DEPARTMENT OF TRANSPORTATION

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Making Conservation a California Way of Life.

May 10, 2022

California Coastal Commission
1385 Eighth Street, Ste. 130
Arcata, CA 9552

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, 2022 Annual Report

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

Coastal Development Permit (CDP) 1-18-1078 was issued by the California Coastal Commission to the California Department of Transportation 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 2022 Annual Report references the Baseline Report, which was submitted to California Coastal Commission staff on May 1, 2020, and the 2021 Annual Report submitted on May 1, 2021.

The Baseline Report and the 2021 Annual Report identify existing water elevation conditions in Humboldt Bay from the North Spit Tide Gauge, which provides data applicable to the Corridor. The Baseline Report (April 1, 2019, through March 31, 2020) and the 2021 Annual Report (April 1, 2020, through March 31, 2021) is referenced in the 2022 Annual Report to identify changes in water elevation conditions over time. 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 and photographs of King Tide events from winter 2019/2020, winter 2020/2021, and winter 2021/2022 are included in Appendix C of the 2022 Annual Report.

Annual Reports also document any closures due to flooding and include a brief discussion of any coastal hazards impacts to highway infrastructure along the Corridor during the reporting period. No flooding or coastal hazards impacted the highway during the 2022 reporting period. The 2022 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.

If you have questions or need additional information, please contact Felicia Zimmerman at **Felicia.Zimmerman@dot.ca.gov** or (707) 815-5994.

Sincerely,

Jason Meyer
Senior Environmental Planner

Attachment: Sea Level Rise and Flooding Impact Monitoring Report 2022

A. Baseline Report

A.1. Water Elevation

The Baseline Report was provided to the California Coastal Commission on May 1, 2020. Water elevation baseline data for the Baseline Report was accessed for the North Spit Tide Gauge from the National Oceanic and Atmospheric Administration (NOAA) website and referenced to NAVD88 (Appendix A). 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 mean monthly maximum water elevation for the baseline 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).

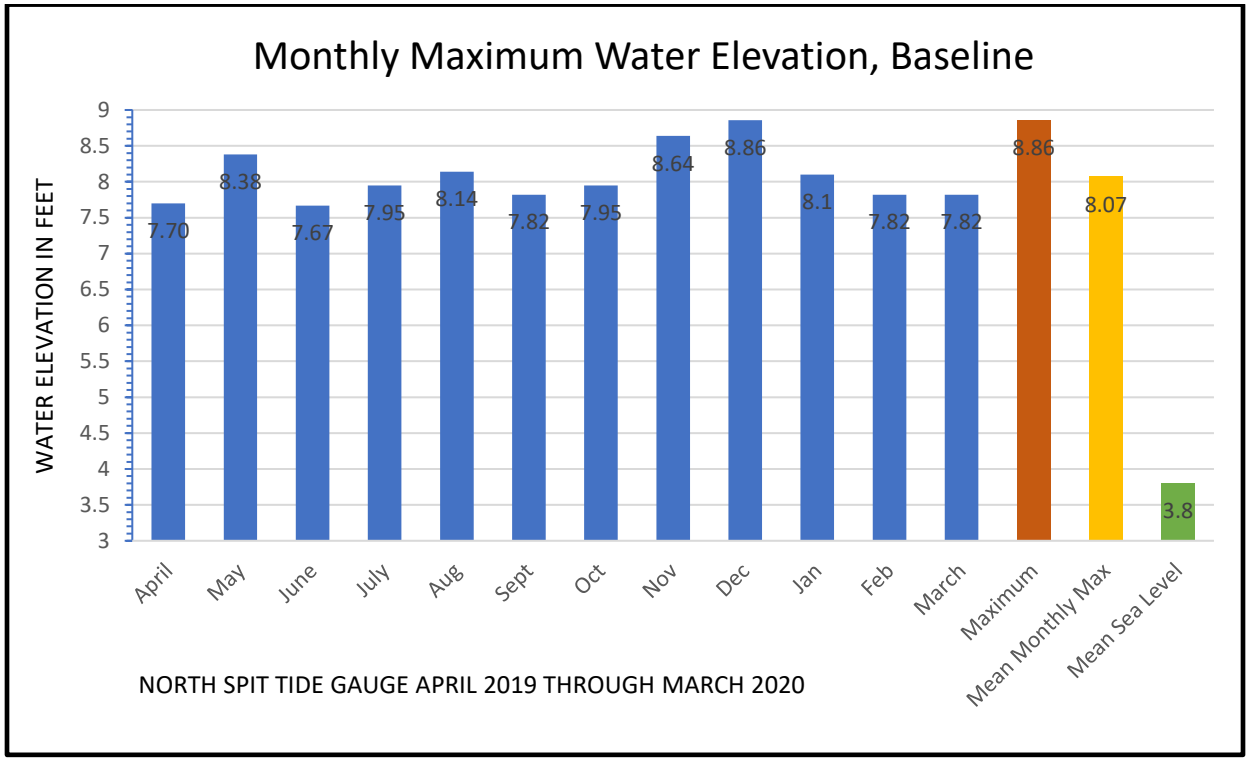

Figure 1. Monthly Maximum Water Elevation, Baseline shows the maximum water elevation by month at the North Spit Tide Gauge from April 1, 2019, to March 31, 2020. Monthly maximum and monthly mean sea level data were accessed from the NOAA Tides and Currents webpage. Mean Monthly Maximum and Mean Sea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

