Appendices

Appendix A

Infrastructure

A.1 Existing Conditions

The following section provides an overview of key infrastructure components in Planning Area 1 under existing conditions.

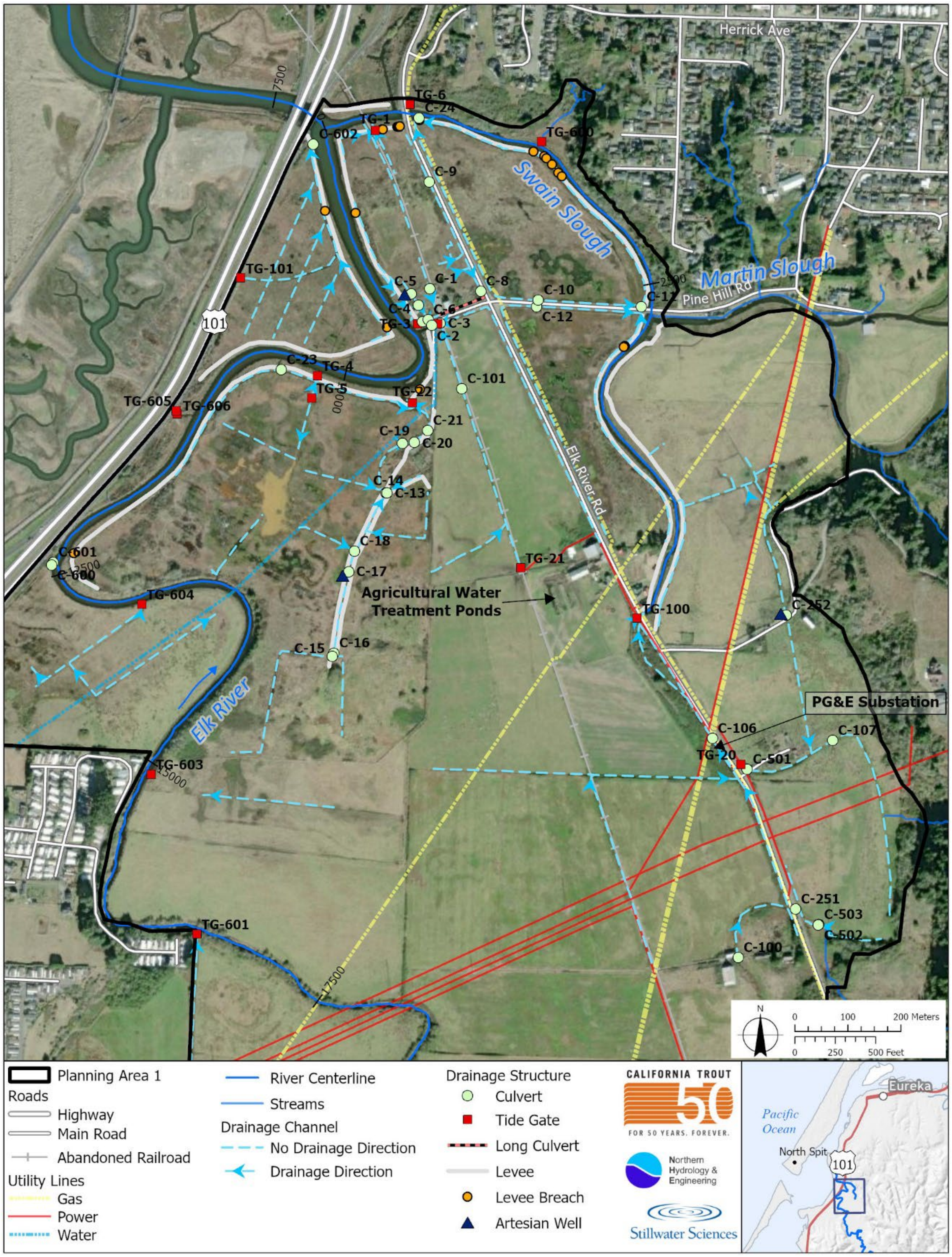


Figure A-1. Planning Area 1 infrastructure from Hwy 101 to Elk River STA 17,500.

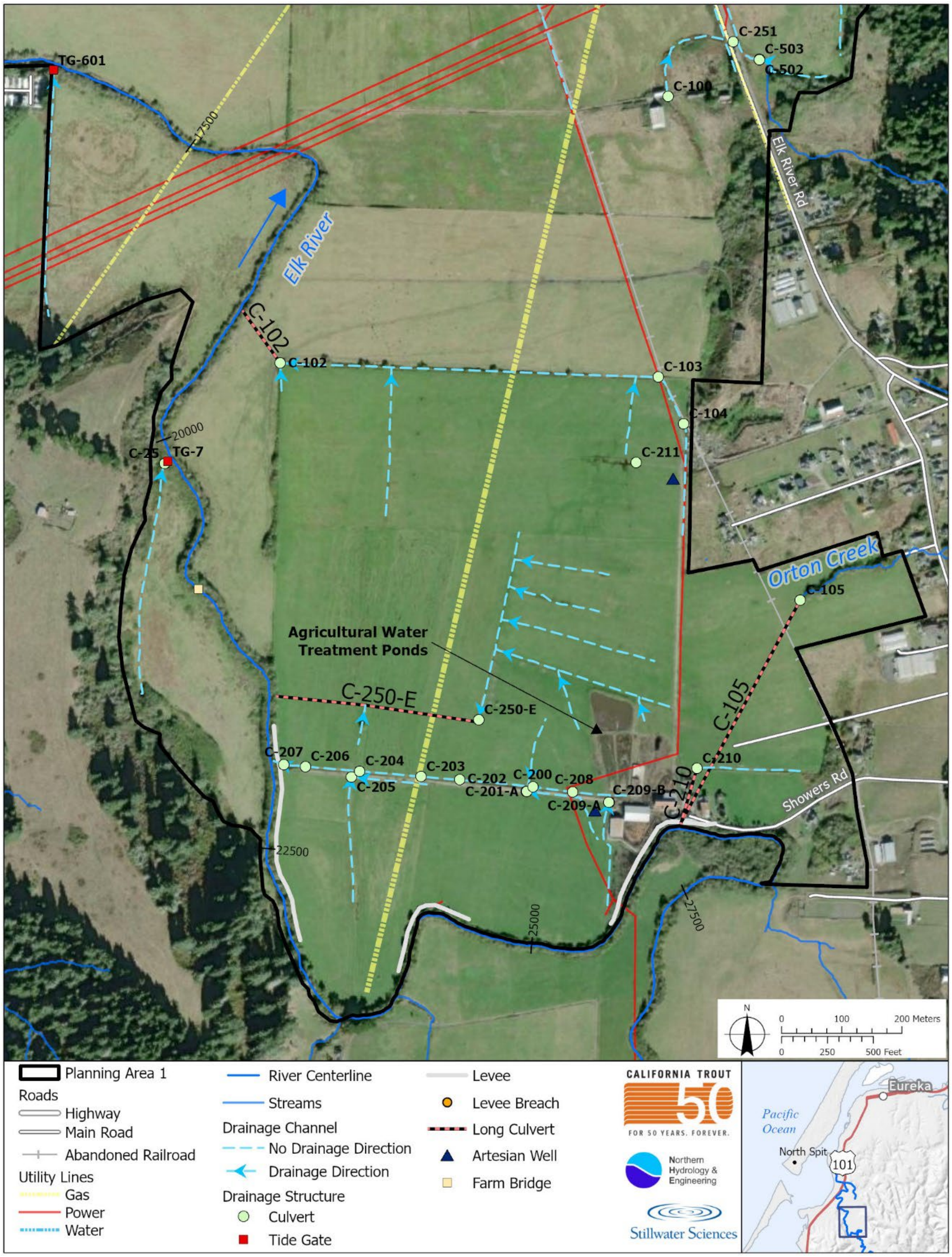


Figure A-2. Planning Area 1 infrastructure from STA 17,500 to Showers Road.

