DEPARTMENT OF TRANSPORTATION
NORTH REGION ENVIRONMENTAL
DISTRICT 1
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EUREKA, CA 9550
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TTY 711

Making Conservation a California Way of Life.

May 1, 2021

California Coastal Commission
1385 Eighth Street, Ste. 130
Arcata, CA 95521

File: Eureka-Arcata Highway 101 Corridor Improvement Project
HUM 101 / PMS 79.9 / 86.3
01-36600 / 0100000127

SUBJECT: CDP 1-18-1078 Special Condition 1, 2021 Annual Report

Special Condition 1. Sea Level Rise and Flooding Impact Monitoring and Reporting

Coastal Development Permit (CDP) 1-18-1078 was issued to the California Department of Transportation by the California Coastal Commission on September 12, 2019. The permit covers the Eureka-Arcata U.S. Highway 101 Corridor Improvement (Corridor) Project, which consists of five component projects within a six-mile segment of U.S. Highway 101 along the east side of Humboldt Bay. In accordance with CDP 1-18-1078, Special Condition 1, the California Department of Transportation (Caltrans) is submitting the Sea Level Rise and Flooding Impact Monitoring Report. This 2021 Annual Report references the Baseline Report, which was submitted to California Coastal Commission staff on May 1, 2020.

The Baseline Report identified existing water elevation conditions in Humboldt Bay at the North Spit Tide Gauge, which provides data applicable to the Corridor. The Baseline Report presents data from April 1, 2019, through March 31, 2020. Additionally, the Baseline Report established locations from which to take reference photographs to annually document King Tides and other extreme tidal events along the Corridor. The reference photographs, photographs of King Tide events from winter 2019/2020 and winter 2020/2021 are included in the 2021 Annual Report.

The 2021 Annual Report documents data from April 1, 2020, through March 31, 2021. The Annual Report presents water elevation data for the reporting period from the North Spit Tide Gauge. The Baseline Report data is referenced to identify changes in water elevation conditions over time. Additionally, the Annual Report documents any closures due to flooding during the reporting period and includes a brief discussion of any coastal hazards impacts to highway infrastructure along the Corridor. The 2021 Annual Report also provides an update on progress made in developing the Comprehensive Adaptation and Implementation Plan (CAIP) required by CDP 1-18-1078, Special Condition 2.

Jason Meyer
Senior Environmental Planner

A. Baseline Report

A.1. Water Elevation

Water elevation baseline data was accessed for the North Spit Tide Gauge from the National Oceanic and Atmospheric Administration (NOAA) website (NOAA, April 2020, Appendix A) and referenced to NAVD88. The reporting period for the Baseline Report is April 1, 2019, to March 31, 2020. Monthly maximum water elevations ranged from 7.67 feet to 8.86 feet. The highest observed elevation of 8.86 feet was recorded on December 25, 2019. The mean monthly maximum water elevation for the reporting period was 8.07 feet (Figure 1). Monthly mean sea level for the baseline reporting period ranged from 3.66 feet to 3.99 feet with a mean of 3.80 feet for the reporting period (Figure 2).

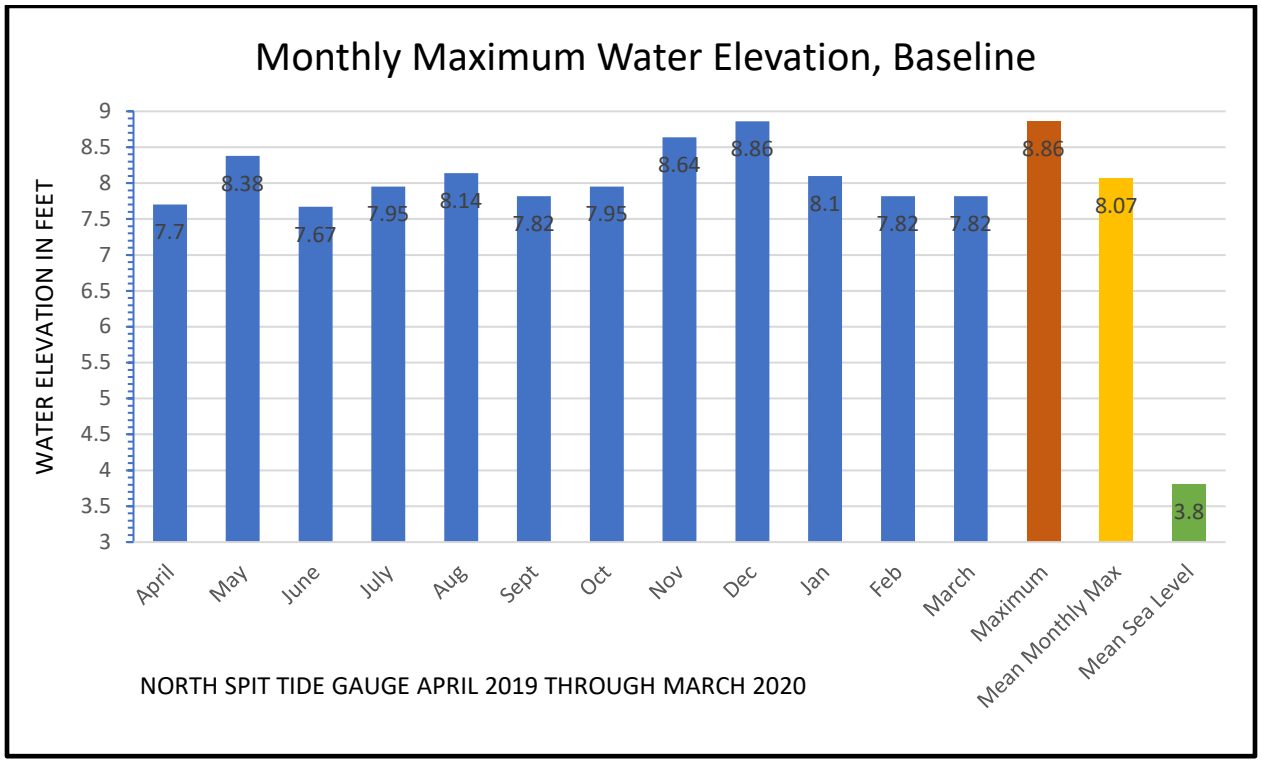


Figure 1. ***Monthly Maximum Water Elevation, Baseline*** *shows the maximum water elevation by month at the North Spit Tide Gauge from April 1, 2019, to March 31, 2020. Monthly maximum and monthly mean sea level data were accessed from the NOAA Tides and Currents webpage. Mean Monthly Maximum and Mean Sea Level were calculated using the NOAA data.*