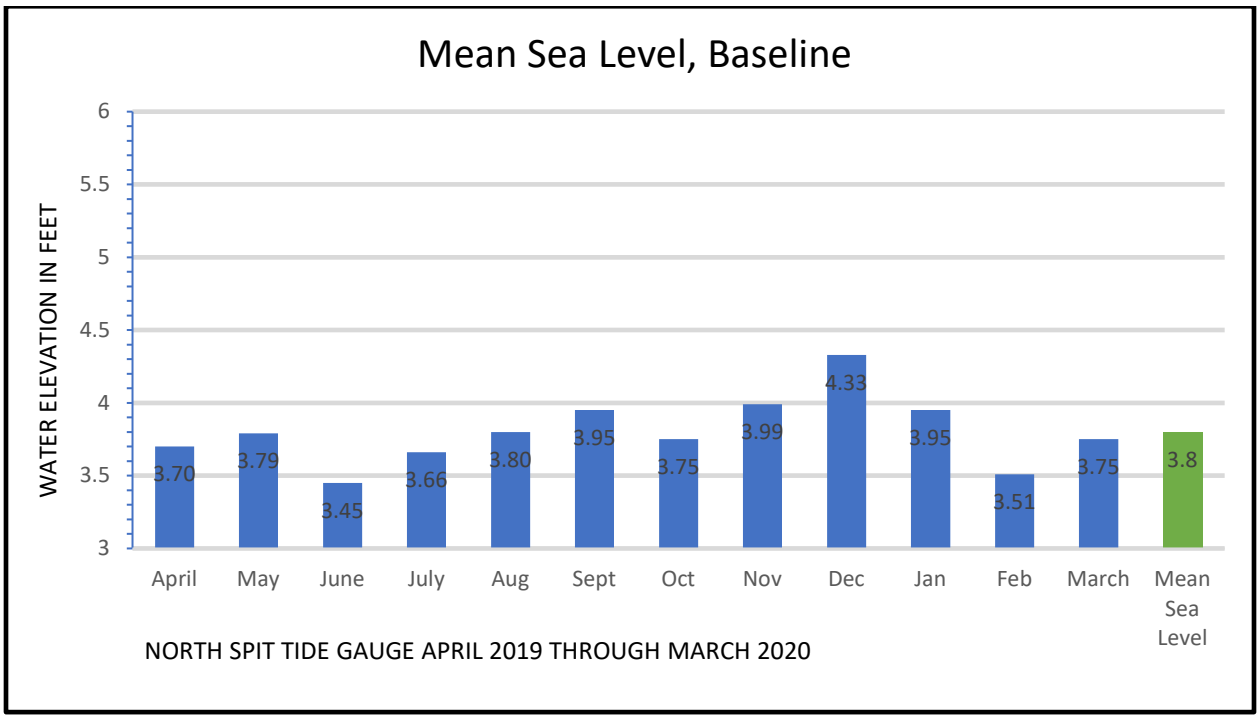

Figure 2. Mean Sea Level, Baseline at the North Spit Tide Gauge for April 1, 2019, through March 31, 2020, was calculated from available monthly mean sea levels from the NOAA Tides and Currents webpage.

A.2. Reference Photograph Locations

Reference locations for photographing annual King Tide and extreme tidal events along the Eureka-Arcata Corridor (Corridor) were established for the Baseline Report and were organized to easily facilitate replicating photos for the Annual Reports (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.

For each of the ten selected reference locations, two to four specific photo sites were established. 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 (NWS) Daily Climate Report 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. NWS reported cloudy weather conditions with an average wind speed of 4.6 miles per hour and minimal precipitation of 0.12 inch. Light precipitation of 0.28 inch was recorded for the previous day.

B. Annual Report 2022

B.1. Water Elevation

Water elevation data for the 2022 Annual Report for the North Spit Tide Gauge was accessed from the NOAA Tides and Currents website (NOAA, April 2022) and referenced to NAVD88 (Appendix A). The reporting period for the 2022 Annual Report was April 1, 2021, through March 31, 2022. Monthly maximum water elevations ranged from 7.26 feet to 9.38 feet (Figure 3). The highest reported water elevation of 9.38 feet was observed on January 3, 2022. This monthly maximum elevation is 0.73 feet higher than the monthly maximum elevation from the 2021 Annual Report and 0.52 feet higher than the monthly maximum elevation from the Baseline Report. The mean monthly maximum water elevation for the 2022 reporting period was 8.16 feet (Figure 3). This is 0.06 feet higher than the mean monthly maximum from the 2021 Annual Report and 0.09 feet higher than the mean monthly maximum from the Baseline Report (Figure 4).

