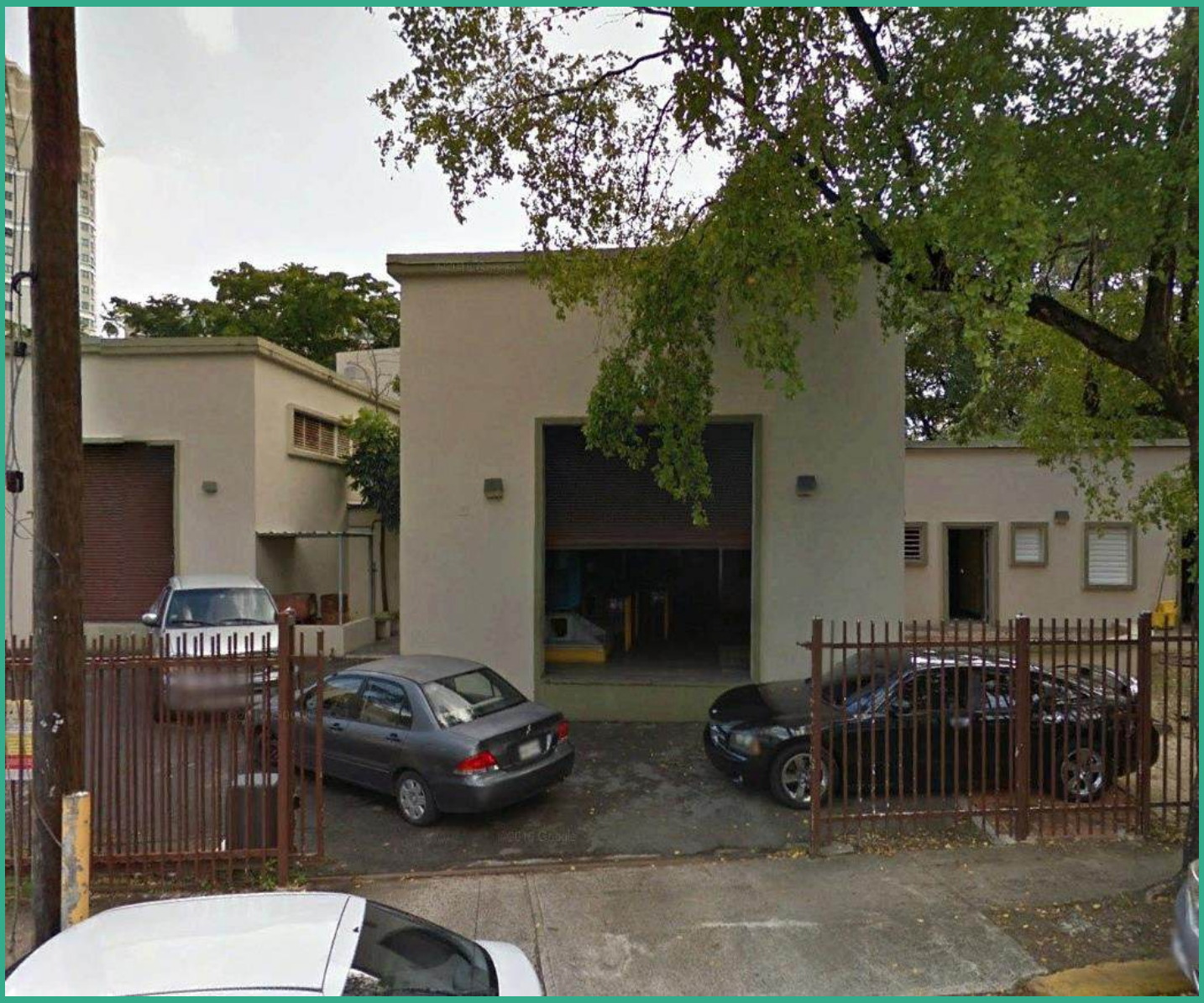
DE DIEGO WATER PUMP REPORT

Agricultural Experiment Station,
UPR, Mayagüez Campus
September, 2024



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EXECUTIVE SUMMARY

On May 3, 2024, the San Juan Bay Estuary Program (SJBE) submitted a Freedom of Information Act (FOIA) Request (Request Submission No. 1188796) to obtain the laboratory analysis results from samples collected at the inlet and discharge points of the de Diego Storm Water FCPS Facility- PREC13 in San Juan, Puerto Rico from 2015 to 2024 (Appendix 1). This facility is located at the Intersection of Julian Blanco Street and Estrella Street Marginal, State Road PR-26, San Juan Puerto Rico. The station's geographic coordinates are 18.451025N (Latitude), -66.065308 (Longitude).

On June 18, The USEPA Caribbean Office provided the analysis results (in PDF format) from samples collected at the inlet manhole of the facility. There were no reports of samples collected at the discharge outlet to the receiving water body (Condado Beach at Latitude 18.455856, Longitude -66.063493). The reports included results from 71 sampling dates (spanning from 4/5/2021 and 3/11/2024) for the biological component, and 31 sampling dates (4/5/21 to 12/4/2023) for the chemical component. The reports were converted to Excel format for analyses.

The absence of results from the point of discharge, and the lack of information on discharge volumens, hinders an assessment of the potential impact of discharges from the facility to the receiving waters. Consequently, this report is constrained to evaluating the nature of the incoming flow.

Median (2,800 MPN/100mL) and average (6,241 MPN/100mL) enterococci results indicate a significant influence of human or animal waste in the incoming flow to the facility. The Water Quality Standards of Puerto Rico establish that the geometric mean of enterococci results in coastal waters shall not exceed 35 colonies /100mL in any 90-day sampling interval, and that the 90th percentile of the samples taken within that interval shall not exceed 130 colonies/100mL. These benchmarks were not met during the sampling period. While these results alone can not determine the impact on the receiving waters (the impact will depend on discharge load (i.e., concentration x volume), and the assimilative capacity of the receiving waters), the results underscore the need to include the receiving waters into the monitoring program.

Results for copper (Cu) (median 11µg/L), mean (13 µg/L) accentuate the contaminant potential of the incoming flow. All sampling events surpassed the regulatory limit of 3.73 µgCu/L for coastal waters. Additionally, the samples surpassed the regulatory limit for turbidity in 42% (13/31) of the sampling events. In the case of dissolved oxygen, 34% of the sampling events were below the regulatory limit (i.e., 5 mg/L). There was no observed correlation between the biological and/or chemical parameters and antecedent rain (24hrs, and 48hrs), suggesting that the nature of the incoming flow is not dependent on runoff from rain events, but might be linked to active contaminant sources within the catchment area.

The biological and chemical characteristics of the incoming flow reflect a significant impact from human activities. Analyses conducted between 2021 to 2024 raise valid concerns about the potential impact of these discharges on the ecological integrity of the receiving waters, as well as the health of beachgoers and residents of the area. This evidence underscores the necessity of including the receiving waters in a monitoring program and evaluating whether this facility should be regulated as a point source of contamination. In the meantime, precautionary measures should be implemented to safeguard the health and safety of the coastal waters and its stakeholders.

RESULTS AND DISCUSSION

Indicators of fecal contamination were measured in samples collected across 71 sampling dates between April 5, 2021, and March 11, 2024. Each sampling event consisted of 5 individual samples collected in sequential order. The findings suggest that the incoming flow consistently exhibits signs of contamination from human or animal waste (Table 1). The Water Quality Standards of Puerto Rico establish that the geometric mean of enterococci results in coastal waters shall not exceed 35 colonies /100mL in any 90-day sampling interval, and that the 90th percentile of the samples taken within that interval shall not exceed 130 colonies/100mL (PRDNER, 2022). Median (2,800 MPN/100mL) and average (6,241 MPN/100mL) enterococci results significantly surpass these thresholds. In fact, the regulatory criteria were not met at any point during the sampling period (Figure 1). Only six (6) samples (1.69%), out of a total of 350 samples collected showed enterococci concentrations of less than 35 MPN/100mL. In contrast, 81% of the samples exhibited concentrations greater than 260 MPN/100mL (Figures 2 and 3). Although, the eventual impact to the receiving waters cannot be established based solely on the composition of the incoming water (the impact will depend on discharge load (i.e., concentration x volume), and the assimilative capacity of the receiving waters), the results emphasize the need to monitor the receiving waters to ascertain the impact of these discharges.

In terms of the chemical parameters, copper concentrations surpassed the Puerto Rico coastal water criteria (i.e., 3.73 µgCu/L) in all the sampling events (Figure 4). Elevated copper concentrations can have adverse effects on aquatic life survival, growth, reproduction, as well as alterations of brain function, enzyme activity, blood chemistry, and metabolism (USEPA, 2007). In addition to copper, the samples exceeded the regulatory limit for turbidity (i.e., 10 NTU) in 42% (13/31) of the sampling events (Figure 5). Similarly, for dissolved oxygen (DO), 34% of the sampling events were below the regulatory limit (i.e., 5 mg/L) (Figures 6, and 7). There was a negative, albeit weak, correlation between DO and total organic carbon, potassium and total nitrogen (Figures 9-11). This aligns with the idea that the incoming flow is impacted by organic waste from the food industry, or sewage of human or animal origin. Increasing organic loads enriched with nutrients is the primary cause of coastal anoxia and the rapid increase in “dead zones” areas around the world. It is imperative to reduce the impact of these contaminant sources to coastal waters.