Table A-1. Culverts surveyed in Planning Area 1.

Structure ID	Northing (ft)	Easting (ft)	Elevation (ft)	Material	Opening	Diam. or WxH (ft)	Length (ft)]
C-1	2165081.980	5955707.028	5.912	Plastic	Circular	1.0	18
C-2	2164855.952	5955720.125	1.465	Concrete	Rectangular	5x6	32
C-4	2164997.787	5955627.063	5.542	Plastic	Circular	1.0	20
C-5	2165058.598	5955587.337	5.281	Concrete	Circular	1.0	8
C-6	2164892.382	5955697.206	4.781	Concrete	Circular	1.0	20
C-7	2164878.869	5955664.786	4.329	Plastic	Circular	1.0	35
C-8	2165068.182	5956024.021	4.524	Concrete	Circular	0.5	440
C-9	2165810.019	5955674.230	7.763	Plastic	Circular	2.0	75
C-10	2165013.607	5956380.115	4.910	Plastic	Circular	1.0	20
C-11	2164972.479	5957016.477	3.939	Concrete	Circular	1.5	35
C-12	2164973.870	5956351.883	4.991	Concrete	Circular	1.0	20
C-13	2163830.393	5955457.675	4.954	Concrete	Circular	1.5	20
C-14	2163817.590	5955436.654	3.749	Plastic	Circular	1.5	20
C-15	2162806.881	5955104.198	4.877	Concrete	Circular	2.0	NA
C-16	2162845.141	5955116.118	5.925	Concrete	Circular	1.8	20
C-17	2163346.686	5955209.622	4.082	Concrete	Circular	2.0	18
C-18	2163457.572	5955241.241	3.482	Concrete	Circular	2.0	30
C-19	2164127.147	5955558.955	3.612	Concrete	Circular	2.0	24
C-20	2164130.115	5955612.824	3.260	Concrete	Circular	2.0	21
C-21	2164205.625	5955693.929	2.887	Concrete	Circular	2.0	NA
C-23	2164581.210	5954772.106	3.708	Concrete	Circular	3.0	15
C-24	2166141.887	5955642.186	2.314	Metal	Circular	2.0	25
C-25	2158936.747	5954873.081	7.788	Concrete	Circular	1.2	4
C-100	2160940.072	5957617.203	3.988	Concrete	Circular	1.3	30
C-101	2164464.533	5955906.667	2.181	Concrete	Circular	2.0	10

Structure ID	Northing (ft)	Easting (ft)	Elevation (ft)	Material	Opening	Diam. or WxH (ft)	Length (ft)]
C-102	2159487.034	5955502.435	5.457	Concrete	Circular	2.0	350
C-103	2159410.654	5957563.929	7.640	Plastic	Circular	0.8	18
C-104	2159154.986	5957701.482	8.795	Plastic	Circular	2.0	30
C-105	2156966.506	5957686.562	11.167	Concrete	Circular	2.5	1400
C-106	2162296.703	5957458.531	1.422	Concrete	Circular	4.3	50
C-107	2162284.694	5958201.886	4.543	Concrete	Circular	2.5	20
C-200	2157172.984	5956879.512	10.773	Plastic	Circular	2.0	50
C-201-A	2157148.201	5956844.963	11.465	Plastic	Circular	2.0	25
C-201-B	2157169.237	5956847.278	10.919	Plastic	Circular	2.0	25
C-202	2157212.178	5956480.896	9.938	Plastic	Circular	2.0	30
C-203	2157229.208	5956269.082	10.030	Plastic	Circular	2.0	62
C-204	2157259.155	5955936.374	8.905	Plastic	Circular	2.0	32
C-205	2157228.579	5955889.981	9.823	Plastic	Circular	1.0	35
C-206	2157284.914	5955638.655	8.808	Plastic	Circular	2.0	45
C-207	2157294.846	5955522.474	9.191	Plastic	Circular	3.0	70
C-208	2157145.534	5957096.088	12.277	Plastic	Circular	2.0	20
C-209-A	2157126.940	5957297.212	13.326	Concrete	Circular	2.0	30
C-209-B	2157090.331	5957298.438	13.942	Concrete	Circular	2.0	30
C-210	2157273.919	5957774.999	16.374	Concrete	Circular	1.0	320
C-211*	2158944	5957442	8	Unk	Unk	Unk	Unk
C-250-E*				Concrete	Circular	1.0	1,100
C-251*				Unk	Unk	Unk	Unk
C-252*	2163066	5957927	7	Unk	Unk	Unk	Unk
C-501	2162106.291	5957674.080	3.800	Concrete	Circular	2.5	30
C-502	2161137.930	5958135.503	5.857	Plastic	Circular	2.0	20
C-503	2161144.054	5958115.818	5.666	Plastic	Circular	2.0	20

Structure ID	Northing (ft)	Easting (ft)	Elevation (ft)	Material	Opening	Diam. or WxH (ft)	Length (ft)]
C-600	2163371.757	5953365.660	3.356	Wood	Rectangular	1x1.25	Unk
C-601	2163388.591	5953374.732	2.231	Wood	Rectangular	1.67x1	Unk
C-602	2165972.611	5954963.723	3.634	Concrete	Circular	1.5	25

* Feature not surveyed, coordinates are estimated.

Table A-2. Tide gates surveyed in Planning Area 1.

Structure ID	Northing (ft)	Easting (ft)	Elevation (ft)	Material	Opening	Diam. Or WxH (ft)	Length (ft)
TG-1	2166063.660	5955370.336	3.714	Wood Gate/Concrete Structure	Rectangular	1.5x4.4	8
TG-2	2164866.859	5955757.134	2.379	Concrete	Rectangular	4x4	16
TG-3	2164865.308	5955633.006	3.299	Plastic Pipe/Wood Gate	Rectangular	1.5x4.5	25
TG-4	2164522.442	5955005.298	4.606	Plastic Pipe/Wood Gate	Circular	2.0	23
TG-5	2164395.016	5954973.934	5.588	Plastic Pipe/Concrete Structure	Circular	1.5	15
TG-6	2166256.157	5955588.145	3.015	Concrete Pipe/Metal Gate	Circular	4.0	35
TG-7	2158950.398	5954888.630	7.516	Metal Gate/Concrete Headwall	Circular	2.5	21
TG-20	2162136.529	5957635.010	5.413	Metal Pipe/Concrete Headwall	Circular	4.0	55
TG-21	2163354.530	5956271.395	4.079	Concrete	Circular	1.3	30
TG-22	2164376.472	5955600.389	2.591	Concrete	Rectangular	4x5	15
TG-100	2163039.483	5956998.938	10.631	Metal Gate/Concrete Headwall	Circular	5.0	70
TG-101	2165151.784	5954536.352	4.443	Metal Gate/Concrete Headwall	Circular	2.0	Spans HWY101
TG-600	2165984.785	5956394.821	2.115	Wood	Rectangular	0.0	11
TG-601	2161065.074	5954264.822	7.423	Metal Pipe/Concrete Headwall	Circular	2.5	21
TG-603	2162075.007	5953982.633	2.654	Concrete	Circular	1.0	NA
TG-604	2163128.617	5953925.453	2.314	Concrete Pipe/Wood Debris	Circular	1.2	4
TG-605	2164327.615	5954137.953	1.635	Metal Pipe/Concrete Headwall	Circular	2.0	2
TG-606	2164308.550	5954143.243	2.194	Metal	Circular	2.0	2

A.2 Design Conditions

The following section provides an overview of infrastructure modifications proposed in Planning Area 1. Refer to Figure 3-15 and Figure 3-16 for locations of structure modifications.