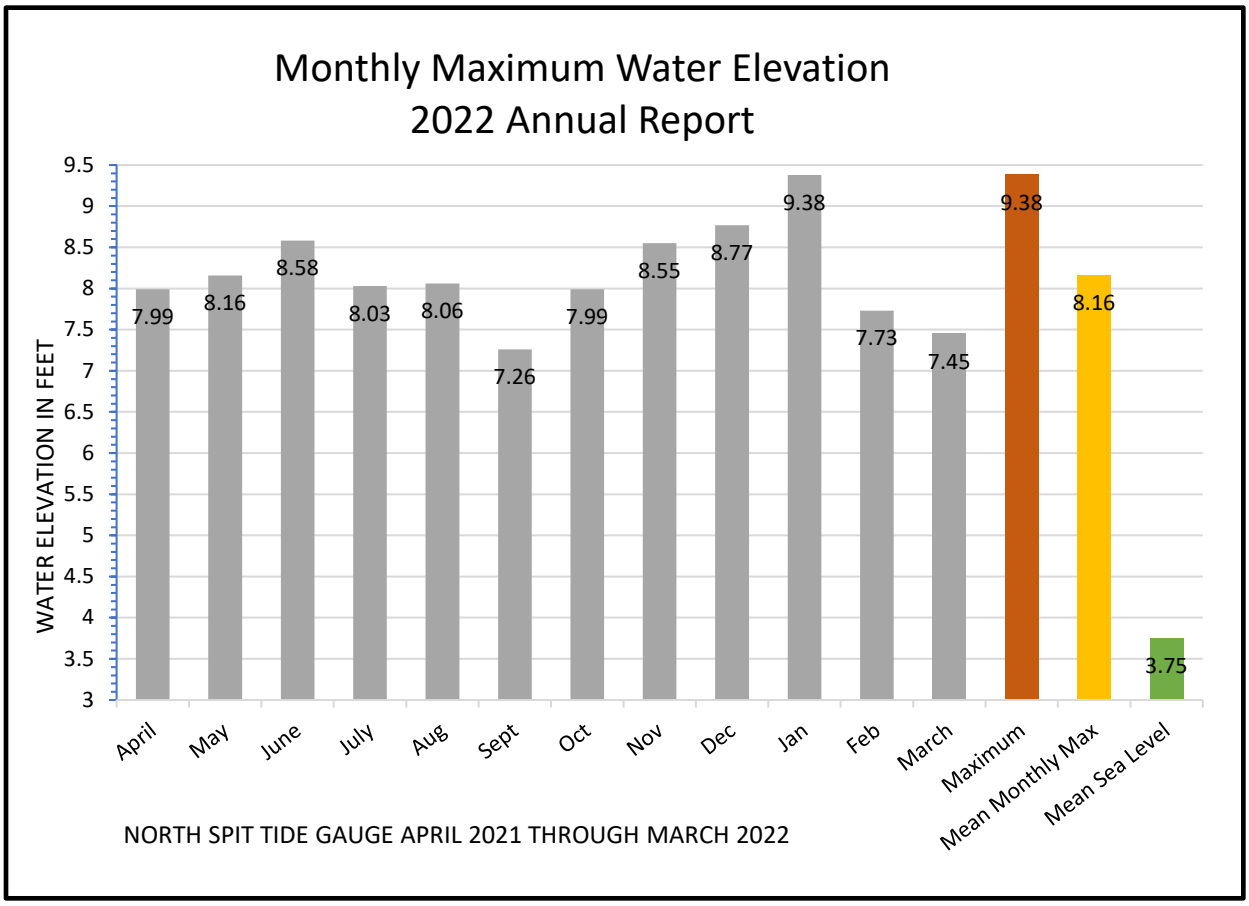

Figure 3. Monthly Maximum Water Elevation, 2022 Annual Report shows the maximum water elevation by month at the North Spit Tide Gauge from April 1, 2021, to March 31, 2022. Monthly maximum and monthly mean sea level data were accessed from the NOAA Tides and Currents webpage. Mean Monthly Maximum and Mean Sea Level were calculated using the NOAA data.

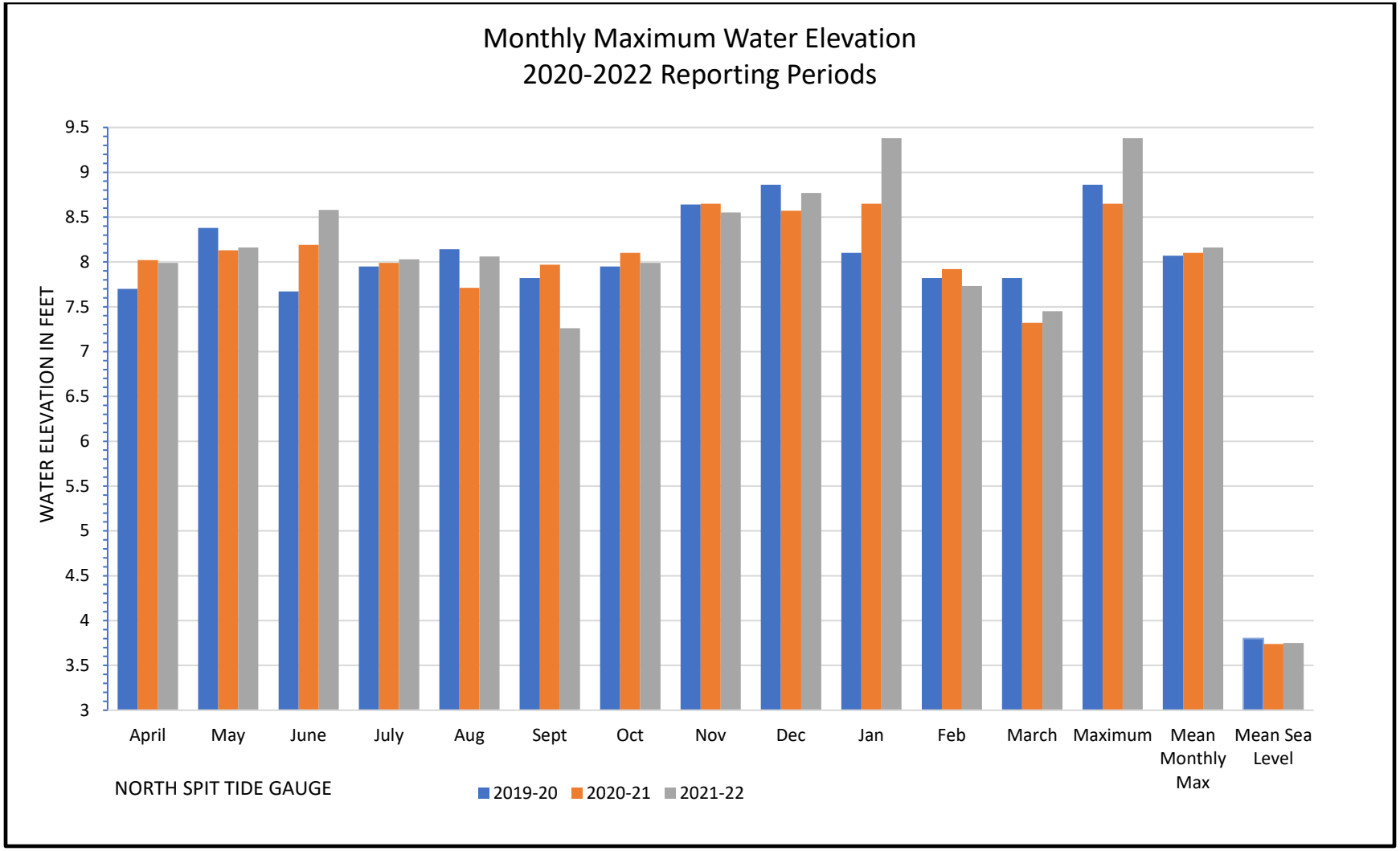

Figure 1. **Monthly Maximum Water Elevation 2020-2022 reports the maximum water elevation by month at the North Spit Tide Gauge for the Baseline Report (April 1, 2019, to March 31, 2020), the 2021 Annual Report (April 1, 2020, through March 31, 2021), and the 2022 Annual Report (April 1, 2021, through March 31, 2022). The maximum water elevation, mean monthly maximum, and mean sea level for the three reporting periods is also represented in the figure.**

B. Annual Report 2022 (continued)

B.1. Water Elevation (continued)

Monthly mean sea level for the 2022 reporting period ranged from 3.40 feet to 4.18 feet. Mean sea level for the 2022 Annual Report is 3.75 feet (Figure 5). The mean sea level for the 2021 reporting period was 0.01 feet lower at 3.74 feet. The Baseline Report mean sea level was 3.80 feet; 0.05 feet higher than the 2022 Annual Report (Figure 6).