The data shows a clear positive correlation between total nitrogen and potassium concentrations (Figure 13), as well as between total nitrogen and total dissolved solids (Figure 14). Moreover, there is a strong correlation between electrical conductivity and potassium (Figure 15). These findings once again highlight the contaminated nature of the incoming flow. Total phosphorus was not included in the parameters analyzed which would have been useful to further characterize the impairment source.

There was no correlation between any biological and/or chemical parameter and antecedent rain recorded at the airport (24hrs, and 48hrs). This suggests that the composition of the incoming flow is not influenced by runoff from rain events, but rather may be associated with ongoing contaminant sources within the catchment area.

REFERENCES:

1. PRDNER. 2022. Puerto Rico (305 (b) and 303(d) Integrated Report.
2. USEPA. 2007. Aquatic Life Ambient Freshwater Quality Criteria- Copper. EPA 822-R-07-001. https://www.epa.gov/wqc/aquatic-life-criteria-copper

Table 1: Statistical summary of indicators of fecal contamination at the inlet point of the de Diego Storm Water FCPS Facility.

Parameter	n	mean	sd	median	min	max	range	se
Fecal Coliforms (MPN/100mL)	350	57,269.61	65,613.97	48,000	660	240,000	239,340	3,507.21
Fecal Enterococci (MPN/100mL)	350	6,421.47	7,898.57	2,800	20	24,000	23,980	422.20
Total Coliforms (MPN/100mL)	70	10,4971.4	82,731.97	48,000	24,000	240,000	216,000	9,888.36

Table 2: Statistical summary of the chemical nature of the incoming flow at the inlet point of the de Diego Storm Water FCPS Facility.

Parameter	units	n	mean	sd	median	min	max	range	se
Cu	**µg/L**	31	13.15	10.42	11	4.5	66	61.5	1.87
Zn	**µg/L**	31	40.81	72.35	27	6	423	417	12.99
Res Cl	**mg/L**	31	0.06	0.06	0.05	0.005	0.28	0.275	0.01
Surfactants	**mgLAS/L**	31	0.10	0.10	0.075	0.005	0.575	0.57	0.02
NH4N	**mg/L**	31	0.46	0.40	0.3	0.05	1.81	1.76	0.07
TN	**mg/L**	31	1.41	0.63	1.4	0.426	2.52	2.094	0.11
Oil & Grease	**mg/L**	31	3.98	2.29	3.3	0.6	10.71	10.11	0.41
Turbidity	**NTU**	31	13.42	15.23	9.15	1.5	81	79.5	2.74
K	**mg/L**	31	3.88	1.23	3.47	1.72	6.5	4.78	0.22
TOC	**mg/L**	31	6.67	2.59	6.59	1.97	12.2	10.23	0.46
DO	**mg/L**	32	5.39	0.97	5.475	3.36	7.35	3.99	0.17
SS	**mg/L**	31	5.05	4.79	2	2	21.2	19.2	0.86
TSS	**mg/L**	31	8.32	7.21	6	2	36	34	1.30
VSS	**mg/L**	31	4.32	2.17	4	2	10	8	0.39
BOD	**mg/L**	31	11.92	23.45	5.38	2.5	112	109.5	4.21
pH	**S.U.**	31	7.48	0.32	7.48	6.6	8.15	1.55	0.06
Temperature	**°C**	31	28.89	1.96	29.4	24.6	33.1	8.5	0.35
TDS	**mg/L**	31	250.65	98.57	267	74	462	388	17.70
Color	**PT-CO**	31	22.24	17.57	17	2.5	100	97.5	3.16
Conductivity	**µmhos/cm**	31	423.60	174.16	377	172	816	644	31.28

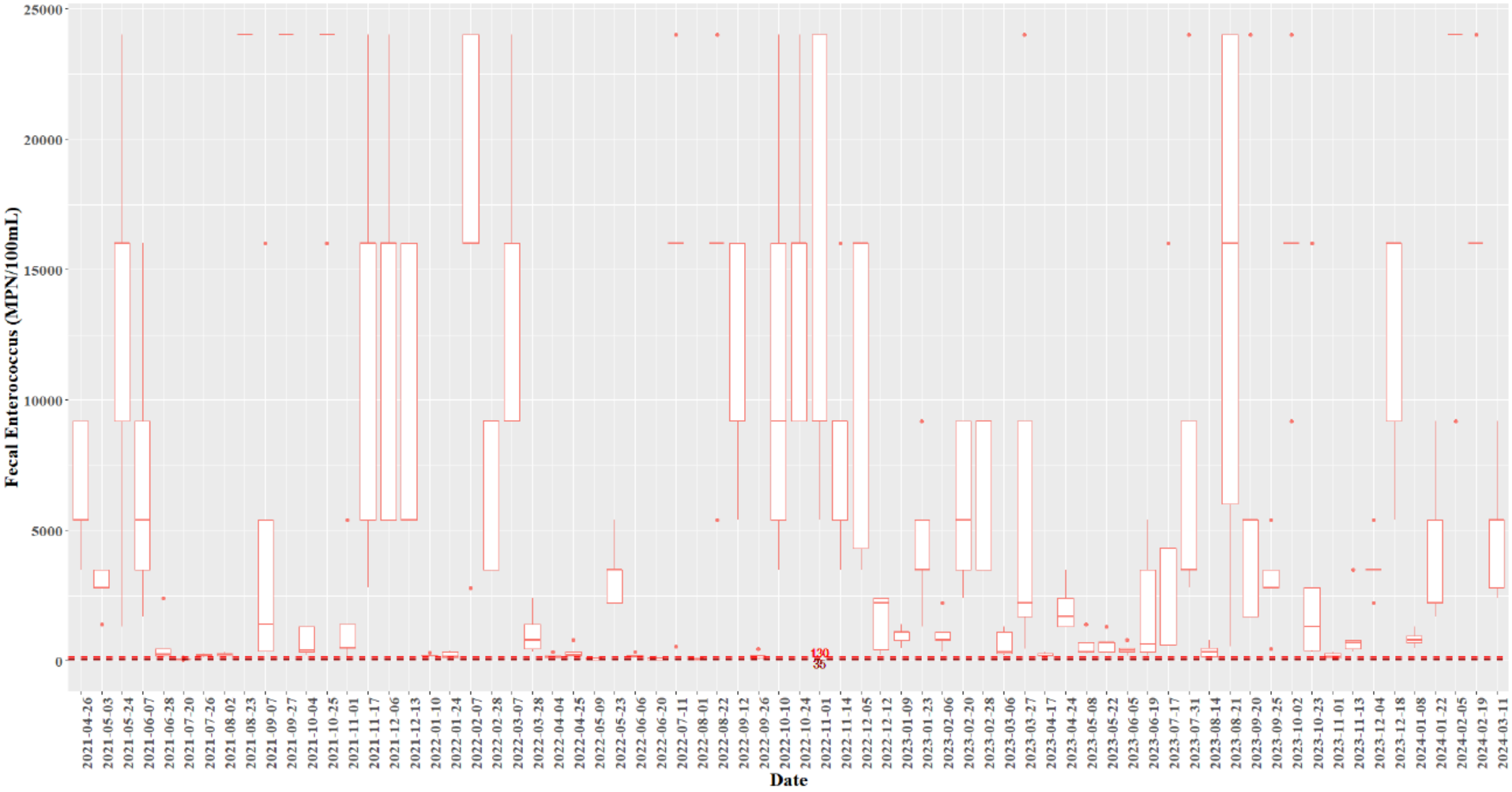

Figure 1:Box plots of fecal enterococci results from samples collected at the inlet manhole of the de Diego Water Pump. Straight line corresponds to mean values. Box top and bottom ends correspond the 75th and 25th percentile values. Guide lines included at the 35 MPN/100 mL and 135 MPN/100mL marks correspond to the Puerto Rico coastal water criteria thresholds.

