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3 March 2021

VIA EMAIL
Laura Cunningham
Western Watersheds Project
PO Box 70
Beatty NV 89003 CA

Report
Surface Water Monitoring Conducted 27 and 28 January 2021
Point Reyes National Seashore
Marin County CA

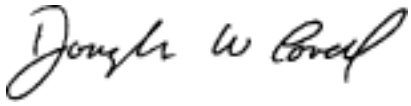
Dear Ms. Cunningham:

The subject report is attached.

Because the monitoring identified imminent risks human health, the report should be forwarded to appropriate regulatory agencies.

Please contact me with any questions or comments.

Sincerely,



Douglas W Lovell
Geoenvironmental Engineer

Attachment

Report
Surface Water Monitoring Conducted 27 and 28 January 2021
Point Reyes National Seashore
Marin County CA

Prepared for
Laura Cunningham
Western Watersheds Project
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Beatty NV 89003 CA

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CONTENTS

INTRODUCTION

This report documents surface water monitoring conducted 27 and 28 January 2021 at selected locations within Point Reyes National Seashore, Marin County CA. Five locations were monitored (Figures 1 and 2, Appendix A):

- PAC1S (South Kehoe Creek)
- PAC3 (Kehoe Lagoon)
- ABB2/3 (Unnamed Northern Tributary to Upper Abbotts Lagoon)
- DES2 (East Schooner Creek)
- DES4 (Main Stem Schooner Creek, downstream of the confluence with East Schooner Creek)

The January 2021 monitoring locations are within drainages with dairy cattle and beef cattle operations that "contribute to poor water quality through bacteria and nutrient loading from animal waste and runoff" (Pawley and Lay 2013). The drainages monitored in January 2021 had not been monitored since 2013, despite documented exceedances of surface water thresholds of concern for coliform bacteria in 2013 (Voller et al. 2020a).

BACKGROUND

Field parameters were measured at each location, including temperature, pH, specific conductivity, salinity, oxidation/reduction potential, dissolved oxygen, quantitative turbidity, qualitative turbidity, qualitative color, and flowrate.

For each location, samples were analyzed in the laboratory for coliform bacteria (total, fecal, E coli), enterococci bacteria, and macronutrients (nitrogen and phosphorus). The North Coast Regional Water Quality Control Board prepared a protocol to study bacteria in coastal watersheds, including freshwater lagoons and contributory freshwater feeder streams/rivers (North Coast RWQCB 2015). The bacteria analyses for the January 2021 monitoring were patterned after the North Coast's protocol, including (1) analysis of coliform bacteria, (2) analysis of enterococci bacteria, and (3) the use of analytical methods that employ whole sample aliquots, reported as most probable number (mpn), instead of filtering, reported as colony forming units (cfu).

Enterococci and E coli are generally considered the most reliable fecal indicator bacteria for evaluating human health risks in fresh, brackish, and marine recreational waters (US Environmental Protection Agency 2012). Enterococci bacteria, instead of E coli bacteria, have been suggested to more reliably predict gastrointestinal illness (North Coast 2015). Enterococci bacteria, instead of E coli bacteria, have been suggested to more reliably predict human health risks in brackish and marine waters because enterococci bacteria are more persistent in these saline environments (Jin et al. 2004, Boehm and Sassoubre 2014). However, enterococci bacteria have not been historically analyzed in the drainages that were monitored in January 2021. The lack of enterococci bacteria analyses may specifically impact conclusions regarding human health risks in Lower Abbotts Lagoon (represented by historical monitoring location

ABB4, Figures 1 and 2) because Lower Abbotts Lagoon is a brackish water environment (Kratzer et al. 2006).

Approximately 1.5 to 1.9 inches of precipitation were recorded for the 48 hours that preceded January 2021 monitoring (Table 1, Figure 3, Appendix D). Detailed hydrologic studies of Abbotts Creek immediately upstream of Upper Abbots Lagoon (Kratzer et al. 2006) revealed that peak instream flow occurred approximately 2.5-4 hours after peak precipitation. The January 2021 monitoring was performed more than 9 hours after peak precipitation (Figure 3), with monitoring performed on the falling portion of the hydrograph (decreasing flowrate with time). Had monitoring been performed sooner, relative to peak precipitation, greater bacteria and micronutrient concentrations would likely have been measured.

Monitoring locations PAC1S, PAC3, and DES2 coincide with historical monitoring locations; locations ABB2/3 and DES4 are new. Location ABB2/3 accounts for the combined input of historical monitoring locations T2 (also named ABB2) and T3 (also named ABB3), which are positioned upstream in separate forks of the drainage (Figures 1 and 2). Compared to historical locations T2 and T3, location ABB2/3 is closer to Upper Abbotts Lagoon and more accurately evaluates the impacts of cattle waste pollution on Upper Abbotts Lagoon. Location DES4 is characterized by brackish water of variable salinity.

Monitoring locations PAC1S, PAC3, and ABB2/3 coincide with drainages generally subject to "medium" and "high" use by dairy cattle (Pawley and Lay 2013, National Park Service 2020). Additionally, these three monitoring locations coincide with drainages subject to land application of cattle manure and composted cattle wastes (National Park Service 2020). Cattle waste management actions have reportedly been implemented in these drainages and temporal analyses of historical data showed (1) a significant decrease in the frequency of exceeding coliform bacteria thresholds of concern, and (2) "little evidence for any global or station level temporal trends" for turbidity due to temporal increases in "algal growth" (Voller et al. 2020a).

Monitoring locations DES2 and DES4 coincide with drainages generally subject to "medium" use by beef cattle (Pawley and Lay 2013, National Park Service 2020).

Special status/at-risk species and critical habitat are associated with the monitoring locations; the species include Central California Coast Steelhead and the California Red-Legged Frog (Appendices M, N, and O of National Park Service 2020) whose lifecycles directly depend on surface water quality.

- Steelhead have been observed in Abbotts Creek, a tributary to Upper Abbotts Lagoon (Figures 1 and 2) (National Park Service 2019).
- East Schooner Creek and downstream reaches of the main stem of Schooner Creek (to Drakes Estero) have been designated critical habitat for Central California Coast Steelhead (monitoring locations DES2 and DES4). Steelhead passage enhancements have been completed on East Schooner Creek and are planned on the main stem of Schooner Creek (National Park Service 2009, Federal Highway Administration 2018). Cattle waste management actions have not been implemented in the East Schooner Creek drainage and temporal analyses of historical data revealed an increase in the frequency of coliform bacteria exceeding thresholds of concern (Voller et al. 2020a).

- Populations of the California Red-Legged Frog are documented in drainages that feed Abbotts Lagoon (monitoring location ABB2/3), Kehoe Creek (monitoring locations PAC1S and PAC3), and Schooner Creek (monitoring location DES4). Cattle exclusion fencing has been installed in the West Schooner Creek drainage and Abbotts Creek drainage for protection of frog habitat (National Park Service 2020).

Depending on hydrologic conditions, time of year (season), and water temperature (which are interrelated); excess phytoplankton growth (leading to Harmful Algal Blooms) has been observed in Upper Abbots Lagoon, Middle Abbotts Lagoon, South Kehoe Creek, Kehoe Marsh, and Kehoe Lagoon (Pawley and Lay 2013; Kratzer et al. 2006; undocumented review of historical aerial photographs that are available on Google Earth; undocumented observations by me, and other undocumented first-person observations). Algal growth was suggested as the reason why turbidity had not decreased in drainages that received cattle waste management actions (Voller et al. 2020a). The National Park Service's Environmental Impact Statement (National Park Service 2020, Voller et al. 2020a, Voller et al. 2020b) did not compile and analyze historical macronutrient data. The link between excess phytoplankton growth, Harmful Algal Blooms, and macronutrient loading is well-established in the scientific literature, as is the expectation that climate change will exacerbate the excess growth.

In 1999-2000, the US Geological Survey performed investigations to evaluate eutrophication in the Abbotts Lagoon system; the investigations evaluated phytoplankton growth a result of nutrient loading (Kratzer et al. 2006). The investigations revealed that approximately 70% of the phosphorus loading and approximately 50% of the nitrogen loading to Upper Abbotts Lagoon originated from the unnamed northern tributary where ABB2/3 is located, whereas the unnamed northern tributary contributed (only) about 20% of the surface water inflow to Upper Abbotts Lagoon. The investigations also revealed that phytoplankton growth was nitrogen-limited as opposed to phosphorus-limited, indicating that reducing nitrogen loading to Upper Abbotts Lagoon would be most effective in limiting excess phytoplankton growth.

At the time of monitoring in January 2021, the cumulative precipitation for water year 2020-2021 was approximately 30-35% of normal (https://www.cnrfc.noaa.gov/monthly_precip.php). Had water year precipitation been normal (or above), a rainfall event similar to that in January 2021 would have likely revealed greater bacterial and macronutrient concentrations at the monitoring locations.

Stock ponds exist upstream of the five monitoring locations. These ponds are associated with historical and ongoing cattle watering (National Park Service 2020). During drier periods of the year, the ponds store precipitation; the ponds release water (spill) given sufficient precipitation. The ponds upstream of the five monitoring locations had not spilled for several months prior to the January 2021 monitoring, nor were the ponds spilling during monitoring. Had the ponds been spilling at the time of monitoring, it is likely that greater bacterial and macronutrient concentrations would have been measured - the increase relatively more for bacteria, which themselves are "particulates" (for example, E coli bacteria are rod-shaped particles, diameter = ±0.5 µm, length =±2 µm) – the increase relatively less for macronutrient because macronutrients continue to be released from the ponds via seepage of dissolved nitrogen and phosphorus, even when the ponds do not spill.

DISCUSSION OF THE MONITORING RESULTS

Table 1 contains the field observations and field parameter measurements. The elevated specific conductance measured at location DES4 reflects the monitoring of brackish water (monitoring was performed about halfway through an ebbing tide and the monitoring location was impacted by brackish water in the adjacent Drakes Estero). Specific conductance measurements at locations PAC1S, PAC3, and ABB2/3 (indicative of dairy cattle impacts) were greater than the measurement at the location DES2 (indicative of beef cattle impacts); the difference is partially due to greater nitrogen and phosphorus concentrations in the dairy cattle-impacted drainages.

Table 2 contains the bacteria laboratory results, along with potentially applicable criteria/thresholds of concern (listed in the rows at the bottom of Table 2).

Table 3 provides a comparison of measured bacteria concentrations to specifically-applicable criteria at each monitoring location. General note "(a)" at the bottom of Table 3 explains the selection of specifically-applicable criteria. The human health risk at each location is characterized by the ratio of (1) measured concentration to (2) specifically-applicable criterion. Locations PAC1S, PAC3, and ABB2/3 (indicative of dairy cattle impacts) exhibit exceedances of all specifically-applicable criteria. The human health risks characterized for locations PAC1S, PAC3, and ABB2/3 (indicative of dairy cattle impacts) significantly and consistently exceed the risks characterized for locations DES2 and DES4 (indicative of beef cattle impacts). The drainages characterized by PAC1S, PAC3, and ABB2/3 have reportedly received more cattle waste management actions than other drainages; the actions have reportedly included fencing, infrastructure improvement, livestock water supply, manure management, and pond restoration (Voller et al. 2020a). The January 2021 data indicate that, despite these reported actions, significant bacterial water quality pollution persists, resulting in continued risk to human health. At the lower water temperatures present during wintertime, coliform and enterococci bacteria will likely persist longer - compared to warmer periods (Korajkic et al. 2019, Dipankar et al. 2013).

For the drainages monitored in January 2021, enterococci bacteria posed greater risks to human health than coliform bacteria and enterococci may serve as a more accurate fecal indicator bacterium. However, only coliform bacteria were historically analyzed, and the National Park Service's conclusions drawn solely from coliform concentrations (National Park Service 2020, Voller et al. 20201) may be inaccurate.

Table 4 contains the macronutrient (nitrogen and phosphorus) laboratory results. Macronutrient concentrations at locations PAC1S, PAC3, and ABB2/3 (indicative of dairy cattle impacts) were more than twice the concentrations at locations DES2 and DES4 (indicative of beef cattle impacts).

Reliable general macronutrient criteria are not available to protect surface waters from excess phytoplankton growth and Harmful Algal Blooms; waterbody-specific analysis is required. The US Geological Survey study of eutrophication in Abbotts Lagoon (Kratzer et al. 2006) provides such an analysis. The US Geological Survey study concluded that phytoplankton growth in Upper Abbotts Lagoon was predominantly influenced by the macronutrient loading from the Unnamed Northern Tributary to Upper Lagoon (corresponding to historical monitoring locations T2 and T3 and January 2021 monitoring location ABB2/3, Figures 1 and 2). The US Geological

Survey study also concluded that phytoplankton growth was nitrogen-limited as opposed to phosphorus-limited. The total inorganic nitrogen/orthophosphate ratio measured in January 2021 at monitoring location ABB2/3 (Table 4) also suggests nitrogen-limiting conditions.

Table 5 provides a comparison of the historical (1999) and January 2021 nitrogen concentrations in the Unnamed Northern Tributary to Upper Abbotts Lagoon. Had location ABB2/3 been monitored in 1999, (1) the approximate flowrate at ABB2/3 would have been the sum of the flowrates at T2 and T3 and (2) the approximate nitrogen concentrations at ABB2/3 would have been the flow-weighted average of nitrogen concentrations at T2 and T3. The flowrates during the 1999 monitoring were approximately two to four times those in January 2021, which would be expected to have caused higher concentrations of nitrogen in 1999. In light of the flowrate differences, the nitrogen concentrations measured in January 2021 are remarkably similar to those measured in 1999; however, the data set for this comparison is small. Between 2000 and January 2012, cattle waste management actions were reportedly implemented in the Unnamed Northern Tributary to Upper Abbotts Lagoon drainage, including fencing, infrastructure improvements, livestock water supply, and manure management (Voller et al. 2020a). Despite these reported actions, nitrogen loads to Upper Abbotts Lagoon appear similar to those measured in 1999 and concerns regarding excess phytoplankton growth persist.

CONCLUSIONS

On the basis of the monitoring results and documented cattle operations, the following conclusions have a high level of confidence, particularly in the context of the meteorologic and hydrological conditions that existed immediately prior to and during monitoring:

- Bacteria contamination of surface water significantly exceeds applicable water quality criteria despite the reported implementation of cattle waste management actions. An increase of the frequency/extent of these same reported actions will likely further reduce bacteria contamination; however, it is likely that exceedances of applicable criteria will persist.
- Imminent human health risks exist regarding exposure to bacterial contamination in surface water, particularly for locations with documented or likely direct water contact.
- Macronutrient pollution of surface water, which causes excess phytoplankton growth, appears to persist at concentrations similar to those that predated the reported implementation of cattle waste management actions. Global warming will exacerbate excess phytoplankton growth.
- Reductions in the localized abundance of cattle waste will likely be necessary to adequately protect surface water quality.

Table 1

Field Observations and Field Parameter Measurements

Point Reyes National Seashore
Marin County CA

Location	Date	Time	Sample Type	Temp (˚C)	pH	Specific Conductance (µS/cm)	Salinity (o/oo) (ppt)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L) [3]	Turbidity (NTU) [4]	Visual Turbidity and Color	Estimated Flowrate (cfs)	Cumulative Precipitation for 6, 12, 24, 48 hours Preceding Monitoring (inches)	Hydrologic Conditions	Comments
PAC1S	27 Jan 21	9:40 am	Grab	9.9	7.0	650	0.3	230	9.6	22	translucent/light brown (with dozens of colloid-size black particles in ±12 fluid ounces)	4 [1] [2]	0.07/0.10/1.48/1.48	1.48” precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1” for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	Monitoring was performed in a marshy area with prevalent aquatic vegetation. A well-mixed, reasonably well-defined flow channel existed within the vegetation. Monitoring was performed in this channel.
	28 Jan 21	9:00 am	Grab	9.6	7.4	630	0.3	210	9.4	18	translucent/light brown (with dozens of colloid-size black particles in ±12 fluid ounces)	4 [1] [2]	0.03/0.05/0.38/1.86	1.86” precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1” for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	Monitoring was performed in a marshy area with prevalent aquatic vegetation. A well-mixed, reasonably well-defined flow channel existed within the vegetation. Monitoring was performed in this channel.
PAC3	28 Jan 21	9:47 am	Grab	10.8	7.5	990	0.5	90	11.8	14	translucent/light brown (with dozens of colloid-size black particles in ±12 fluid ounces)	Not estimated [2]	0.03/0.05/0.38/1.86	1.86” precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1” for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	Monitoring of quiescent water was performed within a freshwater lagoon without observable flow. The monitored water was collected approximately 8 feet from shore at a depth of approximately 1 foot (below water surface). The total water depth at the monitoring location was approximately 6 feet.
ABB2/3	27 Jan 21	10:10 am	Grab	10.6	7.0	650	0.3	190	10.9	12	translucent/light brown (with dozens of colloid-size black particles in ±12 fluid ounces)	3 [1] [2]	0.07/0.10/1.48/1.48	1.48” precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1” for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	Representative monitoring was performed within a well-defined, well-mixed channel.
	28 Jan 21	10:38 am	Grab	11.3	7.7	610	0.3	50	10.8	10	translucent/light brown (with dozens of colloid-size black particles in ±12 fluid ounces)	3 [1] [2]	0.03/0.07/0.38/1.86	1.86” precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1” for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	Representative monitoring was performed within a well-defined, well-mixed channel.
DES2	28 Jan 21	11:22 pm	Grab	10.6	7.9	370	0.2	340	11.6	12	clear/slight brownish tint	4 [2]	0.03/0.07/0.38/1.86	1.86” precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1” for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	Representative monitoring was performed within a well-defined, well-mixed channel.
DES4	28 Jan 21	2:40 pm	Grab	12.3	7.1	12,100	14	50	9.6	10	clear/none	20 [2]	0.01/0.04/0.33/1.87	1.87” precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1” for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	Representative monitoring was performed within a well-defined, well-mixed channel. The monitoring location is impacted by saltwater and tidal fluctuations in Drakes Estero. Monitoring was performed on an ebb tide, approximately half-way between high tide and low tide, with the water in well-defined marsh channels, below the lowest level of channel-side vegetation. Brackish water was monitored, which explains the elevated specific conductance and salinity.

General Notes

(a) Monitoring was performed by Douglas Lovell (Berkeley CA).

(b) Visual turbidity classified as either clear, translucent, or opaque.

(c) Precipitation measurements from the nearby “Pt. Reyes RCA” meteorological station (https://wrcc.dri.edu/cgi-bin/wea_daysum.pl?nvprca).

(d) Comparison to “normal precipitation” based on actual accumulated rainfall for water year 1 October 2020-30 September 2021 (https://www.cnrfc.noaa.gov/monthly_precip.php).

(e) Estimated Flowrate = volumetric discharge of the entire water flow, rounded to one significant digit. The estimate is approximate, based on visual observations and rudimentary estimates of flow velocity and channel dimensions. The estimate is likely accurate within ±50%.

Footnotes

[1] = The flowrate on 28 January 2021 was less than the flowrate on 27 January 2021.

[2] = Monitoring was performed on the falling portion of the hydrograph – flowrate was decreasing at the time of monitoring.

[3] = A calibration check was performed after returning from the field; the calibration check revealed that the reported dissolved oxygen measurements were 0.1 to 0.2 mg/L high.

[4] = A calibration check was performed after returning from the field; the calibration check revealed that the reported turbidity measurements were low (the magnitude of the error was not estimated).

Table 2

Laboratory Analytical Results for Bacteria

Point Reyes National Seashore
Marin County CA

Location	Date	Sample Type	Estimated Flowrate (cfs)	Hydrologic Conditions	Total Coliform Bacteria (mpn/100 ml)	Fecal Coliform Bacteria (mpn/100 ml)	E Coli Bacteria (mpn/100 ml)	Enterococci Bacteria (mpn/100 ml)	Comments
PAC1S	27 Jan 21	Grab	4 (1) (2)	1.48" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	54,000	22,000	17,000	12,000	
	28 Jan 21	Grab	4 (1) (2)	1.86" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	22,000	14,000	11,000	14,000	
PAC3	28 Jan 21	Grab	not estimated (2)	1.86" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	17,000	11,000	9,400	17,000	
ABB2/3	27 Jan 21	Grab	3 (1) (2)	1.48" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	35,000	17,000	13,000	8,700	
	28 Jan 21	Grab	3 (1) (2)	1.86" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	17,000	7,000	920	11,000	
DES2	28 Jan 21	Grab	4 (2)	1.86" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	1,600	920	540	550	
DES4	28 Jan 21	Grab	20 (2)	1.87" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	5,400 (H)	1,700 (H)	1,100 (H)	1,400 (H)	Brackish water was monitored.

Candidate Criteria/Thresholds of Concern (RWQCB 2019)

Geometric mean concentration for "Water Contact Recreation"		200			
90th percentile concentration for "Water Contact Recreation"		400			
Median concentration for "Water Contact Recreation"	240				
Maximum concentration of any sample for "Water Contact Recreation"	10,000				
Median concentration for "Shellfish Harvesting" (mpn/100 mL)	70	14			
90th percentile concentration for "Shellfish Harvesting" (mpn/100 mL)	230	43			
Maximum concentration for a "designed beach" in freshwater (cfu/100 mL)			235	61	
Maximum concentration for a "moderately used area" in freshwater (cfu/100 mL)			298	89	
Maximum concentration for a "lightly used area" in freshwater (cfu/100 mL)			406	108	
Maximum concentration for a "infrequently used area" in freshwater (cfu/100 mL)			576	151	
Maximum concentration for a "designated beach" in saltwater (cfu/100 mL)				104	
Maximum concentration for a "moderately used area" in saltwater (cfu/100 mL)				124	
Maximum concentration for a "lightly used area" in saltwater (cfu/100 mL)				276	
Maximum concentration for a "infrequently used area" in saltwater (cfu/100 mL)				500	
Geometric mean concentration for REC1 beneficial use in freshwater (cfu/100 mL)			100	30	
90th percentile concentration for REC1 beneficial use in freshwater (cfu/100 mL)			320	110	

General Notes

(a) Samples were collected by Douglas Lovell (Berkeley CA). Samples were analyzed by McCampbell Analytical (Pittsburg CA).

(b) Precipitation measurements from the nearby "Pt. Reyes RCA" meteorological station (https://wrcc.dri.edu/cgi-bin/wea_daysum.pl?nvprca).

(c) Comparison to "normal precipitation" based on actual accumulated rainfall for water year 1 October 2020-30 September 2021 (https://www.cnrfc.noaa.gov/monthly_precip.php).

(d) Estimated Flowrate = volumetric discharge of the entire water flow, rounded to one significant digit. The estimate is approximate, based on visual observations and rudimentary estimates of flow velocity and channel dimensions. The estimate is likely accurate within ±50%.

(e) mpn = most probable number. cfu = colony forming units. Common practice treats these as equivalent units although they are not equivalent under certain conditions.

(f) REC1 beneficial use includes direct contact recreation (swimming, wading, etc.).

Footnotes

(H) = sample prepared/analyzed beyond the accepted holding time; however, the measured concentrations are believed accurate.

(1) = The flowrate on 28 January 2021 was less than the flowrate on 27 January 2021.

(2) = Monitoring was performed on the falling portion of the hydrograph – flowrate was decreasing at the time of monitoring.