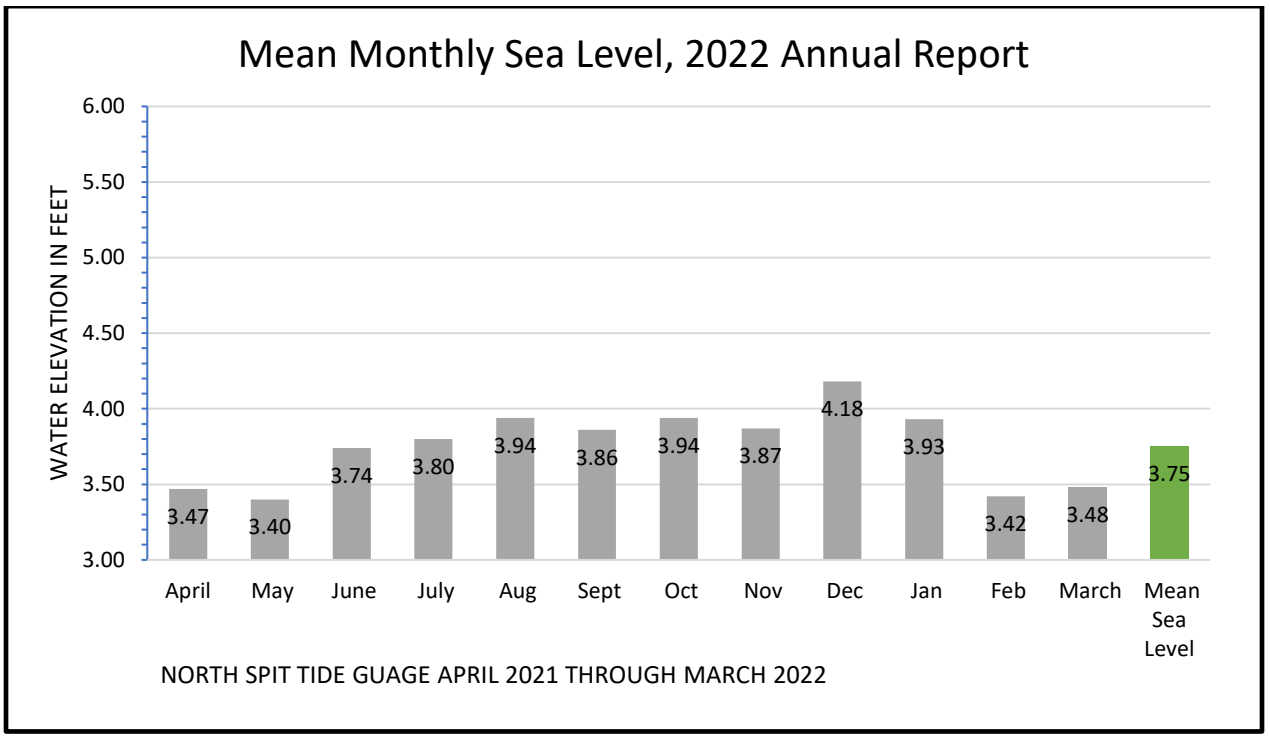

Figure 5. Mean Sea Level at the North Spit Tide Gauge for April 1, 2021, through March 31, 2022, was calculated from available monthly sea level means from the NOAA Tides and Currents webpage.

