

Appendix D

Biological Resources Supporting Information

Special-Status Species Tables

Corte Madera Creek Units 4 and 3 Dewatering and Fish Rescue Plan

Lower College of Marin Corte Madera Creek Restoration Project Draft
Dewatering Plan

APPENDIX D

Table D-1 Database Query Results for Special-Status Plant Species in the Project Vicinity

Common Name Scientific Name	Query Sources	Status ^a Federal/ State/ CRPR	Blooming Period	Elevation Range (feet)	Habitat Associations	Likelihood to Occur in Project Area
Vascular						
Sonoma alopecurus <i>Alopecurus aequalis</i> var. <i>sonomensis</i>	CNPS/CNDDDB	FE/None/1B.1	May to July	15 to 1,200	Freshwater marshes and swamps and riparian scrub	Moderate; suitable habitat presents in project area (Unit 2)
Napa false indigo <i>Amorpha californica</i> var. <i>napensis</i>	CNPS/CNDDDB	None/None/1B.2	April to July	390 to 6,560	Openings in broadleaved upland forest, chaparral, and cismontane woodland	None; although a 1924 documented occurrence overlaps with the project area, the occurrence polygon is non-specific (CDFW 2020a) and the project is outside the plant's elevation range
bent-flowered fiddleneck <i>Amsinckia lunaris</i>	CNPS/CNDDDB	None/None/1B.2	March to June	5 to 1,640	Coastal bluff scrub, cismontane woodland, and valley and foothill grassland	Low; limited suitable habitat present in project area (Units 3 and 4)
coast rockcress <i>Arabis blepharophylla</i>	CNPS	None/None/4.3	February to May	5 to 3,610	Rocky areas in broadleaved upland forest, coastal bluff scrub, coastal prairie, and coastal scrub	None; no suitable habitat present
Franciscan manzanita <i>Arctostaphylos franciscana</i>	CNPS/CNDDDB	FE/None/1B.1	February to April	195 to 985	Serpentine areas in coastal scrub	None; no suitable habitat present and outside of elevation range
Mt. Tamalpais manzanita <i>Arctostaphylos montana</i> subsp. <i>montana</i>	CNPS/CNDDDB	None/None/1B.3	February to April	520 to 2,495	Serpentine and rocky areas of chaparral and valley and foothill grassland	None; no suitable habitat present and outside of elevation range

APPENDIX D

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Presidio manzanita <i>Arctostaphylos montana</i> subsp. <i>ravenii</i>	CNPS/CNDDDB	FE/CE/1B.1	February to March	145 to 705	Serpentine outcrops in chaparral, coastal prairie, and coastal scrub	None; no suitable habitat present and outside of elevation range
Marin manzanita <i>Arctostaphylos virgata</i>	CNPS/CNDDDB	None/None/1B.2	January to March	195 to 2,295	Sandstone and granitic areas of broadleaved upland forest, closed- cone coniferous forest, chaparral, and North Coast coniferous forest	None; no suitable habitat present and outside of elevation range
marsh sandwort <i>Arenaria paludicola</i>	CNPS/CNDDDB	FE/CE/1B.1	May to August	5 to 560	Sandy and openings in freshwater or brackish marshes and swamps	Low; limited suitable habitat present in project area (Unit 2)
Carlotta Hall's lace fern <i>Aspidotis carlotta-halliae</i>	CNPS	None/None/4.2	January to December	325 to 4,595	Usually serpentine areas of chaparral and cismontane woodland	None; no suitable habitat present and outside of elevation range
Brewer's milk-vetch <i>Astragalus breweri</i>	CNPS	None/None/4.2	April to June	295 to 2,395	Often serpentine and volcanic open areas of chaparral, cismontane woodland, meadows and seeps, and open, often gravelly areas of valley and foothill grassland	None; no suitable habitat present and outside of elevation range
ocean bluff milk-vetch <i>Astragalus nuttallii</i> var. <i>nuttallii</i>	CNPS	None/None/4.2	January to November	5 to 395	Coastal bluff scub and coastal dunes	None; no suitable habitat present
coastal marsh milk-vetch <i>Astragalus pycnostachyus</i> var. <i>pycnostachyus</i>	CNPS/CNDDDB	None/None/1B.2	(April) June to October	0 to 100	Coastal dunes (mesic areas), coastal scrub, and streamsides of coastal salt marshes and swamps	Low; limited suitable habitat present in project area (Unit 2)
alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	CNPS/CNDDDB	None/None/1B.2	March to June	0 to 195	Alkaline areas of playas, adobe clay areas of valley and foothill grassland and	None; no suitable habitat present

APPENDIX D

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					vernal pools	
Thurber's reed grass <i>Calamagrostis crassiglumis</i>	CNPS/CNDDDB	None/None/2B.1	May to August	30 to 195	Mesic areas of coastal scrub and freshwater marshes and swamps	Low; limited suitable habitat present in project area (Unit 2)
serpentine reed grass <i>Calamagrostis ophitidis</i>	CNPS	None/None/4.3	April to July	295 to 3,495	Serpentine and rocky areas of open, often north-facing slopes of chaparral, lower montane coniferous forest, meadows and seeps, and valley and foothill grassland	None; no suitable habitat present and outside of elevation range
Brewer's calandrinia <i>Calandrinia breweri</i>	CNPS	None/None/4.2	(January) March to June	30 to 4,005	Sandy or loamy, disturbed sites and burned areas of chaparral and coastal scrub	None; no suitable habitat present
Tiburon mariposa lily <i>Calochortus tiburonensis</i>	CNPS/CNDDDB	FT/CT/1B.1	March to June	160 to 490	Serpentine areas of valley and foothill grassland	None; no suitable habitat present and outside of elevation range
Oakland star-tulip <i>Calochortus umbellatus</i>	CNPS	None/None/4.2	March to May	325 to 2,295	Often serpentine areas of broadleaved upland forest, chaparral, cismontane woodland, lower montane coniferous forest, and valley and foothill grassland	None; no suitable habitat present and outside of elevation range
coastal bluff morning-glory <i>Calystegia purpurata</i> subsp. <i>saxicola</i>	CNPS/CNDDDB	None/None/1B.2	(March) April to September	0 to 345	Coastal bluff scrub, coastal dune, coastal scrub, and North Coast coniferous forest	None; no suitable habitat present

APPENDIX D

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seaside bittercress <i>Cardamine angulata</i>	CNPS/CNDDDB	None/None/2B.2	(January) March to July	80 to 3,000	Wet areas and streambanks of lower montane coniferous forest and North Coast coniferous forest	Moderate; suitable habitat presents in project area (Unit 4)
bristly sedge <i>Carex comosa</i>	CNPS/CNDDDB	None/None/2B.1	May to September	0 to 2,050	Coastal prairie, lake margins of marshes and swamps and valley and foothill grassland	Moderate; suitable habitat presents in project area (Unit 2)
Lynngbye's sedge <i>Carex lynngbyei</i>	CNPS/CNDDDB	None/None/2B.2	April to August	0 to 35	Brackish or freshwater marshes and swamps	Moderate; suitable habitat presents in project area (Unit 2)
northern meadow sedge <i>Carex praticola</i>	CNPS/CNDDDB	None/None/2B.2	May to July	0 to 10,500	Mesic areas of meadows and seeps	None; no suitable habitat present
Tiburon paintbrush <i>Castilleja affinis</i> var. <i>neglecta</i>	CNPS/CNDDDB	FE/CT/1B.2	April to June	195 to 1,310	Serpentine areas of valley and foothill grassland	None; no suitable habitat present and outside of elevation range
johnny-nip <i>Castilleja ambigua</i> var. <i>ambigua</i>	CNPS	None/None/4.2	March to August	0 to 1,425	Coastal bluff scrub, coastal prairie, coastal scrub, marshes and swamps, valley and foothill grassland, and vernal pool margins	Moderate; suitable habitat presents in project area (Unit 2)
Nicasio ceanothus <i>Ceanothus decornutus</i>	CNPS/CNDDDB	None/None/1B.2	March to May	770 to 950	Serpentine, rocky, sometimes clay areas of maritime chaparral	None; no suitable habitat present and outside of elevation range
glory brush <i>Ceanothus gloriosus</i> var. <i>exaltatus</i>	CNPS	None/None/4.3	March to June (August)	95 to 2,000	Chaparral	None; no suitable habitat present
Point Reyes ceanothus <i>Ceanothus gloriosus</i> var. <i>gloriosus</i>	CNPS	None/None/4.3	March to May	15 to 1,705	Sandy areas of coastal bluff scrub, closed-cone coniferous forest, coastal	None; no suitable habitat present

APPENDIX D

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					dunes, and coastal scrub	
Mason's ceanothus <i>Ceanothus masonii</i>	CNPS/CNDDDB	None/CR/1B.2	March to April	750 to 1,640	openings, rocky and serpentine areas of chaparral	None; no suitable habitat present and outside of elevation range
Kern ceanothus <i>Ceanothus pinetorum</i>	CNPS	None/None/4.3	May to July	5,245 to 9,005	Rocky and granitic areas of lower montane coniferous forest, subalpine coniferous forest, and upper montane coniferous forest	None; no suitable habitat present and outside of elevation range
Monterey ceanothus <i>Ceanothus rigidus</i>	CNPS	None/None/4.2	February to April (June)	5 to 1,805	Sandy areas of closed-cone coniferous forest, chaparral, and coastal scrub	None; no suitable habitat present
Point Reyes bird's-beak <i>Chloropyron maritimum</i> subsp. <i>palustre</i>	CNPS/CNDDDB	None/None/1B.2	June to October	0 to 35	Coastal salt marshes and swamps	Moderate; suitable habitat presents in project area (Unit 2)
San Francisco Bay spineflower <i>Chorizanthe cuspidata</i> var. <i>cuspidata</i>	CNPS/CNDDDB	None/None/1B.2	April to July (August)	5 to 705	Sandy areas of coastal bluff scrub, coastal dunes, coastal prairie, and coastal scrub	None; no suitable habitat present
Sonoma spineflower <i>Chorizanthe valida</i>	CNPS	FE/CE/1B.1	June to August	30 to 1,000	Sandy areas of coastal prairie	None; no suitable habitat present
Franciscan thistle <i>Cirsium andrewsii</i>	CNPS/CNDDDB	None/None/1B.2	March to July	0 to 490	Mesic, sometimes serpentine areas of broadleaved upland forest, coastal bluff scrub, coastal prairie, and coastal scrub	Low; limited suitable habitat present in project area (Unit 4)