Table 3

Comparisons of Measured Bacteria Concentrations to Applicable Criteria

Point Reyes National Seashore
Marin County CA

Location	Date	Measured Total Coliform Bacteria (mpn/100 ml)	Applicable Total Coliform Criterion (mpn/100 ml)	Ratio of Measured Total Coliform to Applicable Criterion [1]	Measured E Coli Bacteria (mpn/100 ml)	Applicable E Coli Criterion (cfu/100 ml)	Ratio of Measured E Coli to Applicable Criterion [1]	Measured Enterococci Bacteria (mpn/100 ml)	Applicable Enterococci Criterion (cfu/100 ml)	Ratio of Measured Enterococci to Applicable Criterion [1]
PAC1S	27 Jan 21	54,000	10,000	5	17,000	576	30	12,000	151	80
	28 Jan 21	22,000	10,000	2	11,000	576	20	14,000	151	90
PAC3	28 Jan 21	17,000	10,000	2	9,400	235	40	17,000	61	300
ABB2/3	27 Jan 21	35,000	10,000	3	13,000	576	20	8,700	151	60
	28 Jan 21	17,000	10,000	2	920	576	2	11,000	151	70
DES2	28 Jan 21	1,600	10,000	<1	540	576	<1	550	151	4
DES4 [2]	28 Jan 21	5,400 [H]	10,000	<1	1,100 [H]			1,400 [H]	276-500	3-5

General Notes

(a) Potentially applicable criteria are compiled in the bottom rows of Table 2. Because the January 2021 monitoring consisted of either one or two samples at each location, the data set is too small to calculate meaningful median values, geometric mean values, or 90th percentile values. Accordingly, "maximum concentration" criteria have been employed for comparison purposes. For E Coli and Enterococci bacteria, maximum concentration criteria are segregated according to frequency of use, with the choices being "designated beach," "moderately used area," "lightly used area," and "infrequently used area."

Kehoe Beach, including Kehoe Beach Lagoon (PAC3), receives frequent use that includes wading and swimming – the area is supported by nearby parking that accommodates more than a dozen vehicles, along with restrooms – this location is properly classified as a "designated beach."

The main stem of Schooner Creek at Sir Frances Drake Boulevard (DES4) is supported by adjacent parking and accommodates the launching of personal watercraft – this location is properly classified as either a "lightly used area" or an "infrequently used area."

Each of the remaining locations is properly classified as an "infrequently used area."

(b) mpn = most probable number. cfu = colony forming units. Common practice treats these as equivalent units although they are not equivalent under certain conditions.

Footnotes

[H] = sample prepared/analyzed beyond the accepted holding time; however, the measured concentrations are believed accurate.

[1] = rounded to one significant digit.

[2] = brackish water was monitored at DES4 and saltwater criteria are applicable; an E coli maximum concentration is not available for saltwater.

Table 4

Laboratory Analytical Results for Nitrogen and Phosphorus

Point Reyes National Seashore
Marin County CA

Location	Date	Sample Type	Estimated Flowrate (cfs)	Hydrologic Conditions	Ammonia as Nitrogen (mg N/L)	Unionized Ammonia (calculation) (mg NH_3/L)	Nitrate as Nitrogen (mg N/L)	Nitrite as Nitrogen (mg N/L)	Total Inorganic Nitrogen (calculation) (mg N/L)	Total Kjeldahl Nitrogen (mg N/L)	Total Organic Nitrogen (calculation) (mg N/L)	Total Nitrogen (calculation) (mg N/L)	Ortho-phosphate (PO_4) as Phosphorus (mg P/L)	Total Phosphorus (mg P/L) (FB)	Ratio of Total Inorganic Nitrogen to Ortho-phosphate as P	Comments
PAC1S	27 Jan 21	Grab	4 (1) (2)	1.48" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	0.18	<0.001	4.1	<0.10	4.2	3.1	2.9	7.1	0.48	0.83	9	
	28 Jan 21	Grab	4 (1) (2)	1.86" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	0.14	0.001	3.3	<0.10	3.4	2.4	2.3	5.7	0.20	0.37	17	
PAC3	28 Jan 21	Grab	not estimated (2)	1.86" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	0.14	0.001	2.5	<0.10	2.6	3.0	2.9	5.5	0.59	0.87	4	
ABB2/3	27 Jan 21	Grab	3 (1) (2)	1.48" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	0.24	<0.001	5.2	<0.10	5.4	3.4	3.2	8.6	0.51	0.83	11	
	28 Jan 21	Grab	3 (1) (2)	1.86" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	0.18	0.002	3.9	<0.10	4.1	2.9	2.7	6.8	0.45	0.70	9	
DES2	28 Jan 21	Grab	4 (2)	1.86" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	0.12	0.002	1.9	<0.10	2.0	0.76	0.64	2.6	<0.10	0.14	>20	
DES4	28 Jan 21	Grab	20 (2)	1.87" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	<0.10	<0.001	<2.0 (3)	<2.0 (3)	<2.0	0.90	>0.90	<2.8	<2.0 (3)	0.20	Not calculated	Brackish water was monitored.

General Notes

(a) Samples were collected by Douglas Lovell (Berkeley CA). Samples were analyzed by McCampbell Analytical (Pittsburg CA).

(b) Precipitation measurements from the nearby "Pt. Reyes RCA" meteorological station (https://wrcc.dri.edu/cgi-bin/wea_daysum.pl?nvprca).

(c) Comparison to "normal precipitation" based on actual accumulated rainfall for water year 1 October 2020-30 September 2021 (https://www.cnrfc.noaa.gov/monthly_precip.php).

(d) Estimated Flowrate = volumetric discharge of the entire water flow, rounded to one significant digit. The estimate is approximate, based on visual observations and rudimentary estimates of flow velocity and channel dimensions. The estimate is likely accurate within ±50%.

(e) "<" indicates the result was below the cited laboratory reporting limit.

(g) Calculation of Unionized Ammonia as N from https://www.svl.net/unionized-amonia-calculator/. The calculation is specific to freshwater.

(h) Total Organic Nitrogen = Total Kjeldahl Nitrogen - Ammonia as Nitrogen. Total Inorganic Nitrogen = Ammonia as Nitrogen + Nitrate as Nitrogen + Nitrite as Nitrogen. Total Nitrogen = Organic Nitrogen + Inorganic Nitrogen. For the purposes of calculation, results below the laboratory detection limit have been taken as zero.

Footnotes

(1) = The flowrate on 28 January 2021 was less than the flowrate on 27 January 2021.

(2) = Monitoring was performed on the falling portion of the hydrograph – flowrate was decreasing at the time of monitoring.

(3) = For Nitrate, Nitrite, and Orthophosphate analyses of the sample from location DES4, the reporting limit was raised (the sample was diluted) due to the physical nature (salinity) of the sample; consequently, the surrogate recovery was outside accepted limits. Nitrogen and phosphorus measurements at DES4 were not employed to interpret macronutrient impacts on surface water quality.

(FB) = Total Phosphorus was measured in the field blank at a concentration of 0.083 mg/L (negligible concentration).

Table 5

Nitrogen Concentrations in the Unnamed Northern Tributary to Upper Abbotts Lagoon

Point Reyes National Seashore
Marin County CA

Location	Date	Time	Estimated Flowrate (cfs)	Hydrologic Conditions	Ammonia as Nitrogen (mg N/L)	Nitrate as Nitrogen (mg N/L)	Nitrite as Nitrogen (mg N/L)	Total Inorganic Nitrogen (mg N/L)	Total Kjeldahl Nitrogen (mg N/L)	Total Organic Nitrogen (mg N/L)	Total Nitrogen (mg N/L)
T2 (also named ABB2)	6 Feb 99	6:50 pm	5 (3)	Approximately 3" precipitation over the 48-hours preceding monitoring. Approximately 6" precipitation over the month preceding monitoring.	1.00	3.33	0.076	4.41	5.2	4.2	9.6
	6 Feb 99	9:50 pm	5 (3)	Approximately 3" precipitation over the 48-hours preceding monitoring. Approximately 6" precipitation over the month preceding monitoring.	1.27	2.87	0.058	4.20	6.4	5.1	11.5
	7 Feb 99	10:30 am	5 (3)	Approximately 3" precipitation over the 48-hours preceding monitoring. Approximately 6" precipitation over the month preceding monitoring.	0.83	3.25	0.067	4.15	4.5	3.7	8.2
	7 Feb 99	2:40 pm	3 (3)	Approximately 3" precipitation over the 48-hours preceding monitoring. Approximately 6" precipitation over the month preceding monitoring.	0.72	4.52	0.085	5.33	3.0	2.3	5.3
	11 Apr 99	6:00 am	5 (3)	Approximately 2" precipitation over the 48-hours preceding monitoring. Approximately 3" precipitation over the month preceding monitoring.	0.79	4.91	0.096	5.80	7.8	7.0	14.8
T3 (also named ABB3	7 Feb 99	1:00 pm	7 (3)	Approximately 3" precipitation over the 48-hours preceding monitoring. Approximately 6" precipitation over the month preceding monitoring.	3.46	8.34	0.223	12.12	9.9	6.4	16.3
	11 Apr 99	7:15 am	1.5 (3)	Approximately 2" precipitation over the 48-hours preceding monitoring. Approximately 3" precipitation over the month preceding monitoring.	1.68	3.39	0.085	5.16	13	11.3	24.3
ABB2/3	27 Jan 21	10:10 am	3 (1) (2)	1.48" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	0.24	5.2	<0.10	5.4	3.4	3.2	8.6
	28 Jan 21	10:38 am	3 (1) (2)	1.86" precipitation over the 48-hours preceding monitoring, which was the first precipitation event with more than 1" for water year 2020-2021. Upstream stock ponds had not spilled for at least 7 months preceding monitoring and the recent precipitation did not cause the ponds to spill. As of the date of monitoring, cumulative precipitation has been ±30-35% of normal for water year 2020-2021.	0.18	3.9	<0.10	4.1	2.9	2.7	6.8

General Notes

(a) The US Geological Survey performed the monitoring in 1999 (Kratzer et al. 2006).

(b) "<" indicates the result was below the cited laboratory reporting limit.

(c) Total Organic Nitrogen = Total Kjeldahl Nitrogen - Ammonia as Nitrogen. Total Inorganic Nitrogen = Ammonia as Nitrogen + Nitrate as Nitrogen + Nitrite as Nitrogen. Total Nitrogen = Organic Nitrogen + Inorganic Nitrogen. For the purposes of calculation, results below the laboratory detection limit have been taken as zero.

Footnotes

(1) = The flowrate on 28 January 2021 was less than the flowrate on 27 January 2021.

(2) = Monitoring was performed on the falling portion of the hydrograph – flowrate was decreasing at the time of monitoring.

(3) = Monitoring was performed near peak flowrate.

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

Basemap (northern portion): 2018, Tomales Quadrangle, California-Marin County. 7.5-minute Series. U.S. Geological Survey. Basemap (southern portion): 2015, Drakes Bay Quadrangle, California-Marin County. 7.5-minute Series. U.S. Geological Survey.

PAC3
Kehoe Lagoon

PAC1S
South Kehoe Creek

ABB2/3
Unnamed Northern Tributary to Upper Abbotts Lagoon

DES4
Main Stem Schooner Creek

DES2
East Schooner Creek

Historical monitoring location T3 (also named ABB3)

Historical monitoring location T2 (also named ABB2)

Historical monitoring location T1 (also named ABB1)

Historical monitoring location ABB4

Upper Abbotts Lagoon
Middle Abbotts Lagoon
Lower Abbotts Lagoon

Pt. Reyes RCA meteorological station

East Schooner Creek

Drakes Estero

General Notes

(1) ABB2/3 and DES4 are new locations established in January 2021. The remaining locations and location names are historical.

(2) Upper Abbotts Lagoon receives inflow from Abbotts Creek and the unnamed tributary corresponding to location ABB2/3. Location ABB2/3 accounts for the combined input of historical monitoring locations T2 (also named ABB2) and T3 (also named ABB3).

Figure 1

Monitoring Locations (USGS Basemap)

Point Reyes National Seashore Marin County CA

0 0.5 1

Approximate Scale in Miles

0 3,000 6,000

Approximate Scale in Feet

Basemap: Google Earth, photography 19-20 September 2018.

PAC3
Kehoe Lagoon

PAC1S
South Kehoe Creek

Historical monitoring location T3 (also named ABB3)

Historical monitoring location T2 (also named ABB2)

ABB2/3
Unnamed Northern Tributary to Upper Abbotts Lagoon

Historical monitoring location T1 (also named ABB1)

Abbots Creek

Upper Abbotts Lagoon
Middle Abbotts Lagoon
Lower Abbotts Lagoon

Historical monitoring location ABB4

Lairds Landing

Pierce Point Rd

Pt. Reyes RCA meteorological station

DES4
Main Stem Schooner Creek

DES2
East Schooner Creek

East Schooner Creek

Drakes Estero

General Notes

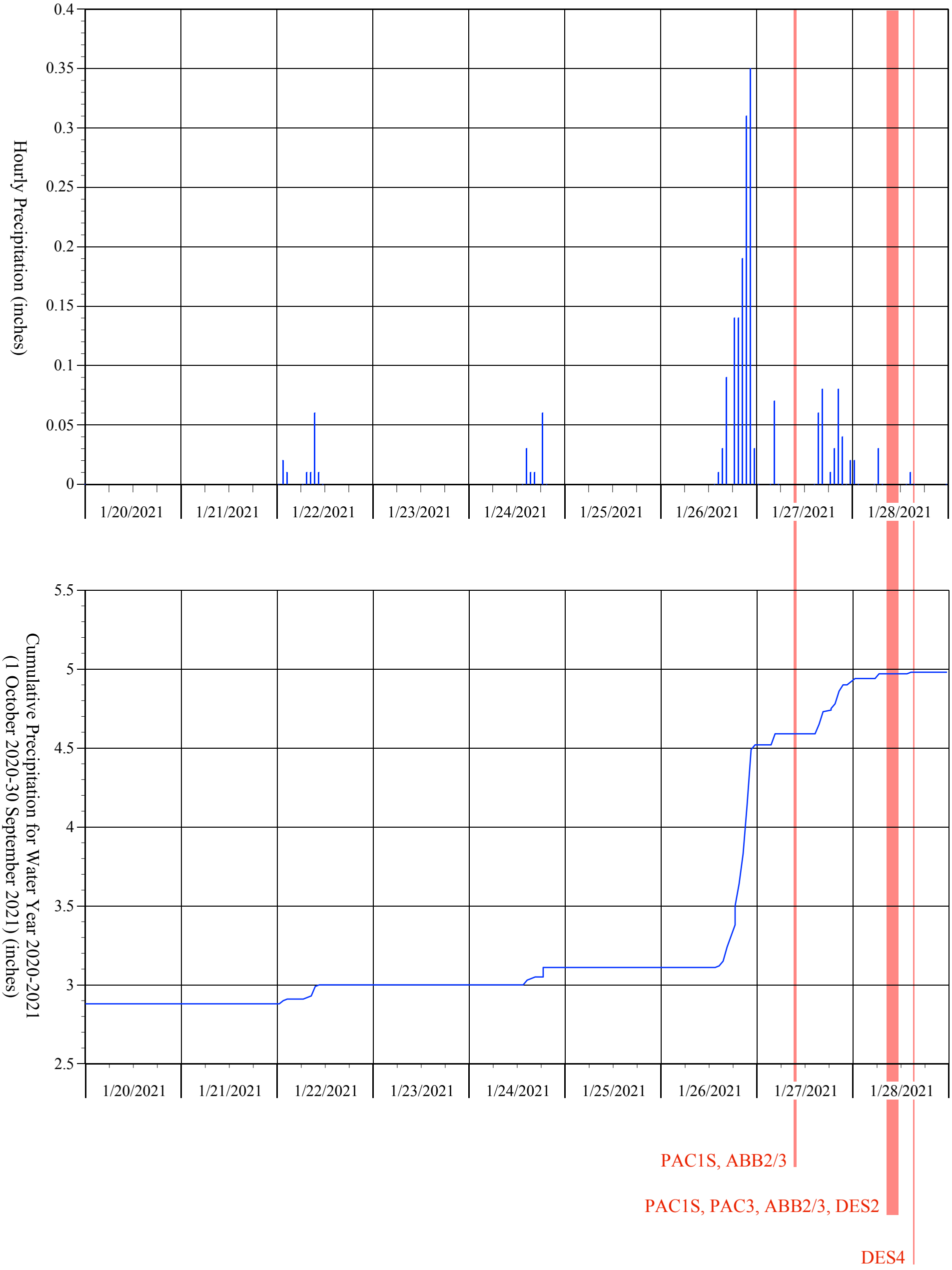
(1) ABB2/3 and DES4 are new locations established in January 2021. The remaining locations and location names are historical.

(2) Upper Abbotts Lagoon receives inflow from Abbotts Creek and the unnamed tributary corresponding to location ABB2/3. Location ABB2/3 accounts for the combined input of historical monitoring locations T2 (also named ABB2) and T3 (also named ABB3).

Figure 2

Monitoring Locations (Google Earth Basemap)

Point Reyes National Seashore Marin County CA



Detailed hydrologic studies of Abbotts Creek immediately upstream of Upper Abbots Lagoon revealed that peak instream flow occurred approximately 2.5-4 hours after peak precipitation [Kratzer, CR, Saleh, DK, and Celia Zamora (2006). *Assessment of Hydrologic and Water Quality Data Collected in Abbotts Lagoon Watershed, Point Reyes National Seashore, California during Water Years 1999 and 2000. Scientific Investigations Report 2005-5261, Prepared in cooperation with the National Park Service.* Prepared by United States Geological Survey, Sacramento CA. 2006. https://pubs.usgs.gov/sir/2005/5261/sir_2005-5261.pdf]

Precipitation data from the nearby Pt Reyes RCA meterological station
https://wrcc.dri.edu/cgi-bin/rawMAIN.pl?nvprca

Figure 3

Precipitation Measurements from the Pt. Reyes RCA Meteorological Station

Point Reyes National Seashore Marin County CA

APPENDIX A

Monitoring Locations

MONITORING LOCATIONS

PAC1S (South Kehoe Creek)

- Historical monitoring location with historical water quality data.
- Primarily reflects dairy cattle impacts.
- Located in a marshy area with abundant terrestrial and aquatic vegetation. Flow at the monitoring location was somewhat diffuse. At the monitoring location, the total width of the flow channel was approximately 8 feet; the depth varied up to approximately 0.7 feet. Some of the water flow occurred around stems and leaves of the aquatic vegetation. Monitoring was performed at a location with visible flow and without vegetation.
- The substrate at the monitoring location was black, organic sandy silt.
- [a] Water was collected from the upper ±2 inches of flow without disturbing the substrate.
- Immediately downstream of PAC1S, Pierce Point Road creates a flow restriction, resulting in standing/quiescent water (on the upstream side of Piercy Point Road). Floating algae have been observed in the standing/quiescent water.
- Visitors have direct access to South Kehoe Creek, particularly the standing/quiescent water upstream of Pierce Pont Road. Restrooms and parking are near the monitoring location.

PAC3 (Kehoe Lagoon)

- Historical monitoring location with historical water quality data.
- Primarily reflects dairy cattle impacts.
- The monitoring location was at the downstream end of Kehoe Marsh, ±8 feet from the northern shore of the lagoon. The water depth at the monitoring location was ±6 feet.
- Quiescent/standing water existed at the monitoring location.
- The substrate at the monitoring locations was brown sand.
- Water was collected at a depth of ±1 foot below the water surface without disturbing the substrate.
- Filamentous algae and floating algae have been observed in Kehoe Lagoon.
- Visitors frequent Kehoe Lagoon. Visitors wade and swim in Kehoe Lagoon. Restrooms and parking are near the monitoring location.

ABB2/3 (Unnamed Northern Tributary to Upper Abbotts Lagoon)

- This new monitoring location is downstream of historical monitoring locations T2 (also named ABB2) and T3 (also named ABB3). Location ABB2/3 accounts for the combined flow from historical monitoring locations T2 and T3. ABB2/3 represents a more accurate location to determine water quality impacts on Upper Abbotts Lagoon.
- Primarily reflects dairy cattle impacts.
- Monitoring was performed in a well-defined flow channel. Monitoring was performed of well-mixed flow.
- The substrate at the monitoring location was brown sand and gravel.

[a] Water was collected from the upper ±2 inches of flow without disturbing the substrate.

- Upper Abbots Lagoon is located immediately downstream of ABB2/3. Floating algae have been observed in Upper Abbotts Lagoon.
- Parking is located near the monitoring location and lightly-used footpaths to the unnamed tributary were observed during monitoring.

DES2 (East Schooner Creek)

- Historical monitoring location with historical water quality data.
- Primarily reflects beef cattle impacts.
- Located where Sir Frances Drake Boulevard crosses the creek.
- Prior to monitoring, the former corrugated-metal-pipe culvert crossing had been replaced with a reinforced-concrete bottomless culvert crossing (Federal Highway Administration 2018). The replacement crossing at DES2 had been constructed in a manner similar to previous side-road crossings of East Schooner Creek (National Park Service 2006).
- Monitoring was performed immediately upstream of the bottomless culvert, within a well-defined flow channel. Monitoring was performed approximately 5 feet upstream of pooled water that existed on the upstream side of the bottomless culvert. Monitoring was performed of well-mixed flow.
- The substrate at the monitoring locations was brown sand and gravel.

[a] Water was collected from the upper ±2 inches of flow without disturbing the substrate.

- East Schooner Creek is designated critical habitat for the Central California Coast Steelhead.
- Parking exists immediately adjacent to the monitoring location. Creek access upstream of the bottomless culvert is limited by fencing; direct access exists on the downstream side of the bottomless culvert.

DES4 (Main Stem Schooner Creek)

- Not a historical monitoring location.
- Primarily reflects beef cattle impacts.
- Located where Sir Frances Drake Boulevard crosses the creek.
- At the time of the January 2021 monitoring, the crossing consisted of twin 84-inch corrugated-metal-pipes. The crossing has been slated for replacement with a single-span bridge (Federal Highway Administration 2018); barricades, silt fence, and sandbags were observed on the downstream side of the crossing, indicating construction of the replacement bridge had commenced.
- Monitoring was performed within the westerly culvert, at the downstream end. Monitoring was performed of well-mixed flow.
- The “substrate” at the monitoring locate was the metal culvert.

[a] Water was collected from the upper ±2 inches of flow.

- Parking exists immediately adjacent to the monitoring location. Visitors can launch personal watercraft at the monitoring location, although the “advertised” personal watercraft launch for Drakes Estero is ±1 mile to the south.

Location PAC1S. View looking east. 28 January 2021.

Kehoe Lagoon. View looking southwest. Location PAC3 was at the outside edge of the tules that are visible on the left side of the photograph. 28 January 2021.

Location PAC3. View looking south. 28 January 2021.

Location ABB2/3. View looking south (downstream towards Upper Abbotts Lagoon). 28 January 2021.

Location ABB2/3. View looking south (downstream towards Upper Abbotts Lagoon). 28 January 2021.

Location DES2 located upstream of the bottomless culvert where Sir Frances Drake Boulevard crosses East Schooner Creek. View looking northeast. 28 January 2021.

Location DES4 at the downstream end of the twin corrugated metal pipes where Sir Frances Drake Boulevard crosses the main stem of Schooner Creek. Monitoring was performed at the westerly (closest pipe). View looking east. 28 January 2021.