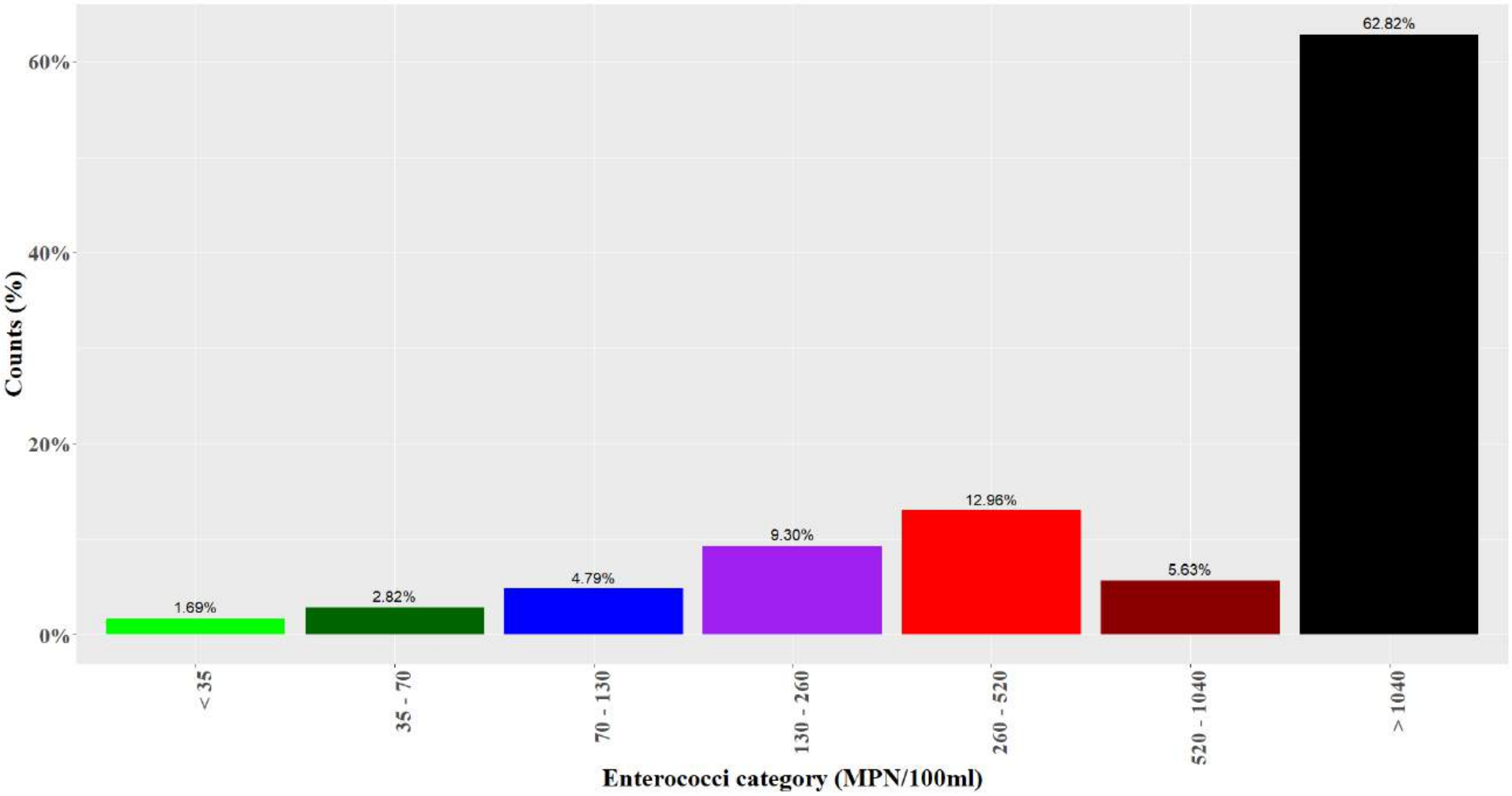

Figure 2: Distribution of Enterococci results by concentration categories. All samples (70 events at 5 samples per event) included.

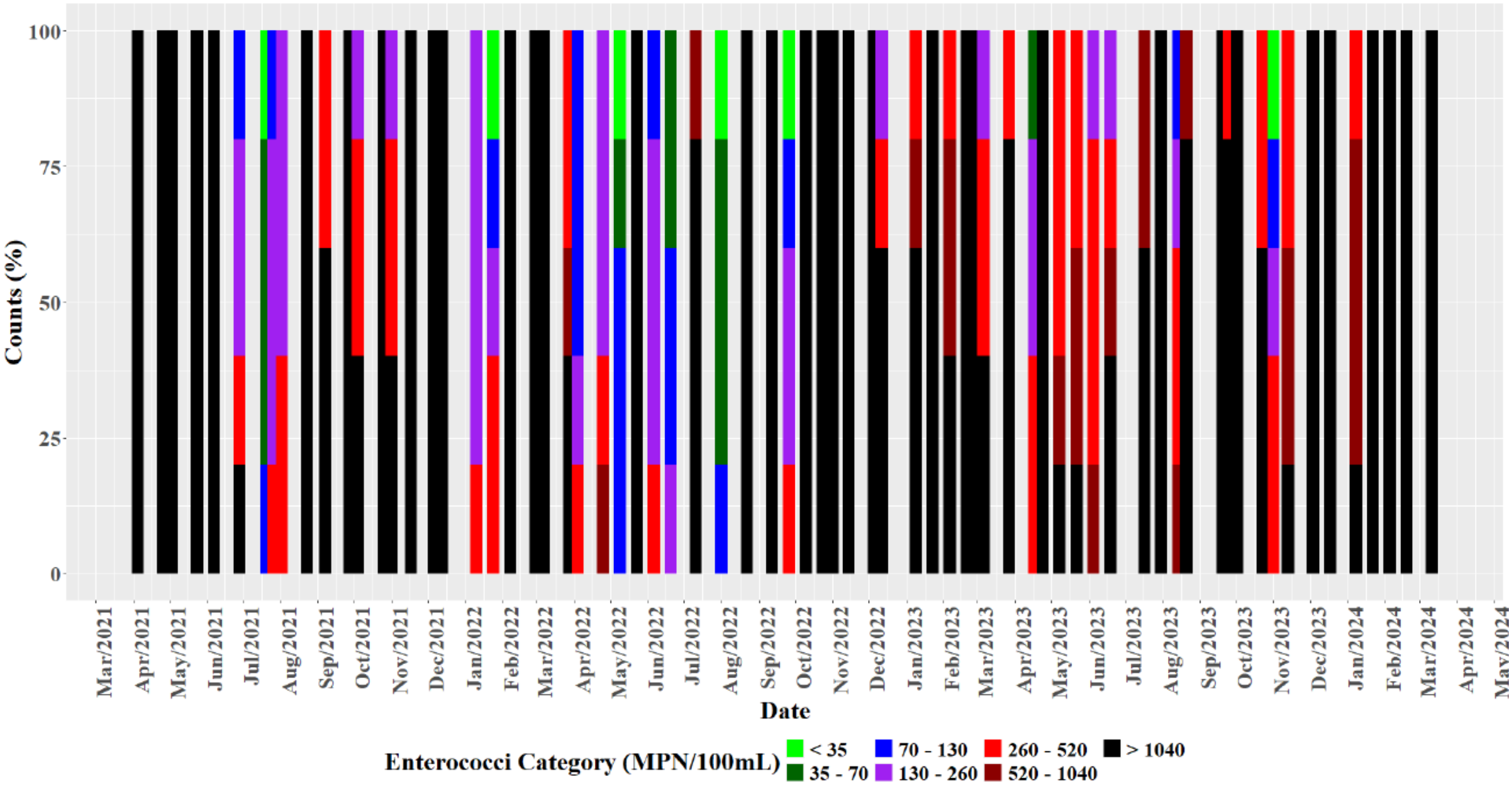

Figure 3: Stacked-bar graph of the Enterococci category distribution per sampling event. There are five samples per sampling event distributed in concentration categories (%).

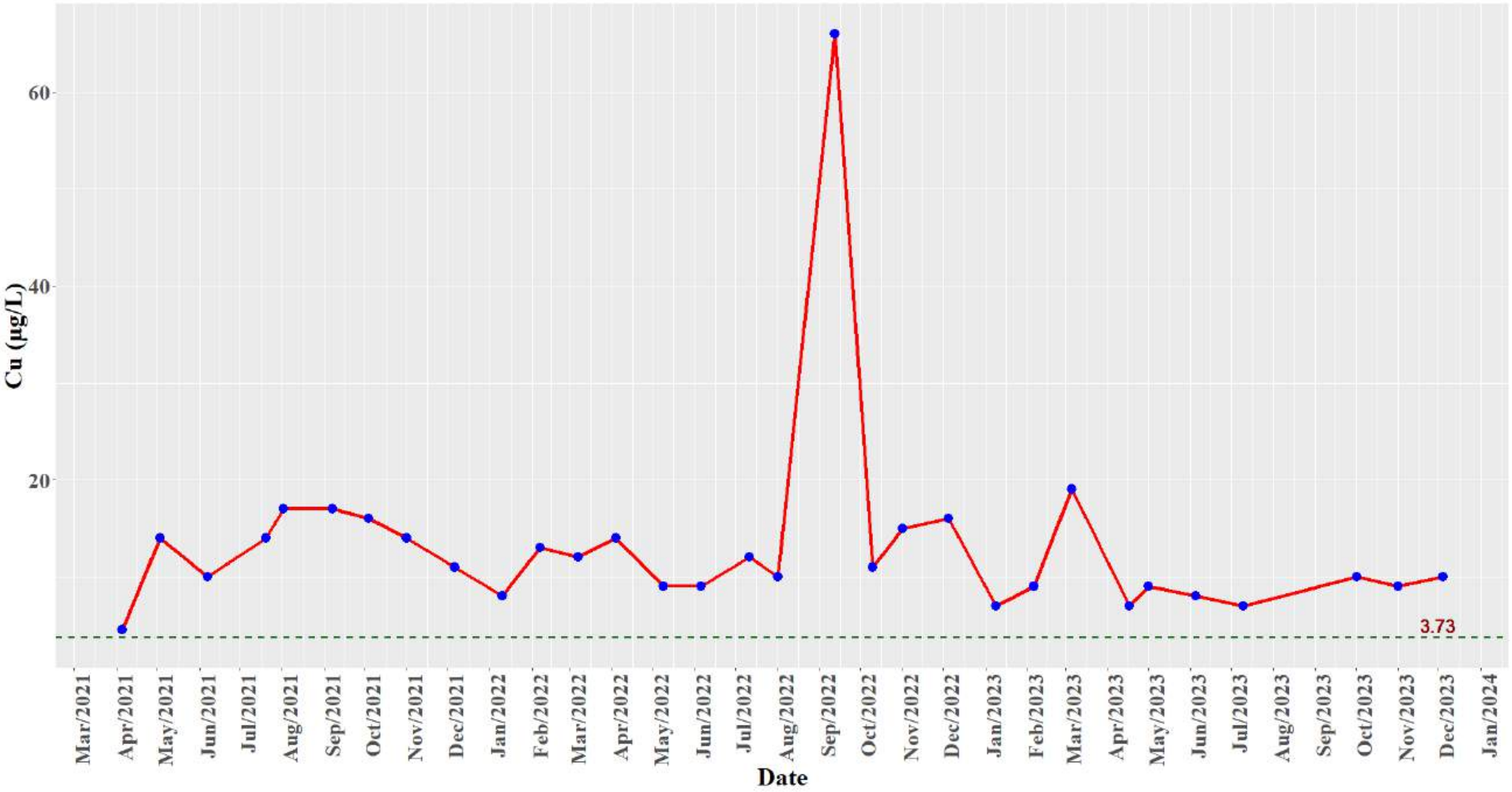

Figure 4: Distribution of copper (Cu) concentration (µg/L) by sampling date. The coastal water criterium (3.73 µg/L) is included as reference.