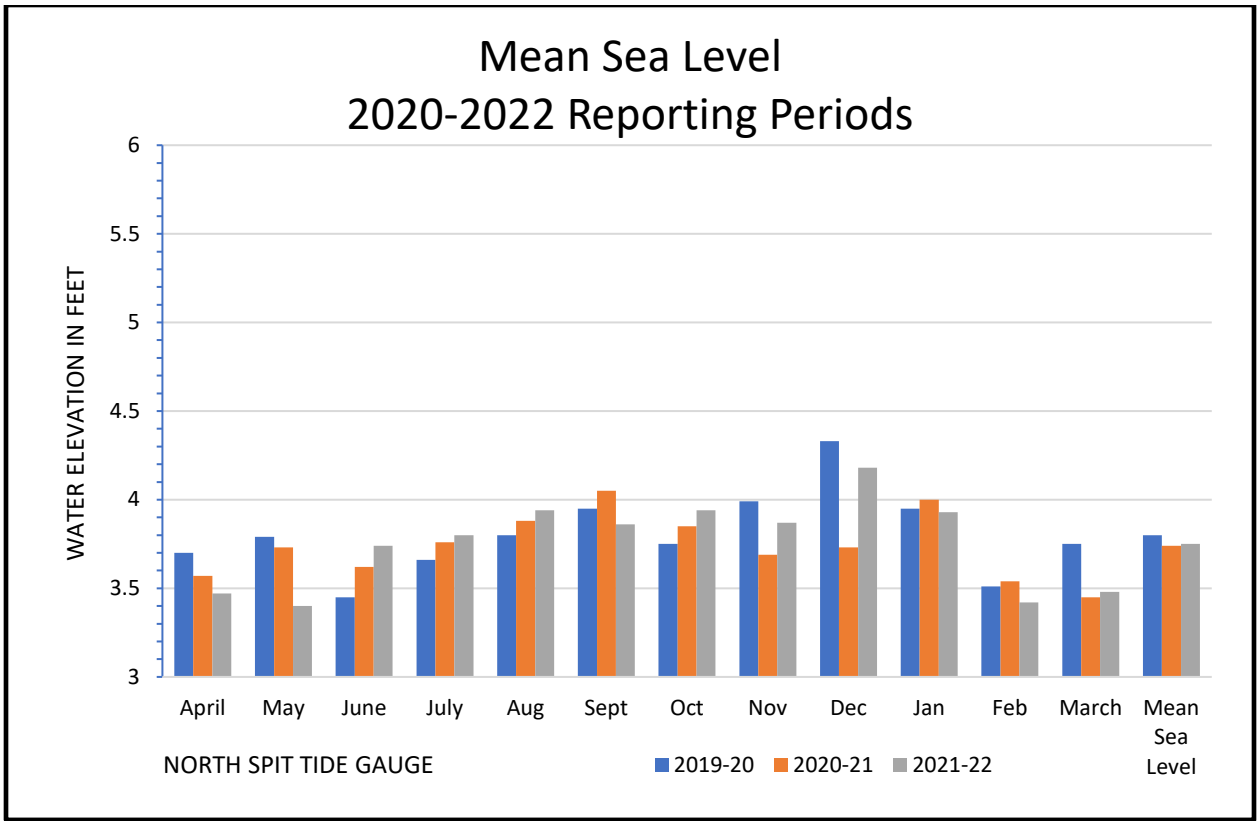

Figure 6. Mean Sea Level for the Baseline Report (2020) through 2022 Annual Report at the North Spit Tide Gauge. The Baseline Report shows monthly mean sea levels from April 1, 2019, through March 31, 2020. The 2021 and 2022 Annual Reports show mean sea levels for April 1, 2020, to March 31, 2021, and April 1, 2021, to March 31, 2022, respectively. Mean sea level was calculated from available monthly sea level data from the NOAA Tides and Currents webpage.

B.2. Coastal Hazard Impacts

No impacts to highway infrastructure within the U.S. Highway 101 Corridor occurred during the 2022 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. Minor erosion impacted the railroad levee, which allowed bay water to flow into the roadside ditch adjacent to U.S. 101 near post mile 82.1. Photos of the localized levee erosion are on pages 42 and 43 of Appendix C.

B.2. Coastal Hazard Impacts (continued)

King Tides for winter 2021/2022 took place December 4 and 5, 2021, and January 1, 2, and 3, 2022. Caltrans staff photographed King Tide conditions from established reference locations along the Corridor on December 4, 2021, and January 3, 2022 (Appendix C). Using the daily 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 water elevations for each day. Three Caltrans staff were scheduled three hours each per day to document the King Tides. Additionally, Caltrans utilized drones to capture video and pictures at the Eureka Slough location during the December 4, 2021, King Tides.

Weather on December 4, 2021, included fog and mostly cloudy conditions with an average wind speed of 2.0 miles per hour and 0.53 inch of precipitation for the day. Previous day precipitation was measured at 0.06 inch (Appendix A—National Weather Service Climate Data). Maximum December 4, 2021, high tide at the North Spit Tide Gauge was 8.65 feet (NOAA). Weather conditions on January 3, 2022, were cloudy with an average wind speed of 11.8 miles per hour and total precipitation of 0.64 inch for the day. No precipitation was recorded the previous day (NWS). Maximum high tide on January 3rd was 9.38 feet.

In addition to documenting King Tides at the established reference locations, Caltrans staff photographed any observed extreme conditions, locations of erosion, and subjects of interest 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 2021, Caltrans established the District 1 (D01) Climate Change Working Group (CCWG). The mission of the CCWG is to develop a strategy for addressing climate change from long-range planning through maintenance. A goal of the CCWG is to lead on climate action planning through partnership, collaboration, and innovation. Specifically, the CCWG engages stakeholders and the public and prioritizes equity in planning and decision-making. Responsibilities and tasks include: (1) coordinate climate change activities across all functional units; (2) identify and provide support for implementation and updates of climate change adaptation policy and strategies; (3) provide review and assistance; (4) develop and implement outreach and education activities; and (5) provide and/or participate in training needs related to climate change.

Additionally, D01 has created a smaller working group—Sea Level Rise Technical Group—to address needs related to the CAIP for the Eureka-Arcata Corridor. The SLR Technical Group is currently developing the CAIP to include: (1) SLR analysis based on updated, best available science and monitoring reports; (2) evaluation of adaptation alternatives (accommodation, protection, and relocation) and their consistency with Coastal Act policies; (3) a timetable for

implementation; and (4) coordination with local governments, stakeholders, and public interest groups.

In 2022, the Eureka-Arcata Corridor Sea Level Rise Project was nominated for the Non-SHOPP- funded Project Initiation Document (PID) process. For major improvements proposed on the State Highway System, a PID is required to be developed and approved by Caltrans before it can be programmed and proceed to the next phase of project development—the Project Approval and Environmental Document (PA&ED) phase. The project would include, but is not limited to: (1) an incremental approach that is adaptable and scalable; (2) a fix-it-first approach for preserving service along this vital North Coast corridor that many communities rely on; (3) the project is a pro-active response to rising sea levels; (4) reduced risk of overtopping events, inundation and interrupted service along the corridor; and (5) provides more time for stakeholders and partners to collaborate with Caltrans to determine the best plan of action as projected sea levels continue to be evaluated.

It is likely the strategy will evolve over time as more information is gathered and analyzed. The options of retreat and accommodating sea level rise are still on the table. Living shorelines and other hybrid approaches will be evaluated during this process, and no hard armoring is proposed in this nomination. In April 2022, the project nomination was awarded because it met the following criteria: (1) alignment with the Climate Action Plan for Transportation Infrastructure (CAPI), the California Transportation Plan 2050, and Caltrans Strategic Management Plan; (2) addresses the priorities of State Agency partners, Caltrans and its Districts, and regional and local transportation agencies and stakeholders; (3) advances transformative, innovative, and multi-modal projects; and (4) meets eligibility requirements of potential Federal and State competitive programs. The target schedule for the $125 million project is as follows: (1) Planning: 2022-2024; (2) PA&ED: 2024-2027; (3) PS&E: 2027-2029; and (4) Construction: 2029-2031. There will be further refinement of the timeline and the process as Caltrans commences the project programming.