View of the tidal marsh upstream of the twin corrugated metal pipes where Sir Frances Drake Boulevard crosses the main stem of Schooner Creek. East Schooner Creek enters on the lower right-hand corner of the photograph. View looking north (upstream). 28 January 2021.

APPENDIX B

Laboratory Analytical Reports

McCampbell Analytical, Inc.

"When Quality Counts"

Analytical Report

WorkOrder: 2101C81

Report Created for: Douglas Lovell

1514 Hearst Avenue
Berkeley, CA 94703

Project Contact: Douglas Lovell
Project P.O.:
Project: P2021.1; Pt Reys Surface Water Monitoring

Project Received: 01/27/2021

Analytical Report reviewed & approved for release on 02/05/2021 by:

Yen Cao
Project Manager

McCampbell Analytical, Inc.
"When Quality Counts"

1534 Willow Pass Road, Pittsburg, CA 94565-1701
Toll Free Telephone: (877) 252-9262 / Fax: (925) 252-9269
http://www.mccampbell.com / E-mail: main@mccampbell.com

Glossary of Terms & Qualifier Definitions

Client: Douglas Lovell
Project: P2021.1; Pt Reys Surface Water Monitoring
WorkOrder: 2101C81

Glossary Abbreviation

%D	Serial Dilution Percent Difference
95% Interval	95% Confident Interval
CPT	Consumer Product Testing not NELAP Accredited
DF	Dilution Factor
DI WET	(DISTLC) Waste Extraction Test using DI water
DISS	Dissolved (direct analysis of 0.45 µm filtered and acidified water sample)
DLT	Dilution Test (Serial Dilution)
DUP	Duplicate
EDL	Estimated Detection Limit
ERS	External reference sample. Second source calibration verification.
ITEF	International Toxicity Equivalence Factor
LCS	Laboratory Control Sample
LQL	Lowest Quantitation Level
MB	Method Blank
MB % Rec	% Recovery of Surrogate in Method Blank, if applicable
MDL	Method Detection Limit
ML	Minimum Level of Quantitation
MS	Matrix Spike
MSD	Matrix Spike Duplicate
N/A	Not Applicable
ND	Not detected at or above the indicated MDL or RL
NR	Data Not Reported due to matrix interference or insufficient sample amount.
PDS	Post Digestion Spike
PDSD	Post Digestion Spike Duplicate
PF	Prep Factor
RD	Relative Difference
RL	Reporting Limit (The RL is the lowest calibration standard in a multipoint calibration.)
RPD	Relative Percent Deviation
RRT	Relative Retention Time
SPK Val	Spike Value
SPKRef Val	Spike Reference Value
SPLP	Synthetic Precipitation Leachate Procedure
ST	Sorbent Tube
TCLP	Toxicity Characteristic Leachate Procedure
TEQ	Toxicity Equivalents
TZA	TimeZone Net Adjustment for sample collected outside of MAI's UTC.
WET (STLC)	Waste Extraction Test (Soluble Threshold Limit Concentration)

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Glossary of Terms & Qualifier Definitions

Client: Douglas Lovell
Project: P2021.1; Pt Reys Surface Water Monitoring
WorkOrder: 2101C81

Analytical Qualifiers

b1	Aqueous sample that contains greater than ~1 vol. % sediment

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101C81
Date Received:	01/27/2021 13:34	**Extraction Method:**	E300.1
Date Prepared:	01/27/2021-01/28/2021	**Analytical Method:**	E300.1
Project:	P2021.1; Pt Reys Surface Water Monitoring	**Unit:**	mg/L

Inorganic Anions by IC

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC 1S	2101C81-001C	Water	01/27/2021 09:40	IC4 01292166.D	213976

Analytes	Result	RL	DF	Date Analyzed
Nitrate as N	**4.1**	0.10	1	01/27/2021 19:34
Nitrate as $NO3^{-}$	**18**	0.44	1	01/27/2021 19:34
Nitrite as N	ND	0.10	1	01/27/2021 19:34
Nitrite as $NO2^{-}$	ND	0.33	1	01/27/2021 19:34
Nitrate & Nitrite as N	**4.1**	0.10	1	01/27/2021 19:34
ortho-Phosphate as P	**0.48**	0.10	1	01/27/2021 19:34
ortho-Phosphate as PO4	**1.5**	0.31	1	01/27/2021 19:34

Surrogates	REC (%)	Limits	
Malonate	97	90-115	01/27/2021 19:34

Analyst(s): AO Analytical Comments: b1

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
ABB2/3	2101C81-002C	Water	01/27/2021 10:10	IC4 01292175.D	213976

Analytes	Result	RL	DF	Date Analyzed
Nitrate as N	**5.2**	0.20	2	01/28/2021 00:13
Nitrate as $NO3^{-}$	**23**	0.88	2	01/28/2021 00:13
Nitrite as N	ND	0.10	1	01/27/2021 19:50
Nitrite as $NO2^{-}$	ND	0.33	1	01/27/2021 19:50
Nitrate & Nitrite as N	**5.2**	0.20	2	01/28/2021 00:13
ortho-Phosphate as P	**0.51**	0.10	1	01/27/2021 19:50
ortho-Phosphate as PO4	**1.6**	0.31	1	01/27/2021 19:50

Surrogates	REC (%)	Limits	
Malonate	98	90-115	01/27/2021 19:50

Analyst(s): AO

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101C81
Date Received:	01/27/2021 13:34	**Extraction Method:**	E350.1
Date Prepared:	01/30/2021	**Analytical Method:**	E350.1
Project:	P2021.1; Pt Reys Surface Water Monitoring	**Unit:**	mg/L

Ammonia as N

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC 1S	2101C81-001B	Water	01/27/2021 09:40	WC_SKALAR 013021A1_114	214180

Analytes	Result	MDL	RL	DF	Date Analyzed
Ammonia, total as N	**0.18**	0.092	0.10	1	01/30/2021 14:07

Analyst(s): RB Analytical Comments: b1

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
ABB2/3	2101C81-002B	Water	01/27/2021 10:10	WC_SKALAR 013021A1_115	214180

Analytes	Result	MDL	RL	DF	Date Analyzed
Ammonia, total as N	**0.24**	0.092	0.10	1	01/30/2021 14:09

Analyst(s): RB

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http://www.mccampbell.com / E-mail: main@mccampbell.com

Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101C81
Date Received:	01/27/2021 13:34	**Extraction Method:**	IDEXX Enterolert
Date Prepared:	01/27/2021 14:00	**Analytical Method:**	9230D.3b
Project:	P2021.1; Pt Reys Surface Water Monitoring	**Unit:**	MPN/100ml

Enterococci, Enumeration

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC 1S	2101C81-001D	Water	01/27/2021 09:40	MICROBIOLOGY	213973

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Enterococci	**12,000**	10	10	8k - 18k	01/28/2021 14:34

Analyst(s): AB Analytical Comments: b1

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
ABB2/3	2101C81-002D	Water	01/27/2021 10:10	MICROBIOLOGY	213973

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Enterococci	**8700**	10	10	6k - 12k	01/28/2021 14:40

Analyst(s): AB

McCampbell Analytical, Inc.
"When Quality Counts"

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Toll Free Telephone: (877) 252-9262 / Fax: (925) 252-9269
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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101C81
Date Received:	01/27/2021 13:34	**Extraction Method:**	E365.1
Date Prepared:	02/04/2021	**Analytical Method:**	E365.1
Project:	P2021.1; Pt Reys Surface Water Monitoring	**Unit:**	mg/L

Total Phosphorous as P

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC 1S	2101C81-001A	Water	01/27/2021 09:40	WC_SKALAR 020521C1_28	214580

Analytes	Result	RL	DF	Date Analyzed
Total Phosphorous as P	**0.83**	0.050	1	02/05/2021 11:38

Analyst(s): RB Analytical Comments: b1

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
ABB2/3	2101C81-002A	Water	01/27/2021 10:10	WC_SKALAR 020521C1_29	214580

Analytes	Result	RL	DF	Date Analyzed
Total Phosphorous as P	**0.83**	0.050	1	02/05/2021 11:40

Analyst(s): RB

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101C81
Date Received:	01/27/2021 13:34	**Extraction Method:**	SM9221B2B3CE1F
Date Prepared:	01/27/2021 14:00	**Analytical Method:**	SM9221B2B3CE1F
Project:	P2021.1; Pt Reys Surface Water Monitoring	**Unit:**	MPN/100ml

Fecal Coliform, Total Coliform, & E. Coli, Enumeration

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC 1S	2101C81-001E	Water	01/27/2021 09:40	MICROBIOLOGY	213969

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Fecal Coliform	**22,000**	180	100	7k - 44k	01/31/2021 13:15
Total Coliform	**54,000**	180	100	15k - 170k	01/31/2021 13:15
E. Coli	**17,000**	180	100	6k - 40k	01/31/2021 13:15

Analyst(s): AB Analytical Comments: b1

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
ABB2/3	2101C81-002E	Water	01/27/2021 10:10	MICROBIOLOGY	213969

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Fecal Coliform	**17,000**	180	100	6k - 40k	01/31/2021 13:21
Total Coliform	**35,000**	180	100	10k - 100k	01/31/2021 13:21
E. Coli	**13,000**	180	100	4k - 40k	01/31/2021 13:21

Analyst(s): AB

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101C81
Date Received:	01/27/2021 13:34	**Extraction Method:**	E351.2
Date Prepared:	01/29/2021	**Analytical Method:**	E351.2
Project:	P2021.1; Pt Reys Surface Water Monitoring	**Unit:**	mg/L

Total Kjeldahl Nitrogen

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC 1S	2101C81-001B	Water	01/27/2021 09:40	WC_SKALAR 013021A1_159	214113

Analytes	Result	RL	DF	Date Analyzed
TKN as N	**3.1**	0.40	1	01/30/2021 15:59

Analyst(s): RB Analytical Comments: b1

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
ABB2/3	2101C81-002B	Water	01/27/2021 10:10	WC_SKALAR 013021A1_160	214113

Analytes	Result	RL	DF	Date Analyzed
TKN as N	**3.4**	0.40	1	01/30/2021 16:02

Analyst(s): RB

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101C81
Date Prepared:	01/27/2021 - 01/28/2021	**BatchID:**	213976
Date Analyzed:	01/27/2021 - 01/28/2021	**Extraction Method:**	E300.1
Instrument:	IC4	**Analytical Method:**	E300.1
Matrix:	Water	**Unit:**	mg/L
Project:	P2021.1; Pt Reys Surface Water Monitoring	**Sample ID:**	MB/LCS/LCSD-213976

QC Summary Report for E300.1

Analyte	MB Result	MDL	RL	SPK Val	MB SS %REC	MB SS Limits
Nitrate as N	ND	0.0170	0.100	-	-	-
Nitrate as $NO3^{-}$	ND	0.0740	0.440	-	-	-
Nitrite as N	ND	0.0190	0.100	-	-	-
Nitrite as $NO2^{-}$	ND	0.0630	0.330	-	-	-
ortho-Phosphate as P	ND	0.0560	0.100	-	-	-
ortho-Phosphate as PO4	ND	0.170	0.310	-	-	-
Surrogate Recovery						
Malonate	0.0995			0.1	99	90-115

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Nitrate as N	0.973	0.960	1	97	96	85-115	1.35	20
Nitrate as $NO3^{-}$	4.31	4.25	4.4	98	97	85-115	1.35	20
Nitrite as N	0.966	0.956	1	97	96	85-115	0.947	20
Nitrite as $NO2^{-}$	3.17	3.14	3.3	96	95	85-115	0.947	20
ortho-Phosphate as P	1.00	0.969	1	100	97	85-115	3.36	20
ortho-Phosphate as PO4	3.07	2.97	3.06	100	97	85-115	3.36	20
Surrogate Recovery								
Malonate	0.0987	0.0972	0.10	99	97	90-115	1.54	20

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101C81
Date Prepared:	01/30/2021	**BatchID:**	214180
Date Analyzed:	01/30/2021	**Extraction Method:**	E350.1
Instrument:	WC_SKALAR	**Analytical Method:**	E350.1
Matrix:	Water	**Unit:**	mg/L
Project:	P2021.1; Pt Reys Surface Water Monitoring	**Sample ID:**	MB/LCS/LCSD-214180

QC Summary Report for E350.1

Analyte	MB Result	MDL	RL			
Ammonia, total as N	ND	0.0920	0.100	-	-	-

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Ammonia, total as N	4.08	4.15	4	102	104	88-113	1.60	20

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101C81
Date Prepared:	01/27/2021	**BatchID:**	213973
Date Analyzed:	01/28/2021	**Extraction Method:**	IDEXX Enterolert
Instrument:	MICROBIOLOGY	**Analytical Method:**	9230D.3b
Matrix:	Water	**Unit:**	MPN/100ml
Project:	P2021.1; Pt Reys Surface Water Monitoring	**Sample ID:**	MB-213973 2101C81-001D

QC Summary Report for Enterococci

Analyte	RL	Blank	Control	Sample Result	Dup / Serial Dilution Result	RPD	RPD Limit
Enterococci	1.00	ND	-	12,000	11,200	7.18	70
Enterococcus faecalis (Ent POS Control)	1.00	-	866	-	-	-	-
E. coli (Ent NEG Control)	1.00	-	ND	-	-	-	-

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101C81
Date Prepared:	02/05/2021	**BatchID:**	214580
Date Analyzed:	02/05/2021	**Extraction Method:**	E365.1
Instrument:	WC_SKALAR	**Analytical Method:**	E365.1
Matrix:	Water	**Unit:**	mg/L
Project:	P2021.1; Pt Reys Surface Water Monitoring	**Sample ID:**	MB/LCS/LCSD-214580

QC Summary Report for E365.1

Analyte	MB Result	MDL	RL			
Total Phosphorous as P	ND	0.0350	0.0500	-	-	-

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Total Phosphorous as P	0.835	0.819	0.80	104	102	90-110	1.91	20

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101C81
Date Prepared:	01/27/2021	**BatchID:**	213969
Date Analyzed:	01/31/2021	**Extraction Method:**	SM9221B2B3CE1F
Instrument:	MICROBIOLOGY	**Analytical Method:**	SM9221B2B3CE1F
Matrix:	Water	**Unit:**	MPN/100ml
Project:	P2021.1; Pt Reys Surface Water Monitoring	**Sample ID:**	MB-213969

QC Summary Report for SM9221B2B3CE1F

Analyte	RL	Blank	Control	Sample Result	Dup / Serial Dilution Result	RPD	RPD Limit
Fecal Coliform	1.80	ND	-	-	-	-	-
E. coli (FC POS Control)	1.80	-	220	-	-	-	-
Enterobacter aerogenes (FC NEG Control)	1.80	-	ND	-	-	-	-
Total Coliform	1.80	ND	-	-	-	-	-
Enterobacter aerogenes (TC POS Control)	1.80	-	110	-	-	-	-
Pseudomonas aeruginosa (TC NEG Control)	1.80	-	ND	-	-	-	-
E. Coli	1.80	ND	-	-	-	-	-
E. coli (EC POS Control)	1.80	-	220	-	-	-	-
Enterobacter aerogenes (EC NEG Control)	1.80	-	ND	-	-	-	-

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101C81
Date Prepared:	01/29/2021	**BatchID:**	214113
Date Analyzed:	01/30/2021	**Extraction Method:**	E351.2
Instrument:	WC_SKALAR	**Analytical Method:**	E351.2
Matrix:	Water	**Unit:**	mg/L
Project:	P2021.1; Pt Reys Surface Water Monitoring	**Sample ID:**	MB/LCS/LCSD-214113 2101C81-001BMS/MSD

QC Summary Report for E351.2 (TKN as N)

Analyte	MB Result	MDL	RL			
TKN as N	ND	0.310	0.400	-	-	-

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
TKN as N	12.0	12.1	12	100	101	73-119	0	20

Analyte	MS DF	MS Result	MSD Result	SPK Val	SPKRef Val	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD Limit
TKN as N		NR	NR		3.1	NR	NR	-	NR	-

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CHAIN-OF-CUSTODY RECORD

WorkOrder: 2101C81 **ClientCode: DLBC** **QuoteID: 212277**

☐ WaterTrax ☐ WriteOn ☐ EDF ☐ EQuIS ☑ Dry-Weight ☐ Email ☐ HardCopy ☐ ThirdParty ☑ J-flag
☐ Detection Summary ☐ Excel

Report to:
Douglas Lovell
Douglas Lovell
1514 Hearst Avenue
Berkeley, CA 94703
(510) 520-3146 FAX:
Email: doug.streamborn@gmail.com
cc/3rd Party:
PO:
Project: P2021.1; Pt Reys Surface Water Monitoring

Bill to:
Douglas Lovell
Douglas Lovell
1514 Hearst Avenue
Berkeley, CA 94703
doug.streamborn@gmail.com

Requested TAT: 5 days;

Date Received: **01/27/2021**
Date Logged: **01/27/2021**

Lab ID	Client ID	Matrix	Collection Date	Hold	Requested Tests (See legend below)											
					1	2	3	4	5	6	7	8	9	10	11	12
2101C81-001	PAC 1S	Water	1/27/2021 09:40	☐	C	B	D	A	A	E	B					
2101C81-002	ABB2/3	Water	1/27/2021 10:10	☐	C	B	D	A	A	E	B					

Test Legend:

1	300_1_W	2	AMMONIA_NPDES_W [J]	3	ENTERO-EST_W	4	PhosTot_W
5	PRDisposal Fee	6	TC&EC&FC_9221_W	7	TKN_W	8	
9		10		11		12	

Project Manager: Angela Rydelius

Prepared by: Valerie Alfaro

Comments:

NOTE: Soil samples are discarded 60 days after results are reported unless other arrangements are made (Water samples are 30 days).
Hazardous samples will be returned to client or disposed of at client expense.

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WORK ORDER SUMMARY

Client Name: DOUGLAS LOVELL **Project:** P2021.1; Pt Reys Surface Water Monitoring **Work Order:** 2101C81
Client Contact: Douglas Lovell **QC Level:**
Contact's Email: doug.streamborn@gmail.com **Comments:** **Date Logged:** 1/27/2021

☐WaterTrax ☐WriteOn ☐EDF ☐Excel ☐EQuIS ☐Email ☐HardCopy ☐ThirdParty ☑J-flag

LabID	ClientSampID	Matrix	Test Name	Containers /Composites	Bottle & Preservative	Head Space	Dry-Weight	Collection Date & Time	TAT	Test Due Date	Sediment Content	Hold	SubOut
001A	PAC 1S	Water	E365.1 (Total Phosphorous as P)	1	500mL aG w/ H2SO4	☐	☐	1/27/2021 9:40	5 days	2/3/2021	1%+	☐	
001B	PAC 1S	Water	E351.2 (TKN)	1	250mL aG w/ H2SO4	☐	☐	1/27/2021 9:40	5 days	2/3/2021	1%+	☐	
			E350.1 (Ammonia as N)			☐	☐		5 days	2/3/2021	1%+	☐	
001C	PAC 1S	Water	E300.1 (Inorganic Anions) <Nitrate & Nitrite as N, Nitrate as N, Nitrate as $NO3^{-}$, Nitrite as N, Nitrite as $NO2^{-}$, ortho-Phosphate as P, ortho-Phosphate as PO4>	1	125mL HDPE, unprsv.	☐	☐	1/27/2021 9:40	5 days	2/3/2021	1%+	☐	
001D	PAC 1S	Water	IDEXX Enterolert (Enterococci, Enumeration)	2	120ML Sterile w/ Na2S2O3	☐	☐	1/27/2021 9:40	5 days	2/3/2021	1%+	☐	
001E	PAC 1S	Water	SM9221B2B3CE1F (FC, TC & E coli)	2	120ML Sterile w/ Na2S2O3	☐	☐	1/27/2021 9:40	5 days	2/3/2021	1%+	☐	
002A	ABB2/3	Water	E365.1 (Total Phosphorous as P)	1	500mL aG w/ H2SO4	☐	☐	1/27/2021 10:10	5 days	2/3/2021	Trace	☐	
002B	ABB2/3	Water	E351.2 (TKN)	1	250mL aG w/ H2SO4	☐	☐	1/27/2021 10:10	5 days	2/3/2021	Trace	☐	
			E350.1 (Ammonia as N)			☐	☐		5 days	2/3/2021	Trace	☐	
002C	ABB2/3	Water	E300.1 (Inorganic Anions) <Nitrate & Nitrite as N, Nitrate as N, Nitrate as $NO3^{-}$, Nitrite as N, Nitrite as $NO2^{-}$, ortho-Phosphate as P, ortho-Phosphate as PO4>	1	125mL HDPE, unprsv.	☐	☐	1/27/2021 10:10	5 days	2/3/2021	Trace	☐	

NOTES: * STLC and TCLP extractions require 2 days to complete; therefore, all TATs begin after the extraction is completed (i.e., One-day TAT yields results in 3 days from sample submission).

- MAI assumes that all material present in the provided sampling container is considered part of the sample - MAI does not exclude any material from the sample prior to sample preparation unless requested in writing by the client.

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WORK ORDER SUMMARY

Client Name: DOUGLAS LOVELL **Project:** P2021.1; Pt Reys Surface Water Monitoring **Work Order:** 2101C81
Client Contact: Douglas Lovell **QC Level:**
Contact's Email: doug.streamborn@gmail.com **Comments:** **Date Logged:** 1/27/2021

☐ WaterTrax ☐ WriteOn ☐ EDF ☐ Excel ☐ EQuIS ☐ Email ☐ HardCopy ☐ ThirdParty ☑ J-flag

LabID	ClientSampID	Matrix	Test Name	Containers /Composites	Bottle & Preservative	Head Space	Dry-Weight	Collection Date & Time	TAT	Test Due Date	Sediment Content	Hold	SubOut
002D	ABB2/3	Water	IDEXX Enterolert (Enterococci, Enumeration)	2	120ML Sterile w/ Na2S2O3	☐	☐	1/27/2021 10:10	5 days	2/3/2021	Trace	☐	
002E	ABB2/3	Water	SM9221B2B3CE1F (FC, TC & E coli)	2	120ML Sterile w/ Na2S2O3	☐	☐	1/27/2021 10:10	5 days	2/3/2021	Trace	☐	

NOTES: * STLC and TCLP extractions require 2 days to complete; therefore, all TATs begin after the extraction is completed (i.e., One-day TAT yields results in 3 days from sample submission).

- MAI assumes that all material present in the provided sampling container is considered part of the sample - MAI does not exclude any material from the sample prior to sample preparation unless requested in writing by the client.