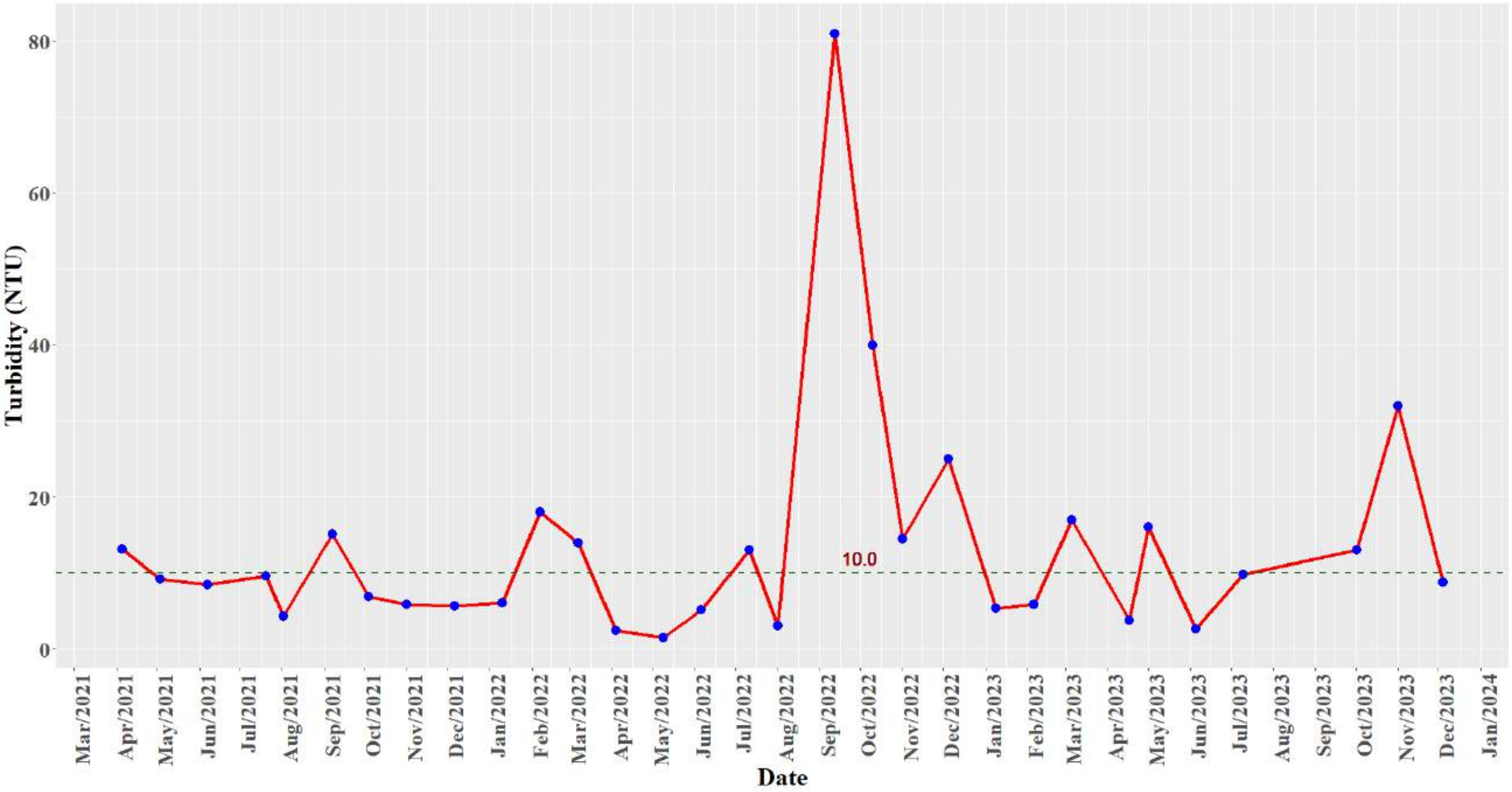

Figure 5: Turbidity results (NTU) by sampling date. The coastal water regulatory limit (10 NTU) is included as reference.

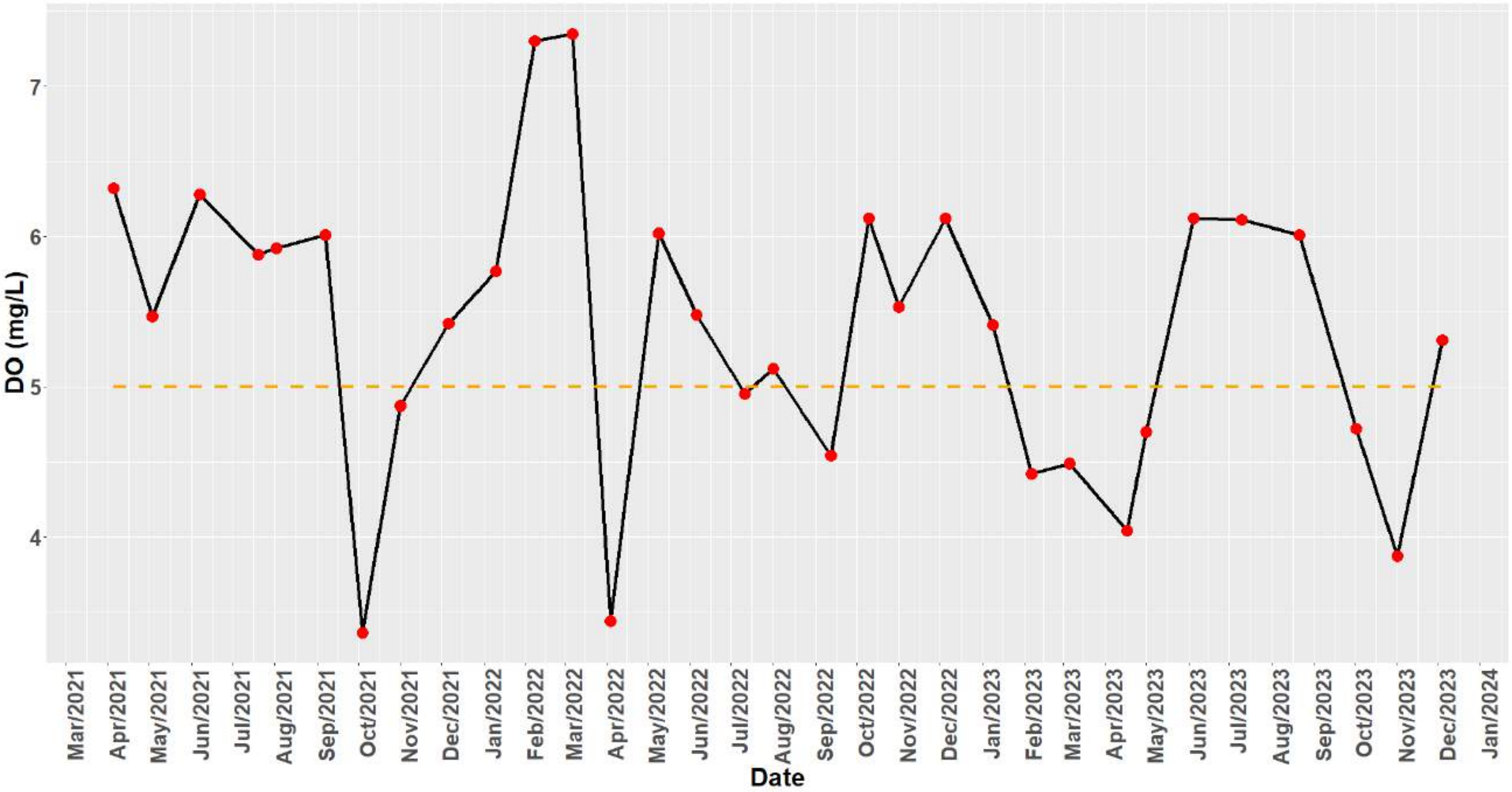

Figure 6: Dissolved oxygen (mg/L) results by sampling date. The coastal water regulatory limit (5 mg/L) is included as reference.

