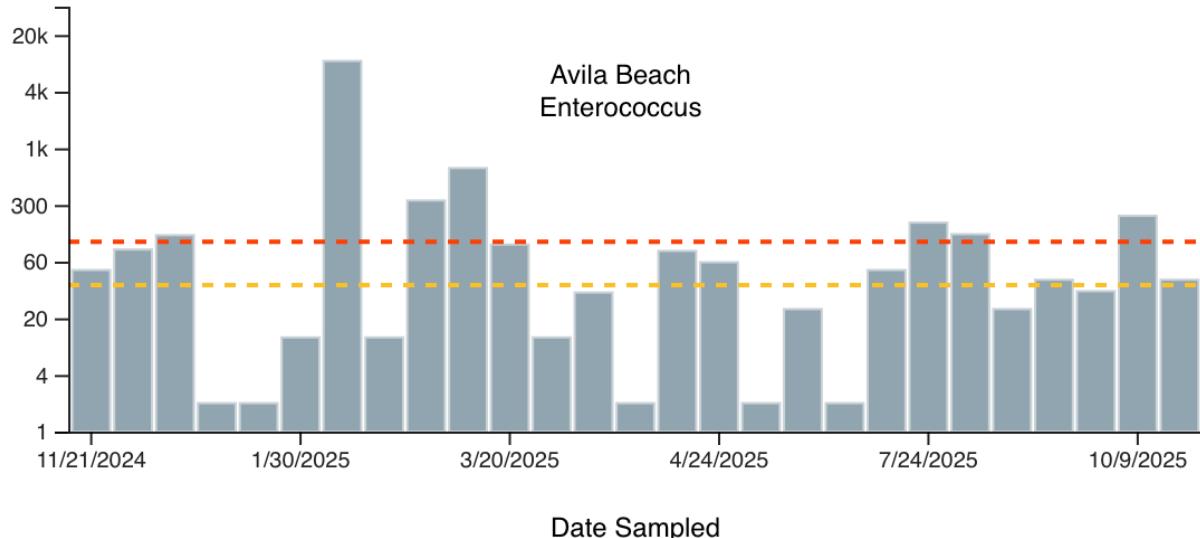
Appendix 3. Historical data for *Enterococcus* abundance at Pismo Beach.

y-axis values represent Most Probable Number (MPN) for *Enterococcus*



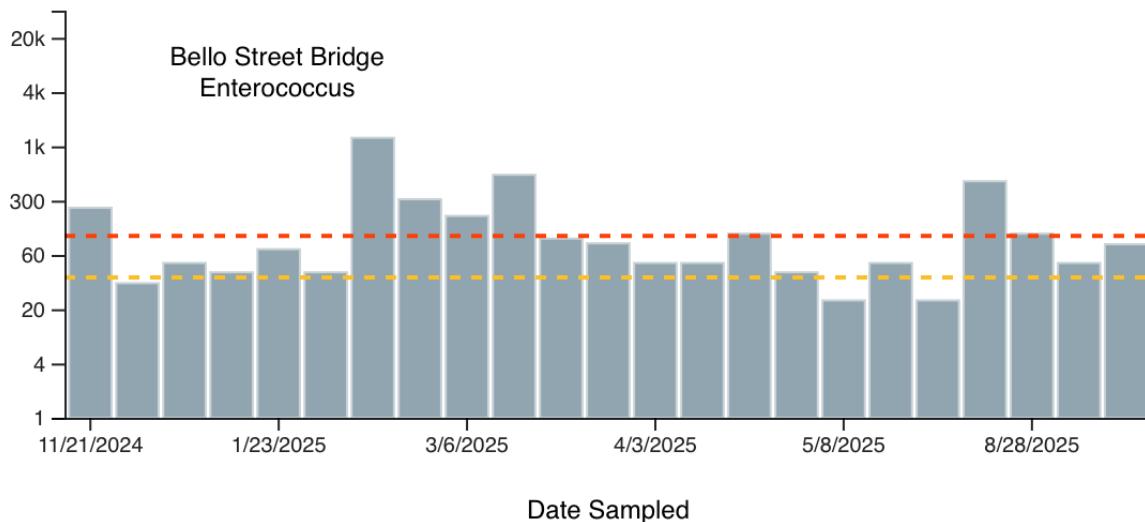
Appendix 4. Historical data for *Enterococcus* abundance at SLO Creek Mouth.

y-axis values represent Most Probable Number (MPN) for *Enterococcus*. The yellow horizontal line represents medium bacterial level while the red line indicates high bacteria level.



Appendix 5. Historical data for *Enterococcus* abundance at Avila Beach.

y-axis values represent Most Probable Number (MPN) for *Enterococcus*



Appendix 6. Historical data for Enterococcus abundance at Bello St bridge.
y-axis values represent Most Probable Number (MPN) for *Enterococcus*

Appendix 7. Summary data for all sample date and species detected.