~~20~~ MA.
210181

Quote ID = 212277

Chain-of-Custody Form

Project Name: Pt Reyes Surface Water Monitoring	Project Location: Pt Reyes National Seashore, Marin County CA	Project Number: P2021.1
Sampler: Douglas Lovell	Laboratory: McCampbell Analytical, 1534 Willow Pass Rd, Pittsburg CA 94565	Laboratory Number: (925) 252-9262

Sample Designation	Date	Time	Matrix: Surface Water	Type: Grab	Containers: Quantity	Containers: Type	Preservative (in addition to ice)	Field Filtration	Turnaround: 5-day (normal)	Analyses: Total coliform, Fecal coliform, e coli (all enumeration, mpn)	Analyses: Enterococci (enumeration, mpn)	Analyses: Total Kjeldahl Nitrogen	Analyses: Ammonia Nitrogen	Analyses: Total Phosphorus	Analyses: Inorganic Anions (Nitrate, Nitrite, Orthophosphate)	Sampler Comments	Laboratory Comments
PAC3	27-Jan-21		x	x	4	120 mL sterile plastic	Sodium Thiosulfate	None	x	x	x						
PAC3	27-Jan-21		x	x	1	500 mL amber glass	H2SO4	None	x			x	x	x			
PAC3	27-Jan-21		x	x	1	125 mL HDPE	None	None	x						x		
PAC1S	27-Jan-21	9:40	x	x	4	120 mL sterile plastic	Sodium Thiosulfate	None	x	x	x					High bacteria counts expected	
PAC1S	27-Jan-21	"	x	x	1	500 mL amber glass	H2SO4	None	x			x	x	x			
PAC1S	27-Jan-21	"	x	x	1	125 mL HDPE	None	None	x						x		
ABB2/3	27-Jan-21	10:10	x	x	4	120 mL sterile plastic	Sodium Thiosulfate	None	x	x	x					High bacteria counts expected	
ABB2/3	27-Jan-21	"	x	x	1	500 mL amber glass	H2SO4	None	x			x	x	x			
ABB2/3	27-Jan-21	"	x	x	1	125 mL HDPE	None	None	x						x		
DES2	27-Jan-21		x	x	4	120 mL sterile plastic	Sodium Thiosulfate	None	x	x	x						
DES2	27-Jan-21		x	x	1	500 mL amber glass	H2SO4	None	x			x	x	x			
DES2	27-Jan-21		x	x	1	125 mL HDPE	None	None	x						x		
DES4	27-Jan-21		x	x	4	120 mL sterile plastic	Sodium Thiosulfate	None	x	x	x						
DES4	27-Jan-21		x	x	1	500 mL amber glass	H2SO4	None	x			x	x	x			
DES4	27-Jan-21		x	x	1	125 mL HDPE	None	None	x						x		
FB2	27-Jan-21		x	x	4	120 mL sterile plastic	Sodium Thiosulfate	None	x	x	x						
FB2	27-Jan-21		x	x	1	500 mL amber glass	H2SO4	None	x			x	x	x			
FB2	27-Jan-21		x	x	1	125 mL HDPE	None	None	x						x		

Note: Sampler and laboratory to observe preservative, condition, integrity, etc. of samples and record (under "Comments") any exceptions from standard protocols.

Relinquished By:	Received By:	Date: 1127121	Time: 1334
Relinquished By:	Received By:	Date:	Time:

Douglas Lovell, 1514 Hearst Avenue, Berkeley CA 94703 510-520-3146

Report results to doug.streamborn@gmail.com

Prepare EDF for Geotracker Upload? **No**	Log code:	Global ID:

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Sample Receipt Checklist

Client Name:	**Douglas Lovell**	Date and Time Received:	**1/27/2021 13:34**
Project:	**P2021.1; Pt Reys Surface Water Monitoring**	Date Logged:	**1/27/2021**
		Received by:	Lilly Ortiz
WorkOrder №:	**2101C81** Matrix: Water	Logged by:	Valerie Alfaro
Carrier:	Client Drop-In		

Chain of Custody (COC) Information

Chain of custody present?	Yes	☑	No	☐		
Chain of custody signed when relinquished and received?	Yes	☑	No	☐		
Chain of custody agrees with sample labels?	Yes	☑	No	☐		
Sample IDs noted by Client on COC?	Yes	☑	No	☐		
Date and Time of collection noted by Client on COC?	Yes	☑	No	☐		
Sampler's name noted on COC?	Yes	☑	No	☐		
COC agrees with Quote?	Yes	☑	No	☐	NA	☐

Sample Receipt Information

Custody seals intact on shipping container/cooler?	Yes	☐	No	☐	NA	☑
Shipping container/cooler in good condition?	Yes	☑	No	☐		
Samples in proper containers/bottles?	Yes	☑	No	☐		
Sample containers intact?	Yes	☑	No	☐		
Sufficient sample volume for indicated test?	Yes	☑	No	☐		

Sample Preservation and Hold Time (HT) Information

All samples received within holding time?	Yes	☑	No	☐	NA	☐
Samples Received on Ice?	Yes	☑	No	☐		
(Ice Type: BLUE ICE)						
Sample/Temp Blank temperature	Temp: 4°C				NA	☐
Water - VOA vials have zero headspace / no bubbles?	Yes	☐	No	☐	NA	☑
Sample labels checked for correct preservation?	Yes	☑	No	☐		
pH acceptable upon receipt (Metal: <2; Nitrate 353.2/4500NO3: <2; 522: <4; 218.7: >8)?	Yes	☐	No	☐	NA	☑
UCMR Samples:						
pH tested and acceptable upon receipt (200.8: ≤2; 525.3: ≤4; 530: ≤7; 541: <3; 544: <6.5 & 7.5)?	Yes	☐	No	☐	NA	☑
Free Chlorine tested and acceptable upon receipt (<0.1mg/L)?	Yes	☐	No	☐	NA	☑

Comments:

McCampbell Analytical, Inc.

"When Quality Counts"

Analytical Report

WorkOrder: 2101D57

Report Created for: Douglas Lovell

1514 Hearst Avenue
Berkeley, CA 94703

Project Contact: Douglas Lovell
Project P.O.:
Project: P2021.1; Pt Reyes Surface Water Monitoring

Project Received: 01/28/2021

Analytical Report reviewed & approved for release on 02/05/2021 by:

Susan Thompson
Project Manager

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Glossary of Terms & Qualifier Definitions

Client: Douglas Lovell
Project: P2021.1; Pt Reyes Surface Water Monitoring
WorkOrder: 2101D57

Glossary Abbreviation

%D	Serial Dilution Percent Difference
95% Interval	95% Confident Interval
CPT	Consumer Product Testing not NELAP Accredited
DF	Dilution Factor
DI WET	(DISTLC) Waste Extraction Test using DI water
DISS	Dissolved (direct analysis of 0.45 µm filtered and acidified water sample)
DLT	Dilution Test (Serial Dilution)
DUP	Duplicate
EDL	Estimated Detection Limit
ERS	External reference sample. Second source calibration verification.
ITEF	International Toxicity Equivalence Factor
LCS	Laboratory Control Sample
LQL	Lowest Quantitation Level
MB	Method Blank
MB % Rec	% Recovery of Surrogate in Method Blank, if applicable
MDL	Method Detection Limit
ML	Minimum Level of Quantitation
MS	Matrix Spike
MSD	Matrix Spike Duplicate
N/A	Not Applicable
ND	Not detected at or above the indicated MDL or RL
NR	Data Not Reported due to matrix interference or insufficient sample amount.
PDS	Post Digestion Spike
PDSD	Post Digestion Spike Duplicate
PF	Prep Factor
RD	Relative Difference
RL	Reporting Limit (The RL is the lowest calibration standard in a multipoint calibration.)
RPD	Relative Percent Deviation
RRT	Relative Retention Time
SPK Val	Spike Value
SPKRef Val	Spike Reference Value
SPLP	Synthetic Precipitation Leachate Procedure
ST	Sorbent Tube
TCLP	Toxicity Characteristic Leachate Procedure
TEQ	Toxicity Equivalents
TZA	TimeZone Net Adjustment for sample collected outside of MAI's UTC.
WET (STLC)	Waste Extraction Test (Soluble Threshold Limit Concentration)

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Received:	01/28/2021 14:02	**Extraction Method:**	E300.1
Date Prepared:	01/28/2021-01/29/2021	**Analytical Method:**	E300.1
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	mg/L

Inorganic Anions by IC

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC3	2101D57-001E	Water	01/28/2021 09:47	IC4 01292192.D	214065

Analytes	Result	RL	DF	Date Analyzed
Nitrate as N	**2.5**	0.10	1	01/28/2021 22:37
Nitrate as $NO3^-$	**11**	0.44	1	01/28/2021 22:37
Nitrite as N	ND	0.10	1	01/28/2021 22:37
Nitrite as $NO2^-$	ND	0.33	1	01/28/2021 22:37
Nitrate & Nitrite as N	**2.5**	0.10	1	01/28/2021 22:37
ortho-Phosphate as P	**0.59**	0.10	1	01/28/2021 22:37
ortho-Phosphate as PO4	**1.8**	0.31	1	01/28/2021 22:37

Surrogates	REC (%)	Limits	
Malonate	98	90-115	01/28/2021 22:37

Analyst(s): AO

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC1S	2101D57-002E	Water	01/28/2021 09:00	IC4 01292193.D	214065

Analytes	Result	RL	DF	Date Analyzed
Nitrate as N	**3.3**	0.10	1	01/28/2021 23:26
Nitrate as $NO3^-$	**14**	0.44	1	01/28/2021 23:26
Nitrite as N	ND	0.10	1	01/28/2021 23:26
Nitrite as $NO2^-$	ND	0.33	1	01/28/2021 23:26
Nitrate & Nitrite as N	**3.3**	0.10	1	01/28/2021 23:26
ortho-Phosphate as P	**0.20**	0.10	1	01/28/2021 23:26
ortho-Phosphate as PO4	**0.62**	0.31	1	01/28/2021 23:26

Surrogates	REC (%)	Limits	
Malonate	98	90-115	01/28/2021 23:26

Analyst(s): AO

(Cont.)

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Received:	01/28/2021 14:02	**Extraction Method:**	E300.1
Date Prepared:	01/28/2021-01/29/2021	**Analytical Method:**	E300.1
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	mg/L

Inorganic Anions by IC

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
ABB2/3	2101D57-003E	Water	01/28/2021 10:38	IC4 01292194.D	214065

Analytes	Result	RL	DF	Date Analyzed
Nitrate as N	**3.9**	0.10	1	01/28/2021 23:42
Nitrate as $NO3^-$	**17**	0.44	1	01/28/2021 23:42
Nitrite as N	ND	0.10	1	01/28/2021 23:42
Nitrite as $NO2^-$	ND	0.33	1	01/28/2021 23:42
Nitrate & Nitrite as N	**3.9**	0.10	1	01/28/2021 23:42
ortho-Phosphate as P	**0.45**	0.10	1	01/28/2021 23:42
ortho-Phosphate as PO4	**1.4**	0.31	1	01/28/2021 23:42

Surrogates	REC (%)	Limits	
Malonate	98	90-115	01/28/2021 23:42

Analyst(s): AO

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
DES2	2101D57-004E	Water	01/28/2021 11:22	IC4 01292195.D	214065

Analytes	Result	RL	DF	Date Analyzed
Nitrate as N	**1.9**	0.10	1	01/28/2021 23:59
Nitrate as $NO3^-$	**8.5**	0.44	1	01/28/2021 23:59
Nitrite as N	ND	0.10	1	01/28/2021 23:59
Nitrite as $NO2^-$	ND	0.33	1	01/28/2021 23:59
Nitrate & Nitrite as N	**1.9**	0.10	1	01/28/2021 23:59
ortho-Phosphate as P	ND	0.10	1	01/28/2021 23:59
ortho-Phosphate as PO4	ND	0.31	1	01/28/2021 23:59

Surrogates	REC (%)	Limits	
Malonate	99	90-115	01/28/2021 23:59

Analyst(s): AO

(Cont.)

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Received:	01/28/2021 14:02	**Extraction Method:**	E300.1
Date Prepared:	01/28/2021-01/29/2021	**Analytical Method:**	E300.1
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	mg/L

Inorganic Anions by IC

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
FB2	**2101D57-005E**	**Water**	**01/28/2021 11:38**	**IC4 01292196.D**	**214065**

Analytes	Result	RL	DF	Date Analyzed
Nitrate as N	ND	0.10	1	01/29/2021 00:15
Nitrate as $NO3^{-}$	ND	0.44	1	01/29/2021 00:15
Nitrite as N	ND	0.10	1	01/29/2021 00:15
Nitrite as $NO2^{-}$	ND	0.33	1	01/29/2021 00:15
Nitrate & Nitrite as N	ND	0.10	1	01/29/2021 00:15
ortho-Phosphate as P	ND	0.10	1	01/29/2021 00:15
ortho-Phosphate as PO4	ND	0.31	1	01/29/2021 00:15

Surrogates	REC (%)	Limits	
Malonate	100	90-115	01/29/2021 00:15

Analyst(s): AO

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Received:	01/28/2021 14:02	**Extraction Method:**	E350.1
Date Prepared:	01/30/2021	**Analytical Method:**	E350.1
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	mg/L

Ammonia as N

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC3	2101D57-001C	Water	01/28/2021 09:47	WC_SKALAR 013021A1_126	214181

Analytes	Result	MDL	RL	DF	Date Analyzed
Ammonia, total as N	**0.14**	0.092	0.10	1	01/30/2021 14:37

Analyst(s): RB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC1S	2101D57-002C	Water	01/28/2021 09:00	WC_SKALAR 013021A1_127	214181

Analytes	Result	MDL	RL	DF	Date Analyzed
Ammonia, total as N	**0.14**	0.092	0.10	1	01/30/2021 14:39

Analyst(s): RB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
ABB2/3	2101D57-003C	Water	01/28/2021 10:38	WC_SKALAR 013021A1_128	214181

Analytes	Result	MDL	RL	DF	Date Analyzed
Ammonia, total as N	**0.18**	0.092	0.10	1	01/30/2021 14:42

Analyst(s): RB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
DES2	2101D57-004C	Water	01/28/2021 11:22	WC_SKALAR 013021A1_129	214181

Analytes	Result	MDL	RL	DF	Date Analyzed
Ammonia, total as N	**0.12**	0.092	0.10	1	01/30/2021 14:44

Analyst(s): RB

(Cont.)

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Received:	01/28/2021 14:02	**Extraction Method:**	E350.1
Date Prepared:	01/30/2021	**Analytical Method:**	E350.1
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	mg/L

Ammonia as N

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
FB2	2101D57-005C	Water	01/28/2021 11:38	WC_SKALAR 013021A1_130	214181

Analytes	Result	MDL	RL	DF	Date Analyzed
Ammonia, total as N	ND	0.092	0.10	1	01/30/2021 14:47

Analyst(s): RB

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Received:	01/28/2021 14:02	**Extraction Method:**	IDEXX Enterolert
Date Prepared:	01/28/2021 15:00	**Analytical Method:**	9230D.3b
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	MPN/100ml

Enterococci, Enumeration

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC3	2101D57-001B	Water	01/28/2021 09:47	MICROBIOLOGY	214054

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Enterococci	**17,000**	10	10	12k - 27k	01/29/2021 15:24

Analyst(s): AB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC1S	2101D57-002B	Water	01/28/2021 09:00	MICROBIOLOGY	214054

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Enterococci	**14,000**	10	10	9k - 21k	01/29/2021 15:27

Analyst(s): AB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
ABB2/3	2101D57-003B	Water	01/28/2021 10:38	MICROBIOLOGY	214054

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Enterococci	**11,000**	10	10	8k - 16k	01/29/2021 15:30

Analyst(s): AB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
DES2	2101D57-004B	Water	01/28/2021 11:22	MICROBIOLOGY	214054

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Enterococci	**550**	1.0	1	360 - 800	01/29/2021 15:32

Analyst(s): AB

(Cont.)

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Received:	01/28/2021 14:02	**Extraction Method:**	IDEXX Enterolert
Date Prepared:	01/28/2021 15:00	**Analytical Method:**	9230D.3b
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	MPN/100ml

Enterococci, Enumeration

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
FB2	**2101D57-005B**	**Water**	**01/28/2021 11:38**	**MICROBIOLOGY**	**214054**

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Enterococci	ND	1.0	1	---	01/29/2021 15:35

Analyst(s): AB

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Received:	01/28/2021 14:02	**Extraction Method:**	E365.1
Date Prepared:	02/04/2021	**Analytical Method:**	E365.1
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	mg/L

Total Phosphorous as P

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC3	2101D57-001D	Water	01/28/2021 09:47	WC_SKALAR 020521C1_34	214580

Analytes	Result	RL	DF	Date Analyzed
Total Phosphorous as P	**0.87**	0.050	1	02/05/2021 11:53

Analyst(s): RB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC1S	2101D57-002D	Water	01/28/2021 09:00	WC_SKALAR 020521C1_35	214580

Analytes	Result	RL	DF	Date Analyzed
Total Phosphorous as P	**0.37**	0.050	1	02/05/2021 11:55

Analyst(s): RB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
ABB2/3	2101D57-003D	Water	01/28/2021 10:38	WC_SKALAR 020521C1_36	214580

Analytes	Result	RL	DF	Date Analyzed
Total Phosphorous as P	**0.70**	0.050	1	02/05/2021 11:58

Analyst(s): RB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
DES2	2101D57-004D	Water	01/28/2021 11:22	WC_SKALAR 020521C1_37	214580

Analytes	Result	RL	DF	Date Analyzed
Total Phosphorous as P	**0.14**	0.050	1	02/05/2021 12:00

Analyst(s): RB

(Cont.)

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Received:	01/28/2021 14:02	**Extraction Method:**	E365.1
Date Prepared:	02/04/2021	**Analytical Method:**	E365.1
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	mg/L

Total Phosphorous as P

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
FB2	2101D57-005D	Water	01/28/2021 11:38	WC_SKALAR 020521C1_49	214580

Analytes	Result	RL	DF	Date Analyzed
Total Phosphorous as P	**0.083**	0.050	1	02/05/2021 12:30

Analyst(s): RB

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Received:	01/28/2021 14:02	**Extraction Method:**	SM9221B2B3CE1F
Date Prepared:	01/28/2021 15:00	**Analytical Method:**	SM9221B2B3CE1F
Project:	Pt Reyes Surface Water Monitoring	**Unit:**	MPN/100ml

Fecal Coliform, Total Coliform, & E. Coli, Enumeration

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC3	2101D57-001A	Water	01/28/2021 09:47	MICROBIOLOGY	214023

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Fecal Coliform	**11,000**	180	100	3k - 25k	02/01/2021 12:15
Total Coliform	**17,000**	180	100	7k - 40k	02/01/2021 12:15
E. Coli	**9400**	180	100	3k - 23k	02/01/2021 12:15

Analyst(s): AB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC1S	2101D57-002A	Water	01/28/2021 09:00	MICROBIOLOGY	214023

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Fecal Coliform	**14,000**	180	100	5k - 40k	02/01/2021 12:21
Total Coliform	**22,000**	180	100	7k - 44k	02/01/2021 12:21
E. Coli	**11,000**	180	100	3k - 25k	02/01/2021 12:21

Analyst(s): AB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
ABB2/3	2101D57-003A	Water	01/28/2021 10:38	MICROBIOLOGY	214023

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Fecal Coliform	**7000**	180	100	2k - 17k	02/01/2021 12:27
Total Coliform	**17,000**	180	100	6k - 40k	02/01/2021 12:27
E. Coli	**920**	180	100	340 - 2k	02/01/2021 12:27

Analyst(s): AB

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CA ELAP 1644

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Received:	01/28/2021 14:02	**Extraction Method:**	SM9221B2B3CE1F
Date Prepared:	01/28/2021 15:00	**Analytical Method:**	SM9221B2B3CE1F
Project:	Pt Reyes Surface Water Monitoring	**Unit:**	MPN/100ml

Fecal Coliform, Total Coliform, & E. Coli, Enumeration

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
DES2	2101D57-004A	Water	01/28/2021 11:22	MICROBIOLOGY	214023

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Fecal Coliform	**920**	1.8	1	220 - 4k	02/01/2021 12:31
Total Coliform	**1600**	1.8	1	400 - 5k	02/01/2021 12:31
E. Coli	**540**	1.8	1	150 - 2k	02/01/2021 12:31

Analyst(s): AB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
FB2	2101D57-005A	Water	01/28/2021 11:38	MICROBIOLOGY	214023

Analytes	Result	RL	DF	95% Interval	Date Analyzed
Fecal Coliform	ND	1.8	1	---	02/01/2021 12:37
Total Coliform	ND	1.8	1	---	02/01/2021 12:37
E. Coli	ND	1.8	1	---	02/01/2021 12:37

Analyst(s): AB

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Received:	01/28/2021 14:02	**Extraction Method:**	E351.2
Date Prepared:	01/29/2021	**Analytical Method:**	E351.2
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	mg/L

Total Kjeldahl Nitrogen

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC3	2101D57-001C	Water	01/28/2021 09:47	WC_SKALAR 013021A1_56	214113

Analytes	Result	RL	DF	Date Analyzed
TKN as N	**3.0**	0.40	1	01/30/2021 11:42

Analyst(s): RB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PAC1S	2101D57-002C	Water	01/28/2021 09:00	WC_SKALAR 013021A1_57	214113

Analytes	Result	RL	DF	Date Analyzed
TKN as N	**2.4**	0.40	1	01/30/2021 11:44

Analyst(s): RB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
ABB2/3	2101D57-003C	Water	01/28/2021 10:38	WC_SKALAR 013021A1_58	214113

Analytes	Result	RL	DF	Date Analyzed
TKN as N	**2.9**	0.40	1	01/30/2021 11:47

Analyst(s): RB

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
DES2	2101D57-004C	Water	01/28/2021 11:22	WC_SKALAR 013021A1_59	214113

Analytes	Result	RL	DF	Date Analyzed
TKN as N	**0.76**	0.40	1	01/30/2021 11:49

Analyst(s): RB

(Cont.)