Caltrans District 1 staff continues to participate as a member in several groups related to climate change in the area, including Cal Poly Humboldt's Sea Level Rise Initiative, Humboldt County's Natural Shoreline Infrastructure Technical Working Group, and Humboldt Bay Initiative. District 1 staff worked with a consultant to develop a Public Engagement Plan (PEP), which resulted in four recorded presentations, including a well-attended public meeting workshop (Humboldt Sea Level Rise Public Forum: Caltrans D01, Eureka-Arcata Comprehensive Adaptation and Implementation Plan – 10/27/21 – Public Meeting Workshop) and presentations for Northern Arizona University's Institute for Tribal Environmental Professionals (ITEP) – Virtual Climate Change 101 Course and Pace University's School of Law – Environmental Skills and Practice.

Public engagement support services under the PEP contract were also used to develop a website. To enhance our efforts to add resiliency to the state highway system, we have launched the website *North Coast Climate Action*On this site the public will find information about planning and projects along the U.S. Highway 101 Corridor and in each of the four counties covered by District 1. We have also launched the video series, *Clancy's Climate Change Corner*, to provide the latest news and updates on projects and opportunities to get involved with the sea level rise planning process.

In anticipation of federal and state monies, District 1 staff are working with Caltrans HQ staff to develop a list of adaptation priorities (bridges, culverts, and roadways) based on the previously-completed *District 1 Adaptation Priorities Report* (2021). The Adaptation Reports included a prioritized list of potentially exposed assets in each Caltrans District. The prioritization methodology in these reports considers, amongst other things, 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.

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.

California Department of Transportation (Caltrans). 2019 *CDP 1-18-1078 Special Condition 1, Baseline and Annual Report.* May 2020.

California Department of Transportation (Caltrans). 2019 *CDP 1-18-1078 Special Condition 1, 2021 Annual Report.* May 2021.

Observed Weather Reports (April 21, 2022). In *National Weather Service*. Retrieved from https://forecast.weather.gov/product.php?site=EKA&issuedby=EKA&product=CF6&format=CI&version=6&glossary=0

Water Level Reports (April 21, 2022). In *NOAA Tides and Currents*. Retrieved from https://tidesandcurrents.noaa.gov/reports.html?type=monthlyextremes&bdate=20210421&edate=20220421&units=standard&datum=NAVD&id=9418767&retrieve=Retrieve

Appendix A

NOAA Tides and Current Data and NWS Climate Data

NOAA Tides and Currents Data

Apr 29 2022 20:03 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

2021	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	4.00	3.54	3.45	3.47	3.40	3.74	3.80	3.94	3.86	3.94	3.87	4.18	
Maximum	8.65	7.92	7.32	7.99	8.16	8.58	8.03	8.06	7.26	7.99	8.55	8.77	
Max Day	12	11	4	28	27	25	24	22	7	24	5	4	
Max Time	18:36	19:06	11:12	07:48	07:18	07:00	06:42	06:42	07:12	21:00	19:18	18:36	
Minimum	-1.84	-1.70	-1.13	-1.98	-2.41	-2.00	-1.92	-0.92	-0.30	-1.05	-1.75	-2.48	
Min Day	14	28	1	29	27	25	23	20	6	10	7	6	
Min Time	02:18	02:00	02:36	15:18	14:12	14:06	13:00	12:06	13:06	04:00	03:00	02:36	

2022	Jan	Feb	Mar	Annual
Mean	3.93	3.42	3.48	
Maximum	9.38	7.73	7.45	
Max Day	3	1	2	
Max Time	19:30	19:06	19:18	
Minimum	-2.03	-2.54	-1.50	
Min Day	2	2	2	
Min Time	00:48	02:12	01:06	

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

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	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 050127
CF6EKA

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

STATION: EUREKA CA
MONTH: JANUARY
YEAR: 2022
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	48	30	39	-8	26	0	0.00	0.0	0	0.8	5	20	M	M	5		6	M
2	52	32	42	-5	23	0	0.00	0.0	0	8.5	16	150	M	M	9		31	M
3	54	47	51	4	14	0	0.64	0.0	0	11.8	17	180	M	M	10		33	M
4	53	47	50	3	15	0	0.59	0.0	0	4.1	10	180	M	M	10		10	M
5	55	46	51	3	14	0	0.22	0.0	0	1.3	6	250	M	M	9	1	8	M
6	56	50	53	5	12	0	0.06	0.0	0	3.6	9	210	M	M	10	2	13	M
7	52	40	46	-2	19	0	0.27	0.0	0	5.3	12	180	M	M	9	1	16	M
8	51	35	43	-5	22	0	0.00	0.0	0	2.3	6	30	M	M	2	1	6	M
9	56	35	46	-2	19	0	0.00	0.0	0	2.4	7	270	M	M	1		7	M
10	60	44	52	4	13	0	T	0.0	0	1.9	6	320	M	M	7		8	M
11	58	41	50	2	15	0	0.00	0.0	0	1.5	7	260	M	M	8	18	9	M
12	60	39	50	2	15	0	0.00	0.0	0	3.7	10	270	M	M	4	1	11	M
13	56	43	50	2	15	0	0.07	0.0	0	3.6	7	350	M	M	7	1	9	M
14	54	40	47	-1	18	0	0.00	0.0	0	3.1	13	10	M	M	2	28	13	M
15	58	41	50	2	15	0	0.00	0.0	0	1.2	6	40	M	M	5	28	6	M
16	54	36	45	-3	20	0	0.00	0.0	0	1.0	6	320	M	M	6	1	7	M
17	51	40	46	-2	19	0	0.00	0.0	0	2.0	6	360	M	M	9	2	8	M
18	49	43	46	-2	19	0	0.00	0.0	0	2.3	9	300	M	M	10	1	9	M
19	53	42	48	0	17	0	0.00	0.0	0	1.3	9	290	M	M	8	2	9	M
20	56	46	51	3	14	0	T	0.0	0	5.5	12	360	M	M	6	18	20	M
21	55	40	48	0	17	0	0.00	0.0	0	4.1	12	20	M	M	6	1	14	M
22	71	37	54	6	11	0	0.00	0.0	0	3.8	10	10	M	M	1		14	M
23	63	39	51	3	14	0	0.00	0.0	0	2.5	7	280	M	M	0	8	10	M
24	58	36	47	-1	18	0	0.00	0.0	0	2.6	13	280	M	M	3		13	M
25	49	41	45	-3	20	0	0.00	0.0	0	1.8	5	310	M	M	9	2	6	M
26	50	37	44	-4	21	0	0.00	0.0	0	2.5	5	360	M	M	5	2	6	M
27	55	33	44	-4	21	0	0.00	0.0	0	2.1	5	270	M	M	1	2	6	M
28	62	34	48	0	17	0	0.00	0.0	0	2.0	6	290	M	M	3		6	M
29	57	35	46	-2	19	0	0.00	0.0	0	3.4	9	310	M	M	0		9	M
30	54	43	49	1	16	0	0.03	0.0	0	2.0	6	330	M	M	7	1	9	M
31	50	41	46	-2	19	0	0.02	0.0	0	11.1	20	10	M	M	5	1	24	M
SM	1710	1233		537		0	1.90	0.0		105.1				M		177		
AV	55.2	39.8								3.4	FASTST		M	M	6		MAX(MPH)	
								MISC ---->		20	10						33	9999