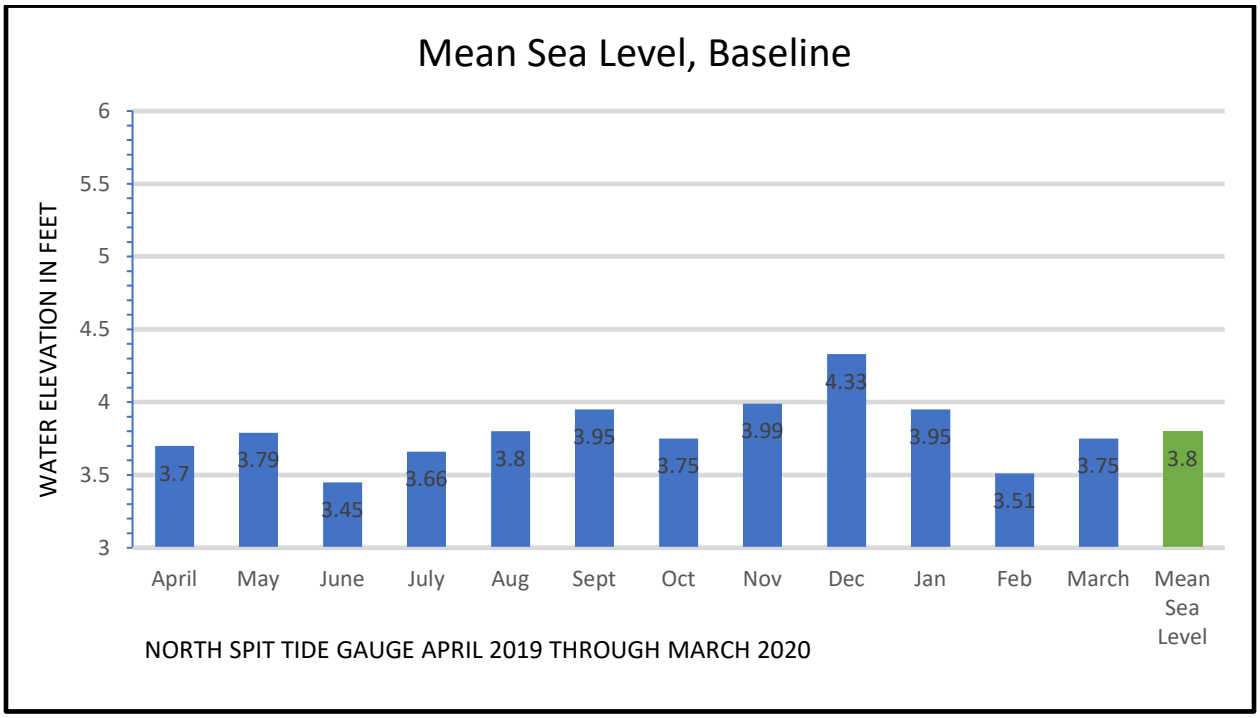


Figure 2. ***Mean Sea Level, Baseline*** *at the North Spit Tide Gauge for April 1, 2019, through March 31, 2020, was calculated from available monthly sea level means from the NOAA Tides and Currents webpage.*

A.2. Reference Photograph Locations

Reference locations for photographing annual King Tide and extreme tidal events along the Corridor are organized to easily facilitate replicating photos for the Annual Reports from approximately the same location and vantage point as the Baseline Report (Appendix B). Photograph location selection criteria included accessibility and safety, vulnerability to flooding (Caltrans Eureka-Arcata Corridor: Sea Level Rise Vulnerabilities and Adaptation Solutions, 2019), and locations representing various shoreline cover and land use (Appendix B).

For each of the ten selected reference locations, two to four specific photo sites were established (Appendix C). Site reference photos for Gannon Slough, Jacoby Creek, North Bracut, South Bracut, Indianola, California Redwood Company, Jacobs Tide Gate, Eureka Slough, and Cole Avenue were taken close to high tide on December 23, 2019. The National Weather Service Daily Climate Report

(NWS, Observed Weather, Eureka CA Station, Appendix A) reported December 23, 2019, weather conditions as clear with an average wind speed of 2.8 miles per hour and no precipitation. The previous day saw 1.23 inches of precipitation. Site reference photos for Fay Slough were taken during the King Tide event on January 10, 2020. Weather conditions were cloudy with an average wind speed of 4.6 miles per hour and very minimal precipitation of 0.12 inch. Light precipitation of 0.28 inch was recorded for the previous day (NWS).

B. Annual Report

B.1. Water Elevation

Water elevation data for the 2021 Annual Report was accessed for the North Spit Tide Gauge from the NOAA Tides and Currents website (NOAA, April 2021, Appendix A) and referenced to NAVD88. The reporting period for the 2021 Annual Report is April 1, 2020, through March 31, 2021. Monthly maximum water elevations ranged from 7.71 feet to 8.65 feet (Figure 3). The highest reported water elevation of 8.65 feet was observed on November 16, 2020, and January 12, 2021. This monthly maximum elevation is 0.21 feet lower than the monthly maximum elevation from the Baseline Report. The mean monthly maximum water elevation for the reporting period was 8.10 feet (Figure 3). Mean monthly maximum water elevation for the 2021 Annual Reporting period is 0.03 feet higher than the Baseline. (Figure 4).

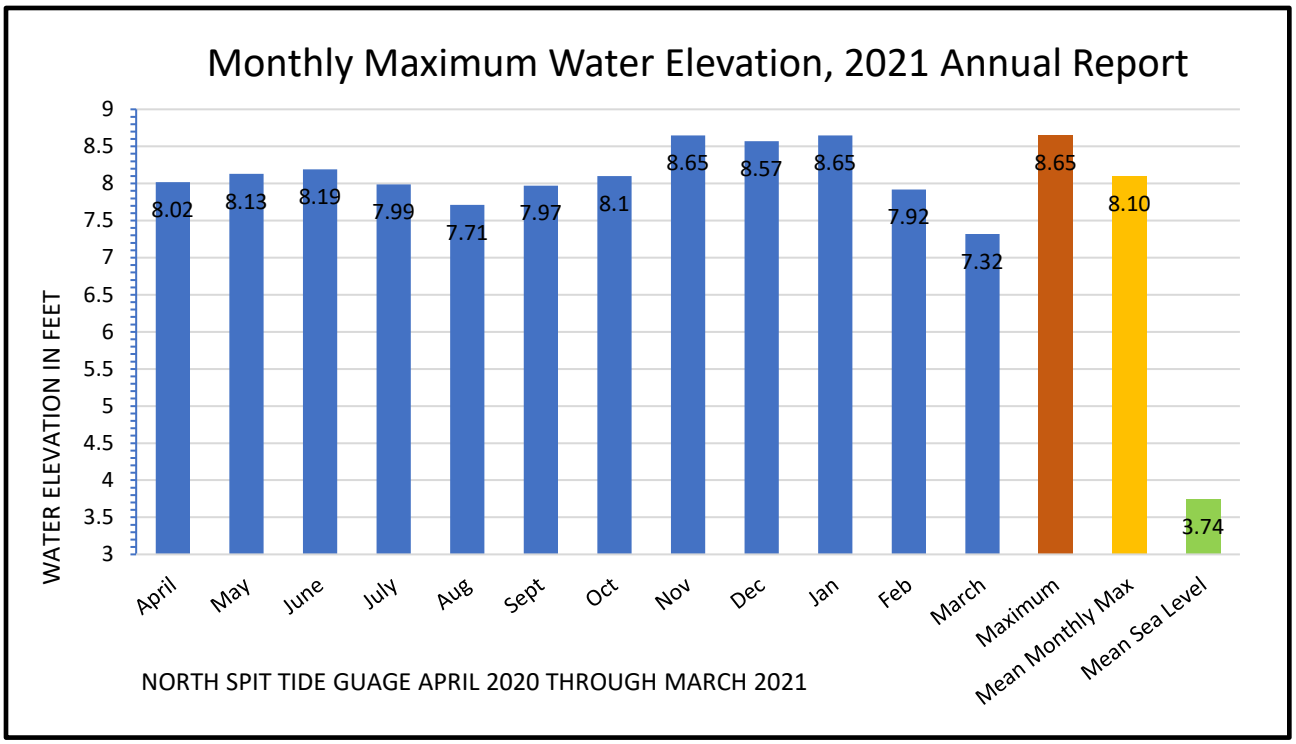


Figure 3. ***Monthly Maximum Water Elevation, 2021 Annual Report*** *shows the maximum water elevation by month at the North Spit Tide Gauge from April 1, 2019, to March 31, 2020. Monthly maximum and monthly mean sea level data were accessed from the NOAA Tides and Currents webpage. Mean Monthly Maximum and Mean Sea Level were calculated using the NOAA data.*