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Received:	01/28/2021 14:02	**Extraction Method:**	E351.2
Date Prepared:	01/29/2021	**Analytical Method:**	E351.2
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	mg/L

Total Kjeldahl Nitrogen

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
FB2	2101D57-005C	Water	01/28/2021 11:38	WC_SKALAR 013021A1_60	214113

Analytes	Result	RL	DF	Date Analyzed
TKN as N	ND	0.40	1	01/30/2021 11:52

Analyst(s): RB

McCampbell Analytical, Inc.
"When Quality Counts"
1534 Willow Pass Road, Pittsburg, CA 94565-1701
Toll Free Telephone: (877) 252-9262 / Fax: (925) 252-9269
http://www.mccampbell.com / E-mail: main@mccampbell.com

Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Prepared:	01/28/2021 - 01/29/2021	**BatchID:**	214065
Date Analyzed:	01/28/2021 - 01/29/2021	**Extraction Method:**	E300.1
Instrument:	IC4	**Analytical Method:**	E300.1
Matrix:	Water	**Unit:**	mg/L
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Sample ID:**	MB/LCS/LCSD-214065 2101D57-005EMS/MSD

QC Summary Report for E300.1

Analyte	MB Result	MDL	RL	SPK Val	MB SS %REC	MB SS Limits
Nitrate as N	ND	0.0170	0.100	-	-	-
Nitrate as NO_3^-	ND	0.0740	0.440	-	-	-
Nitrite as N	ND	0.0190	0.100	-	-	-
Nitrite as NO_2^-	ND	0.0630	0.330	-	-	-
ortho-Phosphate as P	ND	0.0560	0.100	-	-	-
ortho-Phosphate as PO4	ND	0.170	0.310	-	-	-
Surrogate Recovery						
Malonate	0.0972			0.1	97	90-115

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Nitrate as N	0.969	0.977	1	97	98	85-115	0.750	20
Nitrate as NO_3^-	4.29	4.32	4.4	98	98	85-115	0.750	20
Nitrite as N	0.966	0.972	1	97	97	85-115	0.635	20
Nitrite as NO_2^-	3.18	3.20	3.3	96	97	85-115	0.635	20
ortho-Phosphate as P	1.03	1.01	1	102	101	85-115	1.89	20
ortho-Phosphate as PO4	3.14	3.08	3.06	103	101	85-115	1.89	20
Surrogate Recovery								
Malonate	0.0986	0.0991	0.10	99	99	90-115	0.538	20

Analyte	MS DF	MS Result	MSD Result	SPK Val	SPKRef Val	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD Limit
Nitrate as N	1	0.966	0.970	1	ND	91	92	85-115	0.421	20
Nitrate as NO_3^-	1	4.28	4.30	4.4	ND	92	92	85-115	0.421	20
Nitrite as N	1	0.962	0.962	1	ND	96	96	85-115	0.0242	20
Nitrite as NO_2^-	1	3.16	3.16	3.3	ND	96	96	85-115	0.0240	20
ortho-Phosphate as P	1	1.01	0.999	1	ND	101	100	85-115	1.42	20
ortho-Phosphate as PO4	1	3.10	3.06	3.06	ND	101	100	85-115	1.42	20
Surrogate Recovery										
Malonate	1	0.0982	0.0983	0.10		98	98	90-115	0.0254	20

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Prepared:	01/30/2021	**BatchID:**	214181
Date Analyzed:	01/30/2021	**Extraction Method:**	E350.1
Instrument:	WC_SKALAR	**Analytical Method:**	E350.1
Matrix:	Water	**Unit:**	mg/L
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Sample ID:**	MB/LCS/LCSD-214181

QC Summary Report for E350.1

Analyte	MB Result	MDL	RL			
Ammonia, total as N	ND	0.0920	0.100	-	-	-

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Ammonia, total as N	4.13	4.15	4	103	104	88-113	0.585	20

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Prepared:	01/28/2021	**BatchID:**	214054
Date Analyzed:	01/29/2021	**Extraction Method:**	IDEXX Enterolert
Instrument:	MICROBIOLOGY	**Analytical Method:**	9230D.3b
Matrix:	Water	**Unit:**	MPN/100ml
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Sample ID:**	MB-214054

QC Summary Report for Enterococci

Analyte	RL	Blank	Control	Sample Result	Dup / Serial Dilution Result	RPD	RPD Limit
Enterococci	1.00	ND	-	-	-	-	-
Enterococcus faecalis (Ent POS Control)	1.00	-	548	-	-	-	-
E. coli (Ent NEG Control)	1.00	-	ND	-	-	-	-

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Prepared:	02/05/2021	**BatchID:**	214580
Date Analyzed:	02/05/2021	**Extraction Method:**	E365.1
Instrument:	WC_SKALAR	**Analytical Method:**	E365.1
Matrix:	Water	**Unit:**	mg/L
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Sample ID:**	MB/LCS/LCSD-214580

QC Summary Report for E365.1

Analyte	MB Result	MDL	RL			
Total Phosphorous as P	ND	0.0350	0.0500	-	-	-

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Total Phosphorous as P	0.835	0.819	0.80	104	102	90-110	1.91	20

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Prepared:	01/28/2021	**BatchID:**	214023
Date Analyzed:	01/30/2021	**Extraction Method:**	SM9221B2B3CE1F
Instrument:	MICROBIOLOGY	**Analytical Method:**	SM9221B2B3CE1F
Matrix:	Water	**Unit:**	MPN/100ml
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Sample ID:**	MB-214023

QC Summary Report for SM9221B2B3CE1F

Analyte	RL	Blank	Control	Sample Result	Dup / Serial Dilution Result	RPD	RPD Limit
Total Coliform	1.80	ND	-	-	-	-	-
Enterobacter aerogenes (TC POS Control)	1.80	-	110	-	-	-	-
Pseudomonas aeruginosa (TC NEG Control)	1.80	-	0	-	-	-	-

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101D57
Date Prepared:	01/29/2021	**BatchID:**	214113
Date Analyzed:	01/30/2021	**Extraction Method:**	E351.2
Instrument:	WC_SKALAR	**Analytical Method:**	E351.2
Matrix:	Water	**Unit:**	mg/L
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Sample ID:**	MB/LCS/LCSD-214113

QC Summary Report for E351.2 (TKN as N)

Analyte	MB Result	MDL	RL			
TKN as N	ND	0.310	0.400	-	-	-

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
TKN as N	12.0	12.1	12	100	101	73-119	0	20

McCampbell Analytical, Inc.
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Pittsburg, CA 94565-1701
(925) 252-9262

CHAIN-OF-CUSTODY RECORD

WorkOrder: 2101D57 **ClientCode: DLBC** **QuoteID: 212277**

☐ WaterTrax ☐ WriteOn ☐ EDF ☐ EQuIS ☑ Dry-Weight ☐ Email ☐ HardCopy ☐ ThirdParty ☑ J-flag
☐ Detection Summary ☐ Excel

Report to:
Douglas Lovell
Douglas Lovell
1514 Hearst Avenue
Berkeley, CA 94703
(510) 520-3146 FAX:
Email: doug.streamborn@gmail.com
cc/3rd Party:
PO:
Project: P2021.1; Pt Reyes Surface Water Monitoring

Bill to:
Douglas Lovell
Douglas Lovell
1514 Hearst Avenue
Berkeley, CA 94703
doug.streamborn@gmail.com

Requested TAT: 5 days;

Date Received: **01/28/2021**
Date Logged: **01/28/2021**

Lab ID	Client ID	Matrix	Collection Date	Hold	Requested Tests (See legend below)											
					1	2	3	4	5	6	7	8	9	10	11	12
2101D57-001	PAC3	Water	1/28/2021 09:47	☐	E	C	B	D	A	A	C					
2101D57-002	PAC1S	Water	1/28/2021 09:00	☐	E	C	B	D	A	A	C					
2101D57-003	ABB2/3	Water	1/28/2021 10:38	☐	E	C	B	D	A	A	C					
2101D57-004	DES2	Water	1/28/2021 11:22	☐	E	C	B	D	A	A	C					
2101D57-005	FB2	Water	1/28/2021 11:38	☐	E	C	B	D	A	A	C					

Test Legend:

1	300_1_W	2	AMMONIA_NPDES_W [J]	3	ENTERO-EST_W	4	PhosTot_W
5	PRDisposal Fee	6	TC&EC&FC_9221_W	7	TKN_W	8	
9		10		11		12	

Project Manager: Angela Rydelius

Prepared by: Lilly Ortiz

Comments:

NOTE: Soil samples are discarded 60 days after results are reported unless other arrangements are made (Water samples are 30 days).
Hazardous samples will be returned to client or disposed of at client expense.

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WORK ORDER SUMMARY

Client Name: DOUGLAS LOVELL
Client Contact: Douglas Lovell
Contact's Email: doug.streamborn@gmail.com

Project: P2021.1; Pt Reyes Surface Water Monitoring
Comments:

Work Order: 2101D57
QC Level:
Date Logged: 1/28/2021

☐ WaterTrax ☐ WriteOn ☐ EDF ☐ Excel ☐ EQuIS ☐ Email ☐ HardCopy ☐ ThirdParty ☑ J-flag

LabID	ClientSampID	Matrix	Test Name	Containers /Composites	Bottle & Preservative	Head Space	Dry-Weight	Collection Date & Time	TAT	Test Due Date	Sediment Content	Hold	SubOut
001A	PAC3	Water	SM9221B2B3CE1F (FC, TC & E coli)	2	120mL w/Na2S2O3	☐	☐	1/28/2021 9:47	5 days	2/4/2021	Present	☐	
001B	PAC3	Water	IDEXX Enterolert (Enterococci, Enumeration)	2	120mL w/Na2S2O3	☐	☐	1/28/2021 9:47	5 days	2/4/2021	Present	☐	
001C	PAC3	Water	E351.2 (TKN)	1	250mL aG w/ H2SO4	☐	☐	1/28/2021 9:47	5 days	2/4/2021	Present	☐	
			E350.1 (Ammonia as N)			☐	☐		5 days	2/4/2021	Present	☐	
001D	PAC3	Water	E365.1 (Total Phosphorous as P)	1	500mL aG w/ H2SO4	☐	☐	1/28/2021 9:47	5 days	2/4/2021	Present	☐	
001E	PAC3	Water	E300.1 (Inorganic Anions) <Nitrate & Nitrite as N, Nitrate as N, Nitrate as $NO3^{-}$, Nitrite as N, Nitrite as $NO2^{-}$, ortho-Phosphate as P, ortho-Phosphate as PO4>	1	125mL HDPE, unprsv.	☐	☐	1/28/2021 9:47	5 days	2/4/2021	Present	☐	
002A	PAC1S	Water	SM9221B2B3CE1F (FC, TC & E coli)	2	120mL w/Na2S2O3	☐	☐	1/28/2021 9:00	5 days	2/4/2021	Present	☐	
002B	PAC1S	Water	IDEXX Enterolert (Enterococci, Enumeration)	2	120mL w/Na2S2O3	☐	☐	1/28/2021 9:00	5 days	2/5/2021	Present	☐	
002C	PAC1S	Water	E351.2 (TKN)	1	250mL aG w/ H2SO4	☐	☐	1/28/2021 9:00	5 days	2/4/2021	Present	☐	
			E350.1 (Ammonia as N)			☐	☐		5 days	2/4/2021	Present	☐	
002D	PAC1S	Water	E365.1 (Total Phosphorous as P)	1	500mL aG w/ H2SO4	☐	☐	1/28/2021 9:00	5 days	2/4/2021	Present	☐	

NOTES: * STLC and TCLP extractions require 2 days to complete; therefore, all TATs begin after the extraction is completed (i.e., One-day TAT yields results in 3 days from sample submission).

- MAI assumes that all material present in the provided sampling container is considered part of the sample - MAI does not exclude any material from the sample prior to sample preparation unless requested in writing by the client.

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WORK ORDER SUMMARY

Client Name: DOUGLAS LOVELL **Project:** P2021.1; Pt Reyes Surface Water Monitoring **Work Order:** 2101D57
Client Contact: Douglas Lovell **QC Level:**
Contact's Email: doug.streamborn@gmail.com **Comments:** **Date Logged:** 1/28/2021

☐ WaterTrax ☐ WriteOn ☐ EDF ☐ Excel ☐ EQuIS ☐ Email ☐ HardCopy ☐ ThirdParty ☑ J-flag

LabID	ClientSampID	Matrix	Test Name	Containers /Composites	Bottle & Preservative	Head Space	Dry-Weight	Collection Date & Time	TAT	Test Due Date	Sediment Content	Hold	SubOut
002E	PAC1S	Water	E300.1 (Inorganic Anions) <Nitrate & Nitrite as N, Nitrate as N, Nitrate as $NO3^{-}$, Nitrite as N, Nitrite as $NO2^{-}$, ortho-Phosphate as P, ortho-Phosphate as PO4>	1	125mL HDPE, unprsv.	☐	☐	1/28/2021 9:00	5 days	2/4/2021	Present	☐	
003A	ABB2/3	Water	SM9221B2B3CE1F (FC, TC & E coli)	2	120mL w/Na2S2O3	☐	☐	1/28/2021 10:38	5 days	2/4/2021	Present	☐	
003B	ABB2/3	Water	IDEXX Enterolert (Enterococci, Enumeration)	2	120mL w/Na2S2O3	☐	☐	1/28/2021 10:38	5 days	2/4/2021	Present	☐	
003C	ABB2/3	Water	E351.2 (TKN)	1	250mL aG w/ H2SO4	☐	☐	1/28/2021 10:38	5 days	2/4/2021	Present	☐	
			E350.1 (Ammonia as N)			☐	☐		5 days	2/4/2021	Present	☐	
003D	ABB2/3	Water	E365.1 (Total Phosphorous as P)	1	500mL aG w/ H2SO4	☐	☐	1/28/2021 10:38	5 days	2/4/2021	Present	☐	
003E	ABB2/3	Water	E300.1 (Inorganic Anions) <Nitrate & Nitrite as N, Nitrate as N, Nitrate as $NO3^{-}$, Nitrite as N, Nitrite as $NO2^{-}$, ortho-Phosphate as P, ortho-Phosphate as PO4>	1	125mL HDPE, unprsv.	☐	☐	1/28/2021 10:38	5 days	2/4/2021	Present	☐	
004A	DES2	Water	SM9221B2B3CE1F (FC, TC & E coli)	2	120mL w/Na2S2O3	☐	☐	1/28/2021 11:22	5 days	2/4/2021	Present	☐	
004B	DES2	Water	IDEXX Enterolert (Enterococci, Enumeration)	2	120mL w/Na2S2O3	☐	☐	1/28/2021 11:22	5 days	2/4/2021	Present	☐	
004C	DES2	Water	E351.2 (TKN)	1	250mL aG w/ H2SO4	☐	☐	1/28/2021 11:22	5 days	2/4/2021	Present	☐	

NOTES: * STLC and TCLP extractions require 2 days to complete; therefore, all TATs begin after the extraction is completed (i.e., One-day TAT yields results in 3 days from sample submission).

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WORK ORDER SUMMARY

Client Name: DOUGLAS LOVELL **Project:** P2021.1; Pt Reyes Surface Water Monitoring **Work Order:** 2101D57
Client Contact: Douglas Lovell **QC Level:**
Contact's Email: doug.streamborn@gmail.com **Comments:** **Date Logged:** 1/28/2021

☐ WaterTrax ☐ WriteOn ☐ EDF ☐ Excel ☐ EQuIS ☐ Email ☐ HardCopy ☐ ThirdParty ☑ J-flag

LabID	ClientSampID	Matrix	Test Name	Containers /Composites	Bottle & Preservative	Head Space	Dry-Weight	Collection Date & Time	TAT	Test Due Date	Sediment Content	Hold	SubOut
004C	DES2	Water	E350.1 (Ammonia as N)	1	250mL aG w/ H2SO4	☐	☐	1/28/2021 11:22	5 days	2/4/2021	Present	☐	
004D	DES2	Water	E365.1 (Total Phosphorous as P)	1	500mL aG w/ H2SO4	☐	☐	1/28/2021 11:22	5 days	2/4/2021	Present	☐	
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005A	FB2	Water	SM9221B2B3CE1F (FC, TC & E coli)	2	120mL w/Na2S2O3	☐	☐	1/28/2021 11:38	5 days	2/4/2021	None	☐	
005B	FB2	Water	IDEXX Enterolert (Enterococci, Enumeration)	2	120mL w/Na2S2O3	☐	☐	1/28/2021 11:38	5 days	2/4/2021	None	☐	
005C	FB2	Water	E351.2 (TKN)	1	250mL aG w/ H2SO4	☐	☐	1/28/2021 11:38	5 days	2/4/2021	None	☐	
			E350.1 (Ammonia as N)			☐	☐		5 days	2/4/2021	None	☐	
005D	FB2	Water	E365.1 (Total Phosphorous as P)	1	500mL aG w/ H2SO4	☐	☐	1/28/2021 11:38	5 days	2/4/2021	None	☐	
005E	FB2	Water	E300.1 (Inorganic Anions) <Nitrate & Nitrite as N, Nitrate as N, Nitrate as $NO3^{-}$, Nitrite as N, Nitrite as $NO2^{-}$, ortho-Phosphate as P, ortho-Phosphate as PO4>	1	125mL HDPE, unprsv.	☐	☐	1/28/2021 11:38	5 days	2/4/2021	None	☐	

NOTES: * STLC and TCLP extractions require 2 days to complete; therefore, all TATs begin after the extraction is completed (i.e., One-day TAT yields results in 3 days from sample submission).

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Quote ID = 212277

Chain-of-Custody Form

210157

Project Name: Pt Reyes Surface Water Monitoring	Project Location: Pt Reyes National Seashore, Marin County CA	Project Number: P2021.1
Sampler: Douglas Lovell	Laboratory: McCampbell Analytical, 1534 Willow Pass Rd, Pittsburg CA 94565	Laboratory Number: (925) 252-9262

Sample Designation	Date (All 28 Jan)	Time	Matrix: Surface Water	Matrix:	Type: Grab	Type:	Containers: Quantity	Containers: Type	Preservative (in addition to ice)	Field Filtration	Turnaround		Turnaround: 5-day (normal)	Analyses: Total coliform, Fecal coliform, e coli (all enumeration, mpn)	Analyses: Enterococci (enumeration, mpn)	Analyses: Total Kjeldahl Nitrogen	Analyses: Ammonia Nitrogen	Analyses: Total Phosphorus	Analyses: Inorganic Anions (Nitrate, Nitrite, Orthophosphate)	Analyses	Analyses	Sampler Comments	Laboratory Comments
PAC3	27-Jan-21	9:47	x		x		4	120 mL sterile plastic	Sodium Thiosulfate	None			x	x	x								
PAC3	27-Jan-21	"	x		x		1	500 mL amber glass	H2SO4	None			x			x	x	x					
PAC3	27-Jan-21	"	x		x		1	125 mL HDPE	None	None			x						x				
PAC1S	27-Jan-21	9AM	x		x		4	120 mL sterile plastic	Sodium Thiosulfate	None			x	x	x							High bacteria counts expected	
PAC1S	27-Jan-21	"	x		x		1	500 mL amber glass	H2SO4	None			x			x	x	x					
PAC1S	27-Jan-21	"	x		x		1	125 mL HDPE	None	None			x						x				
ABB2/3	27-Jan-21	10:38	x		x		4	120 mL sterile plastic	Sodium Thiosulfate	None			x	x	x							High bacteria counts expected	
ABB2/3	27-Jan-21	"	x		x		1	500 mL amber glass	H2SO4	None			x			x	x	x					
ABB2/3	27-Jan-21	"	x		x		1	125 mL HDPE	None	None			x						x				
DES2	27-Jan-21	11:22	x		x		4	120 mL sterile plastic	Sodium Thiosulfate	None			x	x	x								
DES2	27-Jan-21	11:22	x		x		1	500 mL amber glass	H2SO4	None			x			x	x	x					
DES2	27-Jan-21	"	x		x		1	125 mL HDPE	None	None			x						x				
~~DES4~~	~~27-Jan-21~~	~~11:38~~	x		x		4	120 mL sterile plastic	Sodium Thiosulfate	None			x	x	x								
~~DES4~~	~~27-Jan-21~~	~~11:38~~	x		x		1	500 mL amber glass	H2SO4	None			x			x	x	x					
~~DES4~~	~~27-Jan-21~~	~~11:38~~	x		x		1	125 mL HDPE	None	None			x						x				
FB2	27-Jan-21	11:38	x		x		4	120 mL sterile plastic	Sodium Thiosulfate	None			x	x	x								
FB2	27-Jan-21	"	x		x		1	500 mL amber glass	H2SO4	None			x			x	x	x					
FB2	27-Jan-21	"	x		x		1	125 mL HDPE	None	None			x						x				

Note: Sampler and laboratory to observe preservative, condition, integrity, etc. of samples and record (under "Comments") any exceptions from standard protocols.

Relinquished By: D Lovell	Received By: Lindy Ortiz	Date: 1/28/21	Time: 1402
Relinquished By:	Received By:	Date:	Time: 1,066

Douglas Lovell, 1514 Hearst Avenue, Berkeley CA 94703 510-520-3146

Report results to doug.streamborn@gmail.com

Prepare EDF for Geotracker Upload? **No**	Log code:	Global ID:

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Sample Receipt Checklist

Client Name: **Douglas Lovell**
Project: **P2021.1; Pt Reyes Surface Water Monitoring**

WorkOrder №: **2101D57** Matrix: Water
Carrier: Client Drop-In

Date and Time Received: **1/28/2021 14:02**
Date Logged: **1/28/2021**
Received by: Lilly Ortiz
Logged by: Lilly Ortiz

Chain of Custody (COC) Information

Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Sample IDs noted by Client on COC?	Yes ☑	No ☐		
Date and Time of collection noted by Client on COC?	Yes ☑	No ☐		
Sampler's name noted on COC?	Yes ☑	No ☐		
COC agrees with Quote?	Yes ☑	No ☐	NA ☐	

Sample Receipt Information

Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	NA ☑
Shipping container/cooler in good condition?	Yes ☑	No ☐	
Samples in proper containers/bottles?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	

Sample Preservation and Hold Time (HT) Information

All samples received within holding time?	Yes ☑	No ☐	NA ☐
Samples Received on Ice?	Yes ☑	No ☐	
(Ice Type: BLUE ICE)			
Sample/Temp Blank temperature	Temp: 4°C		NA ☐
ZHS conditional analyses: VOA meets zero headspace requirement (VOCs, TPHg/BTEX, RSK)?	Yes ☐	No ☐	NA ☑
Sample labels checked for correct preservation?	Yes ☑	No ☐	
pH acceptable upon receipt (Metal: <2; Nitrate 353.2/4500NO3: <2; 522: <4; 218.7: >8)?	Yes ☐	No ☐	NA ☑
UCMR Samples:			
pH tested and acceptable upon receipt (200.8: ≤2; 525.3: ≤4; 530: ≤7; 541: <3; 544: <6.5 & 7.5)?	Yes ☐	No ☐	NA ☑
Free Chlorine tested and acceptable upon receipt (<0.1mg/L)?	Yes ☐	No ☐	NA ☑

Comments:

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Analytical Report

WorkOrder: 2101E39

Report Created for: Douglas Lovell

1514 Hearst Avenue
Berkeley, CA 94703

Project Contact: Douglas Lovell
Project P.O.:
Project: P2021.1; Pt Reyes Surface Water Monitoring

Project Received: 01/29/2021

Analytical Report reviewed & approved for release on 02/05/2021 by:

Yen Cao
Project Manager

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Glossary of Terms & Qualifier Definitions

Client: Douglas Lovell
Project: P2021.1; Pt Reyes Surface Water Monitoring
WorkOrder: 2101E39

Glossary Abbreviation

%D	Serial Dilution Percent Difference
95% Interval	95% Confident Interval
CPT	Consumer Product Testing not NELAP Accredited
DF	Dilution Factor
DI WET	(DISTLC) Waste Extraction Test using DI water
DISS	Dissolved (direct analysis of 0.45 µm filtered and acidified water sample)
DLT	Dilution Test (Serial Dilution)
DUP	Duplicate
EDL	Estimated Detection Limit
ERS	External reference sample. Second source calibration verification.
ITEF	International Toxicity Equivalence Factor
LCS	Laboratory Control Sample
LQL	Lowest Quantitation Level
MB	Method Blank
MB % Rec	% Recovery of Surrogate in Method Blank, if applicable
MDL	Method Detection Limit
ML	Minimum Level of Quantitation
MS	Matrix Spike
MSD	Matrix Spike Duplicate
N/A	Not Applicable
ND	Not detected at or above the indicated MDL or RL
NR	Data Not Reported due to matrix interference or insufficient sample amount.
PDS	Post Digestion Spike
PDSD	Post Digestion Spike Duplicate
PF	Prep Factor
RD	Relative Difference
RL	Reporting Limit (The RL is the lowest calibration standard in a multipoint calibration.)
RPD	Relative Percent Deviation
RRT	Relative Retention Time
SPK Val	Spike Value
SPKRef Val	Spike Reference Value
SPLP	Synthetic Precipitation Leachate Procedure
ST	Sorbent Tube
TCLP	Toxicity Characteristic Leachate Procedure
TEQ	Toxicity Equivalents
TZA	TimeZone Net Adjustment for sample collected outside of MAI's UTC.
WET (STLC)	Waste Extraction Test (Soluble Threshold Limit Concentration)

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Glossary of Terms & Qualifier Definitions

Client: Douglas Lovell
Project: P2021.1; Pt Reyes Surface Water Monitoring
WorkOrder: 2101E39

Analytical Qualifiers

H	Samples were analyzed out of hold time.
S	Surrogate recovery outside accepted recovery limits.
a14	Reporting limit raised due to the physical nature of the sample.
c1	Surrogate recovery outside of the control limits due to the dilution of the sample.