APPENDIX D

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Mt. Tamalpais thistle <i>Cirsium hydrophilum</i> var. <i>vaseyi</i>	CNPS/CNDDB	None/None/1B.2	May to August	785 to 2,035	Serpentine seeps in broadleaved upland forest, chaparral, and meadows and seeps	None; no suitable habitat present and outside of elevation range
seaside cistanthe <i>Cistanthe maritima</i>	CNPS	None/None/4.2	(February) March to June (August)	15 to 985	Sandy areas of coastal bluff scrub, coastal scrub, and valley and foothill grassland	None; no suitable habitat present
Presidio clarkia <i>Clarkia franciscana</i>	CNPS/CNDDB	FE/CE/1B.1	May to July	80 to 1,100	Serpentine areas of coastal scrub and valley and foothill grassland	None; no suitable habitat present
round-headed Chinese-houses <i>Collinsia corymbosa</i>	CNPS/CNDDB	None/None/1B.2	April to June	0 to 65	Coastal dunes	None; no suitable habitat present
San Francisco collinsia <i>Collinsia multicolor</i>	CNPS/CNDDB	None/None/1B.2	(February) March to May	95 to 820	Sometimes serpentine areas of closed-cone coniferous forest and coastal scrub	None; no suitable habitat present
California lady's-slipper <i>Cypripedium californicum</i>	CNPS	None/None/4.2	April to August (September)	95 to 9,020	Seeps and streambanks, usually serpentine areas of bogs and fens, and lower coniferous forest	Moderate; suitable habitat presents in project area (Unit 4)
western leatherwood <i>Dirca occidentalis</i>	CNPS/CNDDB	None/None/1B.2	January to March (April)	80 to 1,395	Mesic areas of broadleaved upland forest, closed-cone coniferous forest, chaparral, cismontane woodland, North Coast coniferous forest, riparian forest, and riparian woodland	Moderate; suitable habitat presents in project area (Units 3 and 4)

APPENDIX D

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California bottle-brush grass <i>Elymus californicus</i>	CNPS	None/None/4.3	May to August (November)	45 to 1,540	Mesic areas of broadleaved upland forest, cismontane woodland, North Coast coniferous forest, and riparian woodland	Moderate; suitable habitat presents in project area (Unit 4)
Tiburon buckwheat <i>Eriogonum luteolum</i> var. <i>caninum</i>	CNPS/CNDDDB	None/None/1B.2	May to September	0 to 2,295	Serpentinite, sandy to gravelly areas in chaparral, cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland	None; no suitable habitat present
slender cottongrass <i>Eriophorum gracile</i>	CNPS	None/None/4.3	May to September	4,195 to 9,515	Acidic bogs and fens, meadows and seeps, and upper montane coniferous forest	None; no suitable habitat present and outside of elevation range
San Francisco wallflower <i>Erysimum franciscanum</i>	CNPS	None/None/4.2	March to June	0 to 1,805	Often serpentine or granitic areas, sometimes roadsides of chaparral, coastal dunes, coastal scrub, and valley and foothill grassland	None; no suitable habitat present
Marin checker lily <i>Fritillaria lanceolata</i> var. <i>tristulis</i>	CNPS/CNDDDB	None/None/1B.1	February to May	45 to 490	Coastal bluff scrub, coastal prairie, and coastal scrub	None; no suitable habitat present
fragrant fritillary <i>Fritillaria liliacea</i>	CNPS/CNDDDB	None/None/1B.2	February to April	5 to 1,345	Often serpentine areas of cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland	Low; limited suitable habitat present in project area (Units 3 and 4)
blue coast gilia <i>Gilia capitata</i> subsp.	CNPS/CNDDDB	None/None/1B.1	April to July	5 to 655	Coastal dunes and coastal scrub	None; no suitable habitat present

APPENDIX D

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<i>chamissonis</i>						
Woolly-headed gilia <i>Gilia capitata</i> subsp. <i>tomentosa</i>	CNPS/CNDDDB	None/None/1B.1	May to July	30 to 720	Serpentine and rocky areas or outcrops in coastal bluff scrub and valley and foothill grassland	None; no suitable habitat present
dark-eyed gilia <i>Gilia millefoliata</i>	CNPS/CNDDDB	None/None/1B.2	April to July	5 to 100	Coastal dunes	None; no suitable habitat present
San Francisco gumplant <i>Grindelia hirsutula</i> var. <i>maritima</i>	CNPS/CNDDDB	None/None/3.2	June to September	45 to 1,310	Sandy and serpentine areas of coastal dunes, coastal bluff scrub, coastal scrub, and valley and foothill grassland	None; no suitable habitat present
Diablo helianthella <i>Helianthella castanea</i>	CNPS/CNDDDB	None/None/1B.2	March to June	195 to 4,265	Usually rocky, axonal soils, areas often in partial shade in broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, and valley and foothill grassland	None; no suitable habitat present and outside of elevation range
congested-headed hayfield tarplant <i>Hemizonia congesta</i> subsp. <i>congesta</i>	CNPS/CNDDDB	None/None/1B.2	April to November	65 to 1,835	Sometimes roadsides of valley and foothill grassland	None; no suitable habitat present
Marin western flax <i>Hesperolinon congestum</i>	CNPS/CNDDDB/ USFWS	FT/CT/1B.1	April to July	15 to 1,215	Serpentine areas of chaparral and valley and foothill grassland	None; no suitable habitat present
water star-grass <i>Heteranthera dubia</i>	CNPS/CNDDDB	None/None/2B.2	July to October	95 to 4,905	Requires a pH of 7 or higher, usually in slightly	None; no suitable habitat present

APPENDIX D

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					eutrophic waters in alkaline, still or slow-moving waters in marshes and swamps	
Santa Cruz tarplant <i>Holocarpha macradenia</i>	CNPS/CNDDDB/ USFWS	FT/CE/1B.1	June to October	30 to 720	Often clay and sandy areas of coastal prairie, coastal scrub, and valley and foothill grassland	None; although an 1883 documented occurrence overlaps with the project area, the occurrence polygon is non-specific (CDFW 2020a), it is considered extirpated, and suitable habitat is not present
Kellogg's horkelia <i>Horkelia cuneata</i> var. <i>sericea</i>	CNPS/CNDDDB	None/None/1B.1	April to September	30 to 655	Sandy or gravelly areas and openings in closed-cone coniferous forest, maritime chaparral, coastal dunes, and coastal scrub	None; no suitable habitat present
Point Reyes horkelia <i>Horkelia marinensis</i>	CNPS/CNDDDB	None/None/1B.2	May to September	15 to 2,475	Sandy areas of coastal dunes, coastal prairie, and coastal scrub	None; no suitable habitat present
thin-lobed horkelia <i>Horkelia tenuiloba</i>	CNPS/CNDDDB	None/None/1B.2	May to July (August)	160 to 1,640	Mesic openings and sandy areas of broadleaved upland forest, chaparral, and valley and foothill grassland	None; no suitable habitat present and outside of elevation range
coast iris <i>Iris longipetala</i>	CNPS	None/None/4.2	March to May	0 to 1,970	Mesic areas of coastal prairie, lower montane coniferous forest, and meadows and seeps	None; no suitable habitat present

APPENDIX D

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small groundcone <i>Kopsiopsis hookeri</i>	CNPS/CNDDDB	None/None/2B.3	April to August	295 to 2,905	North Coast coniferous forest	None; no suitable habitat present and outside of elevation range
beach layia <i>Layia carnosa</i>	CNPS/CNDDDB	FE/CE/1B.1	March to July	0 to 195	Coastal dunes and sandy areas of coastal scrub	None; no suitable habitat present
bristly leptosiphon <i>Leptosiphon acicularis</i>	CNPS	None/None/4.2	April to July	180 to 4,920	Chaparral, cismontane woodland, coastal prairie, and valley and foothill grassland	None; no suitable habitat present and outside of elevation range
coast yellow leptosiphon <i>Leptosiphon croceus</i>	CNPS	None/CC/1B.1	April to June	30 to 490	Coastal bluff scrub and coastal prairie	None; no suitable habitat present
large-flowered leptosiphon <i>Leptosiphon grandiflorus</i>	CNPS	None/None/4.2	April to August	15 to 4,005	Usually sandy areas of coastal bluff scrub, closed-cone coniferous forest, cismontane woodland, coastal dunes, coastal prairie, coastal scrub, and valley and foothill grassland	Low; limited suitable habitat present in project area (Units 3 and 4)
rose leptosiphon <i>Leptosiphon rosaceus</i>	CNPS/CNDDDB	None/None/1B.1	April to July	0 to 330	Coastal bluff scrub	None; no suitable habitat present
San Francisco lessingia <i>Lessingia germanorum</i>	CNPS/CNDDDB	FE/CE/1B.1	(June) July to November	80 to 360	Remnant dunes of coastal scrub	None; no suitable habitat present
woolly-headed lessingia <i>Lessingia hololeuca</i>	CNPS	None/None/3	June to October	45 to 1,000	Clay and serpentine areas of broadleaved upland forest, coastal scrub, lower montane coniferous forest, and valley and foothill grassland	None; no suitable habitat present

APPENDIX D

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Tamalpais lessingia <i>Lessingia micradenia</i> var. <i>micradenia</i>	CNPS/CNDDDB	None/None/1B.2	(June) July to October	325 to 1,640	Usually serpentine areas, often roadsides, in chaparral and valley and foothill grassland	None; no suitable habitat present and outside of elevation range
Mt. Diablo cottonweed <i>Micropus amphibolus</i>	CNPS	None/None/3.2	March to May	145 to 2,705	Rocky areas of broadleaved upland forest, chaparral, cismontane woodland, and valley and foothill grassland	None; no suitable habitat present and outside of elevation range
marsh microseris <i>Microseris paludosa</i>	CNPS/CNDDDB	None/None/1B.2	April to June (July)	15 to 1,165	Closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland	Moderate; suitable habitat presents in project area (Units 3 and 4)
Baker's navarretia <i>Navarretia leucocephala</i> subsp. <i>bakeri</i>	CNPS	None/None/1B.1	April to July	15 to 5,710	Mesic areas of cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, and vernal pools	Moderate; suitable habitat presents in project area (Unit 4)
Marin County navarretia <i>Navarretia rosulata</i>	CNPS/CNDDDB	None/None/1B.2	May to July	655 to 2,085	Serpentine and rocky areas of closed-cone coniferous forest and chaparral	None; no suitable habitat present and outside of elevation range
white-rayed pentachaeta <i>Pentachaeta bellidiflora</i>	CNPS/CNDDDB/ USFWS	FE/CE/1B.1	March to May	110 to 2,035	Cismontane woodland, and often serpentine areas of valley and foothill grassland	None; although a 1912 documented occurrence overlaps with the project area, the occurrence polygon is non-specific (CDFW 2020a), it is