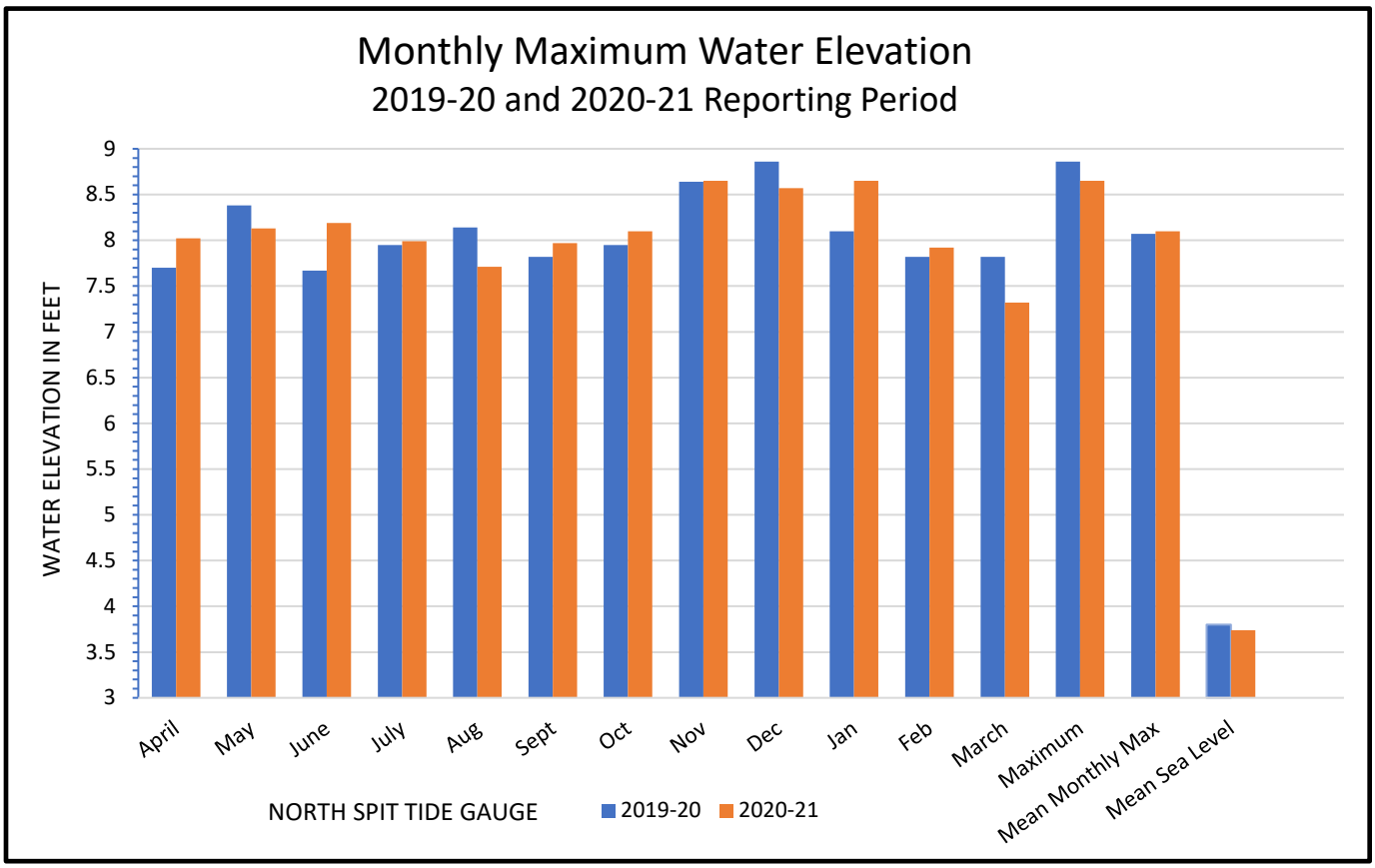


Figure 4. ***Monthly Maximum Water Elevation for the Baseline and 2021 Annual Report*** *shows the maximum water elevation by month at the North Spit Tide Gauge for the Baseline: April 1, 2019 to March 31, 2020 and for the 2021 Annual Report: April 1, 2020 through March 31, 2021. The maximum water elevation, mean monthly maximum, and mean sea level for both reporting periods are also represented.*

Monthly mean sea level for the reporting period ranged from 4.05 feet to 3.54 feet. Mean sea level for the 2021 Annual Report was 3.74 feet (Figure 5). In comparison, the mean sea level reported for the Baseline is 3.8 feet, 0.06 feet higher than the mean sea level for this 2021 Annual Report (Figure 6).

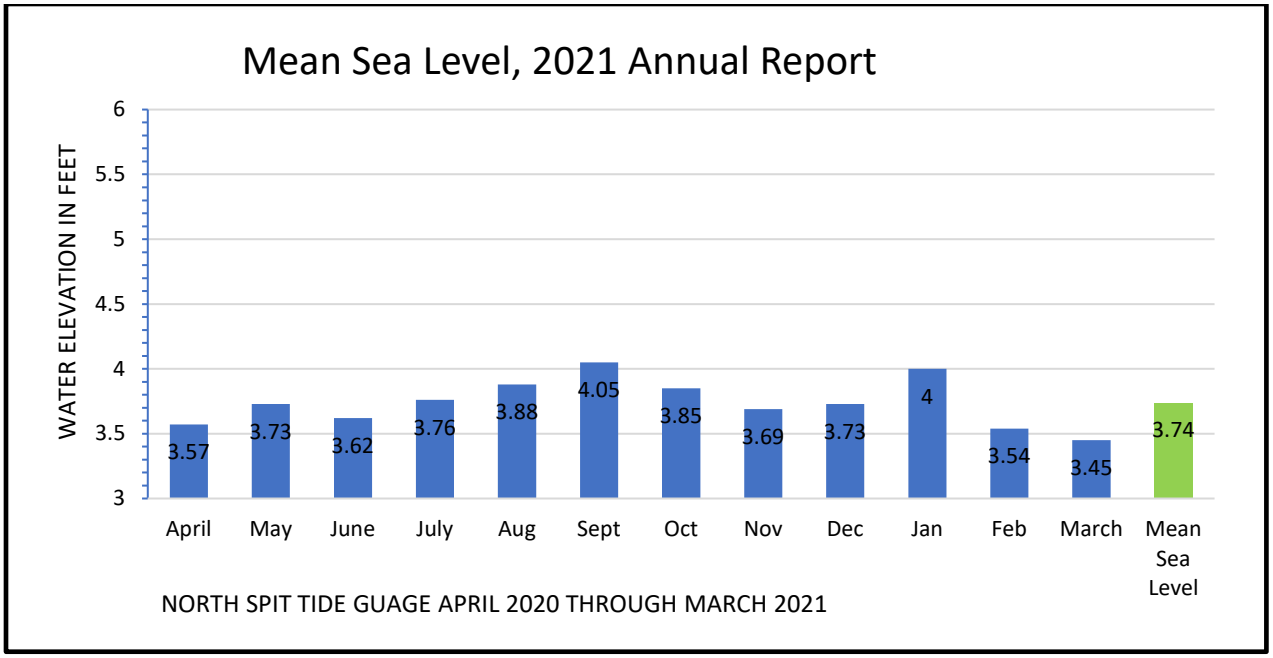


Figure 5. ***Mean Monthly Sea Level*** *at the North Spit Tide Gauge for April 1, 2020, through March 31, 2021, was calculated from available monthly sea level means from the NOAA Tides and Currents webpage.*