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101E39
Date Received:	01/29/2021 9:38	**Extraction Method:**	E300.1
Date Prepared:	01/29/2021	**Analytical Method:**	E300.1
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	mg/L

Inorganic Anions by IC

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
DES4	2101E39-001E	Water	01/28/2021	IC4 02012114.D	214140

Analytes	Result	RL	DF	Date Analyzed
Nitrate as N	ND	2.0	20	01/29/2021 17:47
Nitrate as $NO3^{-}$	ND	8.8	20	01/29/2021 17:47
Nitrite as N	ND	2.0	20	01/29/2021 17:47
Nitrite as $NO2^{-}$	ND	6.6	20	01/29/2021 17:47
Nitrate & Nitrite as N	ND	2.0	20	01/29/2021 17:47
ortho-Phosphate as P	ND	2.0	20	01/29/2021 17:47
ortho-Phosphate as PO4	ND	6.2	20	01/29/2021 17:47

Surrogates	REC (%)	Qualifiers	Limits	
Malonate	0	S	90-115	01/29/2021 17:47

Analyst(s): AO

Analytical Comments: a14,c1

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101E39
Date Received:	01/29/2021 9:38	**Extraction Method:**	E350.1
Date Prepared:	01/30/2021	**Analytical Method:**	E350.1
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	mg/L

Ammonia as N

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
DES4	2101E39-001C	Water	01/28/2021	WC_SKALAR 013021A1_149	214181

Analytes	Result	MDL	RL	DF	Date Analyzed
Ammonia, total as N	ND	0.092	0.10	1	01/30/2021 15:34

Analyst(s): RB

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101E39
Date Received:	01/29/2021 9:38	**Extraction Method:**	IDEXX Enterolert
Date Prepared:	01/29/2021 10:20	**Analytical Method:**	9230D.3b
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	MPN/100ml

Enterococci, Enumeration

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
DES4	2101E39-001B	Water	01/28/2021	MICROBIOLOGY	214137

Analytes	Result	Qualifiers	RL	DF	95% Interval	Date Analyzed
Enterococci	**1400**	H	1.0	1	920 - 2k	01/30/2021 11:03

Analyst(s): AB

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101E39
Date Received:	01/29/2021 9:38	**Extraction Method:**	E365.1
Date Prepared:	02/04/2021	**Analytical Method:**	E365.1
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	mg/L

Total Phosphorous as P

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
DES4	2101E39-001D	Water	01/28/2021	WC_SKALAR 020521C1_50	214580

Analytes	Result	RL	DF	Date Analyzed
Total Phosphorous as P	**0.20**	0.050	1	02/05/2021 12:33

Analyst(s): RB

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101E39
Date Received:	01/29/2021 9:38	**Extraction Method:**	SM9221B2B3CE1F
Date Prepared:	01/29/2021 10:20	**Analytical Method:**	SM9221B2B3CE1F
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	MPN/100ml

Fecal Coliform, Total Coliform, & E. Coli, Enumeration

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
DES4	2101E39-001A	Water	01/28/2021	MICROBIOLOGY	214107

Analytes	Result	Qualifiers	RL	DF	95% Interval	Date Analyzed
Fecal Coliform	**1700**	H	18	10	580 - 4k	02/02/2021 09:44
Total Coliform	**5400**	H	18	10	2k - 17k	02/02/2021 09:44
E. Coli	**1100**	H	18	10	340 - 3k	02/02/2021 09:44

Analyst(s): AB

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Analytical Report

Client:	Douglas Lovell	**WorkOrder:**	2101E39
Date Received:	01/29/2021 9:38	**Extraction Method:**	E351.2
Date Prepared:	01/29/2021	**Analytical Method:**	E351.2
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Unit:**	mg/L

Total Kjeldahl Nitrogen

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
DES4	2101E39-001C	Water	01/28/2021	WC_SKALAR 013021A1_161	214113

Analytes	Result	RL	DF	Date Analyzed
TKN as N	**0.90**	0.40	1	01/30/2021 16:04

Analyst(s): RB

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101E39
Date Prepared:	01/29/2021 - 01/30/2021	**BatchID:**	214140
Date Analyzed:	01/29/2021 - 01/30/2021	**Extraction Method:**	E300.1
Instrument:	IC4	**Analytical Method:**	E300.1
Matrix:	Water	**Unit:**	mg/L
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Sample ID:**	MB/LCS/LCSD-214140

QC Summary Report for E300.1

Analyte	MB Result	MDL	RL	SPK Val	MB SS %REC	MB SS Limits
Nitrate as N	ND	0.0170	0.100	-	-	-
Nitrate as $NO3^{-}$	ND	0.0740	0.440	-	-	-
Nitrite as N	ND	0.0190	0.100	-	-	-
Nitrite as $NO2^{-}$	ND	0.0630	0.330	-	-	-
ortho-Phosphate as P	ND	0.0560	0.100	-	-	-
ortho-Phosphate as PO4	ND	0.170	0.310	-	-	-
Surrogate Recovery						
Malonate	0.0988			0.1	99	90-115

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Nitrate as N	0.969	0.966	1	97	97	85-115	0.331	20
Nitrate as $NO3^{-}$	4.29	4.28	4.4	98	97	85-115	0.332	20
Nitrite as N	0.959	0.955	1	96	95	85-115	0.466	20
Nitrite as $NO2^{-}$	3.15	3.14	3.3	96	95	85-115	0.466	20
ortho-Phosphate as P	0.985	0.962	1	98	96	85-115	2.32	20
ortho-Phosphate as PO4	3.02	2.95	3.06	99	96	85-115	2.32	20
Surrogate Recovery								
Malonate	0.0986	0.0981	0.10	99	98	90-115	0.581	20

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101E39
Date Prepared:	01/30/2021	**BatchID:**	214181
Date Analyzed:	01/30/2021	**Extraction Method:**	E350.1
Instrument:	WC_SKALAR	**Analytical Method:**	E350.1
Matrix:	Water	**Unit:**	mg/L
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Sample ID:**	MB/LCS/LCSD-214181

QC Summary Report for E350.1

Analyte	MB Result	MDL	RL			
Ammonia, total as N	ND	0.0920	0.100	-	-	-

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Ammonia, total as N	4.13	4.15	4	103	104	88-113	0.585	20

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101E39
Date Prepared:	01/29/2021	**BatchID:**	214137
Date Analyzed:	01/30/2021	**Extraction Method:**	IDEXX Enterolert
Instrument:	MICROBIOLOGY	**Analytical Method:**	9230D.3b
Matrix:	Water	**Unit:**	MPN/100ml
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Sample ID:**	MB-214137

QC Summary Report for Enterococci

Analyte	RL	Blank	Control	Sample Result	Dup / Serial Dilution Result	RPD	RPD Limit
Enterococci	1.00	ND	-	-	-	-	-
Enterococcus faecalis (Ent POS Control)	1.00	-	687	-	-	-	-
E. coli (Ent NEG Control)	1.00	-	ND	-	-	-	-

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101E39
Date Prepared:	02/05/2021	**BatchID:**	214580
Date Analyzed:	02/05/2021	**Extraction Method:**	E365.1
Instrument:	WC_SKALAR	**Analytical Method:**	E365.1
Matrix:	Water	**Unit:**	mg/L
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Sample ID:**	MB/LCS/LCSD-214580

QC Summary Report for E365.1

Analyte	MB Result	MDL	RL			
Total Phosphorous as P	ND	0.0350	0.0500	-	-	-

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Total Phosphorous as P	0.835	0.819	0.80	104	102	90-110	1.91	20

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101E39
Date Prepared:	01/29/2021	**BatchID:**	214107
Date Analyzed:	02/02/2021	**Extraction Method:**	SM9221B2B3CE1F
Instrument:	MICROBIOLOGY	**Analytical Method:**	SM9221B2B3CE1F
Matrix:	Water	**Unit:**	MPN/100ml
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Sample ID:**	MB-214107

QC Summary Report for SM9221B2B3CE1F

Analyte	RL	Blank	Control	Sample Result	Dup / Serial Dilution Result	RPD	RPD Limit
Fecal Coliform	1.80	ND	-	-	-	-	-
E. coli (FC POS Control)	1.80	-	220	-	-	-	-
Enterobacter aerogenes (FC NEG Control)	1.80	-	ND	-	-	-	-
Total Coliform	1.80	ND	-	-	-	-	-
Enterobacter aerogenes (TC POS Control)	1.80	-	110	-	-	-	-
Pseudomonas aeruginosa (TC NEG Control)	1.80	-	ND	-	-	-	-
E. Coli	1.80	ND	-	-	-	-	-
E. coli (EC POS Control)	1.80	-	220	-	-	-	-
Enterobacter aerogenes (EC NEG Control)	1.80	-	ND	-	-	-	-

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Quality Control Report

Client:	Douglas Lovell	**WorkOrder:**	2101E39
Date Prepared:	01/29/2021	**BatchID:**	214113
Date Analyzed:	01/30/2021	**Extraction Method:**	E351.2
Instrument:	WC_SKALAR	**Analytical Method:**	E351.2
Matrix:	Water	**Unit:**	mg/L
Project:	P2021.1; Pt Reyes Surface Water Monitoring	**Sample ID:**	MB/LCS/LCSD-214113

QC Summary Report for E351.2 (TKN as N)

Analyte	MB Result	MDL	RL			
TKN as N	ND	0.310	0.400	-	-	-

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
TKN as N	12.0	12.1	12	100	101	73-119	0	20

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CHAIN-OF-CUSTODY RECORD

WorkOrder: 2101E39 **ClientCode: DLBC** **QuoteID: 212277**

☐ WaterTrax ☐ WriteOn ☐ EDF ☐ EQuIS ☑ Dry-Weight ☐ Email ☐ HardCopy ☐ ThirdParty ☑ J-flag
☐ Detection Summary ☐ Excel

Report to:
Douglas Lovell
Douglas Lovell
1514 Hearst Avenue
Berkeley, CA 94703
(510) 520-3146 FAX:

Email: doug.streamborn@gmail.com
cc/3rd Party:
PO:
Project: P2021.1; Pt Reyes Surface Water Monitoring

Bill to:
Douglas Lovell
Douglas Lovell
1514 Hearst Avenue
Berkeley, CA 94703
doug.streamborn@gmail.com

Requested TAT: **5 days;**

Date Received: **01/29/2021**
Date Logged: **01/29/2021**

Lab ID	Client ID	Matrix	Collection Date	Hold	Requested Tests (See legend below)											
					1	2	3	4	5	6	7	8	9	10	11	12
2101E39-001	DES4	Water	1/28/2021 00:00	☐	E	C	B	D	A	A	C					

Test Legend:

1	300_1_W	2	AMMONIA_NPDES_W [J]	3	ENTERO_9230B_W	4	PhosTot_W
5	PRDisposal Fee	6	TC&EC&FC_9221_W	7	TKN_W	8	
9		10		11		12	

Project Manager: Angela Rydelius

Prepared by: Tina Perez

Comments:

NOTE: Soil samples are discarded 60 days after results are reported unless other arrangements are made (Water samples are 30 days).
Hazardous samples will be returned to client or disposed of at client expense.

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WORK ORDER SUMMARY

Client Name: DOUGLAS LOVELL **Project:** P2021.1; Pt Reyes Surface Water Monitoring **Work Order:** 2101E39
Client Contact: Douglas Lovell **QC Level:**
Contact's Email: doug.streamborn@gmail.com **Comments** **Date Logged:** 1/29/2021

☐ WaterTrax ☐ WriteOn ☐ EDF ☐ Excel ☐ EQuIS ☐ Email ☐ HardCopy ☐ ThirdParty ☑ J-flag

LabID	ClientSampID	Matrix	Test Name	Containers /Composites	Bottle & Preservative	Head Space	Dry-Weight	Collection Date & Time	TAT	Test Due Date	Sediment Content	Hold	SubOut
001A	DES4	Water	SM9221B2B3CE1F (FC, TC & E coli)	2	120ML Sterile w/ Na2S2O3	☐	☐	1/28/2021	5 days	2/5/2021	Trace	☐	
001B	DES4	Water	SM9230B (Enterococci, Enumeration)	2	120ML Sterile w/ Na2S2O3	☐	☐	1/28/2021	5 days	2/5/2021	Trace	☐	
001C	DES4	Water	E351.2 (TKN)	1	250mL aG w/ H2SO4	☐	☐	1/28/2021	5 days	2/5/2021	Trace	☐	
			E350.1 (Ammonia as N)			☐	☐		5 days	2/5/2021	Trace	☐	
001D	DES4	Water	E365.1 (Total Phosphorous as P)	1	500mL aG w/ H2SO4	☐	☐	1/28/2021	5 days	2/5/2021	Trace	☐	
001E	DES4	Water	E300.1 (Inorganic Anions) <Nitrate & Nitrite as N, Nitrate as N, Nitrate as $NO3^{-}$, Nitrite as N, Nitrite as $NO2^{-}$, ortho-Phosphate as P, ortho-Phosphate as PO4>	1	125mL HDPE, unprsv.	☐	☐	1/28/2021	5 days	2/5/2021	Trace	☐	

NOTES: * STLC and TCLP extractions require 2 days to complete; therefore, all TATs begin after the extraction is completed (i.e., One-day TAT yields results in 3 days from sample submission).

- MAI assumes that all material present in the provided sampling container is considered part of the sample - MAI does not exclude any material from the sample prior to sample preparation unless requested in writing by the client.

2101E39

Quote ID = 212277

Chain-of-Custody Form

Project Name: Pt Reyes Surface Water Monitoring	Project Location: Pt Reyes National Seashore, Marin County CA	Project Number: P2021.1
Sampler: Douglas Lovell	Laboratory: McCampbell Analytical, 1534 Willow Pass Rd, Pittsburg CA 94565	Laboratory Number: (925) 252-9262

Sample Designation	Date	Time	Matrix: Surface Water	Type: Grab	Containers: Quantity	Containers: Type	Preservative (in addition to ice)	Field Filtration	Turnaround: 5-day (normal)	Analyses: Total coliform, Fecal coliform, e coli (all enumeration, mpn)	Analyses: Enterococci (enumeration, mpn)	Analyses: Total Kjeldahl Nitrogen	Analyses: Ammonia Nitrogen	Analyses: Total Phosphorus	Analyses: Inorganic Anions (Nitrate, Nitrite, Orthophosphate)	Sampler Comments	Laboratory Comments
DES4	28-Jan-21		x	x	4	120 mL sterile plastic	Sodium Thiosulfate	None	x	x	x						
DES4	28-Jan-21		x	x	1	500 mL amber glass	H2SO4	None	x			x	x	x			
DES4	28-Jan-21		x	x	1	125 mL HDPE	None	None	x						x		

(+)

Note: Sampler and laboratory to observe preservative, condition, integrity, etc. of samples and record (under "Comments") any exceptions from standard protocols.

Relinquished By:	Received By:	Date: 1/29/21	Time: 0973
Relinquished By:	Received By:	Date:	Time:

Douglas Lovell, 1514 Hearst Avenue, Berkeley CA 94703 510-520-3146

Report results to doug.streamborn@gmail.com

Prepare EDF for Geotracker Upload? **No**	Log code:	Global ID:

3.9°C
wet

McCampbell Analytical, Inc.
"When Quality Counts"

1534 Willow Pass Road, Pittsburg, CA 94565-1701
Toll Free Telephone: (877) 252-9262 / Fax: (925) 252-9269
http://www.mccampbell.com / E-mail: main@mccampbell.com

Sample Receipt Checklist

Client Name:	**Douglas Lovell**	Date and Time Received	**1/29/2021 09:38**
Project:	**P2021.1; Pt Reyes Surface Water Monitoring**	Date Logged:	**1/29/2021**
		Received by:	Tina Perez
WorkOrder №:	**2101E39** Matrix: Water	Logged by:	Tina Perez
Carrier:	Client Drop-In		

Chain of Custody (COC) Information

Chain of custody present?	Yes	☑	No	☐		
Chain of custody signed when relinquished and received?	Yes	☑	No	☐		
Chain of custody agrees with sample labels?	Yes	☑	No	☐		
Sample IDs noted by Client on COC?	Yes	☑	No	☐		
Date and Time of collection noted by Client on COC?	Yes	☑	No	☐		
Sampler's name noted on COC?	Yes	☑	No	☐		
COC agrees with Quote?	Yes	☑	No	☐	NA	☐

Sample Receipt Information

Custody seals intact on shipping container/cooler?	Yes	☐	No	☐	NA	☑
Shipping container/cooler in good condition?	Yes	☑	No	☐		
Samples in proper containers/bottles?	Yes	☑	No	☐		
Sample containers intact?	Yes	☑	No	☐		
Sufficient sample volume for indicated test?	Yes	☑	No	☐		

Sample Preservation and Hold Time (HT) Information

All samples received within holding time?	Yes	☐	No	☑	NA	☐
Samples Received on Ice?	Yes	☑	No	☐		
(Ice Type: WET ICE)						
Sample/Temp Blank temperature	Temp: 3.9°C				NA	☐
ZHS conditional analyses: VOA meets zero headspace requirement (VOCs, TPHg/BTEX, RSK)?	Yes	☐	No	☐	NA	☑
Sample labels checked for correct preservation?	Yes	☑	No	☐		
pH acceptable upon receipt (Metal: <2; Nitrate 353.2/4500NO3: <2; 522: <4; 218.7: >8)?	Yes	☐	No	☐	NA	☑
UCMR Samples:						
pH tested and acceptable upon receipt (200.8: ≤2; 525.3: ≤4; 530: ≤7; 541: <3; 544: <6.5 & 7.5)?	Yes	☐	No	☐	NA	☑
Free Chlorine tested and acceptable upon receipt (<0.1mg/L)?	Yes	☐	No	☐	NA	☑

Comments Method SM9221B2B3CE1F (FC, TC & E coli) was received past its 0.333-day holding time. Method SM9230B (Enterococci, Enumeration) was received past its 0.333-day holding time.

APPENDIX C

Quality Assurance/Quality Control

QUALITY ASSURANCE/QUALITY CONTROL

Field Meters

- Prior to traveling to the field, the meters were calibrated using reference/standard solutions (brought to a temperature of ±25˚ C).
- During monitoring, each of the meters read within 0.1 ˚C of each other.
- Upon return from the field, meters were checked against reference/standard solutions (brought to a temperature of ±25˚ C) with the following results:
  - pH reference solution = 7.00 Meter = 7.05
  - Specific conductance reference solution = 1,413 µS/cm Meter = 1,429 µS/cm
  - Meter dedicated to salinity: specific conductance reference solution = 1,413 µS/cm Meter = 1,379 µS/cm
  - ORP reference solution = 231 mV Meter = 225 mV
  - Dissolved oxygen reference solution = 0.00 mg/L Meter = 0.15 mg/L
  - Dissolved oxygen reference solution = 100% Meter = 109%
  - Turbidity reference solution = 1.00 NTU Meter = 0.82 NTU
- Except for dissolved oxygen and turbidity, no significant QA/QC issues were noted with the field meters.
  - Dissolved oxygen measurements in mg/L were about 0.1 to 0.2 high. Dissolved oxygen measurements in % saturation were about 9% high
  - Turbidity measurements were higher than measured although the magnitude cannot be reliably estimated

Field Blank

- A field blank (sample ID = FB2) was prepared at monitoring location DES2. The blank was prepared (the sample containers were filled in the field) using deionized water that had been provided by the laboratory.
- Phosphorus was measured in the field blank at a concentration of 0.083 mg/L (negligible concentration). No other analytes were detected in the field blank.

Laboratory Data

- For Nitrate, Nitrite, and Orthophosphate analyses of the sample from location DES4, the reporting limit was raised (the sample was diluted) due to the physical nature (salinity) of the sample; consequently, the surrogate recovery was outside accepted limits. Nitrogen and phosphorus measurements at DES4 were not employed to interpret macronutrient impacts on surface water quality.
- For bacterial analyses of the sample from location DES4, the time between sample collection and laboratory preparation (hold time) was approximately 20 hours, whereas the accepted time is 8 hours. In general, (1) decreased concentrations result from extended hold times and maintenance of the sample at 4˚C minimizes the decrease, and (2) the relatively short hold time of 8 hours is designed to limit reporting nondetect or lower-than-actual concentrations (Pope et al. 2003, Ahammed 2003, Selvakumar et al. 2004, US Environmental Protection Agency 2006, Aulenbach 2009). The sample at DES4 was maintained at a temperature of ±4˚C (on ice) from the time of sample collection until submittal to the laboratory; accordingly, the measured bacteria concentrations at location DES4 are believed accurate.