Table A-2. Proposed culvert modifications in Planning Area 1.

Structure ID	Northing (ft)	Easting (ft)	Elevation (ft)	Material	Opening	Diam. or WxH (ft)	Length (ft)	Action
C-2	2164856	5955720.1	1.47	Concrete	Rectangular	5 x 6	32	Removed
C-3	2164870	5955772.5	2.36	Concrete	Rectangular	4 x 4	32	Removed
C-13	2163830.4	5955457.7	4.95	Concrete	Circular	1.5	20	Removed
C-14	2163817.6	5955436.7	3.75	Plastic	Circular	1.5	20	Removed
C-15	2162806.9	5955104.2	4.88	Concrete	Circular	2	NA	Removed
C-16	2162845.1	5955116.1	5.93	Concrete	Circular	1.8	20	Removed
C-17	2163346.7	5955209.6	4.08	Concrete	Circular	2	18	Removed
C-18	2163457.6	5955241.2	3.48	Concrete	Circular	2	30	Removed
C-19	2164127.1	5955559	3.61	Concrete	Circular	2	24	Removed
C-20	2164130.1	5955612.8	3.26	Concrete	Circular	2	21	Removed
C-21	2164205.6	5955693.9	2.89	Concrete	Circular	2	NA	Removed
C-23	2164581.2	5954772.1	3.71	Concrete	Circular	3	15	Removed
C-24	2166141.9	5955642.2	2.31	Metal	Circular	2	25	Removed
C-25	2158936.7	5954873.1	7.79	Concrete	Circular	1.2	4	Removed
C-102	2159487	5955502.4	5.46	Concrete	Circular	2	350	Removed
C-105	2156966.5	5957686.6	11.17	Concrete	Circular	2.5	1400	Removed
C-206	2157284.9	5955638.7	8.81	Plastic	Circular	2	45	Removed
C-207	2157294.8	5955522.5	9.19	Plastic	Circular	3	70	Removed
C-250-E	2157545.8	5956577.3	8.10	Concrete	Circular	1	1,100	Removed
C-DG1	2164940.7	5955964.8	5.20	Concrete	Box	3 x 2	57	Installed
C-DG2	2165357.9	5955651.9	4.67	Concrete	Box	4 x 2	45	Installed

Table A-3. Proposed tide gate modifications in Planning Area 1.

Structure ID	Northing (ft)	Easting (ft)	Elevation (ft)	Material	Opening	Diam. or WxH (ft)	Length (ft)	DG action
TG-1	2166058.6	5955374.1	3.7	Concrete	Circular	4	8	Replace & Move
TG-2	2164872.9	5955772	2.38	Concrete	Box	4 x 4	54	Replace
TG-3	2164865.3	5955633	3.299	Plastic Pipe/Wood Gate	Rectangular	1.5x4.5	25	Install Side-Hinge Gate
TG-4	2164522.4	5955005.3	4.606	Plastic Pipe/Wood Gate	Circular	2	23	Remove
TG-5	2164395	5954973.9	5.588	Plastic Pipe/Concrete Structure	Circular	1.5	15	Remove
TG-7	2158950.4	5954888.6	7.516	Metal Gate/Concrete Headwall	Circular	2.5	21	Remove
TG-20	2162136.5	5957635	5.413	Metal Pipe/Concrete Headwall	Circular	4	55	Install Side-Hinge Gate
TG-22	2164376.5	5955600.4	2.591	Concrete	Rectangular	4x5	15	Remove
TG-100	2163078.4	5957037	2.55	Concrete	Circular	6	58	Add adjustable opening
TG-600	2165984.8	5956394.8	2.115	Wood	Rectangular	0	11	Remove
TG-601	2162003.5	5954310.2	2	Concrete	Circular	2.5	21	Replace, Move, Add adjustable opening

Table A-4. Proposed building modifications in Planning Area 1.

Structure ID	Northing (ft)	Easting (ft)	Elevation (ft)	Material	Area (ft^2)	Width (ft)	Length (ft)	DG action
B-1	2164102.0	5955699.3	9.25	Wood	1656	24	69	Remove building and pad
B-2	2163027.5	5958055.7	12.25	Wood	5185	61	85	Remove building and pad
B-3	2162140.5	5957820.6	8.25	Wood	1188	27	44	Remove building and pad

Appendix B

Vegetation and Special-status Plant Survey Supplemental Materials

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only

Source Code: ______ Quad Code: ______

Elm Code: ______ Occ No.: ______

EO Index: ______ Map Index: ______

Date of Field Work (mm/dd/yyyy): 05/12/2021

Clear Form | Print Form

California Native Species Field Survey Form

Scientific Name: Angelica lucida

Common Name: sea watch

Species Found? (●) Yes ( ) No ______ If not found, why?

Total No. Individuals: 400 Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? ______ Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: E. Craydon, E. Teraoka, V. Bryant, K. Pow

Address: 850 G Street, Suite K, Arcata, CA 95521

E-mail Address: Emmalien@stillwatersci.com

Phone: 707-822-9607 x210

Plant Information

Phenology:

20 % vegetative 80 % flowering ______ % fruiting

Animal Information

______ # adults ______ # juveniles ______ # larvae ______ # egg masses ______ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

On and near both banks of Elk River near HWY 101

County: Humboldt Landowner / Mgr: State of California (CDFW) and private.

Quad Name: ______ Elevation: ______

T____ R____ Sec____, ____¼ of ____ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____¼ of ____ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: ArcGIS FieldMap app

DATUM: **NAD27** ( ) **NAD83** ( ) **WGS84** ( ) Horizontal Accuracy: ______ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )

Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Growing along and near upper banks of Elk River including some individuals within adjacent agricultural fields and Elk River Wildlife Area. Carex lyngbyei is dominant along bank. Dominant species away from banks include: Deschampsia cespitosa, Potentilla anserina, Hordeum brachyantherum, Symphyotrichum chilense, Achillea millefolia, and Rubus ursinus.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Agriculture (cattle), wildlife area

Visible disturbances: non native encroachment

Threats: non natives and bank erosion

Comments:

Determination: *(check one or more, and fill in blanks)*

- ☐ Keyed (cite reference): Jepson eFlora (2021)
- ☐ Compared with specimen housed at: ______
- ☐ Compared with photo / drawing in: ______
- ☐ By another person (name): ______
- ☐ Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☒
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only

Source Code: ______ Quad Code: ______
Elm Code: ______ Occ No.: ______
EO Index: ______ Map Index: ______

Date of Field Work (mm/dd/yyyy): 05/12/2021

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: Angelica lucida

Common Name: sea watch

Species Found? (●) Yes ( ) No ______ If not found, why?