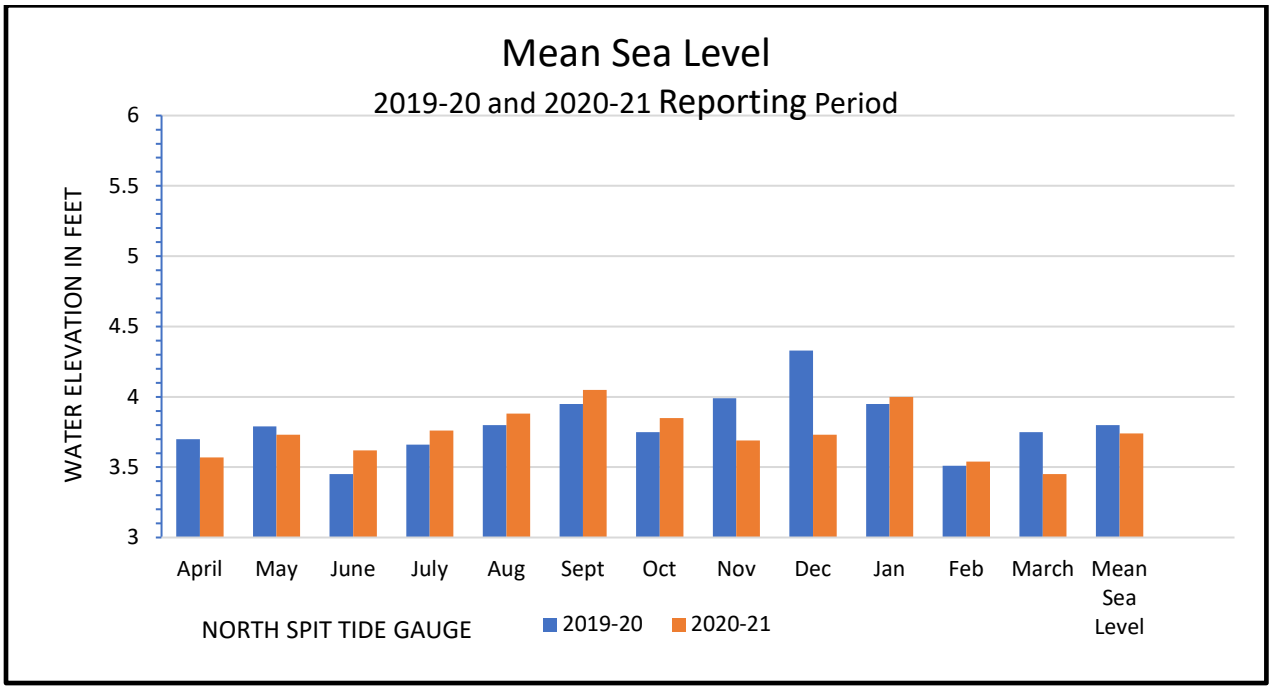


Figure 6. ***Mean Sea Level*** *for the Baseline and the 2021 Annual Report at the North Spit Tide Gauge for April 1, 2019, through March 31, 2020, and April 1, 2020, through March 31, 2021, was calculated from available monthly sea level means from the NOAA Tides and Currents webpage.*

B.2. Coastal Hazard Impacts

No impacts to highway infrastructure within the US. Highway 101 Corridor occurred during the reporting period. No temporary or ongoing flooding was observed and no weather-related incidents such as erosion, overtopping of dikes, or tide gate failures impacted the Corridor. Ponding near the Jacoby Creek Bridge occurred during a period of precipitation due to construction activities at that site. The ponding was remedied by restoring drainage patterns impacted by placement of temporary construction fill.

King Tides for winter 2020/2021 took place December 13, 14, and 15, 2020, and January 11 and 12, 2021. Caltrans staff photographed King Tide conditions from the established reference locations along the Corridor on December 14, 2020, and January 12, 2021 (Appendix C). Using the high tide prediction tables published on the NOAA website, three-hour work windows were identified for when to best document King Tide conditions to capture the highest predicted tide for each day. Three Caltrans staff were scheduled three hours each per day to document the King Tides.

Weather conditions on December 14, 2020, were clear and calm with an average wind speed of 0.9 miles per hour and trace precipitation. Previous day precipitation was measured at 0.73 inch (NWS). Maximum December 14 high tide at the North Spit Tide Gauge was 8.15 feet (NOAA). Weather conditions on January 12, 2021, were cloudy with an average wind speed of 11.5 miles per hour and total precipitation of 0.81 inch for the day. Trace precipitation was recorded the previous day. Maximum high tide on January 12 was 8.65 feet.

In addition to documenting King Tides, Caltrans staff tried to document any observed extreme conditions and locations of erosion within the Corridor. These additional photos are included in Appendix C.

B.3. Adaption and Hazards Response

During the reporting period, Caltrans did not implement any weather- or flooding-related closures within the Corridor.

Additionally, no repair or maintenance was performed by Caltrans or other entities on dikes or berms that protect the highway. No impacts have been identified that would require a planned response, an amendment to CDP 1-18-1078, or a separate CDP application before the next monitoring cycle.

B.4. Adaptation Plan Progress

Coastal Development Permit 1-18-1078, Special Condition 2, directs Caltrans to develop the Comprehensive Adaptation and Implementation Plan (CAIP) to address long-term sea level rise within the Corridor by identifying strategies for protecting, relocating, or adapting the development authorized by CDP 1-18-1078. In 2020, Caltrans created and filled two new staff positions to work in concert to coordinate sea level rise efforts in District 1. The first, a senior environmental planner position within District 1 Planning, will focus on development of the CAIP and coordinating with stakeholders to develop long-term sea level rise adaptation planning. The second position, a senior environmental planner position within North Region Environmental, will function as a liaison between Caltrans and the California Coastal Commission.

Caltrans staff are addressing the components of Special Condition 2 and are developing strategies for thorough data collection and analysis. Staff have been identified to participate in an internal Climate Change Working Group and continue to participate with collaborators and stakeholders in Humboldt County. Caltrans is in the process of joining a sea level rise public participation group affiliated with the Humboldt State Sea Level Rise Initiative. This group is currently developing a schedule of meetings to include the nearly 20 agencies that have expressed interest in participating. Caltrans is also participating in a Technical Working Group on Natural Shoreline Infrastructure in Humboldt Bay for Intertidal Coastal Marsh Restoration and Transportation Corridor Protection hosted by Humboldt County and GHD.

Caltrans partnered with Humboldt County to fund a sea level rise study (Phase 1), which was limited to the shoreline of Humboldt Bay at the northeastern side of the City of Eureka. The County of Humboldt worked with a consultant team and contacted various stakeholders to develop models for potential scenarios. Caltrans has developed a scope of work to complete Phase 2, which would build on this information and expand the study area to include all portions of the Corridor.

Caltrans Headquarters is working with District 1 on a public engagement plan and has completed Adaptation Priorities Reports for each district. These reports include a prioritized list of potentially exposed assets in each Caltrans district. The prioritization methodology in these reports considers factors such as the timing of the climate impacts, their severity and extensiveness, the condition of each asset (a measure of the sensitivity of the asset to damage), the number of system users affected, and the level of network redundancy in the area. Prioritization scores are generated for each potentially exposed asset based on these factors and used to rank them. These reports were preceded by Climate Change Vulnerability Assessments (2019) that described climate change effects in each district and provided a high-level review of potential climate change impacts to each portion of the State Highway System.

To help identify vulnerabilities specific to the Corridor, Caltrans hired a Geology graduate student from Humboldt State University (HSU). The student's master's thesis will contribute to Caltrans' vulnerability assessment through conducting geological research and modeling to assess potential hazards linked to sea level rise along the Corridor. Geological research activities will include three broad components: leveling, geologic/geomorphic mapping and LiDAR differencing, and groundwater. A leveling analysis to identify how the vertical land motion (VLM) varies along the Corridor will be conducted and applied to sea level rise predictions. This work will assist Caltrans in developing amendment alternatives aimed at evaluating potential accommodation strategies to identified vulnerabilities and provide an opportunity for the assessment to be reviewed by scientific experts in relevant fields.