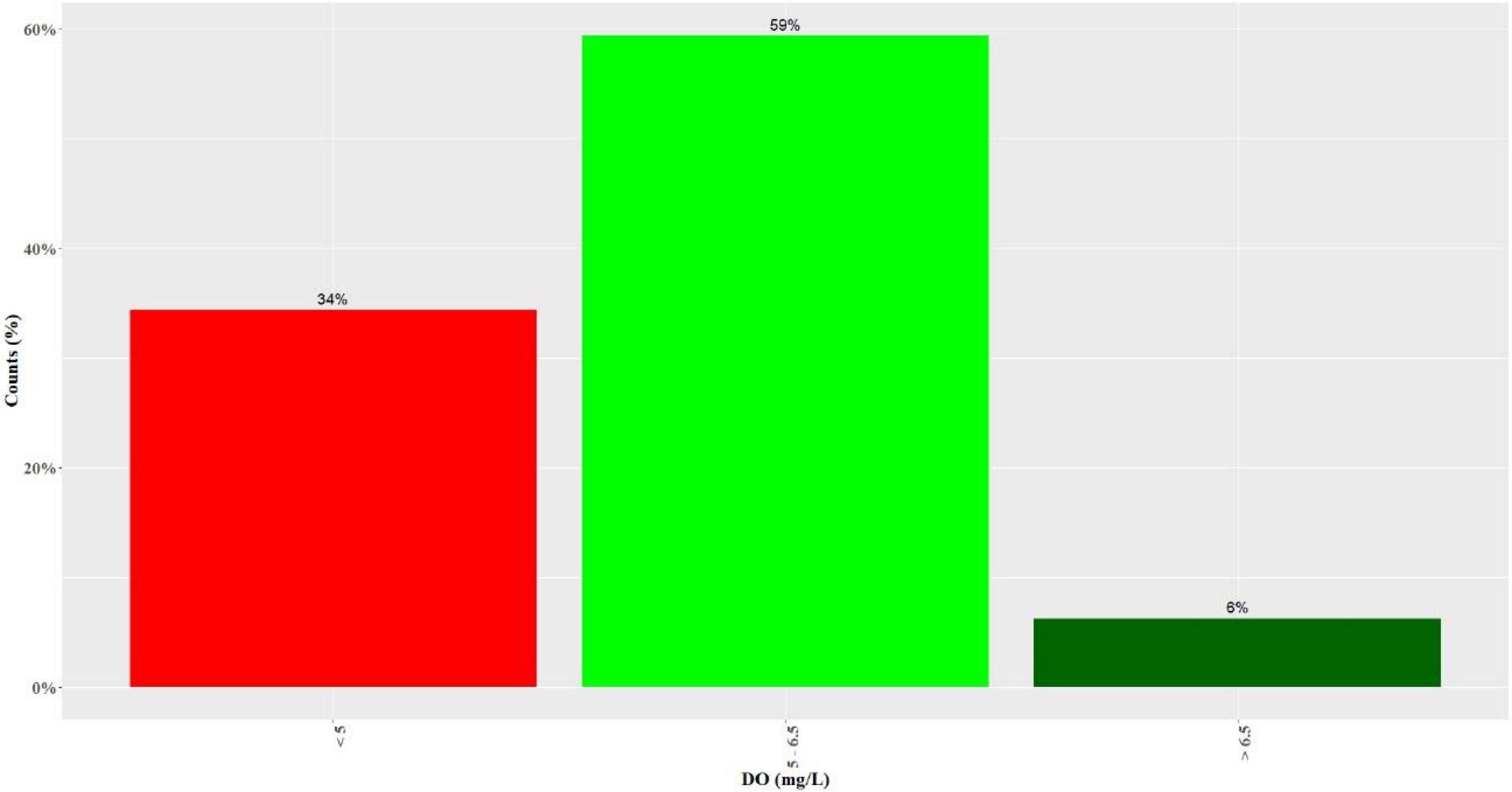

Figure 7: Distribution of dissolved oxygen results by concentration (mg/L) categories.

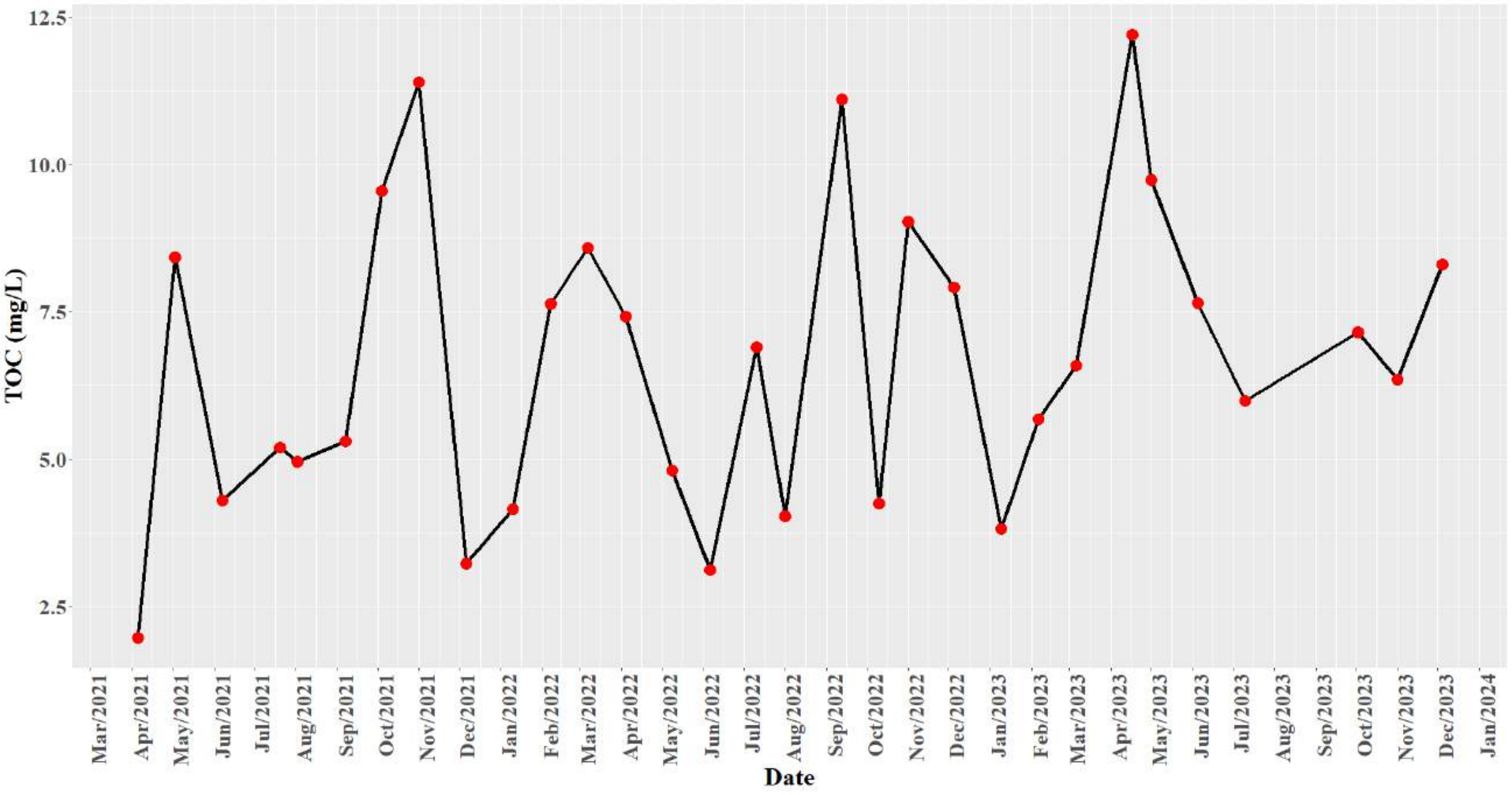

Figure 8: Total organic carbon concentration by sampling event.