APPENDIX D

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						considered extirpated, and the project is outside the plant's elevation range
Gairdner's yampah <i>Perideridia gairdneri</i> subsp. <i>gairdneri</i>	CNPS	None/None/4.2	June to October	0 to 2,000	Vernally mesic areas of broadleaved upland forest, chaparral, coastal prairie, valley and foothill grassland, and vernal pools	Moderate; suitable habitat presents in project area (Unit 4)
Michael's rein orchid <i>Piperia michaelii</i>	CNPS	None/None/4.2	April to August	5 to 3,000	Coastal bluff scrub, closed-cone coniferous forest, chaparral, cismontane woodland, coastal scrub, and lower montane coniferous forest	Moderate; suitable habitat presents in project area (Units 3 and 4)
Choris' popcornflower <i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i>	CNPS/CNDDDB	None/None/1B.2	March to June	5 to 525	Mesic areas in chaparral, coastal prairie, and coastal scrub	None; no suitable habitat present
San Francisco popcornflower <i>Plagiobothrys diffusus</i>	CNPS/CNDDDB	None/CE/1B.1	March to June	195 to 1,180	Coastal prairie and valley and foothill grassland	None; no suitable habitat present and outside of elevation range
hairless popcornflower <i>Plagiobothrys glaber</i>	CNPS/CNDDDB	None/None/1A	March to May	45 to 590	Alkaline meadows and seeps and coastal salt marshes and swamps	Low; limited suitable habitat present in project area (Unit 2)
North Coast semaphore grass <i>Pleuropogon hooverianus</i>	CNPS/CNDDDB	None/CT/1B.1	April to June	30 to 2,200	Open and mesic areas of broadleaved upland forest, meadows and seeps, and North Coast coniferous forest	Moderate; suitable habitat presents in project area (Units 3 and 4)
nodding semaphore grass <i>Pleuropogon refractus</i>	CNPS	None/None/4.2	(March) April to August	0 to 5,250	Mesic areas of lower montane coniferous	Moderate; suitable habitat presents in project area

APPENDIX D

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					forest, meadows and seeps, North Coast coniferous forest, and riparian forest	(Units 3 and 4)
Oregon polemonium <i>Polemonium carneum</i>	CNPS/CNDDDB	None/None/2B.2	April to September	0 to 6,005	Coastal prairie, coastal scrub, and lower montane coniferous forest	None; no suitable habitat present
Marin knotweed <i>Polygonum marinense</i>	CNPS/CNDDDB	None/None/3.1	(April) May to August (October)	0 to 35	Coastal salt or brackish marshes and swamps	Moderate; suitable habitat presents in project area (Unit 2)
Tamalpais oak <i>Quercus parvula</i> var. <i>tamalpaisensis</i>	CNPS/CNDDDB	None/None/1B.3	March to April	325 to 2,460	Lower montane coniferous forest	None; no suitable habitat present and outside of elevation range
Lobb's aquatic buttercup <i>Ranunculus lobbii</i>	CNPS	None/None/4.2	February to May	45 to 1,540	Mesic areas of cismontane woodland, North Coast coniferous forest, valley and foothill grassland, and vernal pools	None; no suitable habitat present
Victor's gooseberry <i>Ribes victoris</i>	CNPS	None/None/4.3	March to April	325 to 2,460	Mesic, shady areas of broadleaved upland forest and chaparral	None; no suitable habitat present and outside of elevation range
adobe sanicle <i>Sanicula maritima</i>	CNPS/CNDDDB	None/CR/1B.1	February to May	95 to 785	Clay and serpentine areas of chaparral, coastal prairie, meadows and seeps, and valley and foothill grassland	None; no suitable habitat present
Point Reyes checkerbloom <i>Sidalcea calycosa</i> subsp. <i>rhizomata</i>	CNPS/CNDDDB	None/None/1B.2	April to September	5 to 245	Freshwater, near coast marshes and swamps	Low; limited suitable habitat present in project area (Unit 2)
Marin checkerbloom <i>Sidalcea hickmanii</i> subsp.	CNPS/CNDDDB	None/None/1B.1	May to June	160 to 1,410	Serpentine areas of chaparral	None; no suitable habitat present and outside of

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/ State/ CRPR	Blooming Period	Elevation Range (feet)	Habitat Associations	Likelihood to Occur in Project Area
<i>viridis</i>						elevation range
Scouler's catchfly <i>Silene scouleri</i> subsp. <i>scouleri</i>	CNPS/CNDDDB	None/None/2B.2	(March to May) June to August (September)	0 to 1,970	Coastal bluff scrub, coastal prairie, and valley and foothill grassland	None; no suitable habitat present
San Francisco campion <i>Silene verecunda</i> subsp. <i>verecunda</i>	CNPS/CNDDDB	None/None/1B.2	(February) March to June (August)	95 to 2,115	Sandy areas of coastal bluff scrub, chaparral, coastal prairie, coastal scrub, and valley and foothill grassland	None; no suitable habitat present
long-styled sand-spurrey <i>Spergularia macrotheca</i> var. <i>longistyla</i>	CNPS/CNDDDB	None/None/1B.2	February to May (June)	0 to 835	Alkaline areas of meadows and seeps and marshes and swamps	None; no suitable habitat present
Santa Cruz microseris <i>Stebbinsoseris decipiens</i>	CNPS/CNDDDB	None/None/1B.2	April to May	30 to 1,640	Open and sometimes serpentine areas of broadleaved upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, and valley and foothill grassland	Low; limited suitable habitat present in project area (Units 3 and 4)
Tamalpais jewelflower <i>Streptanthus batrachopus</i>	CNPS/CNDDDB	None/None/1B.3	April to July	1,000 to 2,135	Serpentine areas of closed-cone coniferous forest and chaparral	None; no suitable habitat present and outside of elevation range
Tiburon jewelflower <i>Streptanthus glandulosus</i> subsp. <i>niger</i>	CNPS/CNDDDB	FE/CE/1B.1	May to June	95 to 490	Serpentine areas of valley and foothill grassland	None; no suitable habitat present
Mt. Tamalpais bristly jewelflower <i>Streptanthus glandulosus</i> subsp. <i>pulchellus</i>	CNPS/CNDDDB	None/None/1B.2	May to July (August)	490 to 2,625	Serpentine areas of chaparral and valley and foothill grassland	None; no suitable habitat present and outside of elevation range

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/ State/ CRPR	Blooming Period	Elevation Range (feet)	Habitat Associations	Likelihood to Occur in Project Area
Suisun Marsh aster <i>Symphotrichum lentum</i>	CNPS/CNDDDB	None/None/1B.2	(April) May to November	0 to 10	Brackish or freshwater marshes and swamps	Moderate; suitable habitat presents in project area (Unit 2)
two-fork clover <i>Trifolium amoenum</i>	CNPS/CNDDDB/ USFWS	FE/None/1B.1	April to June	15 to 1,360	Coastal bluff scrub, and sometimes serpentine areas of valley and foothill grassland	None; no suitable habitat present
saline clover <i>Trifolium hydrophilum</i>	CNPS/CNDDDB	None/None/1B.2	April to June	0 to 985	Marshes and swamps, mesic and alkaline areas of valley and foothill grassland, and vernal pools	Moderate; suitable habitat presents in project area (Unit 2)
San Francisco owl's-clover <i>Triphysaria floribunda</i>	CNPS/CNDDDB	None/None/1B.2	April to June	30 to 525	Usually serpentine areas of coastal prairie, coastal scrub, and valley and foothill grassland	None; no suitable habitat present
Nonvascular						
Koch's cord moss <i>Entosthodon kochii</i>	CNPS/CNDDDB	None/None/1B.3	n/a	590 to 3,280	Soil in cismontane woodland	None; outside of elevation range
minute pocket moss <i>Fissidens pauperculus</i>	CNPS/CNDDDB	None/None/1B.2	n/a	30 to 3,360	Damp coastal soil of North Coast coniferous forest	None; no suitable habitat present
island rock lichen <i>Hypogymnia schizidiata</i>	CNPS/CNDDDB	None/None/1B.3	n/a	1,180 to 1,330	Bark and wood of hardwoods and conifers of closed-cone coniferous forest, and chaparral	None; no suitable habitat present and outside of elevation range
elongate copper moss <i>Mielichhoferia elongata</i>	CNPS/CNDDDB	None/None/4.3	n/a	0 to 6,430	Metamorphic rock, usually acidic, usually vernally mesic, often roadsides, sometimes carbonate areas of broadleaved upland	Low; suitable habitat potentially present in project area (Units 3 and 4)

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/ State/ CRPR	Blooming Period	Elevation Range (feet)	Habitat Associations	Likelihood to Occur in Project Area
					forest, chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, and subalpine coniferous forest	
coastal triquetrella <i>Triquetrella californica</i>	CNPS/CNDDDB	None/None/1B.2	n/a	30 to 330	Soils of coastal bluff scrub and coastal scrub	None; no suitable habitat present
Status Codes:						
Federal				State		
FE	Listed as endangered under the federal Endangered Species Act			SE	Listed as Endangered under the California Endangered Species Act	
FT	Listed as threatened under the federal Endangered Species Act			ST	Listed as Threatened under the California Endangered Species Act	
California Rare Plant Rank (CRPR)						
1B	Plants rare, threatened, or endangered in California and elsewhere					
2B	Plants rare, threatened, or endangered in California, but more common elsewhere					
3	More information needed about this plant, a review list					
4	Plants of limited distribution, a watch list					
0.1	Seriously threatened in California (high degree/immediacy of threat)					
0.2	Fairly threatened in California (moderate degree/immediacy of threat)					
0.3	Not very threatened in California (low degree/immediacy of threats or no current threats known)					

APPENDIX D

Table D-2 Database Query Results for Sensitive Natural Communities in the Project Vicinity