In 2020, Caltrans also engaged HSU students from the Senior Planning Practicum Course to provide a report on the status of sea level rise planning in the Humboldt Bay area. The report identified stakeholders involved in sea level rise adaptation planning for the Corridor. Governmental and non-governmental agencies, private business owners, landowners, and residents were interviewed to identify concerns and needs, current actions being taken to address sea level rise, perceptions of local sea level rise planning efforts, and what they would like to see in an outreach strategy. This helped inform Caltrans of the entities they will need to contact for sea level rise planning collaboration and identified approaches for successful outreach and education campaigns. In March 2021, Caltrans staff were interviewed by planning students for a similar course at HSU.

An analysis of current hazards in the Corridor, including the collection of data provided in the Baseline and 2021 Annual Report and future Annual Reports, will provide documentation of water elevation changes over time and highlight any areas of frequent flooding or other coastal hazards. Caltrans is using this information to help identify vulnerabilities in the Corridor and inform upcoming project design and long-term sea level rise planning.

A timetable for implementation of the CAIP will continue to be developed as staff collect additional data, assess identified vulnerabilities, and consult with technical experts throughout the Department. As sea level rise projections are updated based on best available science, the timetable will be modified.

B.5. Flood Events

No flooding or road closure events occurred during the reporting period.

C. Frequent Flood Event Report

The roadway was not closed during the reporting period; therefore no Frequent Flood Event Report is included with this Annual Report..

References

California Department of Transportation (Caltrans). 2019. *Caltrans Eureka-Arcata Corridor: Sea Level Rise Vulnerabilities and Adaptation Solutions*. May 2019.

Observed Weather Reports (April 2020 and 2021). In *National Weather Service*. Retrieved from https://w2.weather.gov/climate/index.php?wfo=eka

Water Level Reports (April 2020 and 2021). In *NOAA Tides and Currents*. Retrieved from https://tidesandcurrents.noaa.gov/reports.html?id=9418767

Appendix A

NOAA Tides and Current Data and NWS Climate Data

NOAA Tides and Currents Data

Apr 30 2021 16:53 GMT

MAXIMUM, MINIMUM WATER LEVEL DATA
National Ocean Service (NOAA)

Station: 9418767 T.M.: 0 W
Name: North Spit, CA Units: Feet
Type: Mixed Datum: NAVD
Note: [] Inferred Water Level Value Quality: Verified

2020	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	3.95	3.51	3.75	3.57	3.73	3.62	3.76	3.88	4.05	3.85	3.69	3.73	
Maximum	8.10	7.82	7.82	8.02	8.13	8.19	7.99	7.71	7.97	8.10	8.65	8.57	
Max Day	21	8	13	10	9	5	22	19	20	18	16	13	
Max Time	16:36	18:30	10:12	08:54	08:18	06:24	07:54	07:06	21:36	20:18	19:36	17:54	
Minimum	-1.83	-2.05	-1.11	-1.10	-1.66	-1.85	-1.72	-1.26	-0.32	-1.35	-1.88	-2.37	
Min Day	12	10	10	10	8	7	5	3	16	20	16	16	
Min Time	02:42	02:06	01:42	15:24	14:18	14:48	13:48	13:30	12:42	03:54	01:54	02:24	

2021	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	4.00	3.54	3.45										
Maximum	8.65	7.92	7.32										
Max Day	12	11	4										
Max Time	18:36	19:06	11:12										
Minimum	-1.84	-1.70	-1.13										
Min Day	14	28	1										
Min Time	02:18	02:00	02:36										

*The monthly max/min report information is based on high/low tides only.

Apr 22 2021 18:09 GMT

MAXIMUM, MINIMUM WATER LEVEL DATA
National Ocean Service (NOAA)

Station: 9418767
T.M.: 0 W
Name: North Spit, CA
Units: Feet
Type: Mixed
Datum: NAVD
Note: [] Inferred Water Level Value
Quality: Verified

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	4.25	4.26	4.03	3.70	3.79	3.58	3.66	3.80	3.95	3.75	3.99	4.33	
Maximum	9.09	8.48	7.92	7.70	8.38	7.67	7.95	8.14	7.82	7.95	8.64	8.86	
Max Day	20	3	25	20	19	16	31	1	30	29	27	25	
Max Time	18:24	18:24	10:42	07:48	07:24	06:12	05:54	06:48	20:36	20:06	19:24	18:24	
Minimum	-2.09	-1.97	-0.58	-1.32	-0.99	-1.75	-1.93	-1.76	-0.54	-1.31	-1.36	-1.24	
Min Day	23	20	18	21	20	5	5	2	1	31	26	27	
Min Time	02:48	01:48	23:54	15:00	14:48	15:00	15:30	14:30	14:54	03:24	01:00	02:18	

2020	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	3.95	3.51	3.75	3.57	3.73	3.62	3.76	3.88	4.05	3.85	3.69	3.73	
Maximum	8.10	7.82	7.82	8.02	8.13	8.19	7.99	7.71	7.97	8.10	8.65	8.57	
Max Day	21	8	13	10	9	5	22	19	20	18	16	13	
Max Time	16:36	18:30	10:12	08:54	08:18	06:24	07:54	07:06	21:36	20:18	19:36	17:54	
Minimum	-1.83	-2.05	-1.11	-1.10	-1.66	-1.85	-1.72	-1.26	-0.32	-1.35	-1.88	-2.37	
Min Day	12	10	10	10	8	7	5	3	16	20	16	16	
Min Time	02:42	02:06	01:42	15:24	14:18	14:48	13:48	13:30	12:42	03:54	01:54	02:24	

*The monthly max/min report information is based on high/low tides only.