Total No. Individuals: 50-100 Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? ______ Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: E. Craydon, E. Teraoka, V. Bryant, K. Pow

Address: 850 G Street, Suite K, Arcata, CA 95521

E-mail Address: Emmalien@stillwatersci.com

Phone: 707-822-9607 x210

Plant Information

Phenology:

% vegetative	% flowering	% fruiting
10	90	0

Animal Information

______ # adults ______ # juveniles ______ # larvae ______ # egg masses ______ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Along Swain Slough south of Pine Hill Road crossing,

County: Humboldt Landowner / Mgr: ______

Quad Name: ______ Elevation: ______

T____ R____ Sec____, ____$^1/_4$ of ____ $^1/_4$, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____$^1/_4$ of ____ $^1/_4$, Meridian: H( ) M( ) S( ) GPS Make & Model: ArcGIS FieldMap app

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: ______ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) **OR** Geographic (Latitude & Longitude) ( )

Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Plants growing near banks of Swain Slough and within adjacent low-use agricultural field. Site is currently undergoing land conversion caused by unmaintained earthen dikes and leaky tide gates.
Associated plant species include: Deschampsia cespitosa, Juncus balticus/lescurii, Potentilla anserina, Achillea millefolium, Atriplex prostrata, and Symphyotrichum chilense

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Agriculture (Cattle)

Visible disturbances: none

Threats: none

Comments:

Determination: *(check one or more, and fill in blanks)*

☒ Keyed (cite reference): Jepson eFlora (2021)
☐ Compared with specimen housed at: ______
☐ Compared with photo / drawing in: ______
☐ By another person (name): ______
☐ Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☒
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only

Source Code: ______ Quad Code: ______
Elm Code: ______ Occ No.: ______
EO Index: ______ Map Index: ______

Date of Field Work (mm/dd/yyyy): 05/14/2021

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: Angelica lucida

Common Name: sea watch

Species Found? (●) Yes ( ) No ______ If not found, why?

Total No. Individuals: >100 Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? ______ Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: E. Craydon, E. Teraoka, V. Bryant, K. Pow
Address: 850 G Street, Suite K, Arcata, CA 95521
E-mail Address: Emmalien@stillwatersci.com
Phone: 707-822-9607 x210

Plant Information

Phenology:

% vegetative	% flowering	% fruiting
30	70	0

Animal Information

# adults	# juveniles	# larvae	# egg masses	# unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Along and north of Pine Hill Road near Swain Slough

County: Humboldt Landowner / Mgr: ______

Quad Name: ______ Elevation: ______

T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( ) GPS Make & Model: ArcGIS FieldMap app

DATUM: **NAD27** ( ) **NAD83** ( ) **WGS84** ( ) Horizontal Accuracy: ______ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )

Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Population occuring along Pine Hill road near roadside drainages and throughout adjacent low-use agricultural field. Site is currently undergoing land conversion caused by unmaintained earthen dikes and leaky tide gates. Individuals observed in field in transition of lower Potentilla association and higher grassland species.
Associated plant species include: Baccharis pilularis, Deschampsia cespitosa, Juncus balticus/lescurii, Potentilla anserina, Achillea millefolium, Atriplex prostrata, Symphyotrichum chilense, Scrophularia californica, Claytonia perfoliata.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: low use agricultural

Visible disturbances: none

Threats: none

Comments:

Determination: *(check one or more, and fill in blanks)*

☒ Keyed (cite reference): Jepson eFlora (2021)
☐ Compared with specimen housed at: ______
☐ Compared with photo / drawing in: ______
☐ By another person (name): ______
☐ Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☒
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only

Source Code: ______ Quad Code: ______
Elm Code: ______ Occ No.: ______
EO Index: ______ Map Index: ______

Date of Field Work (mm/dd/yyyy): 05/14/2021

Clear Form | Print Form

California Native Species Field Survey Form

Scientific Name: *Castilleja ambigua subsp. humboldtiensis*

Common Name: Humboldt Bay owl's clover

Species Found? (◉) Yes ( ) No ______ If not found, why?

Total No. Individuals: 200 Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? ______ Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: E. Craydon, E. Teraoka, V. Bryant, K. Pow

Address: 850 G Street, Suite K, Arcata, CA 95521

E-mail Address: Emmalien@stillwatersci.com

Phone: 707-822-9607 x210

Plant Information

Phenology:

% vegetative	% flowering	% fruiting
10	90	0

Animal Information

______ # adults ______ # juveniles ______ # larvae ______ # egg masses ______ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Between Elk River and Swain Slough north of Pine Hill Road.

County: Humboldt Landowner / Mgr: ______

Quad Name: Eureka Elevation: ______

T___ R___ Sec___, ___1/4 of ___ 1/4, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T___ R___ Sec___, ___1/4 of ___ 1/4, Meridian: H( ) M( ) S( ) GPS Make & Model: ArcGIS FieldMap app

DATUM: **NAD27** ( ) **NAD83** ( ) **WGS84** ( ) Horizontal Accuracy: ______ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )

Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Occurring in an agricultural field several meters set back from the bank of Swain Slough. Site is currently undergoing land conversion caused by unmaintained earthen dikes and leaky tide gates.
Associated plant species include: Juncus balticus/lescurii., Spergularia marina, Salicornia pacifica, Spartina densiflora, Deschampsia cespitosa, Distichlis spicata, Cotula coronopifolia.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): (◉) Excellent ( ) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Agriculture (low use), near road

Visible disturbances: none

Threats: Invasive plants: Spartina densiflora, Cotula coronopifolia (low threat)

Comments: Camera: ARC-1. Photos: 360-364, 365-367, 386-388.

Determination: *(check one or more, and fill in blanks)*

- ☒ Keyed (cite reference): Jepson eFlora (2021)
- ☐ Compared with specimen housed at: ______
- ☒ Compared with photo / drawing in: Calflora
- ☐ By another person (name): ______
- ☐ Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☒
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (◉) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only

Source Code: ____ Quad Code: ____
Elm Code: ____ Occ No.: ____
EO Index: ____ Map Index: ____

Date of Field Work (mm/dd/yyyy): 05/14/2021

Clear Form | Print Form

California Native Species Field Survey Form

Scientific Name: *Castilleja ambigua ssp. humboldtiensis*

Common Name: Humboldt Bay owl's clover

Species Found? (●) Yes ( ) No ____ If not found, why?

Total No. Individuals: >1,000 Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? ____ Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: ____ Number ____ Museum / Herbarium

Reporter: E. Craydon, E. Teraoka, V. Bryant, K. Pow

Address: 850 G Street, Suite K, Arcata, CA 95521

E-mail Address: Emmalien@stillwatersci.com

Phone: 707-822-9607 x210

Plant Information

Phenology: 10 % vegetative, 90 % flowering, 0 % fruiting

Animal Information

____ # adults ____ # juveniles ____ # larvae ____ # egg masses ____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Between HWY 101 and Elk River Road near confluence of Elk River and Swain Slough.

County: Humboldt Landowner / Mgr: ____

Quad Name: Eureka Elevation: ____

T____ R____ Sec____, ____ 1/4 of ____ 1/4, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____ 1/4 of ____ 1/4, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: ArcGIS FieldMap app

DATUM: **NAD27** ( ) **NAD83** ( ) **WGS84** ( ) Horizontal Accuracy: ____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )

Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Growing on benches in a salt marsh habitat along the banks near the confluence of Elk River and Swain Slough.
Associated plant species include: Juncus sp., Salicornia pacifica, Triglochin maritima, and Spartina densiflora

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Agriculture, adjacent to highway

Visible disturbances: possibly pedestrian foot trail

Threats: nonnative encroachment by Spartina densiflora

Comments: large population

Determination: *(check one or more, and fill in blanks)*

- ☒ Keyed (cite reference): Jepson eFlora (2021)
- ☐ Compared with specimen housed at: ____
- ☒ Compared with photo / drawing in: Calflora
- ☐ By another person (name): ____
- ☐ Other: ____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☒
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 05/14/2021

For Office Use Only

Source Code: ____ Quad Code: ____
Elm Code: ____ Occ No.: ____
EO Index: ____ Map Index: ____

Clear Form | Print Form

California Native Species Field Survey Form

Scientific Name: Castilleja ambigua subsp. humboldtiensis

Common Name: Humboldt Bay owl's clover

Species Found? (●) Yes ( ) No ____ If not found, why?