Natural Community (Holland 1986)	Query Sources	Status ^a (State Rank)	Distribution and Habitat Description	Potential Sensitive Natural Communities (CNPS 2020b)	Likelihood within project area
Coastal Brackish Marsh	CNDDDB	S2.1	Usually at the interior edges of coastal bays and estuaries or in coastal lagoons. Most extensively developed around Suisun Bay at the mouth of the Sacramento-San Joaquin Delta. Dominated by perennial, emergent, herbaceous monocots to two meters tall. Cover is often complete and dense; plant species include plants from both salt marshes and freshwater marshes.	<ul style="list-style-type: none"> • Pacific silverweed marshes (<i>Argentina egedii</i>) • Salt marsh bulrush marshes (<i>Bolboschoenus maritimus</i>) • Slough sedge swards (<i>Carex obnupta</i>) • Gum plant patches (<i>Grindelia (camporum, stricta)</i>) • Salt rush swales (<i>Juncus lescurii</i>) • Water-parsley marsh (<i>Oenanthe sarmentosa</i>) • Ditch-grass mats (<i>Ruppia (cirrhosa, maritima)</i>) • Pondweed mats (<i>Stuckenia (pectinata) - Potamogeton spp.</i>) 	High, species and structure are present in project area.
Coastal Terrace Prairie	CNDDDB	S2.1	Occurs from Santa Cruz County north to the Oregon border, often associated with northern coastal scrub. Dominated by tall rhizomatous and cespitose native perennial grasses forming dense cover on sandy loam soils near the coastal fog zone.	<ul style="list-style-type: none"> • Pacific reed grass meadows (<i>Calamagrostis nutkaensis</i>) • Oatgrass meadow (<i>Danthonia californica</i>) • Idaho fescue - California oatgrass grassland (<i>Festuca rubra</i>) 	None; no species or structure present in project area.
Northern Coastal Salt Marsh	CNDDDB	S3.2	Occurs along the coast from Pt. Conception north to the Oregon border; extensive in the Bay Area and Humboldt, Marin, Monterey, and San Luis Obispo Counties. Found on hydric soils subject to regular tidal inundation in bays, lagoons, and estuaries. Dominated by herbaceous, salt-tolerant	<ul style="list-style-type: none"> • Pacific silverweed marshes (<i>Ageratina egedii</i>) • Parish's glasswort patches (<i>Arthrocnemum subterminale</i>) • Alkali heath marsh (<i>Frankenia salina</i>) • Gum plant patches (<i>Grindelia (camporum, stricta)</i>) 	High, species and structure are present in project area.

APPENDIX D

Natural Community (Holland 1986)	Query Sources	Status ^a (State Rank)	Distribution and Habitat Description	Potential Sensitive Natural Communities (CNPS 2020b)	Likelihood within project area
			hydrophytes, forming moderate to relatively complete cover, generally growing throughout the summer and dormant in winter.	<ul style="list-style-type: none"> • Pickleweed mats (<i>Sarcocornia pacifica</i> (<i>Salicornia depressa</i>)) • Western sea-purslane marshes (<i>Sesuvium verrucosum</i>) • California cordgrass marsh (<i>Spartina foliosa</i>) 	
Serpentine Bunchgrass	CNDDDB	S2.2	Often considered part of the coastal prairie, this series extends from coastal terraces to inland bald hills where it can associate with other series on a fine scale. Upslopes and ridges.	– Idaho fescue - California oatgrass grassland (<i>Festuca rubra</i>)	None; no species or structure present in project area.

^a Status codes:
S1 Critically imperiled
S2 Imperiled
S3 Vulnerable
0.1 Very threatened
0.2 Threatened

APPENDIX D

Table D-3 Database Query Results for Special-Status Wildlife and Fish Species in the Project Vicinity

Common Name Scientific Name	Query Sources	Status ^a Federal/State	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
Invertebrates					
Black abalone <i>Haliotis cracherodii</i>	NMFS	FE/–	Point Arena in northern California to Bahia Tortugas and Isla Guadalupe, Mexico	Intertidal and shallow subtidal rocks, in areas of moderate to heavy surf action	None; suitable habitat not found in project area
California freshwater shrimp <i>Syncaris pacifica</i>	CNDDDB	FE/SE	Sonoma, Napa, and Marin counties	Low-elevation, low-gradient perennial or intermittent freshwater streams with perennial pools and structurally diverse banks	None; no suitable habitat, and no known occurrences in Corte Madera Creek
Western bumble bee <i>Bombus occidentalis</i>	CNDDDB	–/SCE	Throughout California and adjacent states	Uses flowering plants in meadows and forested openings; abandoned rodent burrows are used for nest and hibernation sites for queens	None; suitable habitat not found in project area
San Bruno elfin butterfly <i>Callophrys mossii bayensis</i>	USFWS	FE/–	Largest population on San Bruno Mountain in San Mateo County; smaller populations may occur in Contra Costa and Marin counties	Coastal scrub; host plant is Pacific stonecrop (<i>Sedum spathulifolium</i>)	None; suitable habitat not found in project area
Bay checkerspot butterfly <i>Euphydryas editha bayensis</i>	CNDDDB	FT/–	Populations only known in San Mateo and Santa Clara counties	Serpentinite soils; host plants are dwarf plantain (<i>Plantago erecta</i>) or purple owl's clover (<i>Castilleja densiflora/C. exserta</i>)	None; outside of the species' range
Mission blue butterfly <i>Icaricia icarioides missionensis</i>	CNDDDB, USFWS	FE/–	Scattered localities in San Mateo, Marin (Marin Headlands), and San Francisco counties	Native grassland; host plants are <i>Lupinus albigifrons</i> (preferred), <i>L. formosus</i> , and <i>L. variicolor</i> (perennial lupine)	None; suitable habitat not found in the project area

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/State	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
Myrtle's silverspot butterfly <i>Speyeria zerene myrtleae</i>	USFWS	FE/–	Four populations known in western Marin and southwestern Sonoma counties	Coastal dune or prairie; host plant typically western dog violet (<i>Viola adunca</i>)	None; suitable habitat not found in project area
Fish					
North American green sturgeon: southern DPS <i>Acipenser medirostris</i>	NMFS	FT/SSC	San Francisco, San Pablo, Suisun, and Humboldt bays; Sacramento-San Joaquin Delta, Sacramento and Klamath rivers	Spawns in pools of large freshwater river mainstems with cool water and cobble, clean sand, or bedrock; in San Francisco Bay adults tend to utilize water depths less than 33 feet to swim near the surface or forage along the sea floor	None; no suitable habitat in project area
Tomales roach <i>Lavinia symmetricus</i> ssp.	CNDDDB	–/SSC	Restricted to the western Marin County drainages of Lagunitas Creek and Walker Creek	No habitat requirement studies done specifically on Tomales roach, but assumed to be like roach from adjacent watersheds	None; outside species' range
Sacramento splittail <i>Pogonichthys macrolepidotus</i>	CNDDDB	–/SSC	Lower portions of the Napa, Petaluma, Sacramento, and San Joaquin rivers; Sacramento-San Joaquin Delta including Suisun Bay, Suisun Marsh	Low elevation mainstem rivers and estuaries with low to moderate salinity (0-18 ppt); shallow, flooded vegetated habitat for spawning and foraging	None; outside species' range
Delta smelt <i>Hypomesus transpacificus</i>	USFWS	FT/SE	Found only in the Sacramento-San Joaquin Estuary, including the lower reaches of Sacramento and Napa rivers; the Delta including Suisun Bay, Goodyear, Suisun, Cutoff,	Estuarine or brackish waters up to 18 ppt; spawn in shallow brackish water upstream of the mixing zone (zone of saltwater-freshwater interface) where salinity is around 2 ppt	None; outside species' range

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/State	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
			First Mallard, and Montezuma sloughs		
Longfin Smelt <i>Spirnichus thaleichthys</i>	CNDDDB	FPT/ST	San Francisco estuary from Rio Vista or Medford Island in the Delta as far downstream as South Bay; concentrated in Suisun, San Pablo, and North San Francisco bays; historical populations in Humboldt Bay, Eel River estuary, and Klamath River estuary	Adults in large bays, estuaries, and nearshore coastal areas; migrate into freshwater rivers to spawn; salinities of 15 to 30 ppt. Spawn on sandy substrate in low velocity reaches.	None; no suitable habitat in project area
Southern eulachon DPS <i>Thaleichthys pacificus</i>	CNDDDB	FT/--	Skeena River in British Columbia (inclusive) south to the Mad River in Northern California (inclusive)	An anadromous fish that historically used the Klamath River estuary and lowest portions of the river to spawn; few to no individuals currently use the estuary; most of their life is spent in the ocean	None; outside species' range
Coho salmon, central California coast ESU <i>Oncorhynchus kisutch</i>	CNDDDB, NMFS	FE/SE	Punta Gorda south to the San Lorenzo River in central California	Streams; spawns in gravel riffles	Low; presumed extirpated in Corte Madera Creek
Chinook salmon, central Valley spring-run ESU <i>Oncorhynchus tshawytscha</i>	NMFS	FT/ST	Sacramento River and its tributaries (Deer, Mill, Antelope, Battle, Beegum, Butte, and Big Chico creeks and the Feather and Yuba rivers)	Low- to mid-elevation rivers and streams with cold water, clean gravel of appropriate size for spawning and adequate rearing habitat; typically rear in freshwater for one or more years before migrating to the ocean	None; outside species' range

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/State	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
Chinook salmon, Sacramento River winter-run ESU <i>Oncorhynchus tshawytscha</i>	NMFS	FE/SE	Sacramento River and its tributaries; Sacramento- San Joaquin Delta; San Francisco, San Pablo and Suisun bays	Mainstem river reaches with cool water and available spawning gravel; rear five to ten months in the river and estuary; migrate to the ocean to feed and grow until sexually mature	None; outside species' range
Steelhead, central California coast DPS <i>Oncorhynchus mykiss</i>	CNDDDB	FT/–	Coastal California streams from the Russian River, south to Aptos Creek, San Francisco, San Pablo, and Suisun bays; the drainages of San Francisco, San Pablo, and Suisun bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin rivers; excludes the Sacramento San Joaquin Delta,	Rivers and streams with cold water, clean gravel of appropriate size for spawning, and suitable rearing habitat; typically rear in fresh water for one or more years before migrating to the ocean	High; known to be present in Corte Madera Creek
Steelhead, Central Valley DPS <i>Oncorhynchus mykiss</i>	NMFS	FT/–	Sacramento and San Joaquin rivers and their tributaries	Rivers and streams with cold water, clean gravel of appropriate size for spawning, and suitable rearing habitat; typically rear in freshwater for one or more years before migrating to the ocean	None; outside species' range
Tidewater goby <i>Eucyclogobius newberryi</i>	CNDDDB, USFWS	FE/SSC	San Diego county north to the mouth of the Smith River in Del Norte County	Coastal lagoons and the uppermost zone of brackish large estuaries; prefer sandy substrate for spawning, but can be found on silt, mud, or rocky substrates; can occur in water up to 15 feet in	None; no suitable habitat in project area and presumed extirpated by CDFW.