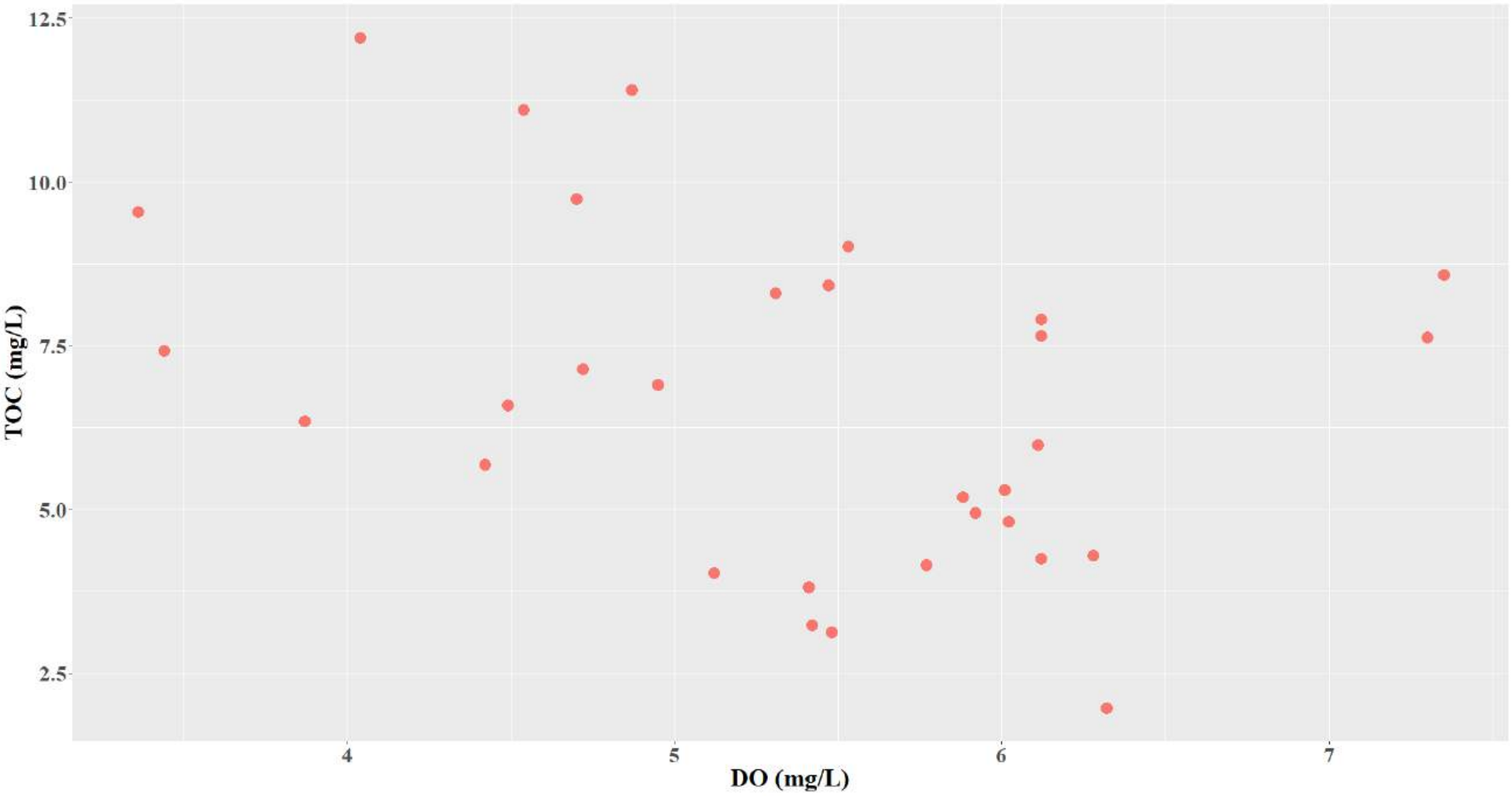

Figure 9: Relationship between dissolved oxygen and total organic carbon.

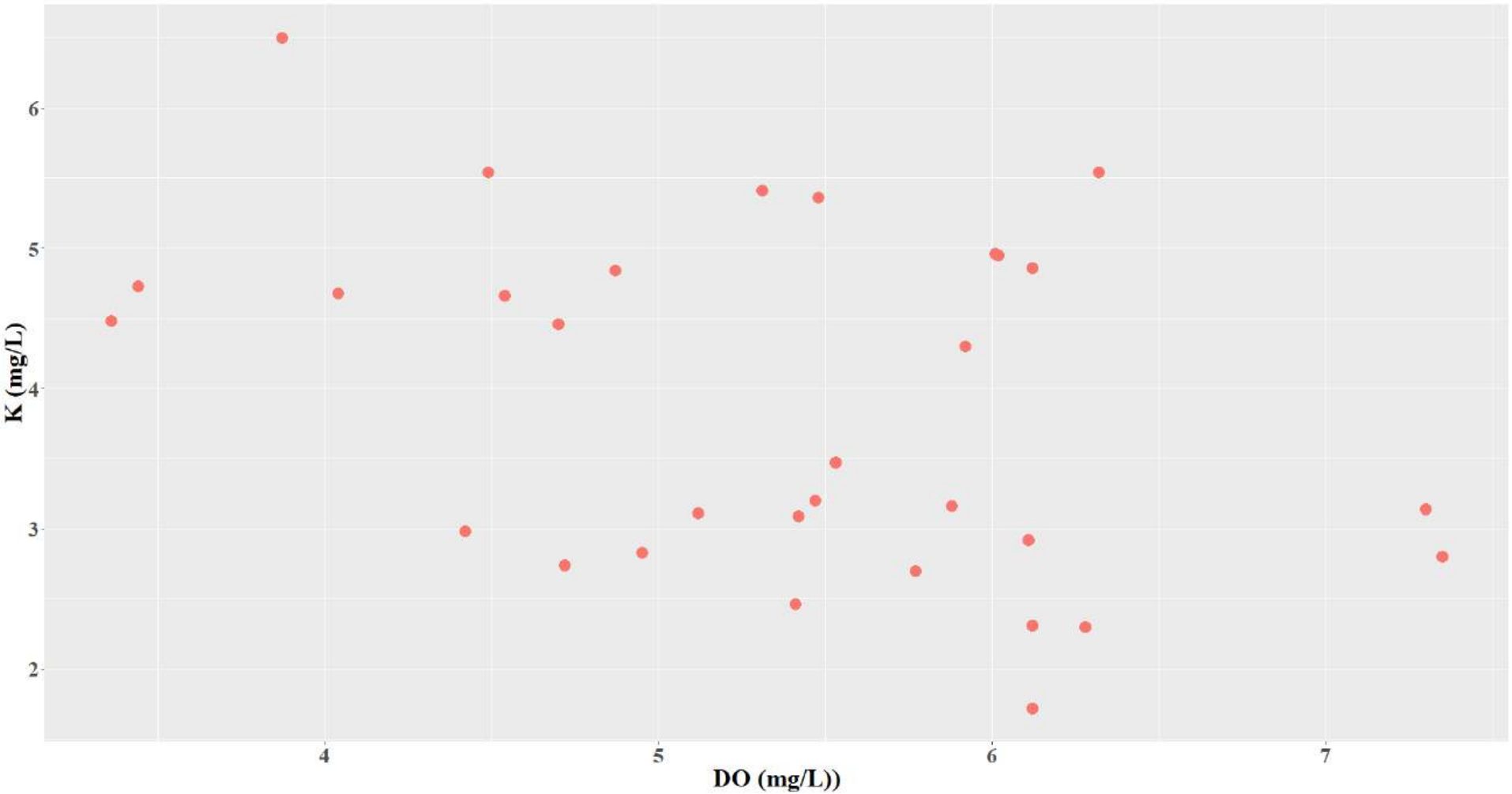

Figure 10: Relationship between dissolved oxygen and total potassium concentrations.

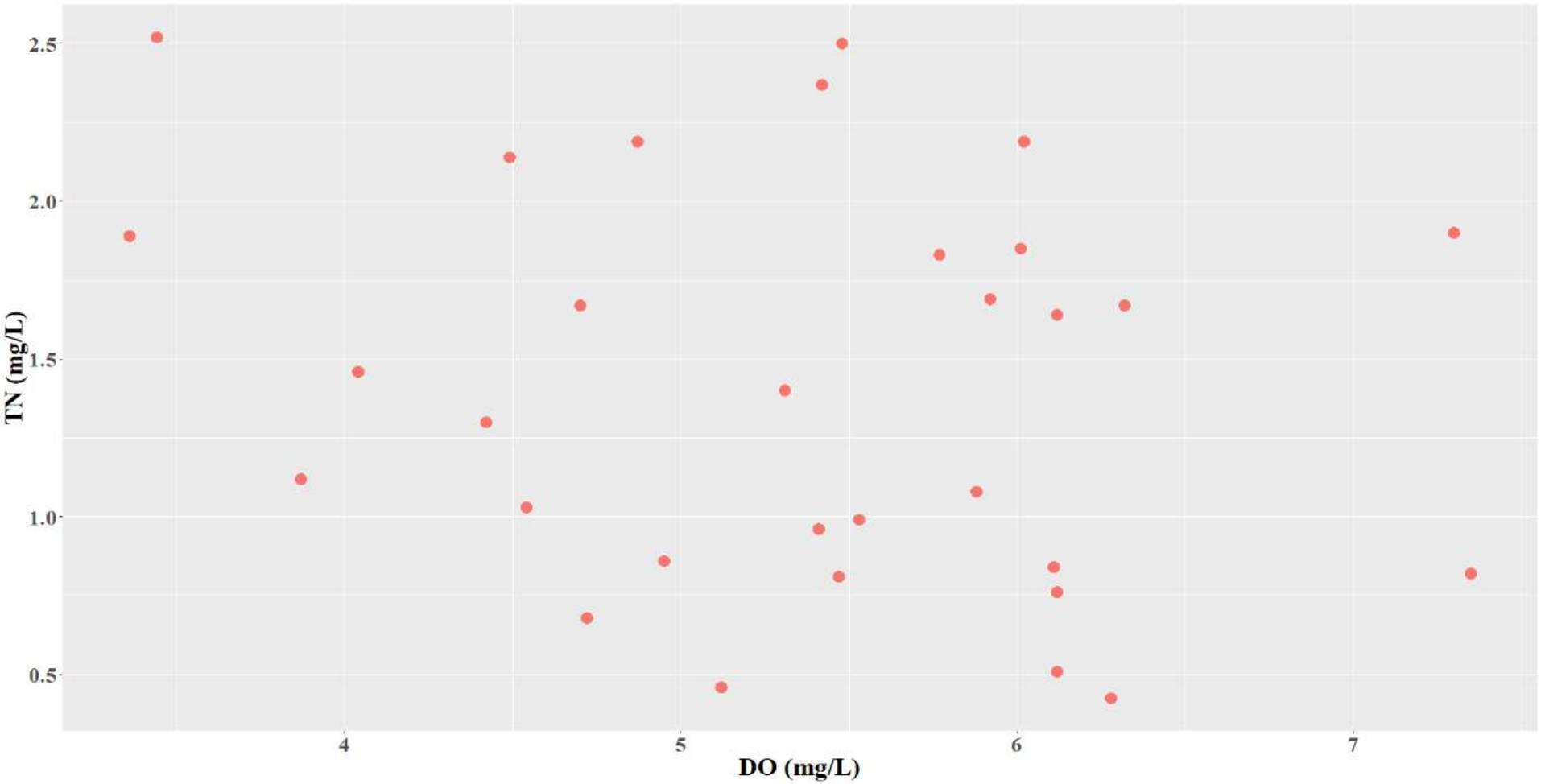

Figure 11: Relationship between dissolved oxygen and total nitrogen concentrations