APPENDIX D

Weather Data from the
Pt. Reyes RCA Meteorological Station
(https://wrcc.dri.edu/cgi-bin/rawMAIN.pl?nvprca)

January 21, 2021

Hour of Day Ending at L.S.T.	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min inches	Point	Bulb	Press.	Precip.
1:00 AM	0.0	2.2	6	5.2	42.4			46.9	47	46.8	-28.9		100		42	42	29.97	0
2:00 AM	0.0	2.3	55	4.7	39.3			47	47.1	46.8	-28.8		100		39	39	29.97	0
3:00 AM	0.0	1.7	67	3.9	39.7			47	47.1	46.9	-28.9		100		40	40	29.97	0
4:00 AM	0.0	2.2	81	3.6	39.7			47	47.1	46.9	-29		100		40	40	29.97	0
5:00 AM	0.0	2.8	54	4.6	39.7			47.1	47.2	47	-29		100		40	40	29.96	0
6:00 AM	0.0	2.3	119	4.7	38.1			47.1	47.2	47	-29		100		38	38	29.95	0
7:00 AM	0.0	2.4	151	5.2	33.5			47.1	47.2	46.9	-29.3		100		33	33	29.95	0
8:00 AM	1.0	1.5	175	3.4	34.2			46.6	46.9	46.3	-29.2		100		34	34	29.96	0
9:00 AM	6.6	3.9	136	5.7	37			46.2	46.4	46.1	-29.1		100		37	37	29.97	0
10:00 AM	13.9	3	189	7.3	41			46.4	46.6	46.2	-29.1		100		41	41	29.99	0
11:00 AM	24.0	4.9	190	9.1	43.2			47	47.6	46.5	-29.1		100		43	43	29.99	0
12:00 PM	25.7	5.9	208	11.8	44.4			48.1	48.7	47.5	-29.1		100		44	44	29.98	0
1:00 PM	32.7	10.1	191	14.7	45.3			49.2	49.7	48.6	-29.2		100		45	45	29.95	0
2:00 PM	35.5	13.1	183	17.4	47.2			50.1	50.5	49.6	-29.2		94		46	46	29.92	0
3:00 PM	38.0	10.8	184	16.4	49.1			50.7	51	50.5	-29.2		87		45	47	29.91	0
4:00 PM	24.6	8.2	183	12.1	49.8			51	51.1	50.9	-29.4		85		46	47	29.91	0
5:00 PM	4.0	6.8	181	9.3	48			51	51.2	50.9	-29.6		91		45	47	29.9	0
6:00 PM	0.4	5.1	168	6.9	46.5			50.7	51	50.5	-29.7		94		45	46	29.9	0
7:00 PM	0.0	5	174	8.1	46.1			50.3	50.6	50	-29.9		96		45	45	29.89	0
8:00 PM	0.0	5.4	183	8.6	47.7			49.9	50.1	49.8	-30.1		95		46	47	29.89	0
9:00 PM	0.0	4.5	206	6.3	48.7			49.8	49.9	49.7	-30.1		92		47	47	29.89	0
10:00 PM	0.0	6.3	176	8.2	48.2			49.7	49.8	49.6	-30		91		46	47	29.88	0
11:00 PM	0.0	7.8	172	9.5	47.4			49.6	49.7	49.5	-30.2		94		46	46	29.85	0
12:00 AM	0.0	7.5	174	9.2	48.1			49.4	49.5	49.3	-30.3		95		47	47	29.85	0

DAILY STATISTICS

	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min inches	Point	Bulb	Press.	Precip.
Total	206.4																	0
Ave.		5.2	166		43.5			48.5			-29.4	96			43	43	29.93	
Max.				17.4		-147.8			51.2		-28.6		-100					
Min.							1831.8			46.1	-30.3			1000				

NOTES:
Daily averages might vary slightly from the average of the hourly values printed due to rounding of the hourly values.
Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.
° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

January 22, 2021

Hour of Day Ending at L.S.T.	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min inches	Point	Bulb	Press.	Precip.
1:00 AM	0.0	7.7	178	10.3	48.7			49.3	49.4	49.2	-30.2		96		48	48	29.82	0
2:00 AM	0.0	9.9	234	24.4	49.9			49.2	49.3	49.1	-30.4		97		49	49	29.81	0.02
3:00 AM	0.0	23.1	330	38.1	49			49.3	49.4	49.2	-30.3		94		47	48	29.8	0.01
4:00 AM	0.0	18.1	346	28.9	48.9			49.4	49.4	49.3	-30.4		89		46	47	29.8	0
5:00 AM	0.0	15.1	336	21.5	48.3			49.3	49.4	49.1	-30.3		88		45	46	29.8	0
6:00 AM	0.0	12.5	325	19.4	48.7			49	49.2	48.9	-30.5		84		44	46	29.8	0
7:00 AM	0.0	12	311	21	48.3			48.9	49	48.7	-30.4		91		46	47	29.79	0
8:00 AM	1.1	12.8	297	25.1	48.4			48.7	48.9	48.6	-30.4		89		45	47	29.79	0.01
9:00 AM	3.7	11.4	293	19.1	47.8			48.7	48.7	48.6	-30.4		92		46	47	29.79	0.01
10:00 AM	16.4	6.3	284	18.6	47.8			48.8	49	48.6	-30.3		90		45	46	29.79	0.06
11:00 AM	11.4	4.8	167	14.2	47.2			49.1	49.2	48.9	-30.4		94		46	46	29.78	0.01
12:00 PM	33.3	8.9	266	13.7	50.7			49.5	49.8	49.1	-30.2		86		46	48	29.76	0
1:00 PM	26.7	6.1	288	14.8	49.4			50.3	50.7	49.8	-30.1		89		46	48	29.75	0
2:00 PM	43.0	9.5	340	16	50.9			51.1	51.6	50.6	-30.1		82		46	48	29.74	0
3:00 PM	36.3	14.8	349	19.1	50.9			51.7	51.9	51.5	-30.1		83		46	48	29.75	0
4:00 PM	22.9	16.1	348	22.3	51.2			51.7	51.8	51.6	-30		83		46	48	29.74	0
5:00 PM	11.0	13	342	19.3	50.7			51.5	51.7	51.4	-30.2		84		46	48	29.74	0
6:00 PM	0.8	13	340	21.1	49.4			51.2	51.5	50.9	-30.1		86		46	47	29.75	0
7:00 PM	0.0	11.9	335	17.7	49			50.7	51	50.4	-30.1		89		46	47	29.76	0
8:00 PM	0.0	12.3	335	18	49			50.3	50.5	50	-30		85		45	47	29.76	0
9:00 PM	0.0	10.1	349	20.9	48.6			49.9	50.1	49.8	-30		88		45	47	29.76	0
10:00 PM	0.0	8.2	14	14.1	46.6			49.6	49.9	49.5	-30.1		89		44	45	29.76	0
11:00 PM	0.0	4.9	33	9.1	43.6			49.3	49.5	49	-29.9		96		43	43	29.78	0
12:00 AM	0.0	3.8	38	6.6	43.3			48.8	49	48.6	-29.9		98		43	43	29.78	0

DAILY STATISTICS

	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min inches	Point	Bulb	Press.	Precip.
Total	206.7																	0.12
Ave.		11.1	328		48.6			49.8			-30.2	89			46	47	29.77	
Max.				38.1		-147.8			51.9		-29.7		-100					
Min.							1831.8			48.6	-30.6			1000				

NOTES:
Daily averages might vary slightly from the average of the hourly values printed due to rounding of the hourly values.
Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.
° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

January 23, 2021

Hour of Day Ending at L.S.T.	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min	Point	Bulb	Press.	Precip.
1:00 AM	0.0	1	39	3.4	42.1			48.4	48.7	48.1	-29.9		98			42	42	29.79	0
2:00 AM	0.0	3.3	72	8.3	42.3			47.8	48.2	47.4	-29.8		98			42	42	29.8	0
3:00 AM	0.0	2.4	49	5.3	42.7			47.3	47.5	47.1	-29.7		96			41	42	29.8	0
4:00 AM	0.0	4.4	57	8.8	42.4			47	47.2	46.8	-29.8		95			41	42	29.81	0
5:00 AM	0.0	4.2	37	6.9	40.4			46.6	46.8	46.4	-29.6		96			39	40	29.81	0
6:00 AM	0.0	3.7	10	5.6	39.9			46.2	46.5	46	-29.6		98			39	40	29.82	0
7:00 AM	0.0	3.6	23	7.1	40.4			45.8	46.1	45.6	-29.6		97			40	40	29.84	0
8:00 AM	1.5	3.9	354	7.7	40.5			45.5	45.6	45.3	-29.5		94			39	40	29.85	0
9:00 AM	13.6	4	56	7.4	43.8			45.2	45.3	45.1	-29.4		92			42	43	29.87	0
10:00 AM	26.6	4.3	27	6.9	48.2			45.4	45.8	45.1	-29.3		82			43	45	29.88	0
11:00 AM	37.7	4.1	354	8.8	50.5			46.3	46.9	45.8	-29.2		80			45	47	29.9	0
12:00 PM	44.8	5.3	331	10	51.2			47.6	48.2	46.9	-29		79			45	48	29.89	0
1:00 PM	47.4	8.3	334	13.6	51.3			48.9	49.5	48.2	-29.1		77			44	47	29.87	0
2:00 PM	44.4	13	334	16.8	52			49.9	50.3	49.5	-29.3		74			44	47	29.85	0
3:00 PM	36.6	13.3	333	17.6	52.1			50.4	50.6	50.3	-29.2		75			45	48	29.84	0
4:00 PM	24.8	12.7	331	16.7	51.6			50.6	50.7	50.5	-29.5		78			45	48	29.84	0
5:00 PM	11.2	11.1	339	15.9	50.6			50.5	50.7	50.4	-29.6		82			45	48	29.83	0
6:00 PM	1.0	11.7	339	18.2	49.2			50.3	50.5	50	-29.7		87			46	47	29.84	0
7:00 PM	0.0	12.6	345	19.6	49.2			49.8	50.1	49.5	-29.7		89			46	47	29.85	0
8:00 PM	0.0	10.4	356	17.5	48.7			49.4	49.6	49.2	-29.7		91			46	47	29.84	0
9:00 PM	0.0	9.1	355	14	48.3			49.1	49.3	48.9	-29.8		93			46	47	29.84	0
10:00 PM	0.0	8.4	356	13.2	47.2			48.8	49	48.6	-29.8		95			46	46	29.84	0
11:00 PM	0.0	11.2	344	15.6	47.9			48.5	48.7	48.3	-29.7		92			46	47	29.84	0
12:00 AM	0.0	10.2	345	14.1	47.4			48.3	48.5	48.2	-29.7		92			45	46	29.84	0
DAILY STATISTICS																		
	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min	Point	Bulb	Press.	Precip.
Total	289.6																	0
Ave.		7.4	3		46.7			48.1			-29.5	89			43	45	29.84	
Max.				19.6		-147.8			50.7		-28.9		-100					
Min.							1831.8			45.1	-30.0			1000				

NOTES:
Daily averages might vary slightly from the average of the hourly values printed due to rounding of the hourly values.
Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.
° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

January 24, 2021

Hour of Day Ending at L.S.T.	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min	Point	Bulb	Press.	Precip.
1:00 AM	0.0	13.5	338	19.5	47.8			48.1	48.3	48	-29.7		91			45	46	29.84	0
2:00 AM	0.0	14.6	340	20.7	47.6			48	48.1	47.9	-29.7		90			45	46	29.85	0
3:00 AM	0.0	14.4	334	21.9	47.5			47.9	48	47.7	-29.7		89			44	46	29.84	0
4:00 AM	0.0	15.9	335	23.8	47.3			47.7	47.8	47.7	-29.6		88			44	45	29.83	0
5:00 AM	0.0	18.8	332	25.8	47.3			47.6	47.8	47.6	-29.7		87			44	45	29.83	0
6:00 AM	0.0	18	332	25.3	46.9			47.6	47.7	47.5	-29.7		86			43	45	29.82	0
7:00 AM	0.0	16.5	333	26.4	47.1			47.5	47.6	47.4	-29.6		84			42	45	29.81	0
8:00 AM	1.1	15.3	333	21.9	47.1			47.4	47.5	47.4	-29.7		83			42	44	29.81	0
9:00 AM	6.3	17.3	332	25.3	47.8			47.4	47.6	47.4	-29.7		82			43	45	29.81	0
10:00 AM	13.2	16.2	335	22.5	48.8			47.6	47.7	47.4	-29.7		81			43	46	29.81	0
11:00 AM	8.2	16.2	334	21.6	48.8			47.9	48.1	47.6	-29.7		78			42	45	29.82	0
12:00 PM	14.5	9.2	329	14.8	49.3			48.2	48.4	48	-29.7		81			44	46	29.81	0
1:00 PM	18.1	10.9	308	16	50.3			48.6	48.9	48.3	-29.7		80			44	47	29.79	0
2:00 PM	17.6	10.6	309	14.9	50.4			49.2	49.7	48.9	-29.8		82			45	47	29.77	0
3:00 PM	6.5	9.1	292	15.9	47.8			49.8	49.9	49.6	-29.7		93			46	47	29.75	0.03
4:00 PM	6.5	10.7	275	15.5	46.6			49.9	50	49.8	-29.7		96			46	46	29.74	0.01
5:00 PM	4.5	17.4	318	32.5	47.5			49.8	49.9	49.7	-29.7		92			45	46	29.72	0.01
6:00 PM	0.4	19.2	335	31	48.1			49.6	49.8	49.5	-29.8		92			46	47	29.69	0
7:00 PM	0.0	18.2	8	35.1	46.2			49.4	49.6	49.2	-29.7		92			44	45	29.73	0.06
8:00 PM	0.0	25.2	341	38.5	46.6			49	49.3	48.8	-29.7		82			41	44	29.74	0
9:00 PM	0.0	31.1	339	41.8	46.5			48.6	48.9	48.3	-29.5		78			40	43	29.73	0
10:00 PM	0.0	30.5	342	44.8	46.2			48.1	48.4	47.8	-29.3		75			39	42	29.73	0
11:00 PM	0.0	26.9	339	38.7	45.6			47.6	47.9	47.3	-29		74			38	42	29.74	0
12:00 AM	0.0	29.9	338	41.6	45.6			47.1	47.4	46.9	-28.7		75			38	42	29.74	0
DAILY STATISTICS																		
	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min	Point	Bulb	Press.	Precip.
Total	96.9																	0.11
Ave.		17.7	330		47.5			48.3			-29.6	85			43	45	29.78	
Max.				44.8		-147.8			50.0		-28.7		-100					
Min.							1831.8			46.9	-30.0			1000				

NOTES:
Daily averages might vary slightly from the average of the hourly values printed due to rounding of the hourly values.
Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.
° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

January 25, 2021

Hour of Day Ending at L.S.T.	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min	Point	Bulb	Press.	Precip.
1:00 AM	0.0	27.5	341	40.2	45.2			46.8	47	46.6	-28.4		78		39	42	29.73	0
2:00 AM	0.0	27.5	339	38.1	44.7			46.5	46.7	46.4	-28.2		77		38	41	29.72	0
3:00 AM	0.0	26.1	340	38.2	44.9			46.3	46.5	46.1	-28		78		38	41	29.73	0
4:00 AM	0.0	26.6	344	36.9	44.8			46.1	46.2	45.9	-27.7		74		37	41	29.73	0
5:00 AM	0.0	26.9	340	38.7	44.4			45.9	46	45.7	-27.5		75		37	41	29.72	0
6:00 AM	0.0	27.8	342	37.4	44.4			45.6	45.8	45.5	-27.3		78		38	41	29.73	0
7:00 AM	0.0	22.8	349	30.9	43.5			45.5	45.6	45.3	-27		75		36	40	29.74	0
8:00 AM	2.4	23.7	352	37.1	44.2			45.3	45.4	45.1	-27		75		37	40	29.75	0
9:00 AM	14.9	26	348	37.6	45.2			45.1	45.2	45	-26.8		69		36	40	29.76	0
10:00 AM	28.8	26.3	342	34.9	46.6			45.2	45.3	45	-26.7		68		37	41	29.77	0
11:00 AM	40.1	26.4	340	35.7	47.9			45.6	46	45.3	-26.6		67		37	42	29.78	0
12:00 PM	47.1	26.7	333	36.5	48.7			46.3	46.6	45.9	-26.7		67		38	43	29.76	0
1:00 PM	49.3	29.2	331	38.1	48.9			47	47.4	46.6	-26.7		66		38	43	29.74	0
2:00 PM	45.8	28.8	330	38.6	48.8			47.6	47.9	47.3	-26.7		68		39	43	29.74	0
3:00 PM	37.8	30.6	331	40.9	48.3			48	48.1	47.8	-26.7		69		38	43	29.72	0
4:00 PM	25.8	29.9	331	39.2	47.9			48	48.1	47.9	-26.8		68		38	43	29.73	0
5:00 PM	11.4	29.2	331	40.9	46.9			47.9	48	47.7	-26.8		69		37	42	29.72	0
6:00 PM	0.9	28.4	334	38.4	46			47.5	47.8	47.2	-26.8		70		37	41	29.73	0
7:00 PM	0.0	25.8	338	35.8	45.8			47	47.2	46.8	-26.9		72		37	41	29.73	0
8:00 PM	0.0	24.1	339	32.4	45.5			46.6	46.8	46.4	-26.9		71		36	41	29.74	0
9:00 PM	0.0	22.3	342	31.6	45.1			46.3	46.5	46.1	-26.8		74		37	41	29.75	0
10:00 PM	0.0	22.5	337	30.7	44.9			46	46.1	45.8	-26.9		77		38	41	29.75	0
11:00 PM	0.0	18.8	346	28.2	44.3			45.8	45.9	45.6	-26.8		73		36	40	29.77	0
12:00 AM	0.0	19	345	27.1	44.1			45.5	45.7	45.3	-26.8		75		37	40	29.78	0

DAILY STATISTICS

	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min	Point	Bulb	Press.	Precip.
Total	304.3																	0
Ave.		25.9	339		45.9			46.4			-27.1	72			37	41	29.74	
Max.				40.9		-147.8			48.1		-26.6		-100					
Min.							1831.8			45.0	-28.5			1000				

NOTES:
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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

January 26, 2021

Hour of Day Ending at L.S.T.	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min	Point	Bulb	Press.	Precip.
1:00 AM	0.0	17.4	347	24.5	43.7			45.3	45.4	45.1	-26.8		74		36	40	29.79	0
2:00 AM	0.0	15.4	347	21.4	43.1			45	45.2	44.8	-26.9		72		35	39	29.79	0
3:00 AM	0.0	13.1	343	17.5	42.6			44.8	45	44.6	-26.9		74		35	39	29.8	0
4:00 AM	0.0	12.4	343	17.4	42.5			44.5	44.7	44.4	-26.9		74		35	39	29.8	0
5:00 AM	0.0	13.7	345	19.1	42.6			44.3	44.4	44.2	-26.9		75		35	39	29.8	0
6:00 AM	0.0	12.1	344	18.3	42.3			44.1	44.2	44	-26.9		78		36	39	29.81	0
7:00 AM	0.0	7.1	337	11.8	40.6			43.9	44.1	43.8	-26.9		82		36	38	29.82	0
8:00 AM	2.4	2.4	49	5.9	35.8			43.7	43.9	43.4	-26.9		88		33	34	29.82	0
9:00 AM	14.8	3.2	137	5.1	40.2			43.2	43.5	43.1	-26.8		87		37	38	29.83	0
10:00 AM	27.7	7.1	164	12.1	46.1			43.5	43.9	43.2	-26.8		76		39	42	29.84	0
11:00 AM	24.3	11.5	173	16.5	47.4			44.4	45.1	43.8	-26.8		74		40	43	29.85	0
12:00 PM	17.0	14	171	20.6	47.2			45.6	46	45	-26.9		77		40	43	29.84	0
1:00 PM	15.5	15.9	171	21.9	47.8			46.2	46.6	45.9	-26.9		76		41	44	29.8	0
2:00 PM	16.7	18.5	187	29.1	47.3			46.7	47	46.5	-27.1		75		40	43	29.76	0
3:00 PM	8.6	20.3	176	32.1	46.5			47.1	47.2	46.9	-27.1		82		41	44	29.73	0.01
4:00 PM	3.8	26.1	172	37.5	45.7			47.2	47.3	47.1	-27.1		91		43	44	29.69	0.03
5:00 PM	0.9	29	169	41.4	45.5			47.1	47.2	47	-27.1		93		44	44	29.65	0.09
6:00 PM	0.1	32.3	167	44.6	45.4			46.9	47	46.7	-26.9		95		44	45	29.6	0.14
7:00 PM	0.0	34.8	174	50.9	45.6			46.6	46.8	46.5	-21.4		95		44	45	29.57	0.12
8:00 PM	0.0	37.5	175	54.1	46.1			46.5	46.6	46.4	-17.6		96		45	46	29.52	0.14
9:00 PM	0.0	41.5	176	60.4	46.4			46.4	46.5	46.3	-20.9		96		45	46	29.48	0.19
10:00 PM	0.0	37.2	178	56	46.9			46.4	46.5	46.3	-21.3		97		46	46	29.47	0.31
11:00 PM	0.0	29.5	191	49.3	48.1			46.5	46.6	46.3	-22.4		98		48	48	29.48	0.35
12:00 AM	0.0	15	193	24.2	48.9			46.7	46.9	46.5	-24		97		48	48	29.48	0.03

DAILY STATISTICS

	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min	Point	Bulb	Press.	Precip.
Total	131.8																	1.41
Ave.		19.5	177		44.8			45.5			-25.5	84			40	42	29.71	
Max.				60.4		-147.8			47.3		-17.2		-100					
Min.							1831.8			43.1	-27.3			1000				

NOTES:
Daily averages might vary slightly from the average of the hourly values printed due to rounding of the hourly values.
Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.
° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

January 27, 2021

Hour of Day Ending at L.S.T.	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min inches	Point	Bulb	Press.	Precip.
1:00 AM	0.0	11.1	203	21.8	49			46.9	47.1	46.8	-24.8		98		48	49	29.5	0
2:00 AM	0.0	9.2	216	15.6	48.4			47.1	47.2	47	-23.8		97		48	48	29.52	0
3:00 AM	0.0	10.5	214	17.2	48.4			47.1	47.2	47	-23.6		96		47	48	29.54	0
4:00 AM	0.0	15	216	24.8	49.8			47	47.1	46.9	-23.7		93		48	49	29.56	0
5:00 AM	0.0	15.1	221	36.4	47.8			47	47.1	46.9	-23.9		91		45	46	29.56	0.07
6:00 AM	0.0	8.3	200	11.7	45.3			46.9	47.1	46.7	-24		94		44	44	29.59	0
7:00 AM	0.0	9	197	15.6	46.6			46.5	46.7	46.4	-23.8		93		45	46	29.62	0
8:00 AM	0.8	7.8	218	9.9	45.3			46.3	46.5	46.1	-23.8		93		43	44	29.64	0
9:00 AM	7.3	8.7	186	13.2	47.2			45.9	46.2	45.8	-23.6		94		45	46	29.65	0
10:00 AM	22.4	12.4	199	19.5	51.9			46	46.3	45.8	-23.7		89		49	50	29.66	0
11:00 AM	28.5	15.7	185	23.2	53.2			46.8	47.5	46.2	-23.7		89		50	51	29.67	0
12:00 PM	28.3	17.2	171	24.3	52.9			48	48.5	47.4	-23.6		90		50	51	29.67	0
1:00 PM	23.2	16.7	172	24.1	52.6			48.9	49.2	48.5	-23.5		93		50	51	29.65	0
2:00 PM	19.1	19.7	168	28	52.2			49.5	49.8	49.2	-23.6		92		50	51	29.6	0
3:00 PM	15.2	19.5	166	27.8	51.8			49.9	50.1	49.7	-23.6		90		49	50	29.59	0
4:00 PM	4.0	15.8	169	27	49.2			50.1	50.2	50	-23.4		96		48	49	29.59	0.06
5:00 PM	1.8	12.3	151	18.1	48.3			49.9	50.1	49.8	-23.2		96		47	48	29.58	0.08
6:00 PM	0.2	7.4	133	12.9	47.8			49.7	49.9	49.5	-22.8		96		47	47	29.56	0.01
7:00 PM	0.0	4.2	109	8.8	46.8			49.4	49.6	49.2	-22.5		96		46	46	29.56	0.01
8:00 PM	0.0	9	143	15.9	47.6			49.2	49.4	49	-22.5		95		46	47	29.55	0.03
9:00 PM	0.0	12.9	158	19.6	48			49	49.1	48.9	-22.3		96		47	47	29.55	0.08
10:00 PM	0.0	13.5	167	23.5	48			48.8	49	48.7	-21.3		97		47	47	29.55	0.04
11:00 PM	0.0	14.8	171	23.7	48.6			48.7	48.8	48.6	-21.2		97		48	48	29.55	0
12:00 AM	0.0	13.9	179	19.8	49.7			48.7	48.8	48.6	-21.5		98		49	49	29.56	0.02

DAILY STATISTICS

	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min inches	Point	Bulb	Press.	Precip.
Total	151.1																	0.4
Ave.		12.5	180		49.0			48.1			-23.2	94			47	48	29.59	
Max.				36.4		-147.8			50.2		-21.0		-100					
Min.							1831.8			45.8	-25.1			1000				

NOTES:
Daily averages might vary slightly from the average of the hourly values printed due to rounding of the hourly values.
Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.
° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