Total No. Individuals: 800   Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? ____ Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: ____ Number ____ Museum / Herbarium

Reporter: E. Craydon, E. Teraoka, V. Bryant, K. Pow

Address: 850 G Street, Suite K, Arcata, CA 95521

E-mail Address: Emmalien@stillwatersci.com

Phone: 707-822-9607 x210

Plant Information

Phenology:

% vegetative	% flowering	% fruiting
10	90	0

Animal Information

____ # adults ____ # juveniles ____ # larvae ____ # egg masses ____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Along Swain Slough from Pine Hill Road south to Elk River Road.

County: Humboldt   Landowner / Mgr: ____

Quad Name: Eureka   Elevation: ____

T____ R____ Sec____, ____ $^1/_4$ of ____ $^1/_4$, Meridian: H ( ) M ( ) S ( )   Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____ $^1/_4$ of ____ $^1/_4$, Meridian: H ( ) M ( ) S ( )   GPS Make & Model: ArcGIS FieldMap app

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( )   Horizontal Accuracy: ____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )

Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Growing on flat bench along east bank of Swain Slough. Bench is adjacent to cattle fields but is apparently inaccessible due to sharp berm bordering field.
Associated plant species include: Juncus balticus/lescurii., Spergularia marina, Salicornia pacifica, Spartina densiflora, Deschampsia cespitosa, Distichlis spicata, and Cotula coronopifolia.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Agriculture

Visible disturbances: none

Threats: Invasive plants: Spartina densiflora, Cotula coronopifolia (low threat)

Comments: Camera: ARC-1; Photos: 391-392.

Determination: *(check one or more, and fill in blanks)*

- ☒ Keyed (cite reference): Jepson eFlora (2021)
- ☐ Compared with specimen housed at: ____
- ☒ Compared with photo / drawing in: Calflora
- ☐ By another person (name): ____
- ☐ Other: ____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☒
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 05/20/2021

For Office Use Only

Source Code: ______ Quad Code: ______
Elm Code: ______ Occ No.: ______
EO Index: ______ Map Index: ______

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Carex lyngbyei*

Common Name: Lyngbye's sedge

Species Found? (●) Yes ( ) No ______ If not found, why?

Total No. Individuals: >1,000 Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? ______ Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: E. Craydon, E. Teraoka, V. Bryant, K. Pow

Address: 850 G Street, Suite K, Arcata, CA 95521

E-mail Address: Emmalien@stillwatersci.com

Phone: 707-822-9607 x210

Plant Information

Phenology:

10 % vegetative 90 % flowering 0 % fruiting

Animal Information

______ # adults ______ # juveniles ______ # larvae ______ # egg masses ______ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Elk River reach south of adjacent HWY 101 exit: Humboldt Hill Road

County: Humboldt Landowner / Mgr: ______

Quad Name: Eureka Elevation: ______

T____ R____ Sec____, ____$^1/_4$ of ____ $^1/_4$, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____$^1/_4$ of ____ $^1/_4$, Meridian: H( ) M( ) S( ) GPS Make & Model: ArcGIS FieldMap app

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: ______ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) **OR** Geographic (Latitude & Longitude) ( )

Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Growing in patches along partially forested reach of Elk River. Plants restricted to openings of riparian canopy. Associated plant species in openings include: Rubus ursinus, Urtica dioica, Symphyotrichum chilense, Holcus lanatus, Potentilla anserina. Adjacent riparian spepcies include: Salix scouleriana, Salix hookeriana, Sambucus racemosa.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: agriculture (hay production)

Visible disturbances: none

Threats: Erosion, sea level rise

Comments:

Determination: *(check one or more, and fill in blanks)*

☒ Keyed (cite reference): Jepson eFlora (2021)
☐ Compared with specimen housed at: ______
☐ Compared with photo / drawing in: ______
☐ By another person (name): ______
☐ Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☒
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 05/12/2021

For Office Use Only
Source Code: ______ Quad Code: ______
Elm Code: ______ Occ No.: ______
EO Index: ______ Map Index: ______

Clear Form | Print Form

California Native Species Field Survey Form

Scientific Name: Carex lyngbyei

Common Name: Lyngbye's sedge

Species Found? (●) Yes ( ) No ______ If not found, why?

Total No. Individuals: >10,000 Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? ______ Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: E. Craydon, E. Teraoka, V. Bryant, K. Pow

Address: 850 G Street, Suite K, Arcata, CA 95521

E-mail Address: Emmalien@stillwatersci.com

Phone: 707-822-9607 x210

Plant Information

Phenology:

10	90	0
% vegetative	% flowering	% fruiting

Animal Information

______ # adults ______ # juveniles ______ # larvae ______ # egg masses ______ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Along Elk River between adjacent HWY 101 exits: Humboldt Hill Road and Elk River Road.

County: Humboldt Landowner / Mgr: ______

Quad Name: Eureka Elevation: ______

T___ R___ Sec___, ___ 1/4 of ___ 1/4, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T___ R___ Sec___, ___ 1/4 of ___ 1/4, Meridian: H( ) M( ) S( ) GPS Make & Model: ArcGIS FieldMap app

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: ______ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )

Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Large population occurring as an intertidal monotypic band along both sides of Elk River in dense stands. Population extends into small, incised slough channels within adjacent wildlife area and private lands subject to low-impact cattle grazing.
Associated plant species include: Spartina densiflora, Potentilla anserina, Juncus lescurii, Agrostis stolonifera.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: agriculture (cattle), wildlife area

Visible disturbances: none

Threats: Erosion, sea level rise, nonnative encroachment (not severe)

Comments:

Determination: *(check one or more, and fill in blanks)*

☒ Keyed (cite reference): Jepson eFlora (2021)
☐ Compared with specimen housed at: ______
☐ Compared with photo / drawing in: ______
☐ By another person (name): ______
☐ Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 05/14/2021

For Office Use Only

Source Code: ____ Quad Code: ____
Elm Code: ____ Occ No.: ____
EO Index: ____ Map Index: ____

Clear Form | Print Form

California Native Species Field Survey Form

Scientific Name: Carex lyngbyei

Common Name: Lyngbye's sedge

Species Found? (●) Yes ( ) No ____ If not found, why?

Total No. Individuals: ____ Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? ____ Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: ____ Number ____ Museum / Herbarium

Reporter: E. Craydon, E. Teraoka, V. Bryant, K. Pow

Address: 850 G Street, Suite K, Arcata, CA 95521

E-mail Address: Emmalien@stillwatersci.com

Phone: 707-822-9607 x210

Plant Information

Phenology:

% vegetative	% flowering	% fruiting
20	80	0

Animal Information

____ # adults ____ # juveniles ____ # larvae ____ # egg masses ____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Swain Slough south of Pine Hill Road

County: Humboldt Landowner / Mgr: ____

Quad Name: Eureka Elevation: ____

T____ R____ Sec____, ____¼ of ____¼, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____¼ of ____¼, Meridian: H( ) M( ) S( ) GPS Make & Model: ArcGIS FieldMap app

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: ____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) **OR** Geographic (Latitude & Longitude) ( )

Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Growing as monotypic intertidal bands along both sides of Swain Slough channel.
Associated plant species include: Deschampsia cespitosa, Spartina densiflora, Baccharis pilularis, Potentilla anserina, Triglochin maritima.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: agriculture (cattle)

Visible disturbances: none

Threats: Nonnative encroachment (Spartina), erosion, sea level rise.