National Weather Service Daily Climate Data for Eureka

000
CXUS56 KEKA 050032
CF6EKA

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

STATION: EUREKA CA
MONTH: DECEMBER
YEAR: 2020
LATITUDE: 40 47 N
LONGITUDE: 124 10 W

	TEMPERATURE IN F:						:PCPN:		SNOW:	WIND	:SUNSHINE:		SKY	:PK WND			
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
														12Z	AVG	MX	2MIN	
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
1	53	39	46	-3	19	0	0.00	0.0	0	0.9	5	340	M	M	5	18	5	M
2	52	35	44	-4	21	0	0.00	0.0	0	0.8	5	270	M	M	5	18	5	M
3	53	42	48	0	17	0	0.00	0.0	0	1.3	5	310	M	M	7	2	5	M
4	57	39	48	0	17	0	0.00	0.0	0	1.5	5	290	M	M	4	28	6	M
5	63	38	51	3	14	0	0.11	0.0	0	3.5	14	180	M	M	8	2	14	M
6	55	38	47	-1	18	0	0.00	0.0	0	2.7	9	360	M	M	1	2	14	M
7	59	37	48	0	17	0	0.00	0.0	0	3.3	9	30	M	M	4	28	9	M
8	57	37	47	-1	18	0	0.00	0.0	0	2.0	6	340	M	M	5	18	9	M
9	55	40	48	0	17	0	0.03	0.0	0	4.1	12	20	M	M	8	28	15	M
10	54	35	45	-3	20	0	0.00	0.0	0	3.3	8	260	M	M	6	1	8	M
11	47	38	43	-5	22	0	0.14	0.0	0	3.1	8	140	M	M	10	1	8	M
12	57	45	51	3	14	0	0.04	0.0	0	2.8	9	18	M	M	10	1	16	M
13	57	43	50	2	15	0	0.73	0.0	0	4.2	10	23	M	M	10		16	M
14	53	37	45	-3	20	0	T	0.0	0	0.9	6	320	M	M	4	18	6	M
15	55	40	48	0	17	0	0.15	0.0	0	2.5	9	12	M	M	10	2	12	M
16	60	43	52	4	13	0	0.87	0.0	0	5.8	12	M	M	M	10	2	20	M
17	53	38	46	-2	19	0	0.10	0.0	0	6.8	14	340	M	M	4	18	17	M
18	54	34	44	-4	21	0	0.00	0.0	0	1.7	9	300	M	M	4	1	9	M
19	60	45	53	5	12	0	0.12	0.0	0	2.3	7	280	M	M	9	18	7	M
20	63	50	57	9	8	0	0.01	0.0	0	1.8	8	320	M	M	7	1	8	M
21	60	43	52	4	13	0	0.43	0.0	0	3.8	13	300	M	M	8	1	25	M
22	51	36	44	-4	21	0	0.00	0.0	0	3.5	13	10	M	M	1		23	M
23	58	31	45	-3	20	0	0.00	0.0	0	1.3	6	300	M	M	0	8	6	M
24	62	33	48	0	17	0	0.00	0.0	0	5.8	14	170	M	M	9		25	M
25	60	49	55	7	10	0	0.60	0.0	0	11.3	17	180	M	M	9		39	M
26	56	40	48	0	17	0	0.11	0.0	0	4.8	12	240	M	M	4		18	M
27	54	35	45	-3	20	0	0.00	0.0	0	1.9	7	50	M	M	3	1	7	M
28	52	33	43	-5	22	0	0.00	0.0	0	2.0	6	330	M	M	0	8	7	M
29	53	32	43	-5	22	0	0.00	0.0	0	2.0	7	330	M	M	4		8	M
30	53	38	46	-2	19	0	0.50	M	M	5.4	17	180	M	M	10		20	M
31	55	43	49	1	16	0	0.02	0.0	0	1.7	7	320	M	M	7	18	8	M
SM	1731	1206		536	0	3.96	0.0	98.8	M	186								

398
CXUS56 KEKA 022021
CF6EKA

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

STATION: EUREKA CA
MONTH: JANUARY
YEAR: 2021
LATITUDE: 40 47 N
LONGITUDE: 124 10 W

TEMPERATURE IN F:							:PCPN:		SNOW:		WIND :SUNSHINE:			SKY	:PK WND		
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
												12Z		AVG MX 2MIN				
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
1	59	41	50	2	15	0	0.43	0.0	0	3.4	10	180	M	M	9	1	18	M
2	57	42	50	2	15	0	0.07	0.0	0	5.3	11	180	M	M	10	1	14	M
3	60	51	56	8	9	0	0.06	0.0	0	9.0	17	160	M	M	10		31	M
4	58	41	50	2	15	0	0.53	0.0	0	8.2	16	180	M	M	9	1	38	180
5	59	37	48	0	17	0	0.00	0.0	0	3.0	10	300	M	M	7		14	M
6	57	41	49	1	16	0	0.41	0.0	0	7.3	16	190	M	M	9		28	M
7	57	38	48	0	17	0	0.17	0.0	0	6.3	18	170	M	M	9	1	25	M
8	56	41	49	1	16	0	0.05	0.0	0	2.8	7	360	M	M	4	1	M	M
9	59	36	48	0	17	0	0.07	0.0	0	4.5	10	180	M	M	4		14	M
10	55	47	51	3	14	0	0.14	0.0	0	2.7	9	280	M	M	10	1	16	280
11	62	42	52	4	13	0	T	0.0	0	5.0	14	200	M	M	7	1	19	M
12	61	55	58	10	7	0	0.81	0.0	0	11.5	16	180	M	M	10		22	M
13	60	51	56	8	9	0	0.30	0.0	0	2.7	10	170	M	M	10	28	18	M
14	61	42	52	4	13	0	0.00	0.0	0	2.8	9	280	M	M	4	2	10	M
15	56	47	52	4	13	0	T	0.0	0	0.0	7	50	M	M	9	18	7	M
16	50	46	48	0	17	0	0.00	0.0	0	1.6	6	290	M	M	10	2	7	M
17	58	40	49	1	16	0	0.00	0.0	0	3.2	14	10	M	M	5	2	25	M
18	58	40	49	0	16	0	0.00	0.0	0	6.2	17	20	M	M	0	8	25	M
19	60	35	48	-1	17	0	0.00	0.0	0	4.0	14	340	M	M	2	8	16	M
20	59	33	46	-3	19	0	0.00	0.0	0	2.0	6	330	M	M	3		7	M
21	54	38	46	-3	19	0	0.29	0.0	0	3.5	12	310	M	M	7		15	M
22	52	42	47	-2	18	0	0.17	0.0	0	8.5	16	360	M	M	9		23	M
23	52	35	44	-5	21	0	0.00	0.0	0	5.4	17	10	M	M	1		24	M
24	46	39	43	-6	22	0	0.42	0.0	0	5.6	16	340	M	M	10		41	350
25	48	33	41	-8	24	0	0.13	0.0	0	2.8	9	50	M	M	6		15	M
26	44	31	38	-11	27	0	0.79	0.0	0	11.0	21	170	M	M	10		49	170
27	49	40	45	-4	20	0	1.51	0.0	0	7.0	12	160	M	M	10	3	20	M
28	51	36	44	-5	21	0	0.54	0.0	0	3.7	10	170	M	M	7	1	14	M
29	52	32	42	-7	23	0	0.01	0.0	0	4.6	12	260	M	M	7	1	14	0
30	57	46	52	3	13	0	0.02	0.0	0	13.0	18	170	M	M	9		30	0
31	58	51	55	6	10	0	0.18	0.0	0	12.8	20	160	M	M	10		35	0
SM	1725	1269		509	0	7.10		0.0		169.4		M	227					

Note: An "M" in any column means the data are Missing for that element.

Column		
1	**DY**	The **day** of the month.
2	**MAX**	The **highest** temperature for the day in degrees Fahrenheit (F).
3	**MIN**	The **lowest** temperature for the day in degrees Fahrenheit (F).
4	**AVG**	The **average** temperature for the day, computed by finding the average of the values in columns 2 and 3, then rounding (if necessary). Example; 55.5 rounds up to 56, 55.4 rounds down to 55 degrees.
5	**DEP**	**Departure** from normal. The difference between column 4 and the 30 year normal temperature for this date. A minus (-) is number of degrees below normal. A zero (0) indicates that the average for that day was the Normal.
6a & 6b	**HDD & CDD**	**Degree Day:** A gauge of the amount of heating or cooling needed for a building using 65 degrees as a baseline. To compute heating/cooling degree-days, take the average temperature for a day and subtract the reference temperature of 65 degrees. If the difference is positive, it is called a "**Cooling Degree Day**". If the difference is negative, it is called a "**Heating Degree Day**". The magnitude of the difference is the number of days. For example, if your average temperature for a day is 50 degrees in September, the difference of the average temperature for that day and the reference temperature of 65 degrees would yield a minus 15. Therefore, you have 15 Heating Degree Days that day. If the average temperature is 77 degrees for a day, you would have 12 Cooling Degree Days (77-65). If the average temperature for the day is 65 degrees, there are no Heating or Cooling degree days. Electrical, natural gas, power, and heating, and air conditioning industries utilize heating and cooling degree information to calculate their energy needs. The Heating season runs from July 1st through June 30th. The Cooling season runs from Jan 1st through Dec 31st.
7	**WTR**	Total **precipitation** for the day to the nearest hundredth of an inch. This includes all forms of precipitation, both liquid and water equivalent of any snow or ice that occurred (T = Trace, some precipitation fell but not enough to measure).
8	**SNW**	Total **snowfall** for the day to the nearest tenth of an inch.
9	**DPTH**	Snow **depth** on the ground to the nearest inch at 1200UTC. 7am EST., 6am CST, 5am MST, 4am PST, 3am AST, etc.
10	**AVG SPD**	**Average wind speed** for the day in miles per hour (mph).
11	**MX SPD**	The **highest wind speed** in mph averaged over a 2 minute period.