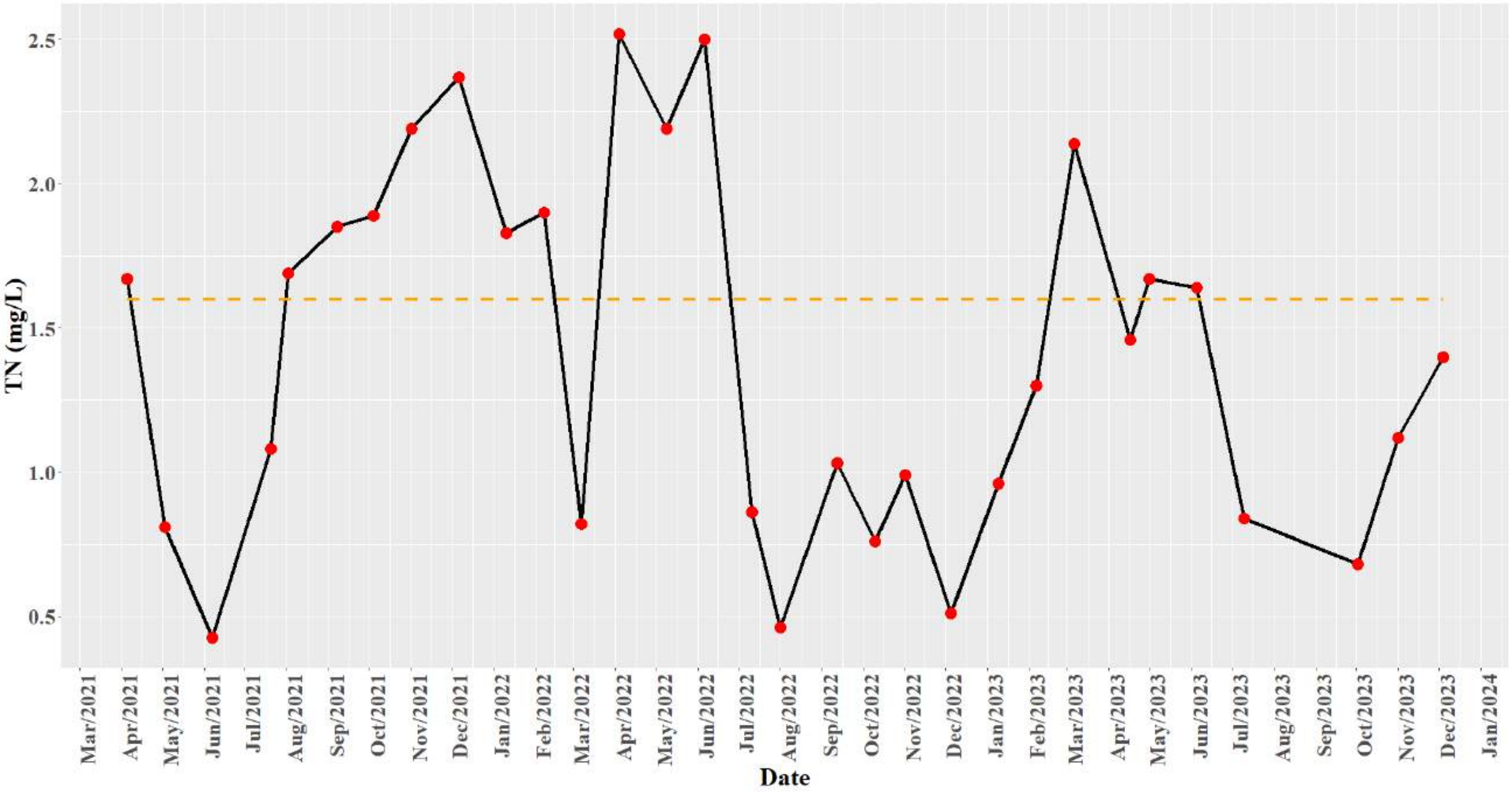

Figure 12: Total nitrogen by sampling date. The Puerto Rico water quality criteria for rivers (1.7 mg TN/L) is included as reference.

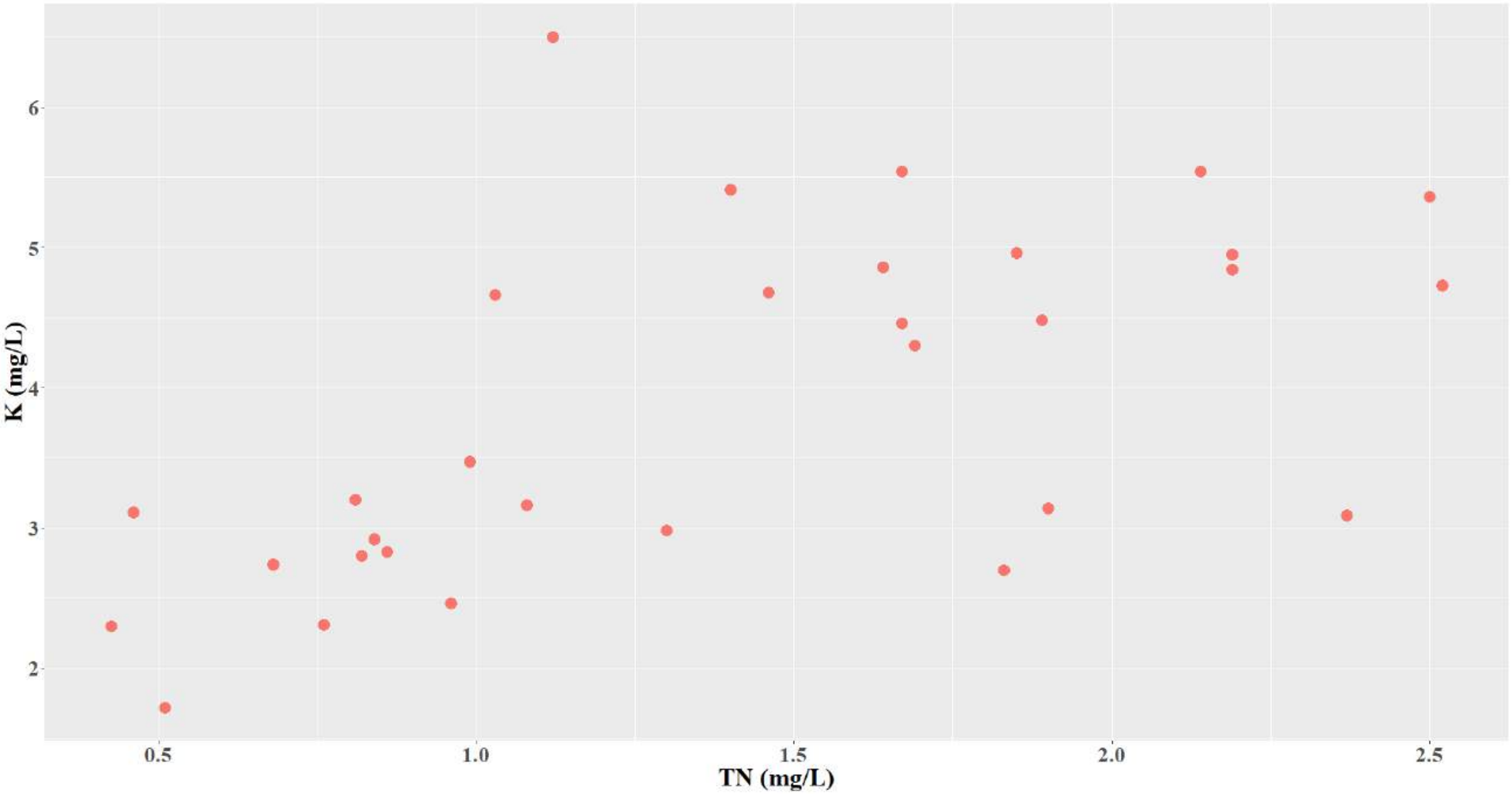

Figure 13: Relationship between total nitrogen and potassium in samples collected at the inlet manhole of the de Diego Water Pump.