Comments:

Determination: *(check one or more, and fill in blanks)*

- ☒ Keyed (cite reference): Jepson eFlora (2021)
- ☐ Compared with specimen housed at: ____
- ☐ Compared with photo / drawing in: ____
- ☐ By another person (name): ____
- ☐ Other: ____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☒
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only

Source Code: ______ Quad Code: ______
Elm Code: ______ Occ No.: ______
EO Index: ______ Map Index: ______

Date of Field Work (mm/dd/yyyy): 05/20/2021

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: Carex lyngbyei

Common Name: Lyngbye's sedge

Species Found? (●) Yes ( ) No ______ If not found, why?

Total No. Individuals: >1,000 Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? ______ Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: E. Craydon, E. Teraoka, V. Bryant, K. Pow

Address: 850 G Street, Suite K, Arcata, CA 95521

E-mail Address: Emmalien@stillwatersci.com

Phone: 707-822-9607 x210

Plant Information

Phenology:

% vegetative	% flowering	% fruiting
10	90	0

Animal Information

______ # adults ______ # juveniles ______ # larvae ______ # egg masses ______ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Swain Slough north of Pine Hill Road.

County: Humboldt Landowner / Mgr: ______

Quad Name: Eureka Elevation: ______

T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( ) GPS Make & Model: ArcGIS FieldMap app

DATUM: **NAD27** ( ) **NAD83** ( ) **WGS84** ( ) Horizontal Accuracy: ______ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )

Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Growing in patches along banks in partially forested reach of Swain Slough. Plants occurring only withing some openings of riparian canopy.
Associated plant species include: Juncus balticus/lescurii., Spergularia marina, Salicornia pacifica, Spartina densiflora, Deschampsia cespitosa, Distichlis spicata, Cotula coronopifolia.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: agriculture, residential

Visible disturbances: none

Threats: nonnative encroachment, erosion, sea level rise

Comments:

Determination: *(check one or more, and fill in blanks)*

☒ Keyed (cite reference): Jepson eFlora (2021)
☐ Compared with specimen housed at: ______
☐ Compared with photo / drawing in: ______
☐ By another person (name): ______
☐ Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☒
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only

Source Code: ______ Quad Code: ______
Elm Code: ______ Occ No.: ______
EO Index: ______ Map Index: ______

Date of Field Work (mm/dd/yyyy): 05/20/2021

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: Carex lyngbyei

Common Name: Lyngbye's sedge

Species Found? (●) Yes ( ) No ______ If not found, why?

Total No. Individuals: 500 Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? ______ Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: E. Craydon, E. Teraoka, V. Bryant, K. Pow

Address: 850 G Street, Suite K, Arcata, CA 95521

E-mail Address: Emmalien@stillwatersci.com

Phone: 707-822-9607 x210

Plant Information

Phenology:

% vegetative	% flowering	% fruiting
10	90	0

Animal Information

______ # adults ______ # juveniles ______ # larvae ______ # egg masses ______ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Drainages within cattle fields west of Elk River Road.

County: Humboldt Landowner / Mgr: Private

Quad Name: Eureka Elevation: ______

T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( ) GPS Make & Model: ArcGIS FieldMap app

DATUM: **NAD27** ( ) **NAD83** ( ) **WGS84** ( ) Horizontal Accuracy: ______ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )

Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Growing along channels and drainages within cattle fields.
Associated plant species include: Spartina densiflora, Triglochin striata, Bolboschoenus maritimus, submerged aquatic plants, Deschampsia cespitosa, Potentilla anserina and Triglochin maritima.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Agriculture (cattle), roadside

Visible disturbances: Grazing (observed), roadside litter.

Threats: Grazing and nonnative encroachment (Spartina)

Comments:

Determination: *(check one or more, and fill in blanks)*

☒ Keyed (cite reference): Jepson eFlora (2021)
☐ Compared with specimen housed at: ______
☐ Compared with photo / drawing in: ______
☐ By another person (name): ______
☐ Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☒
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only			
Source Code:		Quad Code:	
Elm Code:		Occ No.:	
EO Index:		Map Index:	

Date of Field Work (mm/dd/yyyy): 06/23/2021

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: Spergularia canadensis var. occidentale

Common Name: western sand-spurrey

Species Found? ◉ Yes ○ No ______ If not found, why?

Total No. Individuals: 200+   Subsequent Visit? ○ Yes ○ No

Is this an existing NDDB occurrence? ______ Yes, Occ. # ☒ No ☐ Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: E. Craydon, E. Teraoka, V. Bryant, K. Pow

Address: 850 G Street, Suite K, Arcata, CA 95521

E-mail Address: Emmalien@stillwatersci.com

Phone: 707-822-9607 x210

Plant Information

Phenology:

% vegetative	% flowering	% fruiting
20	80	0

Animal Information

______ # adults ______ # juveniles ______ # larvae ______ # egg masses ______ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Swain Slough just south of Pine Hill Road crossing.

County: Humboldt   Landowner / Mgr: ______

Quad Name: Eureka   Elevation: ______

T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H○ M○ S○   Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H○ M○ S○   GPS Make & Model: ArcGIS FieldMap app

DATUM: NAD27 ○ NAD83 ○ WGS84 ○   Horizontal Accuracy: 12.3 ft meters/feet

Coordinate System: UTM Zone 10 ○ UTM Zone 11 ○ ***OR*** Geographic (Latitude & Longitude) ◉

Coordinates: 40.752303N, 124.182720W

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Growing on open subtidal mudflat island within Swain Slough just downstream of Martin Slough tidegate. Associated species include Cotula coronopifolia, Spartina densiflora, Carex lyngbyei.

Please fill out separate form for other rare taxa seen at this site. Carex lyngbyeii along banks, Castellija ambiguia var. humboldtiensis on sm bench

Site Information Overall site/occurrence quality/viability (site + population): ○ Excellent ◉ Good ○ Fair ○ Poor

Immediate AND surrounding land use: Swain Slough, opposite bank of new Martin Slough tide gate

Visible disturbances: Nonnatives present: Cotula coronopifolia and Spartina densiflora

Threats: Nonnatives however low tidal zone so high innudation times limiting spread of nonnatives; Erosion and scour

Comments:

Determination: *(check one or more, and fill in blanks)*

☒ Keyed (cite reference): Jepson eFlora (2021)
☐ Compared with specimen housed at: ______
☐ Compared with photo / drawing in: ______
☐ By another person (name): ______
☐ Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☒
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ◉ yes ○ no

Table B-1. Comprehensive scoping list of special-status plant species in the Project Vicinity.