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/State	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
				lagoons and within a wide range of salinity (0 to 42 ppt)	
Amphibians					
California giant salamander <i>Dicamptodon ensatus</i>	CNDDDB	-/SSC	From Mendocino County near Point Arena east into the coast ranges into Lake and Glenn counties, south to Sonoma and Marin Counties, continuing south of the San Francisco Bay from San Mateo County to southern Santa Cruz County	Wet coastal forests in or near clear, cold permanent and semi-permanent streams and seepages	Low; marginally suitable habitat in Unit 4; reported observations in Corte Madera Creek watershed (Friends of Corte Madera Watershed 2004)
California red-legged frog <i>Rana draytonii</i>	CNDDDB, USFWS	FT/SSC	Largely restricted to coastal drainages on the central coast from Mendocino County to Baja California; in the Sierra foothills south to Tulare and possibly Kern counties	Breeds in still or slow-moving water with emergent and overhanging vegetation, including wetlands, wet meadows, ponds, lakes, and low-gradient, slow moving stream reaches with permanent pools; uses adjacent uplands for dispersal and summer retreat	Low; Suitable habitat is present in the study area, but it is not hydrologically connected to a known population of California; species is presumed absent in eastern Marin County (District 2017)
Foothill yellow-legged frog <i>Rana boylei</i>	CNDDDB	-/SSC Northwest/North Coast Clade (includes project area), -/SE (Southern Sierra, Central Coast and South Coast clades), ST (Feather River and	From the Oregon border along the coast to the Transverse Ranges, and south along the western side of the Sierra Nevada Mountains to Kern County; a possible isolated population in Baja California. Last recorded	Shallow tributaries and mainstems of perennial streams and rivers, typically associated with cobble or boulder substrate	None; considered extirpated from eastern Marin County (CDFW 2020)

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/State	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
		Northern Sierra clades)	observation in project area was in 1913.		
Reptiles					
Western pond turtle <i>Actinemys marmorata</i>	CNDDDB	-/SSC	From the Oregon border along the coast ranges to the Mexican border, and west of the crest of the Cascades and Sierras	Permanent, slow-moving fresh or brackish water with available basking sites and adjacent open habitats or forest for nesting	Low; suitable aquatic habitat found in Unit 4, though limited upland nesting habitat present
Olive (Pacific) Ridley sea turtle <i>Lepidochelys olivacea</i>	NMFS	FT/-	Warm waters of the Pacific coast, primarily from southern California south; does not nest in California	Well out to sea in pelagic zone as well as coastal areas, including bays and estuaries; nests on sandy ocean beaches	None; pelagic species
Green sea turtle <i>Chelonia mydas</i>	NMFS, USFWS	FT/-	Warm waters of the Pacific coast, primarily from San Diego south; does not nest in California	Uses convergence zones in the open ocean and benthic feeding grounds in coastal areas; nests on sandy ocean beaches	None; pelagic species
Loggerhead sea turtle <i>Caretta caretta</i>	NMFS	FT/-	Warm waters of the Pacific coast, primarily from the Channel Islands south; does not nest in California	Uses the near-shore zone and open ocean; nests on high energy, relatively narrow, steep, coarse-grained beaches	None; pelagic species
Leatherback sea turtle <i>Dermochelys coriacea</i>	NMFS	FE/-	Temperate and cool waters of the Pacific coast; most sightings in California are from boats out at sea; have been observed in open ocean near San Diego, Santa Barbara, Ventura, San Mateo, and Santa Cruz counties; does not nest in California	Pelagic, though also forages near coastal waters	None; pelagic species

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/State	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
Birds					
Short-tailed albatross <i>Phoebastris albatrus</i>	USFWS	FE/SSC	Pacific Ocean (nests in Japan)	Feeds in open ocean in north Pacific	None; no suitable habitat in project area
White-tailed kite <i>Elanus leucurus</i>	CNDDB	-/SFP	Year-round resident; found in nearly all lowlands of California west of the Sierra Nevada mountains and the southeast deserts	Lowland grasslands and wetlands with open areas; nests in trees near open foraging area	Moderate; documented along Corte Madera Creek in project area near Unit 2 (eBird 2020); nesting and foraging habitat present
American peregrine falcon <i>Falco peregrinus anatum</i>	CNDDB	FD/SD, SFP	Most of California during migrations and in winter; nests primarily in the Coast Ranges, northern Sierra Nevada Mountains, and other mountainous areas of northern California	Wetlands, woodlands, cities, agricultural lands, and coastal area with cliffs (and rarely broken-top, predominant trees) for nesting; often forages near water	Low; foraging only; documented foraging in Corte Madera Marsh approximately 1.8 miles southeast of project area
California black rail <i>Laterallus jamaicensis coturniculus</i>	CNDDB	-/ST, SFP	Northern San Francisco Bay area (primarily San Pablo and Suisun bays) and Sacramento-San Joaquin Delta	Large tidally-influenced marshes with saline to brackish water, typically with a high proportion of pickleweed (<i>Salicornia virginica</i>); also can be associated with bulrush (<i>Schoenoplectus</i> spp.), cattail (<i>Typha</i> spp.), or rushes (<i>Juncus</i> spp.); peripheral vegetation at and above mean high higher water necessary to protect nesting birds during extremely high tides	None; no suitable habitat; coastal brackish marsh in Unit 2 at downstream end of project area not extensive enough to support black rail
California Ridgway's rail	CNDDB, USFWS	FE/SE, SFP	Predominantly in the marshes of the San Francisco estuary: South	Salt and brackish water marshes, typically dominated by pickleweed (<i>Salicornia virginica</i>)	Moderate; observed in 2020 approximately 600 feet downstream of

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/State	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
<i>Rallus obsoletus</i> <i>obsoletus</i>			San Francisco Bay, North San Francisco Bay, San Pablo Bay, and sporadically throughout the Suisun Marsh area east to Browns Island	and Pacific cordgrass (<i>Spartina foliosa</i>)	project area in tidal marsh
Western snowy plover <i>Charadrius alexandrinus nivosus</i>	CNDDDB, USFWS	FT (Pacific coastal population)/SSC (interior population)	Nests in locations along the California coast, including the Eel River in Humboldt County; nests in the interior of the state in the Central Valley, Klamath Basin, Modoc Plateau, and Great Basin, Mojave, and Colorado deserts; winters primarily along coast	Barren to sparsely vegetated beaches, barrier beaches, salt- evaporation pond levees, and shores of alkali lakes; also nests on gravel bars in rivers with wide flood plains; needs sandy, gravelly, or friable soils for nesting	None; no suitable nesting or foraging habitat in project area
California least tern <i>Sternula antillarum browni</i>	USFWS	FE/SE, SFP	Pacific coast from San Francisco to Baja California	Sparsely vegetated coastal beaches and estuaries near shallow waters, above high tide line. Nests in colonies of 30 to 50.	None; no suitable nesting or foraging habitat in project area
Marbled murrelet <i>Brachyramphus marmoratus</i>	USFWS	FT/SE,	Nesting murrelets in California mostly concentrated on coastal waters near Del Norte and Humboldt counties, and in lesser numbers near San Mateo and Santa Cruz counties; winter throughout nesting range, and in small numbers in southern California	Most time spent on the ocean; nests inland in old-growth conifers with suitable platforms, especially redwood or Douglas-fir forests near coastal areas	None; no suitable nesting or foraging habitat in project area

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/State	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
Western burrowing owl <i>Athene cunicularia hypugaea</i>	CNDDB	-/SSC	Year-round resident throughout much of the state; Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along south coast	Level, open, dry, heavily-grazed or low- stature grassland or desert vegetation with available burrows	None; no suitable habitat in project area; breeding western burrowing owls are now absent from Marin County
Northern spotted owl <i>Strix occidentalis caurina</i>	USFWS	FT/SSC	Northwestern California south to Marin County, and southeast to the Pit River area of Shasta County	Typically in older forested habitats; nests in complex stands dominated by conifers, especially coastal redwood, with hardwood understories; some open areas are important for foraging	None; no suitable habitat in project area
Short-eared owl <i>Asio flammeus</i>	CNDDB	-/SSC	Year-round resident in certain areas; breeding in California episodic and a widespread winter migrant, found primarily in the Central Valley, in the western Sierra Nevada foothills, and along the coastline	Irrigated alfalfa or grain fields, ungrazed grasslands, old pastures, and salt or freshwater marshlands	None; no suitable habitat in project area
Black swift <i>Cypseloides niger</i>	CNDDB	-/SSC	Breeds locally in Sierra Nevada and Cascade ranges, the San Gabriel, San Bernardino, and San Jacinto Mts., and from San Mateo County south likely to San Luis Obispo County	Nests in moist crevices behind or beside permanent or semipermanent waterfalls in deep canyons, on perpendicular sea cliffs above surf, and in sea caves; forages widely over many habitats	None; no suitable habitat in project area
Bank swallow <i>Riparia riparia</i>	CNDDB	-/ST	Summer resident; occurs along the Sacramento River	Nests in vertical bluffs or banks, usually adjacent to water, where	None; no suitable habitat in project area

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/State	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
			from Tehama County to Sacramento County, along the Feather and lower American rivers; and in the plains east of the Cascade Range in Modoc, Lassen, and northern Siskiyou counties; small populations near the coast from San Francisco County to Monterey County	the soil consists of sand or sandy loam	
Saltmarsh common yellowthroat <i>Geothlypis trichas sinuosa</i>	CNDDDB	-/SSC	San Francisco Bay region	Brackish marsh, riparian woodland/swamp, freshwater marsh, and salt marsh often near upland habitats	Moderate; suitable foraging and nesting habitat in the coastal brackish marsh in Unit 2 at the downstream end of the project area
Alameda song sparrow <i>Melospiza melodia pusillula</i>	CNDDDB	-/SSC	Restricted to the periphery of southern San Francisco Bay	Tidal salt marsh	None; outside of the species' range
San Pablo song sparrow <i>Melospiza melodia samuelis</i>	CNDDDB	-/SSC	North side of San Francisco and San Pablo bays	Tidal salt marshes; requires dense vegetation for nesting; typically associated with California cord grass (<i>Spartina foliosa</i>), pickleweed (<i>Salicornia pacifica</i>), or gumplant (<i>Grindelia stricta</i>)	Moderate; suitable foraging and nesting habitat in the coastal brackish marsh in Unit 2 at the downstream end of the project area
Mammals					
Point Reyes jumping mouse <i>Zapus trinitatus orarius</i>	CNDDDB	-/SSC	Point Reyes area	Moist areas, including bunchgrass marshes, deciduous woody vegetation along streams	None; outside of species' range