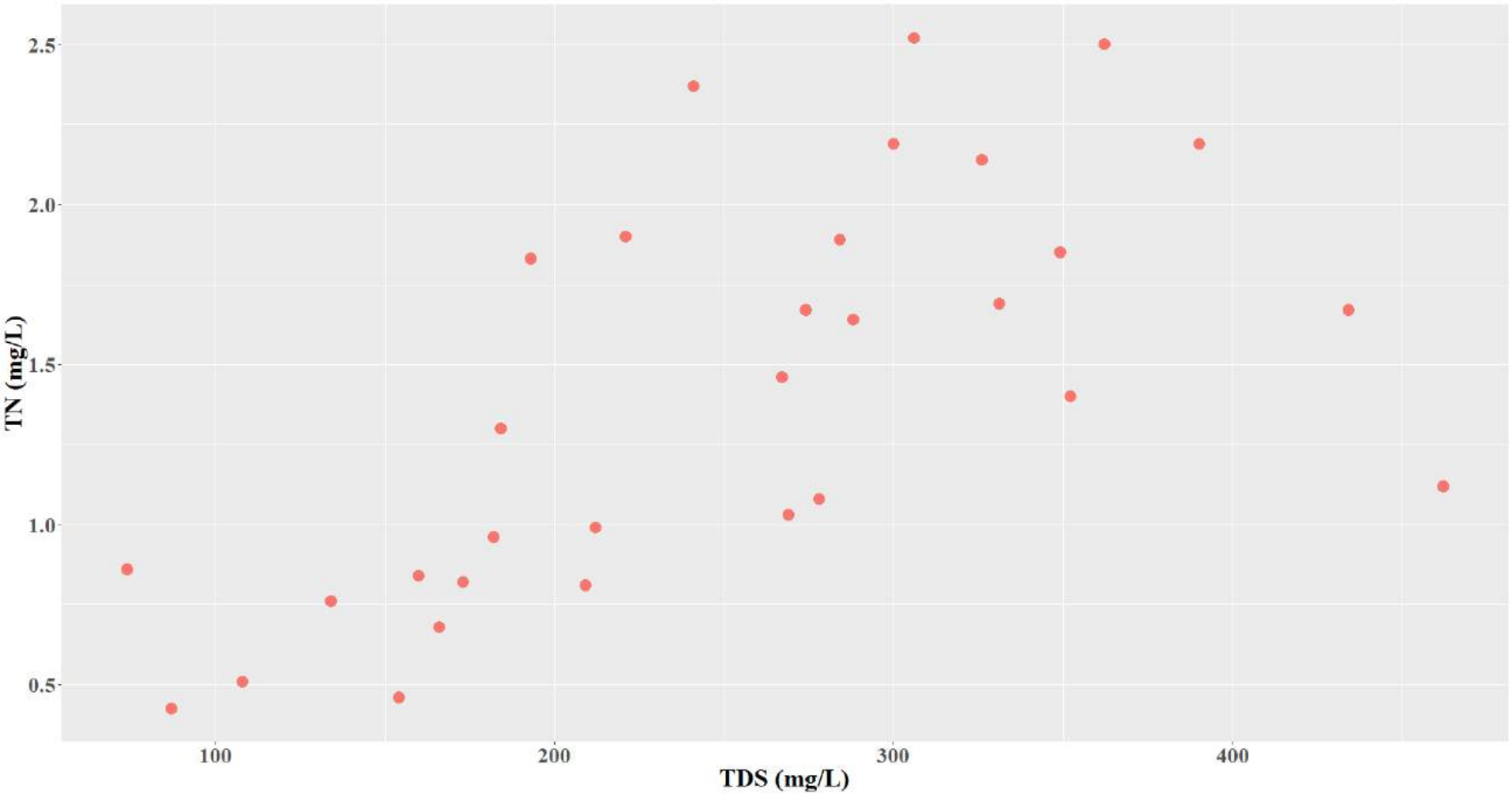

Figure 14: Relationship between total dissolved solids and total nitrogen in samples collected at the inlet manhole of the de Diego Water Pump.

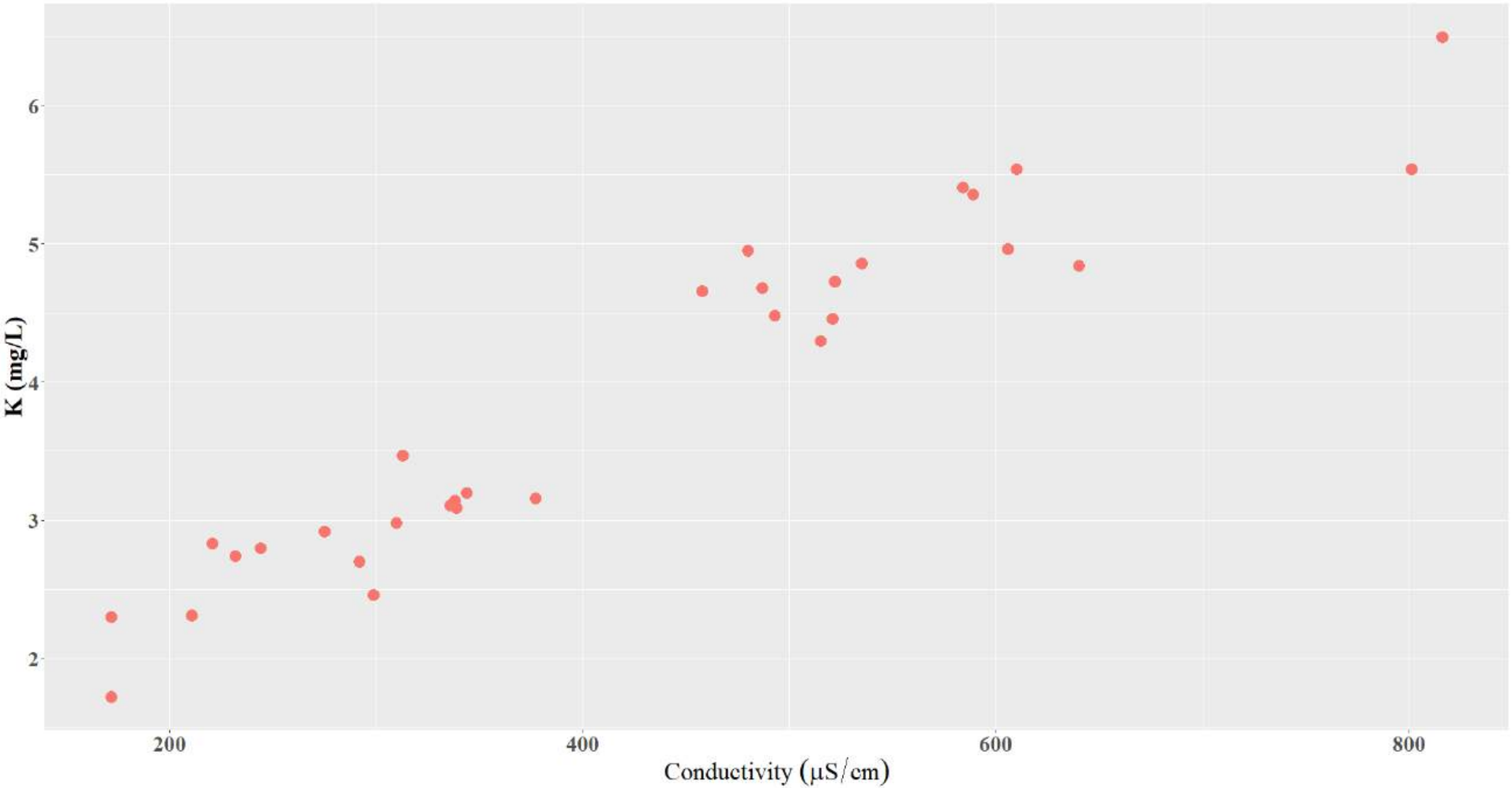

Figure 15: Relationship between electrical conductivity and potassium in samples collected at the inlet manhole of the de Diego Water Pump.

APPENDIX 1

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Submission ID: 1188796

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202-566-1667

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hq.foia@epa.gov

National FOIA Office, Office of General Counsel, US Environmental Protection Agency
1200 Pennsylvania Avenue, NW, Mail Code 2310A
Washington, DC 20460

Request summary

Request submitted on **May 3, 2024**.

The confirmation ID for your request is **1188796**.

The confirmation ID is only for identifying your request on FOIA.gov and acts as a receipt to show that you submitted a request using FOIA.gov. This number does not replace the information you'll receive from the agency to track your request. In case there is an issue submitting your request to the agency you selected, you can use this number to help.

Contact information

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Your request

We request the laboratory analysis results from water samples collected, from 2015 to 2024 at the inlet and discharge point of the De Diego Storm Water FCPS Facility, Costa-PREC13 in San Juan, Puerto Rico. This facility is located at the intersection of Julian Blanco Street and Estrella Street Marginal, State Road PR-26, San Juan Puerto Rico, 00907. The station, geographic coordinates are Latitude 18.451025N, Longitude -66.065308. The geographic coordinates of the discharging point at Condado Beach are Latitude 18.455856, Longitude -66.063493. The specific analyses requested are listed below: -Low Dissolved Oxygen -Oil and Grease -pH -Thermal Modifications -Total Phosphorus -Ammonia -Surfactants -Total Nitrogen -Copper -Lead -Fecal Coliforms -Total Coliforms -Mercury -Turbidity We would appreciate if you could send us the requested information in an Excel format.

Fees

What type of requester are you?
other

Fee waiver
no

Fee waiver justification
Access to water quality data from the De Diego Storm Water FCPS Facility, impacts the San Juan Bay Estuary, which is crucial for public health and environmental conservation. The data could inform research, policymaking, and public awareness efforts aimed at protecting the estuary's ecosystem and ensuring the safety of nearby communities. The Corporation for the Conservation of the San Juan Bay Estuary (CCSJBE) could highlight the significance of the water quality data in understanding the effectiveness of stormwater management practices at the De Diego facility, as well as the broader impact of such facilities on the estuary. This information could support efforts to improve water management strategies and hold responsible parties accountable for any environmental harm. The CCSJBE could outline its plans to utilize the data in various outreach and educational initiatives targeting local communities, policymakers, and stakeholders. This could include publishing reports, organizing workshops or seminars, and collaborating with other organizations to raise awareness about water quality issues in the San Juan Bay Estuary. The CCSJBE could present evidence of its track record in communicating scientific information to diverse audiences, including through bilingual outreach materials, community engagement events, and partnerships with local media outlets. Demonstrating its capacity to translate technical data into accessible formats. The CCSJBE is a non-profit organization National Estuary Program that does not have any commercial interests in obtaining the data and our

primary motivation is to promote environmental conservation and public awareness. Our mission-driven approach is to advocate for the protection of the San Juan Bay Estuary.

Request expedited processing

Expedited processing
no

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CONTACT

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