Scientific name (Common name)	Family	Lifeform	Status (Federal, State, CRPR)	Habitat association and blooming period	Potential to occur
*Abronia umbellat*a var. *breviflora* (pink sand-verbena)	Nyctaginaceae	perennial herb	None/None/1B.1	Coastal dunes; 0-35 ft. Blooming period: June–October	None: No suitable habitat is present within the planning area.
Angelica lucida (sea-watch)	Apiaceae	perennial herb	None/None/4.2	Coastal bluff scrub, coastal dunes, coastal scrub, coastal salt marshes and swamps; 0–490 ft. Blooming period: May–September	High. Suitable habitat is present and documented occurrences known less than one mile from the planning area.
Anomobryum julaceum (slender silver moss)	Bryaceae	moss	None/None/4.2	Damp rock and soil on outcrops, usually on roadcuts in Broadleafed upland forest, lower montane coniferous forest, and North Coast coniferous forest; 325–3,280 ft. Blooming period:	None: No suitable habitat is present within the planning area.
Astragalus pycnostachyus var. *pycnostachyus* (coastal marsh milk-vetch)	Fabaceae	perennial herb	None/None/1B.2	Mesic coastal dunes, coastal scrub, and coastal salt and streamside marshes and swamps; 0–100 ft. Blooming period: (April) June–October	Low. Suitable habitats are present in planning area however, nearest occurrence is greater than 10 miles from the Project.
Astragalus rattanii var. *rattanii* (Rattan's milk-vetch)	Fabaceae	perennial herb	None/None/4.3	Gravelly streambanks in Chaparral, Cismontane woodland, and lower montane coniferous forest; 95–2,705 ft. Blooming period: April–July	None: No suitable habitat is present within the planning area.
Bryoria pseudocapillaris (false gray horsehair lichen)	Parmeliaceae	fruticose lichen (epiphytic)	None/None/3.2	Usually on conifers in coastal dunes (SLO Co.) and immediate coast in North Coast coniferous forest; 0–295 ft. Blooming period: N/A (lichen)	Low. A sparse quantity of mature conifers are located within the planning area.
Bryoria spiralifera (twisted horsehair lichen)	Parmeliaceae	fruticose lichen (epiphytic)	None/None/1B.1	Usually on conifers in North Coast coniferous forest along the immediate coast; 0–100 ft. Blooming period: N/A (lichen)	Low. A sparse quantity of mature conifers are located within the planning area.
Cardamine angulata (seaside bittercress)	Brassicaceae	perennial herb	None/None/2B.2	Wet areas, streambanks in Lower montane coniferous forest, and North Coast coniferous forest; 80–3,000 ft. Blooming period: (January)March–July	None: No suitable habitat is present within the planning area.

Scientific name (Common name)	Family	Lifeform	Status (Federal, State, CRPR)	Habitat association and blooming period	Potential to occur
Carex arcta (northern clustered sedge)	Cyperaceae	perennial herb	None/None/2B.2	Bogs and fens, and North Coast coniferous forest (mesic); 195–4595 ft. Blooming period: June–September	None: No suitable habitat is present within the planning area.
Carex leptalea (bristle-stalked sedge)	Cyperaceae	perennial rhizomatous herb	None/None/2B.2	Bogs and fens, mesic meadows and seeps, and marshes and swamps; 0–2,295 ft. Blooming period: March–July	Low. Suitable habitat is present in the planning area however, nearest occurrence is known from a 1918 Tracy collection occurring in a mossy bog along a north slope (CDFW 2022b)
Carex lyngbyei (Lyngbye's sedge)	Cyperaceae	perennial rhizomatous herb	None/None/2B.2	Brackish or freshwater marshes and swamps; 0–35 ft. Blooming period: April–August	High. Suitable habitat is present and documented occurrences known along the Elk River and Swain Slough banks within the planning area.
Carex praticola (northern meadow sedge)	Cyperaceae	perennial herb	None/None/2B.2	Mesic meadows and seeps; 0–10,500 ft. Blooming period: May–July	Low. Suitable habitat is present in the planning area however nearest documented occurrence within 10 miles of the project is known from a 1914 and 1915 Tracy collection attributed to the Ryan Slough region.
Castilleja ambigua var. *humboldtiensis* (Humboldt Bay owl's-clover)	Orobanchaceae	annual herb (hemiparasitic)	None/None/1B.2	Coastal salt marshes and swamps; 0–10 ft. Blooming period: April–August	High. Suitable habitat is present and documented occurrences known less than one mile from the planning area.
Castilleja litoralis (Oregon coast paintbrush)	Orobanchaceae	perennial herb (hemiparasitic)	None/None/2B.2	Sandy in coastal bluff scrub, coastal dunes, and coastal scrub; 45–330 ft. Blooming period: June–July	None: No suitable habitat is present within the planning area.
Chloropyron maritimum ssp. *palustre* (Point Reyes bird's-beak)	Orobanchaceae	annual herb (hemiparasitic)	None/None/1B.2	Coastal salt marshes and swamps; 0–35 ft. Blooming period: June–October	High. Suitable habitat is present and documented occurrences known less than one mile from the planning area.

Scientific name (Common name)	Family	Lifeform	Status (Federal, State, CRPR)	Habitat association and blooming period	Potential to occur
Chrysosplenium glechomifolium (Pacific golden saxifrage)	Saxifragaceae	perennial herb	None/None/4.3	Streambanks, sometimes seeps, sometimes roadsides in North Coast coniferous forest and riparian forest; 30–2,100 ft. Blooming period: February–June (July)	Low. Riparian habitat is present it in the planning area however the riparian structure and plant composition present do not appear suitable for this species.
Clarkia amoena ssp. *whitneyi* (Whitney's farewell-to-spring)	Onagraceae	annual herb	None/None/1B.1	Coastal bluff scrub, and coastal scrub; 30–330 ft. Blooming period: June–August	None. Suitable habitat is present however the only known occurrence within 10 miles of the project is documented from an unknown dated (pre-1955) Harris collection in the Eel River/Fortuna region.
Collinsia corymbosa (round-headed Chinese-houses)	Plantaginaceae	annual herb	None/None/1B.2	Coastal dunes; 0–65 ft. Blooming period: April–June	None: No suitable habitat is present within the planning area.
Collomia tracyi (Tracy's collomia)	Polemoniaceae	annual herb	None/None/4.3	Rocky, sometimes serpentinite in broadleafed upland forest, and Lower montane coniferous forest; 980–6,890 ft. Blooming period: June–July	None: No suitable habitat is present within the planning area.
Downingia willamettensis (Cascade downingia)	Campanulaceae	annual herb	None/None/2B.2	Cismontane woodland (lake margins), valley and foothill grassland (lake margins), and vernal pools; 45–3640 ft. Blooming period: June–July (September)	None: No suitable habitat is present within the planning area.
Erysimum menziesii (Menzies' wallflower)	Brassicaceae	perennial herb	FE/CE/1B.1	Coastal dunes; 0–115 ft. Blooming period: March–September	None: No suitable habitat is present within the planning area.
Erythronium revolutum (coast fawn lily)	Liliaceae	perennial bulbiferous herb	None/None/2B.2	Mesic, streambanks in bogs and fens, broadleafed upland forest, North Coast coniferous forest; 0–5,250 ft. Blooming period: March–July (August)	None: No suitable habitat is present within the planning area.
Fissidens pauperculus (minute pocket moss)	Fissidentaceae	moss	None/None/1B.2	North Coast coniferous forest (damp coastal soil); 30–3,360 ft. Blooming period:	None: No suitable habitat is present within the planning area.

Scientific name (Common name)	Family	Lifeform	Status (Federal, State, CRPR)	Habitat association and blooming period	Potential to occur
Gilia capitata ssp. *pacifica* (Pacific gilia)	Polemoniaceae	annual herb	None/None/1B.2	Coastal bluff scrub, chaparral (openings), coastal prairie, valley and foothill grassland; 15–5,465 ft. Blooming period: April–August	None. Suitable habitat is present however, only documented occurrence within 10 miles of the Project is known from a 1905 Tracy collection located in a sandy field near Bucksport (Eureka).
Gilia millefoliata (dark-eyed gilia)	Polemoniaceae	annual herb	None/None/1B.2	Coastal dunes; 5–100 ft. Blooming period: April–July	None: No suitable habitat is present within the planning area.
Glehnia littoralis ssp. *leiocarpa* (American glehnia)	Apiaceae	perennial herb	None/None/4.2	Coastal dunes; 0–65 ft. Blooming period: May–August	None: No suitable habitat is present within the planning area.
Hesperevax sparsiflora var. *brevifolia* (short-leaved evax)	Asteraceae	annual herb	None/None/1B.2	Coastal bluff scrub (sandy), coastal dunes, and coastal prairie; 0–705 ft. Blooming period: March–June	None. No suitable habitat is present in the planning area.
Hesperolinon adenophyllum (glandular western flax)	Linaceae	annual herb	None/None/1B.2	Usually serpentinite in chaparral, cismontane woodland, and valley and foothill grassland; 490–4,315 ft. Blooming period: May–August	None: No suitable habitat is present within the planning area.
Lasthenia californica ssp. *macrantha* (perennial goldfields)	Asteraceae	perennial herb	None/None/1B.2	Coastal bluff scrub, coastal dunes, and coastal scrub; 15–1,705 ft. Blooming period: January–November	None. Suitable habitat is present however the only known occurrence within 10 miles of the project is known from 1913 Hutchinson collection in the Eureka area (CDFW 2022b).
Lathyrus japonicus (seaside pea)	Fabaceae	perennial rhizomatous herb	None/None/2B.1	Coastal dunes; 0–100 ft. Blooming period: May–August	None: No suitable habitat is present within the planning area.
Lathyrus palustris (marsh pea)	Fabaceae	perennial herb	None/None/2B.2	Mesic in bogs and fens, coastal prairie, coastal scrub, lower montane coniferous forest, marshes and swamps, and North Coast coniferous forest; 0–330 ft. Blooming period: March–August	Moderate. Suitable habitat is present and a single occurrence near the planning area was documented in a marsh north of Elk River Slough in 2003 (CDFW 2022b)