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/State	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
				and seeps, and wet/grassy meadows	
San Pablo vole <i>Microtus californicus sanpabloensis</i>	CNDDDB	-/SSC	San Pablo Creek, Contra Costa County, on the south shore of San Pablo Bay	Salt marsh	None; outside of the species' range
Salt marsh harvest mouse <i>Reithrodontomys raviventris</i>	CNDDDB, USFWS	FE/SE, SFP	San Pablo, Suisun, and San Francisco bays in Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara, and San Mateo counties	Tidal salt marshes; depend on dense cover, preferring pickleweed (<i>Salicornia pacifica</i>) and saltgrass	Low; marginally suitable habitat at the downstream end of project area in tidal marsh
Suisun shrew <i>Sorex ornatus sinuosus</i>	CNDDDB	-/SSC	Along the north shore of San Pablo and Suisun bays, from Tubbs Island/Sonoma Creek in Sonoma County east to Grizzly Island in Solano County	Areas of low, dense vegetation, in salt and brackish marshes	None; outside of species' range
Salt marsh wandering shrew <i>Sorex vagrans halicoetes</i>	CNDDDB	-/SSC	San Francisco Bay in San Mateo, Santa Clara, Alameda and Contra Costa counties	Saline emergent wetlands, preferably with pickleweed (<i>Salicornia virginica</i>)	None; outside of species' range
Western red bat <i>Lasiurus blossevillii</i>	CNDDDB	-/SSC	Near the Pacific Coast, Central Valley, and the Sierra Nevada	Riparian forests, woodlands near streams, fields and orchards	Low (foraging only); limited suitable roosting habitat found in project area
Townsend's western big-eared bat <i>Corynorhinus townsendii</i>	CNDDDB	-/SSC	Throughout California, found in all but subalpine and alpine habitats, details of distribution not well known	Most abundant in mesic habitats, also found in oak woodlands, desert, vegetated drainages, caves or cave-like structures (including basal hollows in large	Low (foraging only); limited suitable roosting habitat found in project area

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/State	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
				trees, mines, tunnels, and buildings)	
Pallid bat <i>Antrozous pallidus</i>	CNDDDB	-/SSC	Throughout California except for elevations greater than 3,000 meters in the Sierra Nevada	Roosts in rock crevices, tree hollows, mines, caves, and a variety of vacant and occupied buildings; feeds in a variety of open woodland habitats	Low (foraging only); limited suitable roosting habitat found in project area
Guadalupe fur seal <i>Arctocephalus townsendi</i>	NMFS	FT/ST, SFP	Southern California to Mexico region	During breeding season, found in coastal rocky habitats and caves	None; no suitable habitat in project area
Steller (=northern) sea-lion <i>Eumetopias jubatus</i>	CNDDDB, NMFS (habitat)	FT/-	Coastal waters of California	Colder waters; haul outs and rookeries usually consist of beaches, ledges, or rocky reefs	None; no suitable habitat in project area
Southern sea otter <i>Enhydra lutris nereis</i>	CNDDDB	FT/SFP	Along the coastline from San Mateo County to Santa Barbara County	Protected bays and exposed outer coasts; hard- and soft-sediment marine habitats to depths of less than 100 meters (330 feet).	None; no suitable habitat in project area
American badger <i>Taxidea taxus</i>	CNDDDB	-/SSC	Throughout the state except in the humid coastal forests of Del Norte County and the northwest portion of Humboldt County	Shrubland, open grasslands, fields, and alpine meadows with friable soils	None; no suitable habitat in project area
Blue whale <i>Balaenoptera musculus</i>	NMFS	FE/-	Pacific Ocean	Deep ocean waters; also can be found in coastal waters	None; no suitable habitat in project area
Fin whale <i>Balaenoptera physalus</i>	NMFS	FE/-	Pacific Ocean	Deep ocean waters	None; no suitable habitat in project area
Humpback whale <i>Megaptera novaengliae</i>	NMFS	FE/-	Pacific Ocean	Deep ocean waters	None; no suitable habitat in project area

APPENDIX D

Common Name Scientific Name	Query Sources	Status ^a Federal/State	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
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^a Status Codes:

Federal

- FE = Listed as endangered under the federal Endangered Species Act
- FT = Listed as threatened under the federal Endangered Species Act
- FPE = Federally proposed as endangered
- FPT = Federally proposed as threatened
- FC = Federal candidate species
- FD = Federally delisted
- PD = Federally proposed for delisting
- BGEPA = Federally protected under the Bald and Golden Eagle Protection Act
- FSS = Forest Service Sensitive species
- BLMS = Bureau of Land Management Sensitive Species

State

- SE = Listed as Endangered under the California Endangered Species Act
- ST = Listed as Threatened under the California Endangered Species Act
- SCE = State Candidate Endangered
- SD = State Delisted
- SSC = CDFW Species of Special Concern
- SFP = CDFW Fully Protected species
- BOFS = Considered a sensitive species by the California Board of Forestry under the California Forest Practice Rules (14 CCR §895.1)

Appendix D

Biological Resources Supporting Information

Special-Status Species Tables

Corte Madera Creek Units 4 and 3 Dewatering and Fish Rescue Plan

Lower College of Marin Corte Madera Creek Restoration Project Draft
Dewatering Plan



DRAFT TECHNICAL MEMORANDUM

DATE: December 9, 2020
TO: Susanne Heim, Panorama Environmental
FROM: Dennis Halligan, Senior Fisheries Biologist
SUBJECT: Corte Madera Creek Units 4 and 3 Dewatering and Fish Rescue Plan

1 INTRODUCTION

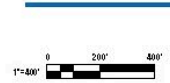
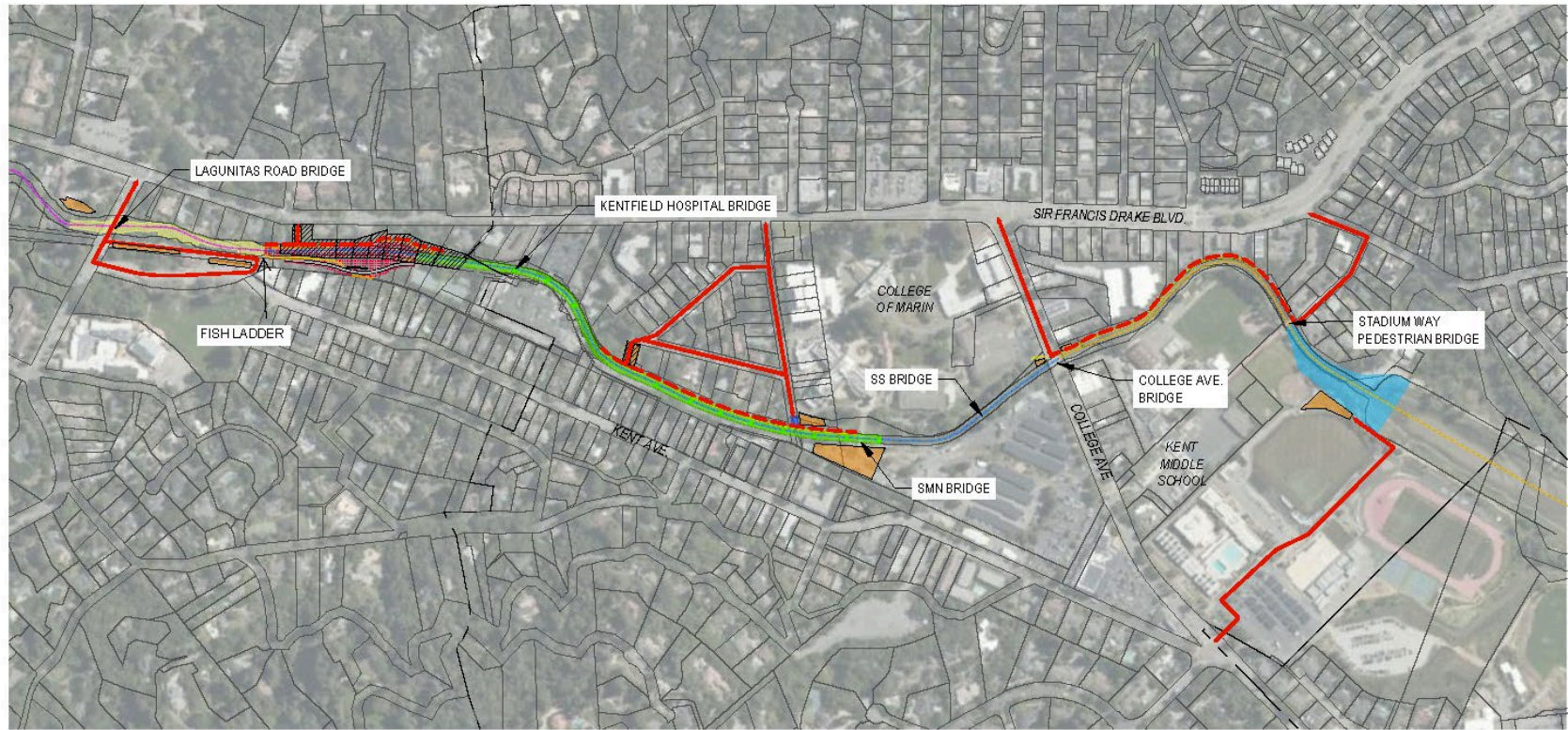
The Marin County Flood Control and Water Conservation District (District) is proposing to construct the Corte Madera Creek Flood Risk Management Project, Phase 1 (Project) (Figure 1). The Project area is located within three Units of Corte Madera Creek as designated by the U.S. Army Corps of Engineers (USACE), shown on Figure 1, and described below. The Project will include the following within the Corte Madera Creek channel:

- removal of an inoperable fish ladder (Unit 4),
- re-grading and stabilizing the natural channel upstream of the inoperable fish ladder (Unit 4),
- removal of the concrete flood control channel and restoration of approximately 800 feet of natural stream channel and floodplain (Unit 3), and
- construction of fish resting pools in the concrete-lined reach (Unit 3), and
- removal of a portion of the concrete-lined channel and restoration of a natural channel and wetlands (Unit 2).

The work in Unit 2 will be permitted by the Friends of Corte Madera Creek, who will also be developing a separate dewatering and fish rescue plan. Their plan is not included in this document and will not be discussed further.

The activities in Units 4 and 3 will require demolition and construction within the wetted Corte Madera Creek channel, which is inhabited by native fish species including steelhead trout. The Project will require the dewatering of the work areas to facilitate demolition and construction. The dewatering activities would likely adversely affect any fish present in the work area at the time of construction. Therefore, a fish removal and relocation program will be implemented prior to and during any dewatering activities.

This document describes the fish removal/relocation actions in Units 4 and 3 that would occur in conjunction with the work area dewatering.



MARIN COUNTY FLOOD CONTROL
 Corte Madera Creek
 Flood Risk Management Project - Phase 1
 Construction Access and Staging Areas
 Overview

Job Number | 11188581
 Revision |
 Date | Aug 2020

Figure 1. Project reach (GHD 2020).