NOTES:
LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

STATION: EUREKA CA
MONTH: JANUARY
YEAR: 2022
LATITUDE: 40 47 N
LONGITUDE: 124 10 W

000
CXUS56 KEKA 030325
CF6EKA

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

STATION: EUREKA CA
MONTH: DECEMBER
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	61	42	52	4	13	0	0.00	0.0	0	2.7	9	360	M	M	2	28	10	M
2	51	48	50	2	15	0	T	0.0	0	1.9	6	340	M	M	10	2	M	M
3	50	45	48	0	17	0	0.03	0.0	0	2.5	6	170	M	M	10	2	7	M
4	50	47	49	1	16	0	0.01	0.0	0	2.0	6	20	M	M	10	1	7	M
5	51	47	49	1	16	0	0.00	0.0	0	1.4	6	10	M	M	10	1	M	M
6	51	44	48	0	17	0	0.35	0.0	0	2.3	7	350	M	M	10	18	M	M
7	57	47	52	4	13	0	0.02	0.0	0	3.7	13	270	M	M	9	2	M	M
8	52	48	50	2	15	0	0.05	0.0	0	7.5	13	30	M	M	10	1	14	M
9	51	37	44	-4	21	0	0.00	0.0	0	7.5	17	10	M	M	1		20	M
10	51	33	42	-5	23	0	0.00	0.0	0	2.0	8	360	M	M	3		M	M
11	51	41	46	-1	19	0	0.56	0.0	0	10.3	20	160	M	M	10		31	M
12	53	46	50	3	15	0	0.49	0.0	0	7.2	12	180	M	M	8	1	M	M
13	49	39	44	-3	21	0	0.89	T	0	6.0	12	190	M	M	10	5	18	M
14	50	34	42	-5	23	0	0.03	0.0	0	2.8	9	270	M	M	5		10	M
15	46	40	43	-4	22	0	0.54	0.0	0	10.2	21	170	M	M	10	1	37	M
16	54	38	46	-1	19	0	0.11	0.0	0	3.6	9	180	M	M	6	1	M	M
17	51	34	43	-4	22	0	0.00	0.0	0	1.3	8	300	M	M	3	1	10	M
18	51	35	43	-4	22	0	0.09	0.0	0	0.7	6	120	M	M	9	1	M	M
19	56	45	51	4	14	0	T	0.0	0	7.9	14	180	M	M	10	1	26	M
20	60	52	56	9	9	0	T	0.0	0	8.5	13	150	M	M	10		25	M
21	59	46	53	6	12	0	0.29	0.0	0	5.5	13	180	M	M	9	1	18	M
22	60	45	53	6	12	0	0.83	0.0	0	5.2	17	190	M	M	10	1	20	M
23	52	43	48	1	17	0	0.47	0.0	0	3.3	12	10	M	M	10		16	M
24	50	41	46	-1	19	0	0.26	0.0	0	7.2	21	280	M	M	10		31	M
25	50	37	44	-3	21	0	0.54	T	0	5.7	15	330	M	M	7	5	23	M
26	45	35	40	-7	25	0	0.96	T	0	8.2	13	270	M	M	10	5	25	M
27	44	36	40	-7	25	0	0.16	0.0	0	6.3	12	300	M	M	9		22	M
28	49	37	43	-4	22	0	0.16	0.0	0	3.4	8	170	M	M	10		10	M
29	50	34	42	-5	23	0	0.21	0.0	0	4.6	12	10	M	M	3		21	M
30	49	34	42	-5	23	0	0.13	0.0	0	1.6	7	260	M	M	8	1	8	M
31	49	33	41	-6	24	0	0.07	0.0	0	2.2	9	40	M	M	7	1	9	M
SM	1603	1263		575		0	7.25	T		145.2			M		249			
AV	51.7	40.7								4.7	FASTST		M	M	8		MAX(MPH)	
								MISC ---->		# 21	170						37 9999	