Sample ID	Sample Site	Date of Sample	Average Number of Copies by Species						
			Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 3036	Pismo Creek	12/20/23	0	7	1	56	29	0	0
JVB 3092	SLO Creek Mouth	1/20/24	0	12	66	73	23	0	0
JVB 3139	Wild Cherry Crk	2/8/24	0	12	14	10	0	0	0
JVB 3709	SLO Creek Mouth	7/16/24	0	0	12,695	0	0	0	0
JVB 3731	Avila Beach	7/16/24	0	11	0	434	0	0	0
			Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 3925	Pismo Creek	8/22/24	0	436	286	30,249	240	0	0
JVB 3925	Pismo Beach	8/22/24	0	0	18	404	23	0	0
JVB 3925	Avila Beach	8/22/24	0	0	346	2,956	72	0	0
JVB 3925	SLO Creek Mouth	8/22/24	0	0	1,224	331	0	0	32
			Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 4040	Pismo Creek	9/26/24	27	566	963	664	0	0	0
JVB 4040	Pismo Beach	9/26/24	0	44	0	277	0	0	0
JVB 4040	Avila Beach	9/26/24	0	0	0	405	27	0	0
JVB 4040	SLO Creek Mouth	9/26/24	0	0	7	1,131	0	0	75
			Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 4301	Pismo Creek	10/24/24	262	39	819	380	706	0	0
JVB 4301	Pismo Beach	10/24/24	2,309	201	0	1,162	117	0	74
JVB 4301	SLO Creek Mouth	10/24/24	0	15	921	1,534	24	0	0
JVB 4301	Avila Beach	10/24/24	0	37	0	362	0	0	0
			Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 4377	Pismo Creek	11/21/24	57	42	1,067	101,863	19	0	8
JVB 4377	Pismo Beach	11/21/24	0	101	0	190	51	0	0
JVB 4377	SLO Creek Mouth	11/21/24	0	0	0	135	0	0	0
JVB 4377	Avila Beach	11/21/24	0	21	10	4,850	1,470	0	0
			Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 4484	Pismo Creek	12/19/24	0	103	1,388	4,445	27	0	34
JVB 4484	Pismo Beach	12/19/24	0	7	30	4,848	36	0	93
JVB 4484	SLO Creek Mouth	12/19/24	0	43	120	1,780	242	0	65
JVB 4484	Avila Beach	12/19/24	0	64	25	4,386	36	0	37

Appendix 7. Continued. Summary data for all sample date and species detected.

		Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 4542	Pismo Creek	1/23/25	106	28	189	30	92	0
JVB 4542	Pismo Beach	1/23/25	0	13	0	0	0	0
JVB 4542	SLO Creek Mouth	1/23/25	0	4	0	183	0	0
JVB 4542	Avila Beach	1/23/25	0	0	0	152	27	0
		Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 4572	Pismo Creek	2/6/25	71	23	132	511	0	0
JVB 4572	Pismo Beach	2/6/25	0	1,646	0	2,793	0	0
JVB 4572	SLO Creek Mouth	2/6/25	445	44	255	455	0	0
JVB 4572	Avila Beach	2/6/25	117	85	53	266	0	0
		Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 4620	Pismo Creek	2/20/25	1,027	26	117	1,054	87	0
JVB 4620	Pismo Beach	2/20/25	0	26	8	13,453	0	0
JVB 4620	SLO Creek Mouth	2/20/25	78	0	6	962	49	0
JVB 4620	Avila Beach	2/20/25	0	66	45	493	0	0
		Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 4697	Pismo Creek	3/27/25	103	13	131	13,281	46	0
JVB 4697	Pismo Beach	3/27/25	0	49	0	121	27	0
JVB 4697	SLO Creek Mouth	3/27/25	0	0	0	305	0	0
JVB 4697	Avila Beach	3/27/25	0	0	0	4,933	92	0
		Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 4745	Pismo Creek	4/17/25	0	26	114	701	23	0
JVB 4745	Pismo Beach	4/17/25	0	0	11	480	0	0
JVB 4745	SLO Creek Mouth	4/17/25	0	13	32	571	40	0
JVB 4745	Avila Beach	4/17/25	0	0	7	1,037	0	0
		Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 4881	Pismo Creek	5/22/25	27	859	96	822	0	0
JVB 4881	Pismo Beach	5/22/25	0	134	0	0	0	0
JVB 4881	SLO Creek Mouth	5/22/25	49	771	0	402	30	0
JVB 4881	Avila Beach	5/22/25	0	0	71	789	224	0
		Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 5004	Pismo Creek	6/26/25	16	8	411	1,823	27	0
JVB 5004	Pismo Beach	6/26/25	0	0	0	307	27	0
JVB 5004	SLO Creek Mouth	6/26/25	0	0	17,900	2,642	0	27
JVB 5004	Avila Beach	6/26/25	0	14	0	2,887	432	62
		Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 5125	Pismo Creek	7/24/25	0	31	471	2	79	0
JVB 5125	Pismo Beach	7/24/25	0	8	0	12	0	0
JVB 5125	SLO Creek Mouth	7/24/25	21	0	14	366	82	0
JVB 5125	Avila Beach	7/24/25	0	14	19	0	0	0
		Bovine	Dog	E. coli	Human	Poultry	Sheep	Swine
JVB 5341	Pismo Creek	8/28/25	8	21	544	848	0	0
JVB 5341	Pismo Beach	8/28/25	0	7	0	312	22	0
JVB 5341	SLO Creek Mouth	8/28/25	21	10	0	606	114	0
JVB 5341	Avila Beach	8/28/25	0	18	19	1864	247	0