12	**2MIN DIR**	The **direction** (in compass degrees divided by 10) from which the wind speed in column 11 came from. (N=36 S=18 W=27 E=09, etc.)
13	**MIN**	The number of **minutes** of sunshine received at the station. Not reported at all locations.
14	**PSBL**	The percentage of **possible** sunshine. Computed by dividing the minutes of sunshine in column 13 by the total possible minutes. Not reported at all locations.
15	**S-S**	The average sky cover between sunrise and sunset in tenths of sky covered. The minimum of "0" means no clouds observed, "10" means clouds covered the entire sky for that day.
16	**WX**	A coded number representing certain types of **weather** observed during the day. 1 = Fog 2 = Fog reducing visibility to 1/4 mile or less 3 = Thunder 4 = Ice pellets 5 = Hail 6 = Glaze or rime 7 = Blowing dust or sand: visibility 1/2 mile or less 8 = Smoke or haze 9 = Blowing snow X = Tornado In the example above on the 12th, you see "138" coded for the day. That means Fog, Thunder and Smoke or Haze were observed at some time during that day.
17	**SPD**	Peak wind **speed** for the day in mph. The highest wind speed observed at the station.
18	**DR**	The compass **direction** from which the peak wind speed came.

Appendix B

Photo Documentation Locations

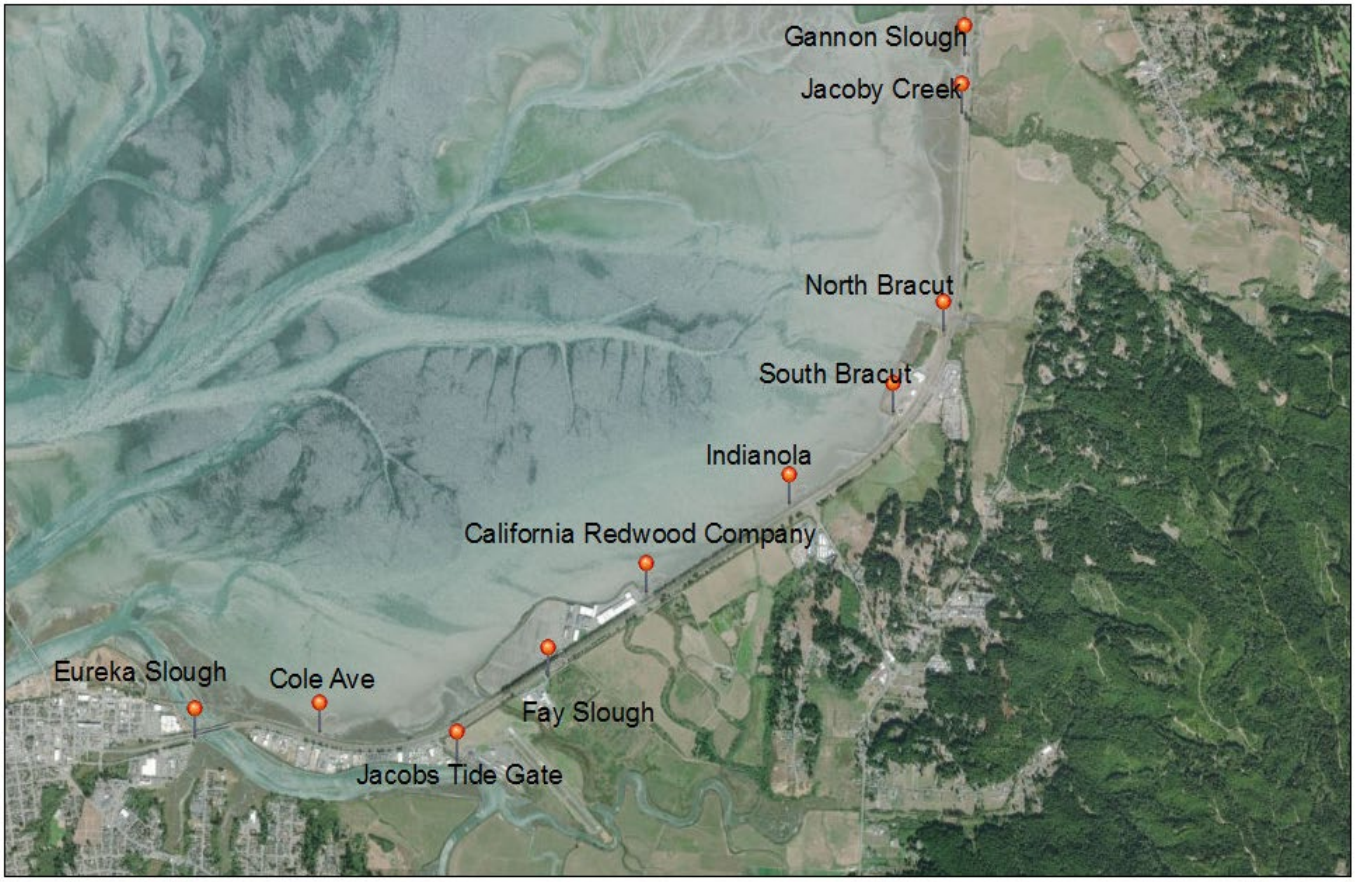


Figure 1 ***Reference Photograph Locations*** *for documenting King Tides and extreme weather events along the Eureka-Arcata 101 Corridor.*

Table 1 ***Location Selection Criteria***

	Accessibility and Safety	**Vulnerability to Flooding**	**Shoreline Cover**	**Adjacent Land Use / Zoning**
Gannon Slough	Good, *Bay Trail*	moderate-high	Salt marsh, slough channel	Trail/Natural Resources (NR)
Jacoby Creek	Good, *Bay Trail*	moderate-high	Salt marsh, creek channel	Trail/NR
North Bracut	Fair, *behind Bayside Garden Supply*	moderate-high	Bracut dike, railroad grade, vegetation	Businesses/NR and Industrial General
South Bracut	Fair, *near California Trailers*	moderate	Bracut dike, railroad grade, salt marsh	Businesses/NR and Industrial General
Indianola	Caution, *shoulder*	moderate	Railroad grade, rock, exposed with areas of erosion	Future Trail/NR
California Redwood Company	Fair, *entrance to CRC*	moderate-high	Railroad grade, salt marsh, rock, CRC levee to the south	Future Trail/ NR, Industrial General
Jacobs Tide Gate	Fair, *Airport Rd*	low-moderate	Jacobs Ave south side levee, rock protection	Businesses/Service Commercial
Eureka Slough	Good, *Eureka Waterfront Trail*	high	Bank of Eureka Slough, rock, vegetation	Trail/Service Commercial/NR
Cole Ave	Caution, *shoulder*	high	Railroad grade, rock, erosion bound by salt marsh to north and south	Future Trail/NR
Fay Slough	Fair, *CDFW parking lot*, *shoulder*	subject to inland flooding from Fay Slough	Roadside ditch paralleling Highway 101 north	Businesses/Service Commercial/ Coastal Agricultural

Appendix C

Photo Documentation

King Tide and Extreme Tidal Event Photo Documentation

Reference Photos

December 23, 2019:

Gannon Slough, Jacoby Creek, North Bracut, South Bracut, Indianola, California Redwood Company, Jacobs Tide Gate, Eureka Slough, and Cole Ave

January 10, 2020:

Fay Slough

2020 Annual Report, Winter 2019/2020 King Tide Photos

January 10 and 11, 2020:

All locations

February 8, 2020:

All locations

2021 Annual Report, Winter 2020/21 King Tide Photos

December 14, 2020:

All locations

January 12, 2021:

All locations

Gannon Slough Photos

Gannon Slough South Reference

Gannon Slough South 2020 Annual Report

1/10/20

1/11/20

2/8/20

Gannon Slough South 2021 Annual Report

12/14/20

1/12/21

Gannon Slough North Reference

Gannon Slough North 2020 Annual Report

1/10/20

1/11/20

2/8/20

Gannon Slough North 2021 Annual Report

12/14/20

1/12/21

Gannon Slough Bay Reference

Gannon Slough Bay 2020 Annual Report

1/10/20

1/11/20

2/8/20

Gannon Slough Bay 2021 Annual Report

12/14/20

1/12/21

Jacoby Creek Photos

Jacoby Creek Left Reference

Jacoby Creek Left 2020 Annual Report

1/10/20

1/11/20

2/8/20

Jacoby Creek Left 2021 Annual Report

12/14/20

1/12/21

Jacoby Creek Right Reference

Jacoby Creek Right 2020 Annual Report

1/10/20

1/11/20

2/8/20

Jacoby Creek Right 2021 Annual Report

12/14/20

1/12/21

Jacoby Creek RR Reference

Jacoby Creek RR 2020 Annual Report

1/10/20

1/11/20

2/8/20

Jacoby Creek RR 2021 Annual Report

12/14/20

1/12/21

Jacoby Creek Bay Reference

Jacoby Creek Bay 2020 Annual Report

1/10/20

1/11/20

2/8/20

Jacoby Creek Bay 2021 Annual Report

12/14/20

North Bracut Photos

North Bracut Full Reference

North Bracut Full 2020 Annual Report

1/10/20

1/11/20

2/8/20

North Bracut Full 2021 Annual Report

12/14/20

1/12/21

North Bracut Zoom Reference

North Bracut Zoom 2020 Annual Report

1/10/20

1/11/20

2/8/20

North Bracut Zoom 2021 Annual Report

12/14/20

1/12/21

South Bracut Photos

South Bracut Full Reference

South Bracut Full 2020 Annual Report

1/10/20

1/11/20

2/8/20

South Bracut Full 2021 Annual Report

12/14/20

1/12/21

South Bracut Zoom Reference

South Bracut Zoom 2020 Annual Report

1/10/20

1/11/20

2/8/20

South Bracut Zoom 2021 Annual Report

12/14/20

1/12/21

Indianola Photos

Indianola North Reference

Indianola North 2020 Annual Report

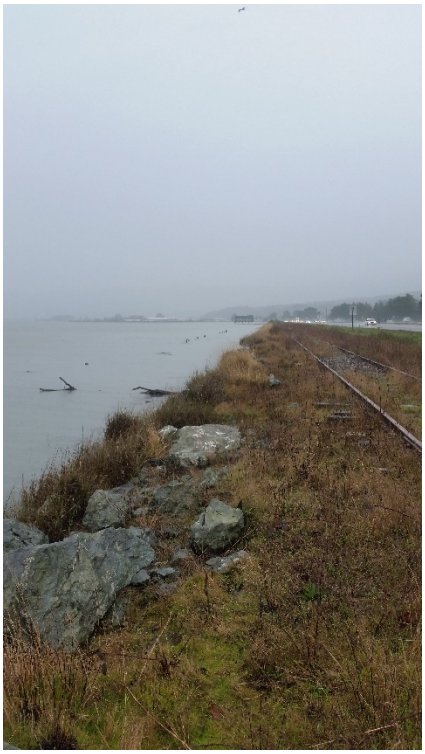
1/10/20

1/11/20

2/8/20

Indianola North 2021 Annual Report

12/14/20



1/12/21

California Redwood Company Photos

Tree trimming work taking place near the photo sites for the California Redwood company on February 8, 2020 prevented Caltrans staff from being able to safely access the site for photo documentation.

CRC Full Reference

CRC Full 2020 Annual Report

1/10/20

1/11/20

CRC Full 2021 Annual Report

12/14/20

1/12/21

CRC Zoom Reference

CRC Zoom 2020 Annual Report

1/10/20

1/11/20

CRC Zoom 2021 Annual Report

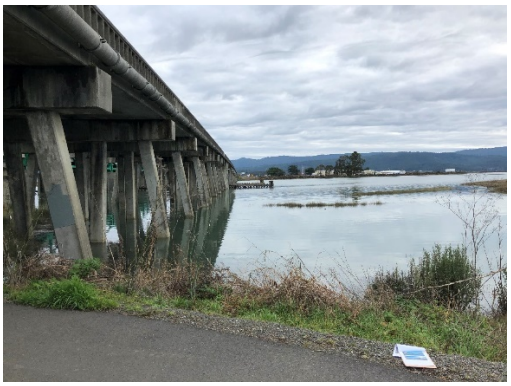
12/14/20

1/12/21

Eureka Slough Photos

Eureka Slough Zoom Reference

Eureka Slough Zoom 2020 Annual Report



1/10/20

1/11/20

2/8/20

Eureka Slough Zoom 2021 Annual Report

12/14/20

1/12/21

Jacobs Tide Gate Photos

Jacobs Tide Gate East Zoom Reference

Jacobs Tide Gate East Zoom 2020 Annual Report

1/10/20

1/11/20

2/8/20

Jacobs Tide Gate East Zoom 2021 Annual report

12/14/20

1/12/21

Jacobs Tide Gate East Reference

Jacobs Tide Gate East 2020 Annual Report

1/10/20

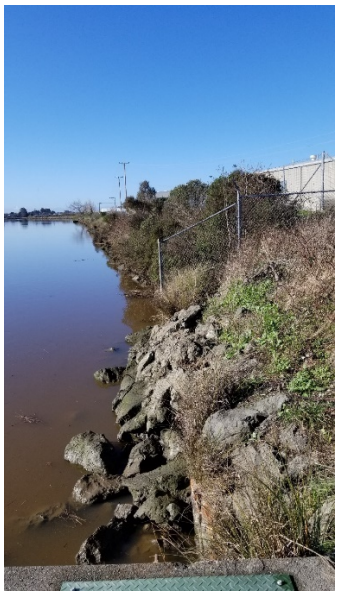
1/11/20

2/8/20

Jacobs Tide Gate East 2021 Annual Report

1/12/21

Jacobs Tide Gate West Reference



Jacobs Tide Gate West 2020 Annual Report

1/10/20

1/11/20

2/8/20

Jacobs Tide Gate West 2021 Annual Report

12/14/20

1/12/21

Cole Ave Photos

Cole Ave North Reference

Cole Ave North 2020 Annual Report

1/10/20

1/11/20

2/8/20

Cole Ave North 2021 Annual Report

12/14/20

1/12/21

Cole Ave South Reference

Cole Ave South 2020 Annual Report

1/10/20

1/11/20

2/8/20

Cole Ave South 2021 Annual Report

12/14/20

1/12/21

Fay Slough Photos

Fay Slough Mid City South Reference

Fay Slough Mid City South 2020 Annual Report

1/10/20

1/11/20

2/8/20

Fay Slough Mid City South 2021 Annual Report

12/14/20

Fay Slough North Reference

Fay Slough North 2020 Annual Report

1/11/20

2/8/20

Fay Slough North 2021 Annual Report

12/14/20

Miscellaneous 2021 Annual Report Photos

Jacoby Creek Railroad Bridge 1/12/21

Eureka Slough Bridge Boat Ramp 1/12/21

Indianola South 12/14/20

Indianola North Railroad Erosion 1/12/21