2 DEWATERING AND FISH RELOCATION

Dewatering of the channel can be accomplished either by controlling the flow in the entire reach or within the individual localized work areas where demolition and construction activities will be performed. However, there are three distinct work areas within the USACE designated units that have their own individual flow and substrate characteristics:

1. Unit 4 (except for the fish ladder) is contained within a natural flowing channel and provides steelhead rearing habitat.
2. Upper Unit 3 is located in the freshwater reach between the fish ladder and Kentfield Hospital Bridge. This reach is contained within a concrete channel with no habitat complexity, and experiences limited fish use during the summer and fall months.
3. Lower Unit 3 is intertidal, extends from the Kentfield Hospital Bridge to the SMN Bridge, is also within a concrete channel, and experiences intertidal flow.

Each of the three work areas will require individualized fish removal and relocation efforts due to their specific characteristics, habitat conditions, lengths, and flow/tidal characteristics.

For the purposes of this plan, it is assumed that a cofferdam will be installed at the upstream end of Unit 4, a second one immediately downstream of the fish ladder, and a third in Unit 3 immediately downstream of the SMN Bridge. There might be interior cofferdams installed within these reaches that could be moved as work progresses, however, the fish removal activities would remain generally the same as described below.

All fish removal and relocation activities will be conducted by biologists that have been approved by the California Department of Fish and Wildlife and National Marine Fisheries Service.

2.1 Unit 4 Cofferdam Installation and Fish Removal

The Unit 4 reach extends from the fish ladder approximately 700 feet upstream, which is about 150 feet upstream of the Lagunitas Road bridge. This reach has a natural pool/riffle morphology and contains habitat for special-status and other fish species. It is expected that the Unit 4 cofferdam will be installed immediately downstream of the #1 Sylvan Lane sheet pile wall. Fish removal in this reach will require two phases. First, Unit 4 will need to be initially cleared of fish prior to cofferdam installation. Second, Unit 4 will require fish removal and relocation as the cofferdam is completed, water is bypassed around the work area, and the site dewatered.

2.1.1 Pre-cofferdam installation

The initial fish removal efforts will occur at least two days prior to installation of the Unit 4 cofferdam and while natural flow is in the channel.

2.1.2 Vegetation trimming

There is a pool that is approximately 110 feet long immediately downstream of the Lagunitas Road Bridge. This pool is located under a dense canopy of willows, which would make it very difficult to capture and remove fish. These willows will need to be trimmed back prior to the bird nesting season to facilitate fish removal efforts. Efforts should also be made to trim back any other riparian vegetation encroaching into the Unit 4 wetted channel at this time. Large and small woody debris should be retained in the channel.

2.1.3 Fish removal and relocation

The following steps are recommended to remove fish from Unit 4 prior to cofferdam installation.

1. Install a block net at the top of the Unit 4 work area and several feet upstream of the cofferdam footprint.
2. Install a block net immediately downstream of the fish ladder.
3. Begin fish removal from individual sub-reach units (e.g., a single pool/riffle/run sequence) in a sequential fashion starting at the fish ladder and moving upstream.
4. Install a block net at the upstream end of the discrete sub-reach to be cleared.
5. Fish will first be removed by use of seines and dip nets. Electrofishers, handled by experienced biologists, may be used if required.
6. Conduct at least three passes through the sub-reach or until no more fish are captured.
7. All captured fish will be held in buckets containing cool, aerated water. No more than 25 fish per bucket.
8. Fish shall not be anesthetized or measured. However, they will be visually identified to species, and year classes of special-status species will be estimated and recorded.
9. Relocate captured fish into suitable habitat areas upstream of the #1 Sylvan Lane sheet pile wall. The buckets of fish will be released in different habitat units upstream of the sheet pile wall to reduce crowding.
10. Once the fish are cleared from the first sub-reach, install a block net at the upstream end of the next section.
11. Repeat the sequence and continue up to the block net at the upstream end of Unit 4.
12. The upstream block net will stay in place during the entire Unit 4 construction period to maintain a fish-free area in front of the cofferdam and bypass structure.
13. The cofferdam can be constructed after fish are cleared from throughout Unit 4.

2.1.4 Dewatering fish removal and relocation

1. The cofferdam construction should begin several feet downstream of the upstream block net.
2. Continue installation of cofferdam to the point of near completion but leaving a gap through which flow can continue downstream. The purpose of leaving a gap is to avoid a rapid cut-off of water that could strand fish as habitat downstream dewaterers.
3. Station biologists and buckets containing aerated water at several intervals throughout Unit 4.
4. Slowly fill in the cofferdam gap to begin the backwatering and initiation of the bypass flow. The bypass flow pipe inlet should be contained in a screened containment that complies with the California Department of Fish and Wildlife screening criteria (CDFG 2002).
5. The work area will begin to dewater as the bypass takes an increasing amount of flow. Any remaining fish will become more exposed and available for capture as the water levels drop and habitat units shallow and dry.
6. Fish shall not be anesthetized or measured. However, they will be visually identified to species level, and year classes of special-status species will be estimated and recorded.
7. Any fish captured will be placed in suitable habitat upstream of the #1 Sylvan Lane sheet pile wall.
8. Biologists will remain until the area is fully dewatered.

2.2 Unit 3

Unit 3 extends downstream approximately 3,400 feet from the fish ladder to the College Avenue Bridge. This reach is contained entirely within a concrete-lined channel and becomes intertidal in the vicinity of the Kentfield Hospital Bridge, which is about 900 feet downstream of the fish ladder. The lower extent of the proposed fish resting pool construction is approximately 2,600 feet downstream of the fish ladder and 100 feet below the SMN Bridge. Unit 3 will require two different fish removal techniques; one for freshwater and another that would take advantage of tidal characteristics.

2.2.1 Unit 3 freshwater reach fish removal

The Unit 3 freshwater reach extends from the fish ladder downstream approximately 900 feet to the Kentfield Hospital Bridge. The fish habitat in this reach is of very poor quality and consists of very shallow concrete pools separated by narrow, smooth-bottomed riffles. Fish removal in this reach would be performed as follows:

1. Install a block net at the fish ladder and a second one at the upstream end of the intertidal reach.
2. Conduct a beach seine sweep starting at the fish ladder and moving in a downstream direction.
3. As the sweep moves downstream, biologists in front of the seine will haze fish out of the concrete pools as they are encountered. Any fish captured in the concrete pools will be placed in cool aerated buckets of water for transfer to the reach upstream of the Unit 4 cofferdam.
4. The sweep will continue in a downstream direction until biologists reach the block net at the upper end of the intertidal zone near the Kentfield Hospital.
5. Any fish between the seine and block net will be dip netted and relocated in suitable habitat upstream of Unit 4 and the #1 Sylvan Lane sheet pile wall.
6. Fish shall not be anesthetized or measured. However, they will be visually identified to species level, and year classes of special-status species will be estimated and recorded.
7. The block net at the upstream end of the intertidal reach will remain in place during the intertidal fish removal effort described below.
8. Biologists will remain in the reach as water levels drop following construction of the cofferdam at the fish ladder and initiation of flow bypass and dewatering activities.

2.2.2 Unit 3 Kentfield Hospital to the SMN Bridge intertidal reach

The Unit 3 intertidal reach fish resting pool work area extends approximately 1,700 feet from the Kentfield Hospital downstream to the SMN Bridge. The intertidal concrete channel contains very little suitable habitat for special-status fish species. The initial fish removal efforts will be timed to take advantage of the ebbing tide to assist moving fish downstream. It is recommended that installation of the supersack cofferdam (constructed using large bags or “sacks”) downstream of the SMN Bridge and first fish resting pool begin prior to initiation of the fish removal effort. The center section of the supersack cofferdam should stay open and allow the ebb tide to pass until the fish removal effort described below is completed. The tidal flux in this area and lack of anchoring points would make a block net ineffective.

1. The fish removal effort within the intertidal reach would begin at the downstream end of the Unit 3 freshwater reach during the ebbing tide and just prior to low tide.
2. Conduct a single beach seine sweep starting at the freshwater block net and moving in a downstream direction.
3. Any fish present in the shallow concrete pools will be crowded downstream with the seine net.

4. The seine sweep will continue in a downstream direction until it reaches the supersack cofferdam. At that point, the fish will be crowded through the opening in the center of the cofferdam.
5. A block net will be placed immediately downstream of the cofferdam opening to restrict reentry into Unit 3 by fish.
6. The very smooth nature of the concrete channel should allow the single seine net sweep to remove the vast majority of fish present.
7. The block net will remain in place while the opening is closed and the supersack cofferdam is completed.
8. Biologists will remain in the reach to collect any remaining fish as water levels drop following initiation of during bypass activities.

3 DECONTAMINATION

Corte Madera Creek is known to contain New Zealand mud snails. All gear (block nets, seines, dip nets, buckets, etc.) used to capture and relocate fish will undergo decontamination. Decontamination protocols will include:

- Freeze equipment/gear for a minimum of 8 hours at temperatures at 26°F (-3°C) or below.
- Soak equipment/gear in a bath of hot water (at least 120°F, 46°C) for 10 minutes.
- Soak equipment/gear in a bath of a disinfectant containing quaternary ammonium compounds (QAC) (e.g., Quat 4, Quat 128, Super HDQ Neutral, etc.) for 10 minutes. The QAC-containing disinfectant should be diluted with water at a rate to achieve a minimum active QAC concentration of 0.4%. Six (6) ounces of disinfectant to gallon of water can be used as a disinfectant to water ratio (1:21). After removal from the bath, rinse equipment/gear thoroughly with tap water.

4 REFERENCES

CDFG (California Department of Fish and Game). 2002. Fish screen criteria. Appendix S, California Salmonid Stream Habitat Restoration Manual.

GHD. 2020. Overall construction considerations. Prepared for the Marin County Flood Control and Water Conservation District. Santa Rosa, California.

Appendix D

Biological Resources Supporting Information

Special-Status Species Tables

Corte Madera Creek Units 4 and 3 Dewatering and Fish Rescue Plan

**Lower College of Marin Corte Madera Creek Restoration Project Draft
Dewatering Plan**

Lower COM Corte Madera Creek Restoration Project

DRAFT Dewatering Plan

November 27, 2020

The purpose of the Lower College of Marin (Lower COM) Corte Madera Creek Restoration Project (project) is to (1) restore as much natural functioning aquatic, tidal, transitional, and riparian upland habitat as possible within site constraints, in a manner that is adaptive to future sea level rise (SLR) and (2) accommodate floodwater delivered to the channel and convey it to the downstream end of the concrete channel where there is adequate capacity, by removing parts of the downstream end of the USACE concrete flood control channel.