NOTES:
LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

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

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					

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								

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

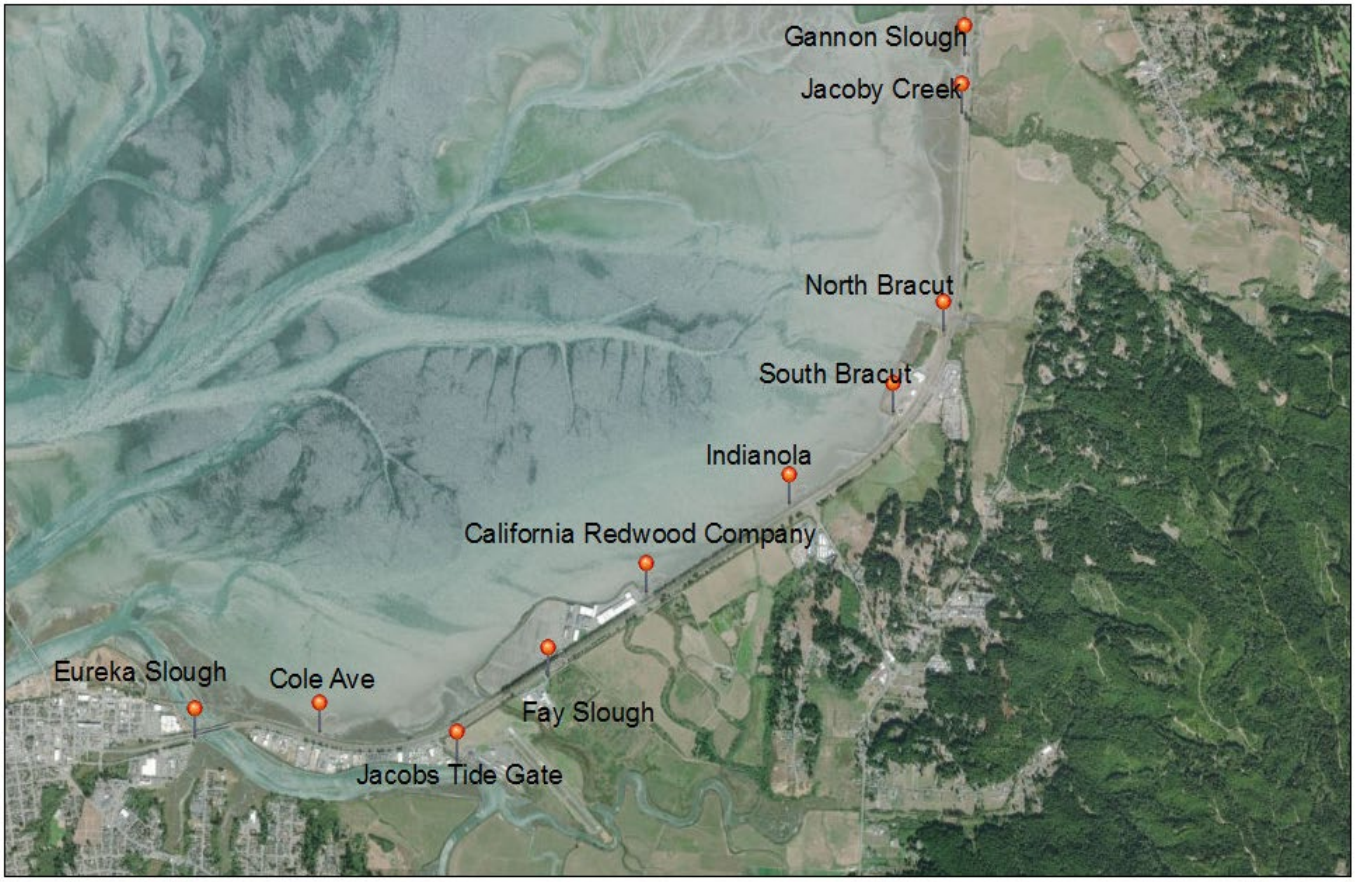

Figure 1 ***Reference Photograph Locations*** *for documenting King Tides and extreme weather events along the Eureka-Arcata 101 Corridor.*

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

2022 Annual Report, Winter 2021/22 King Tide Photos

December 4, 2021:

All locations

January 3, 2022:

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 South 2022 Annual Report

12/4/22

1/3/22

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 North 2022 Annual Report

12/4/21

1/3/22

Gannon Slough Bay Reference

1/10/20

1/11/20

2/8/20

Gannon Slough Bay 2021 Annual Report

12/14/20

1/12/21

12/4/21

1/3/22

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 Left 2022 Annual Report

12/4/21 *1/3/22*

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 Right 2022 Annual Report

12/4/21 *1/3/22*

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

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Jacoby Creek RR 2022 Annual Report

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Jacoby Creek Bay Reference

Jacoby Creek Bay 2020 Annual Report

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Jacoby Creek Bay 2021 Annual Report

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Jacoby Creek Bay 2022 Annual report

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Jacoby Creek Kayaker 2022 Annual Report

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North Bracut Photos

North Bracut Full Reference

North Bracut Full 2020 Annual Report

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North Bracut Full 2021 Annual Report

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North Bracut Zoom Reference

North Bracut Zoom 2020 Annual Report

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South Bracut Photos

South Bracut Full Reference

South Bracut Full 2020 Annual Report

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South Bracut Full 2021 Annual Report

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South Bracut Zoom Reference

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South Bracut Zoom 2021 Annual Report

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South Bracut Zoom 2022 Annual Report

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Indianola Photos

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Indianola Erosion 2020 Annual Report

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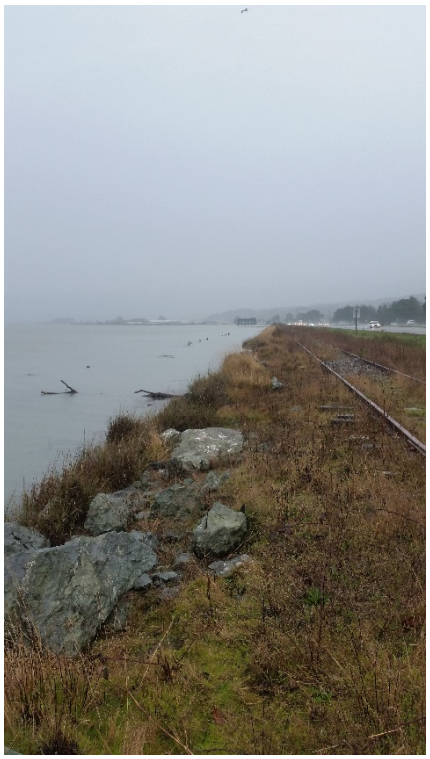

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California Redwood Company Photos

CRC Full Reference

CRC Full 2020 Annual Report

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CRC Zoom Reference

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Eureka Slough Photos

Eureka Slough Zoom Reference

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Eureka Slough Bridge Boat Ramp 2021 Annual Report

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Jacobs Tide Gate Photos

Jacobs Tide Gate East Zoom Reference

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Jacobs Tide Gate East Zoom 2021 Annual Report

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Jacobs Tide Gate East Reference

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Jacobs Tide Gate East 2022 Annual Report

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Jacobs Tide Gate West Reference

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Cole Ave Photos

Cole Ave North Reference

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Railroad Levee Erosion Near PM 82.1, 2022 Annual Report (1/3/22)