January 28, 2021

Hour of Day Ending at L.S.T.	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min inches	Point	Bulb	Press.	Precip.
1:00 AM	0.0	9.4	199	16.4	49.9			48.8	48.9	48.7	-21.7		99		50	50	29.56	0.02
2:00 AM	0.0	6.5	217	11.8	49.1			48.9	49	48.8	-21.8		99		49	49	29.56	0
3:00 AM	0.0	5.8	197	8.2	47.6			48.8	49	48.6	-21.9		99		47	47	29.57	0
4:00 AM	0.0	5.8	173	7.5	47.3			48.5	48.7	48.4	-22.1		99		47	47	29.58	0
5:00 AM	0.0	7.2	167	9.9	48.3			48.3	48.4	48.2	-22.4		99		48	48	29.59	0
6:00 AM	0.0	7.4	184	12	49.5			48.3	48.4	48.2	-22.5		99		49	49	29.59	0
7:00 AM	0.0	8.8	188	12.6	49.9			48.4	48.5	48.3	-22.6		100		50	50	29.6	0.03
8:00 AM	0.5	8.8	198	16.3	47.4			48.5	48.6	48.4	-22.5		98		47	47	29.61	0
9:00 AM	3.7	5.1	201	8.3	47.9			48.5	48.6	48.4	-22.5		97		47	47	29.62	0
10:00 AM	9.1	5.8	212	9.3	50			48.5	48.6	48.4	-22.5		96		49	49	29.63	0
11:00 AM	19.4	7.7	225	11.9	52.4			48.9	49.4	48.5	-22.5		91		50	51	29.65	0
12:00 PM	36.9	9.9	240	14.2	53.4			49.8	50.4	49.3	-22.7		83		48	50	29.64	0
1:00 PM	49.3	11.4	251	15.3	53.9			51.1	51.7	50.4	-22.6		82		48	51	29.63	0
2:00 PM	46.6	10.8	247	14.6	54.1			52.2	52.7	51.6	-22.6		79		48	50	29.61	0
3:00 PM	40.4	10.4	251	14.3	53.8			52.9	53.1	52.6	-22.6		82		48	51	29.62	0.01
4:00 PM	28.7	9.3	259	13	53.1			53	53.1	52.9	-22.8		81		48	50	29.62	0
5:00 PM	12.7	6.5	266	11.2	51.9			52.8	53	52.6	-22.8		82		47	49	29.62	0
6:00 PM	1.2	3.8	270	7.4	48.2			52.4	52.7	52	-23		91		46	47	29.61	0
7:00 PM	0.0	1.5	133	2.9	45.1			51.5	52.1	51	-23		96		44	45	29.62	0
8:00 PM	0.0	2.6	121	3.7	43.3			50.5	51	50.1	-23		99		43	43	29.62	0
9:00 PM	0.0	3.3	134	5.3	42			49.7	50.1	49.3	-23.1		100		42	42	29.62	0
10:00 PM	0.0	2.9	142	5.2	41.9			49.1	49.4	48.7	-23.1		100		42	42	29.63	0
11:00 PM	0.0	3	117	5.3	42.2			48.6	48.8	48.4	-23.2		100		42	42	29.64	0
12:00 AM	0.0	2.1	118	4.5	42.5			48.2	48.5	48	-23.1		100		42	42	29.65	0

DAILY STATISTICS

	Total Solar Rad. ° ly.	Wind Ave. mph	V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. F.	Soil Temperature Max	Soil Moisture Min Deg. F.	Relative Humidity Mean cBars	Relative Humidity Max	Dew Wet Min Percent	Baro. Mean Deg. F.	Baro. Mean in. Hg.	Total Max	Total Min inches	Point	Bulb	Press.	Precip.
Total	248.6																	0.06
Ave.		6.5	199		48.5			49.8			-22.6	94			47	47	29.61	
Max.				16.4		-147.8			53.1		-21.6		-100					
Min.							1831.8			48.0	-23.2			1000				

NOTES:
Daily averages might vary slightly from the average of the hourly values printed due to rounding of the hourly values.
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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

October, 2020

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. Fahrenheit	Soil Temperature Max	Soil Moisture Min Deg. Fahrenheit	Humidity Mean cBars	Humidity Max	Dew Min Percent	Wet Mean Deg. Fahrenheit	Baro. Max in. HG.	Baro. Min in. HG.	Total Mean inches	Point Max	Point Min	Bulb Mean	Bulb Max	Bulb Min	Press. Mean	Precip. Total
1	275	297	3.0	282	9.4	57			62.7	66	60	-597	-578	-613	92	55	55	29.86	0.00			
2	276	367	5.4	307	17.0	55			62.4	66	59	-579	-560	-600	97	54	55	29.85	0.00			
3	277	345	7.1	331	16.0	54			62.5	65	61	-580	-562	-598	98	54	54	29.83	0.00			
4	278	177	9.1	343	16.8	54			61.2	62	60	-576	-564	-588	100	53	54	29.88	0.00			
5	279	319	4.3	340	11.8	52			61.4	64	60	-574	-558	-586	99	51	51	29.91	0.01			
6	280	217	5.1	341	14.3	52			60.9	63	59	-577	-564	-592	100	52	52	29.89	0.00			
7	281	142	6.2	338	15.5	56			60.9	62	60	-576	-563	-588	93	54	55	29.83	0.00			
8	282	140	3.5	274	11.1	57			61.8	64	60	-569	-556	-586	91	54	55	29.84	0.00			
9	283	336	4.9	179	16.4	57			62.7	65	61	-566	-550	-580	94	55	55	29.85	0.02			
10	284	115	6.1	191	15.4	57			62.2	64	61	-564	-549	-578	99	57	57	29.87	0.00			
11	285	409	8.7	358	20.8	56			61.3	63	59	-564	-544	-579	87	52	54	29.98	0.00			
12	286	412	6.6	348	19.1	56			60.4	63	57	-561	-541	-576	88	53	54	29.98	0.00			
13	287	404	7.0	343	16.9	57			60.3	63	57	-560	-541	-577	89	53	54	29.98	0.00			
14	288	400	8.6	358	21.0	57			60.9	64	59	-558	-544	-572	86	53	54	29.98	0.00			
15	289	399	3.3	327	10.7	61			61.0	65	57	-550	-526	-566	74	50	54	29.87	0.00			
16	290	403	4.7	20	17.2	68			62.1	66	59	-542	-520	-565	47	43	53	29.84	0.00			
17	291	399	3.3	294	10.4	62			61.9	66	58	-538	-516	-562	69	49	54	29.82	0.00			
18	292	391	5.1	226	16.9	59			61.6	65	58	-533	-518	-550	79	52	54	29.88	0.00			
19	293	345	5.9	248	20.5	53			61.3	64	60	-527	-515	-539	97	52	52	29.87	0.00			
20	294	361	4.1	198	12.2	54			60.6	64	59	-520	-507	-538	95	52	53	29.78	0.00			
21	295	373	5.9	343	18.3	54			59.2	62	57	-514	-500	-531	93	52	52	29.71	0.00			
22	296	288	9.3	190	21.3	54			58.7	61	56	-504	-489	-521	95	52	53	29.75	0.00			
23	297	330	5.0	188	15.0	55			60.1	63	58	-498	-485	-507	90	52	53	29.86	0.00			
24	298	150	5.0	195	16.7	55			59.5	62	57	-489	-476	-503	91	52	53	29.86	0.00			
25	299	307	6.1	349	18.6	54			60.0	62	58	-484	-472	-497	85	49	51	29.84	0.00			
26	300	368	6.9	26	22.1	57			57.3	61	54	-474	-458	-494	38	25	43	30.00	0.00			
27	301	365	4.1	232	11.5	55			57.5	62	54	-464	-448	-480	76	46	50	29.96	0.00			
28	302	360	3.9	103	13.1	53			57.0	61	54	-457	-440	-472	77	45	49	29.96	0.00			
29	303	348	4.3	352	12.2	50			56.5	59	54	-449	-434	-463	94	48	49	29.95	0.00			
30	304	284	6.2	360	16.3	50			57.2	59	56	-441	-430	-450	95	49	49	29.95	0.00			
31	305	321	5.0	6	12.2	50			56.6	59	54	-437	-425	-452	95	49	49	29.97	0.00			

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. Fahrenheit	Soil Temperature Max	Soil Moisture Min Deg. Fahrenheit	Humidity Mean cBars	Humidity Max	Dew Min Percent	Wet Mean Deg. Fahrenheit	Baro. Max in. Hg.	Baro. Min in. Hg.	Total Mean inches	Point Max	Point Min	Bulb Mean	Bulb Max	Bulb Min	Press. Mean	Precip. Total
Total	9874																				0.03
Ave.	319	5.6	328	15.7	55.5			60.3	63	57.9	-529.7	-514	-545.3	87	51	53	29.88				
Max.	412	9.3		22.1	68			63	66	61	-437	-425	-450	100	57	57	30	0.02			
Min.	115	3		9.4	50			56	59	54	-597	-578	-613	38	25	43	29.71	0			

Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.
° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

November, 2020

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. Fahrenheit	Soil Temperature Max	Soil Moisture Min Deg. Fahrenheit	Humidity Mean cBars	Humidity Max	Dew Min Percent	Wet Mean Deg. Fahrenheit	Baro. Max in. HG.	Baro. Min in. HG.	Total Mean inches	Point Max	Point Min	Bulb Mean	Bulb Max	Bulb Min	Press. Mean	Precip. Total
1	306				13.7					60	56		-423	-446								
2	307	302	5.7	348	18.9	51			57.3	59	55	-431	-421	-441	98	50	50	29.97	0.00			
3	308	267	8.2	338	19.5	53			57.6	59	56	-429	-419	-441	94	51	51	29.98	0.00			
4	309	256	5.7	337	17.0	55			59.2	61	58	-425	-414	-435	98	55	55	30.09	0.00			
5	310	273	6.6	342	30.0	53			58.0	60	56	-427	-415	-436	98	53	53	29.96	0.00			
6	311	278	15.2	327	40.3	53			57.4	59	56	-424	-413	-433	82	47	50	29.67	0.01			
7	312	322	14.7	352	42.4	51			55.3	57	54	-418	-407	-430	79	44	47	29.61	0.00			
8	313	296	21.2	346	43.4	49			54.5	56	52	-410	-398	-418	73	41	44	29.73	0.00			
9	314	300	3.8	79	15.0	44			51.2	54	48	-404	-390	-418	68	34	39	30.05	0.00			
10	315	266	3.8	219	14.9	47			51.5	55	48	-393	-380	-407	75	39	43	30.09	0.00			
11	316	190	4.5	13	15.7	48			54.3	56	52	-387	-375	-396	95	46	47	29.97	0.00			
12	317	309	5.4	341	16.6	47			51.3	54	48	-385	-375	-396	91	44	45	29.97	0.00			
13	318	57	10.7	207	29.2	50			52.3	54	50	-383	-375	-393	98	49	50	29.99	0.24			
14	319				15.4					53	49		-374	-396								
15	320	288	3.6	35	8.6	50			50.8	54	48	-384	-370	-397	84	45	47	30.14	0.00			
16	321	294	6.1	111	21.5	60			52.8	56	50	-379	-365	-391	66	47	52	29.87	0.00			
17	322	50	16.7	181	31.4	55			54.5	55	54	-163	-16	-391	93	53	53	29.76	0.65			
18	323	213	7.9	201	20.1	54			56.2	58	54	-18	-17	-19	98	53	53	29.93	0.00			
19	324	260	4.7	19	14.2	48			52.9	55	51	-20	-19	-22	96	47	47	30.16	0.01			
20	325	287	4.6	14	12.0	47			50.4	53	48	-23	-22	-24	89	43	45	30.12	0.00			
21	326	255	4.5	33	12.3	48			48.6	52	46	-24	-24	-25	75	40	44	30.06	0.00			
22	327	169	7.3	1	24.5	48			49.2	52	47	-26	-25	-27	94	47	47	29.95	0.00			
23	328	259	12.1	350	25.6	51			51.7	53	51	-27	-26	-28	91	49	50	29.92	0.00			
24	329	269	7.1	307	25.0	49			50.7	53	48	-29	-28	-30	93	47	48	29.99	0.00			
25	330	272	17.2	337	34.0	51			51.7	53	51	-30	-29	-32	86	47	49	30.10	0.00			
26	331	276	7.8	24	21.9	47			49.2	51	47	-33	-32	-34	71	37	42	30.10	0.00			
27	332				11.1					51	45		-34	-37								
28	333	266	4.3	38	17.0	46			47.0	50	44	-38	-36	-39	73	37	42	30.11	0.00			
29	334	261	4.6	30	15.3	48			46.8	50	44	-40	-39	-42	78	40	44	30.08	0.00			
30	335	255	8.4	353	19.3	49			49.4	51	48	-43	-41	-44	93	47	48	30.16	0.00			

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. Fahrenheit	Soil Temperature Max	Soil Moisture Min Deg. Fahrenheit	Humidity Mean cBars	Humidity Max	Dew Min Percent	Wet Mean Deg. Fahrenheit	Baro. Max in. Hg.	Baro. Min in. Hg.	Total Mean inches	Point Max	Point Min	Bulb Mean	Bulb Max	Bulb Min	Press. Mean	Precip. Total
Total	6791																				0.91
Ave.	252	8.2	357	21.5	50			52.6	54.8	50.4	-229.4	-223.4	-248.9	86	46	48	29.98				
Max.	322	21.2		43.4	60			59	61	58	-18	-16	-19	98	55	55	30.16	0.65			
Min.	50	3.6		8.6	44			47	50	44	-431	-423	-446	66	34	39	29.61	0			

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

December, 2020

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. Fahrenheit	Soil Temperature Max	Soil Moisture Min Deg. Fahrenheit	Humidity Mean cBars	Humidity Max	Dew Min Percent	Wet Mean Deg. Fahrenheit	Wet Max	Wet Min	Baro. Mean in. HG.	Baro. Max	Baro. Min	Total Mean inches	Total Max	Total Min	Point	Bulb	Press.	Precip.
1	336	235	4.4	346	15.9	46			50.8	53	49	-45	-44	-47				97			45	46	30.08	0.00
2	337	221	6.5	0	15.6	46			48.4	50	46	-48	-46	-49				96			45	45	30.01	0.00
3	338	206	4.4	7	12.5	49			49.9	52	48	-50	-49	-52				87			45	46	30.13	0.00
4	339	247	3.7	24	12.7	49			48.5	52	46	-52	-51	-54				76			41	45	30.12	0.00
5	340	157	4.0	163	14.1	49			48.3	51	46	-55	-54	-57				88			45	47	30.12	0.00
6	341	218	5.4	349	17.6	49			50.6	53	49	-57	-56	-59				96			48	48	30.17	0.00
7	342	257	9.0	31	35.3	57			50.0	53	47	-60	-58	-63				51			36	46	30.05	0.00
8	343	258	4.9	358	14.5	53			49.6	52	47	-65	-63	-68				68			40	46	30.03	0.00
9	344	223	4.1	22	18.7	47			49.8	52	48	-70	-68	-72				89			43	45	29.95	0.00
10	345	243	10.7	349	30.0	48			48.8	51	47	-72	-71	-74				91			46	47	29.94	0.00
11	346	100	10.4	324	27.0	49			50.0	51	49	-72	-24	-76				84			44	47	30.02	0.37
12	347	131	5.8	201	18.6	53			52.9	55	51	-19	-18	-22				93			51	51	30.00	0.07
13	348	56	10.7	233	24.5	51			52.8	54	51	-21	-17	-24				96			50	51	30.04	0.42
14	349	243	10.2	353	22.1	48			50.4	52	49	-23	-23	-24				90			45	47	30.16	0.00
15	350	204	3.0	28	9.8	48			49.5	52	48	-24	-24	-24				89			44	46	30.20	0.00
16	351	105	5.9	153	21.7	51			51.2	54	49	-24	-18	-24				90			48	49	30.05	0.44
17	352	241	15.1	341	34.4	50			51.7	53	49	-21	-19	-23				90			47	48	29.96	0.12
18	353	245	3.4	10	9.9	44			47.6	50	45	-23	-22	-23				88			40	42	30.17	0.00
19	354	246	4.2	36	18.0	46			46.6	50	44	-23	-22	-23				87			41	43	30.26	0.00
20	355	258	4.6	20	14.8	47			47.0	50	44	-23	-23	-24				93			45	45	30.16	0.00
21	356	217	5.9	5	23.4	47			46.9	49	44	-24	-23	-24				93			45	46	29.97	0.00
22	357	250	8.7	10	32.1	47			48.0	50	46	-24	-24	-25				88			43	45	30.06	0.00
23	358	251	4.6	73	19.4	47			45.3	48	43	-25	-25	-26				62			33	40	30.09	0.00
24	359	214	10.4	136	29.7	55			47.7	50	46	-26	-25	-26				51			36	45	30.07	0.00
25	360	53	16.9	181	34.3	53			50.1	52	49	-23	-17	-27				85			48	50	29.94	0.50
26	361	234	6.7	305	18.6	50			50.7	53	48	-22	-21	-22				95			48	49	30.07	0.00
27	362	217	4.8	118	18.8	47			48.1	51	46	-22	-22	-22				89			43	45	29.79	0.00
28	363	222	5.8	12	17.0	48			48.8	51	47	-22	-22	-23				82			42	45	29.74	0.00
29	364	256	3.2	27	11.2	45			46.6	50	44	-23	-23	-24				91			42	44	30.11	0.00
30	365	168	6.0	255	23.2	48			47.4	50	45	-24	-23	-24				95			46	47	30.18	0.03
31	366	246	10.2	356	25.1	49			49.3	51	47	-24	-23	-24				91			47	48	30.07	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. Fahrenheit	Soil Temperature Max	Soil Moisture Min Deg. Fahrenheit	Humidity Mean cBars	Humidity Max	Dew Min Percent	Wet Mean Deg. Fahrenheit	Wet Max	Wet Min	Baro. Mean in. Hg.	Baro. Max	Baro. Min	Total Mean inches	Total Max	Total Min	Point	Bulb	Press.	Precip.
Total	6423																						1.95
Ave.	207	6.9	13	20.7	48.9			49.1	51.4	46.9	-35.6	-32.8	-37				86			44	46	30.05	
Max.	258	16.9		35.3	57			53	55	51	-19	-17	-22				97			51	51	30.26	0.5
Min.	53	3		9.8	44			45	48	43	-72	-71	-76				51			33	40	29.74	0

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

January, 2021

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. Fahrenheit	Soil Temperature Max	Soil Moisture Min Deg. Fahrenheit	Humidity Mean cBars	Humidity Max	Dew Min Percent	Wet Mean Deg. Fahrenheit	Wet Max	Wet Min	Baro. Mean in. HG.	Baro. Max	Baro. Min	Total Mean inches	Total Max	Total Min	Point	Bulb	Press.	Precip.
1	1	195	6.9	169	22.2	47			48.1	51	45	-24	-23	-24				95			46	46	30.04	0.01
2	2	61	5.5	158	18.7	50			51.0	53	50	-21	-20	-24				99			50	50	30.11	0.08
3	3	121	5.8	167	12.4	49			51.8	54	50	-20	-20	-21				100			49	49	30.10	0.01
4	4	142	13.2	194	34.8	51			52.0	54	49	-20	-16	-22				94			49	50	30.00	0.39
5	5	245	3.6	47	17.3	46			48.6	51	46	-21	-21	-22				94			44	45	30.14	0.00
6	6	101	5.0	145	20.4	47			48.1	50	45	-21	-20	-22				96			46	46	30.10	0.16
7	7	225	4.5	101	14.7	51			50.3	53	48	-21	-20	-21				87			46	48	30.08	0.00
8	8	118	4.2	19	20.6	48			50.8	53	49	-21	-20	-21				98			48	48	30.15	0.15
9	9	253	4.6	27	15.1	48			48.1	51	46	-21	-21	-22				86			43	45	30.14	0.00
10	10	153	4.0	92	13.4	48			48.9	53	46	-22	-21	-22				91			45	46	30.15	0.00
11	11	237	5.6	17	21.1	47			48.4	51	46	-23	-22	-23				96			45	46	30.13	0.00
12	12	125	5.7	164	14.2	51			50.3	53	48	-23	-23	-24				87			47	49	30.17	0.00
13	13	115	5.6	225	19.0	54			53.6	57	51	-24	-24	-25				95			53	53	30.24	0.00
14	14	243	6.5	35	17.6	51			53.2	56	51	-24	-24	-25				97			50	50	30.20	0.00
15	15	253	5.5	354	22.2	50			50.9	54	48	-24	-23	-24				94			48	49	30.17	0.00
16	16	95	7.1	350	15.9	49			51.4	53	50	-24	-23	-24				100			49	49	30.06	0.00
17	17	279	4.1	306	14.8	51			50.9	55	48	-23	-23	-24				92			49	50	29.96	0.00
18	18	294	9.9	18	39.3	56			50.7	53	48	-24	-24	-25				61			38	47	29.84	0.00
19	19	293	12.8	47	34.4	58			50.0	52	48	-26	-25	-27				21			18	41	29.89	0.00
20	20	289	3.8	34	10.7	51			48.9	52	46	-28	-27	-29				49			30	41	29.97	0.00
21	21	206	5.2	166	17.4	44			48.5	51	46	-29	-29	-30				96			43	43	29.93	0.00
22	22	207	11.1	328	38.1	49			49.8	52	49	-30	-30	-31				89			46	47	29.77	0.12
23	23	290	7.4	3	19.6	47			48.1	51	45	-30	-29	-30				89			43	45	29.84	0.00
24	24	97	17.7	330	44.8	48			48.3	50	47	-30	-29	-30				85			43	45	29.78	0.11
25	25	304	25.9	339	40.9	46			46.4	48	45	-27	-27	-28				72			37	41	29.74	0.00
26	26	132	19.5	177	60.4	45			45.5	47	43	-25	-17	-27				84			40	42	29.71	1.41
27	27	151	12.5	180	36.4	49			48.1	50	46	-23	-21	-25				94			47	48	29.59	0.40
28	28	249	6.5	199	16.4	49			49.8	53	48	-23	-22	-23				94			47	47	29.61	0.06
29	29	264	3.6	149	11.0	45			47.7	51	45	-23	-22	-23				92			42	43	29.81	0.00
30	30	215	9.5	158	19.0	50			49.2	53	47	-23	-23	-24				84			45	47	30.03	0.00
31	31	260	13.2	164	25.6	53			50.8	54	49	-25	-24	-26				72			44	48	30.00	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Air Temperature Max. mph	Soil Temperature Mean Deg. Fahrenheit	Soil Temperature Max	Soil Moisture Min Deg. Fahrenheit	Humidity Mean cBars	Humidity Max	Dew Min Percent	Wet Mean Deg. Fahrenheit	Wet Max	Wet Min	Baro. Mean in. Hg.	Baro. Max	Baro. Min	Total Mean inches	Total Max	Total Min	Point	Bulb	Press.	Precip.
Total	6211																						2.9
Ave.	200	8.3	90	23.5	49.2			49.6	52.3	47.3	-23.9	-22.9	-24.7				87			44	47	29.98	
Max.	304	25.9		60.4	58			54	57	51	-20	-16	-21				100			53	53	30.24	1.41
Min.	61	3.6		10.7	44			46	47	43	-30	-30	-31				21			18	41	29.59	0

Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.

° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

APPENDIX E

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