Purpose of this Plan

To ensure potential impacts to aquatic species are avoided or minimized, they will be protected in accordance with this Dewatering Plan. Project activities will require 650 feet of the creek to be dewatered and aquatic species relocated out of the in-stream work area. A qualified biologist, as described in the paragraph *Qualified Biologist*, will implement the plan. This project will operate under U.S. Army Corps of Engineers (USACE) Clean Water Act §404 compliance, USACE Section §408 compliance for modification of an existing USACE structure, §1602 Streambed Alteration Agreement from the California Department of Fish and Wildlife (CDFW), and §401 Certification from the San Francisco Bay Regional Water Quality Control Board (RWQCB). The USACE will consult with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) as part of the permit process.

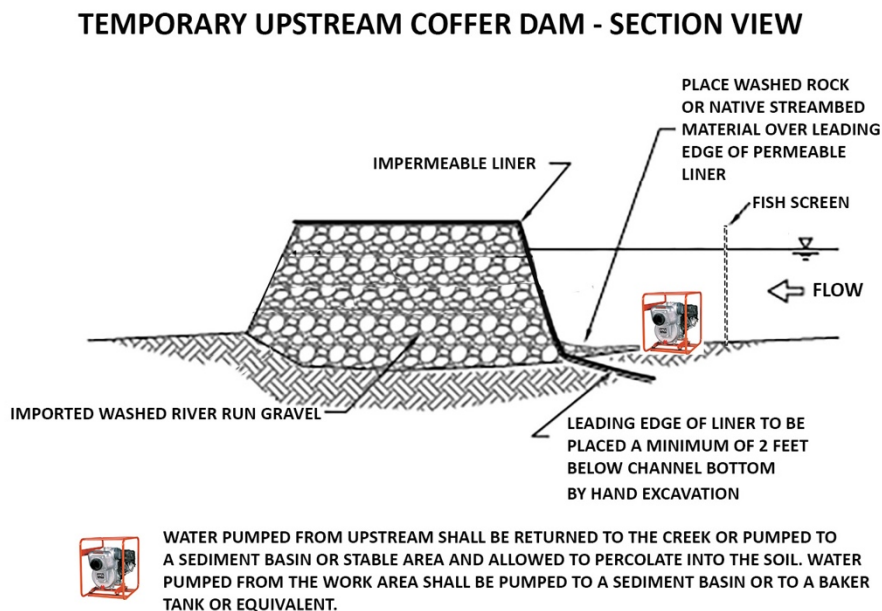
Stages of Construction

To avoid the discharge of sediment-laden water into Corte Madera Creek during construction, the work will take place during summer/fall low flow conditions. Construction is planned for the following stages:

1. Remove most of the soil behind the concrete wall on the right side of the creek (use temporary supports for the wall as necessary)
2. Install fish screens and remove fish from the project area (see below for a description of fish protection measures)
3. When fish removal is near completion, install coffer dams upstream and downstream of the work area
4. Dewater work area and complete fish removal
5. Remove a portion of the right wall to allow construction of a temporary dirt ramp across the creek to provide access for earthmoving equipment to the left bank
6. Remove the downstream section of the left wall and regrade the left bank, hauling material across the dewatered creek; no work will take place in the creek channel other than that necessary to reach the left bank
7. Remove dirt ramp and the remainder of the right wall; regrade the right bank
8. Remove the coffer dams
9. Install plants in fall and winter following construction

Upstream Cofferdam: Large sandbags (aka super sacks: <https://megasack.com/> or similar), filled with off-site gravel and/or sand will be used to construct a coffer dam in the concrete channel upstream of Stadium Way, near the upstream end of the project site (Figure 1). The upstream end of the upstream coffer dam will be reinforced with thick plastic sheeting to act as an additional barrier for water and fish traveling downstream. Water from upstream will be pumped around the work area and back into the creek or onto a stable area and allowed to infiltrate or pumped to the creek below the work area.

Figure 1: Sample coffer dam design



Downstream Cofferdam: Tides ranging over several feet reach into the work area from downstream and sandbags are not appropriate. Sheet piles will be installed with a silent, reaction-based hydraulic pile machine (aka Giken Silent Piler https://www.giken.com/en/products/silent_piler/ or similar) across the outer edges of the downstream work areas that will need to be dewatered, leaving an opening in the center that can be closed with a bladder or more sheet piles when it becomes necessary to dewater the work area by preventing tidal flow from entering it.

In addition to the stream flow diversion around the in-stream project area, a small dewatering basin within the work area will be dug. A sump pump of adequate capacity will be placed at the bottom of the basin to remove subsurface creek flow and keep the work area dry. The pump will be screened in accordance with *Juvenile Fish Screen Criteria for Pump Intakes* developed by (NMFS 1997) and will consist of 3/32-inch screen mesh. The water removed from the basin will be sent to a stilling basin, tank, or other approved device for final clarification prior to being

returned to the creek. All silt, sand, and fines removed in the clarification process will be used in the restoration.

A NMFS-authorized biologist will be on site to oversee installation and decommissioning of the water diversion structures and to conduct aquatic species rescue in the in-stream project reach (see *Qualified Biologist* paragraph below). Cofferdams and temporary water diversions will meet all permit requirements. The stream will be returned to its natural flow and bed condition upon project completion.

Throughout project construction, a qualified biologist will make frequent visits to the project area to ensure that no aquatic animals or Ridgway's rails are being impacted by construction activities. The biologist will also monitor to ensure water quality standards are being met and sediment is not entering the watercourse.

Protection of Aquatic Species

To avoid impacts to aquatic species (i.e., steelhead trout, other resident fish), surveys and relocation activities by a qualified biologist will be conducted to avoid disturbance to these species prior to commencing project construction. If found, all species will be relocated as described below in *Procedures for Removing Fish and Other Aquatic Species*. The in-stream project area will also be swept by the qualified biologist periodically during construction to ensure no animals have moved into the area. In addition, proper erosion control and other water quality Best Management Practices (BMPs) will be implemented to avoid sedimentation and disturbance into the creek.

Immediately prior to beginning construction work, a qualified biologist will determine if any fish are present in the project vicinity. An assessment of the site will be fashioned after protocols described in the *California Salmonid Stream Habitat Restoration Manual* (CDFW 2009). The survey will be done at a low tide when the water is very shallow in the project area.

If prior to construction no fish are detected, no additional fish protection measures will be implemented. A qualified biologist will also survey the site periodically during the construction process to ensure fish have not moved into the project area. If fish are observed after construction commences, work shall stop and appropriate actions taken to safely remove them.

Fish Capture and Relocation: If in-channel work requires dewatering, including for sediment-removal maintenance activities, fish shall be captured and relocated upstream of the project areas to avoid injury and mortality and minimize disturbance. The District shall implement the measures below or whatever more stringent species-preservation and avoidance measures are imposed by resource agencies, including NMFS and CDFW, with jurisdiction over aquatic special-status species:

1. The name(s) and credentials of qualified biologist(s) to act as construction monitors shall be submitted to CDFW and NMFS for approval at least 15 days before construction work begins.
2. Prior to and during the initiation of construction activities, a qualified fisheries biologist (i.e., approved by CDFW and/or NMFS) shall be present during installation and removal of creek-diversion structures.
3. For sites that require flow diversion and exclusion, the work area shall be blocked by placing fine-meshed nets or screens above and below the work area to prevent salmonids from re-entering the work area. To minimize the potential for re-entry, mesh diameter shall not exceed 1/8 inch. The bottom edge of the net or screen shall be secured to the channel bed to prevent fish from passing under the screen. Exclusion screening shall be placed in low-velocity areas to minimize fish impingement against the mesh. Screens shall be checked periodically and cleaned of debris to permit free flow of water.
4. Before removal and relocation on individual fish begins, a qualified fisheries biologist shall identify the most appropriate release location(s). In general, release locations should have water temperatures similar to (<3.6 degrees Fahrenheit difference) the capture location and offer ample habitat (e.g., depth, velocity, cover, connectivity) for released fish and should be selected to minimize the likelihood of reentering the work area or becoming impinged on exclusion nets or screens.
5. The means of capture shall depend on the nature of the work site and shall be selected by a qualified fisheries biologist as authorized by CDFW and NMFS. Complex stream habitat may require the use of electrofishing equipment, whereas in outlet pools, fish and other aquatic species may be captured by pumping down the pool and then seining or dip netting.
6. Initial fish relocation efforts shall be performed several days prior to the scheduled start of construction and continue through cofferdam installation and work-area dewatering activities.
7. Flow diversions and species relocation shall be performed during morning periods. The fisheries biologist shall survey the exclusion screening throughout the diversion effort to verify that no special-status fish, amphibians, or aquatic invertebrates are present. Afternoon pumping activities shall be limited, and pumping shall be suspended when water temperatures exceed 18 degrees Celsius. Water temperatures shall be measured periodically, and flow diversion and species relocation shall be suspended if temperatures exceed the 18-degree limit under NMFS guidelines. Handling of fish shall be minimized. When handling is necessary, personnel shall wet hands or nets before touching them.
8. Prior to translocation, fish that are collected during surveys shall be temporarily held in cool, aerated, shaded water using a five-gallon container with a lid. Overcrowding in containers shall be avoided; at least two containers shall be used, and no more than 25 fish shall be kept in each bucket. Aeration shall be provided with a battery-powered external bubbler. Fish shall be protected from jostling and noise and shall not be removed from the container until the time of release. A thermometer shall be placed in

each holding container, and partial water changes shall be conducted as necessary to maintain a stable water temperature. Special-status fish shall not be held more than 30 minutes.

9. If fish are abundant, capture shall cease periodically to allow release and minimize the time fish spend in holding containers.
10. Fish shall not be anesthetized or measured. However, they shall be visually identified to species level, and year classes shall be estimated and recorded.
11. Reports on fish-relocation activities shall be submitted to CDFW and NMFS in within two weeks following completion of in-channel operations.

Qualified Biologist

For the purposes of the Lower COM Corte Madera Creek Restoration Project:

- A person holding a valid collector's permit for all salmonid species subject to take from NMFS and CDFW; or
- A person with a bachelors or higher degree in fisheries biology, wildlife biology, marine biology, aquatic biology, hydrology, wetland ecology or equivalent other course of study; and 5 or more years of professional experience in fisheries research, management, and/or habitat restoration; and direct participation in 5 or more fish capture and transport events. The name(s) and credentials of qualified biologist(s) to act as construction monitors shall be submitted to CDFW and NMFS for approval at least 15 days before construction work begins.

References Cited

CDFW 2009

California Department of Fish and Wildlife. 2009. *California Salmonid Stream Habitat Restoration Manual*.

NMFS 1997

National Marine Fisheries Service. 1997. *Fish Screening Criteria for Anadromous Salmonids*.