Scientific name (Common name)	Family	Lifeform	Status (Federal, State, CRPR)	Habitat association and blooming period	Potential to occur
Layia carnosa (beach layia)	Asteraceae	annual herb	FE/CE/1B.1	Coastal dunes and coastal scrub (sandy); 0–195 ft. Blooming period: March–July	None: No suitable habitat is present within the planning area.
Lilium kelloggii (Kellogg's lily)	Liliaceae	perennial bulbiferous herb	None/None/4.3	Openings, roadsides in lower montane coniferous forest, North Coast coniferous forest; 5–4,265 ft. Blooming period: May–August	None: No suitable habitat is present within the planning area.
Lilium occidentale (western lily)	Liliaceae	perennial bulbiferous herb	FE/CE/1B.1	Bogs and fens, coastal bluff scrub, coastal prairie, coastal scrub, marshes and swamps (freshwater), and North Coast coniferous forest (openings); 5–605 ft. Blooming period: June–July	None. Nearby occurrences are under CDFW management in the Table Bluff Ecological Reserve and are not known to occur in the planning area.
Lilium rubescens (redwood lily)	Liliaceae	perennial bulbiferous herb	None/None/4.2	Sometimes serpentinite, sometimes roadsides in broadleafed upland forest, chaparral, lower montane coniferous forest, North Coast coniferous forest, and upper montane coniferous forest; 95–6,265 ft. Blooming period: April–August (September)	None: No suitable habitat is present within the planning area.
Listera cordata (heart-leaved twayblade)	Orchidaceae	perennial herb	None/None/4.2	Bogs and fens, lower montane coniferous forest, and North Coast coniferous forest; 15–4,495 ft. Blooming period: February–July	None: No suitable habitat is present within the planning area.
Lycopodium clavatum (running-pine)	Lycopodiaceae	perennial rhizomatous herb	None/None/4.1	Often edges, openings, and roadsides in lower montane coniferous forest (mesic), marshes and swamps; and North Coast coniferous forest (mesic); 145–4,020 ft. Blooming period: June–August (September)	None: No suitable habitat is present within the planning area.

Scientific name (Common name)	Family	Lifeform	Status (Federal, State, CRPR)	Habitat association and blooming period	Potential to occur
Mitellastra caulescens (leafy-stemmed mitrewort)	Saxifragaceae	perennial rhizomatous herb	None/None/4.2	Mesic, sometimes roadsides in broadleafed upland forest, lower montane coniferous forest, meadows and seeps, and North Coast coniferous forest; 15–5,575 ft. Blooming period: (March) April–October	None: No suitable habitat is present within the planning area.
Monotropa uniflora (ghost-pipe)	Ericaceae	perennial herb (achlorophyllous)	None/None/2B.2	Broadleafed upland forest and North Coast coniferous forest; 30–1,805 ft. Blooming period: June–August (September)	None: No suitable habitat is present within the planning area.
Montia howellii (Howell's montia)	Montiaceae	annual herb	None/None/2B.2	Vernally mesic, sometimes roadsides in meadows and seeps, North Coast coniferous forest, and vernal pools; 0–2,740 ft. Blooming period: (January–February) March–May	None. No suitable habitat is present in the planning area.
Noccaea fendleri ssp. *californica* (Kneeland Prairie pennycress)	Brassicaceae	perennial herb	FE/None/1B.1	Coastal prairie (serpentinite); 2,490–2,675 ft. Blooming period: May–June	None: No suitable habitat is present within the planning area.
Oenothera wolfii (Wolf's evening-primrose)	Onagraceae	perennial herb	None/None/1B.1	Sandy, usually mesic in coastal bluff scrub, coastal dunes, coastal prairie, and lower montane coniferous forest; 5–2,625 ft. Blooming period: May–October	None. No suitable habitat is present in the planning area.
Packera bolanderi var. *bolanderi* (seacoast ragwort)	Asteraceae	perennial rhizomatous herb	None/None/2B.2	Sometimes roadsides in coastal scrub, and North Coast coniferous forest; 95–2,135 ft. Blooming period: (January–April) May–July (August)	None. No suitable habitat is present in the planning area.
Pityopus californicus (California pinefoot)	Ericaceae	perennial herb (achlorophyllous)	None/None/4.2	Mesic in broadleafed upland forest, lower montane coniferous forest, North Coast coniferous forest, and upper montane coniferous forest; 45–7,300 ft. Blooming period: (March–April) May–August	None: No suitable habitat is present within the planning area.

Scientific name (Common name)	Family	Lifeform	Status (Federal, State, CRPR)	Habitat association and blooming period	Potential to occur
Pleuropogon refractus (nodding semaphore grass)	Poaceae	perennial rhizomatous herb	None/None/4.2	Mesic in lower montane coniferous forest, meadows and seeps, North Coast coniferous forest, and riparian forest; 0–5,250 ft. Blooming period: (March) April–August	Low. Suitable habitat is present in the planning area however no known occurrence within 10-miles of the Project.
Polemonium carneum (Oregon polemonium)	Polemoniaceae	perennial herb	None/None/2B.2	Coastal prairie, coastal scrub, and lower montane coniferous forest; 0–6,005 ft. Blooming period: April–September	Low. Suitable habitat is present in the planning area however no known occurrence within 10-miles of the Project.
Puccinellia pumila (dwarf alkali grass)	Poaceae	perennial herb	None/None/2B.2	Coastal salt marshes and swamps; 0–35 ft. Blooming period: July	Low. Suitable habitat is present in the planning area however only known occurrence within 10-miles of the Project is from a 1938 Tracy collection near the Eel River mouth.
Ribes laxiflorum (trailing black currant)	Grossulariaceae	perennial deciduous shrub	None/None/4.3	Sometimes roadside in North Coast coniferous forest; 15–4,575 ft. Blooming period: March–July (August)	None: No suitable habitat is present within the planning area.
Sidalcea malachroides (maple-leaved checkerbloom)	Malvaceae	perennial herb	None/None/4.2	Often in disturbed areas in broadleafed upland forest, coastal prairie, coastal scrub, North Coast coniferous forest, and riparian woodland; 0–2395 ft. Blooming period: (March) April–August	None. No suitable habitat is present in the planning area.
Sidalcea malviflora ssp. *patula* (Siskiyou checkerbloom)	Malvaceae	perennial rhizomatous herb	None/None/1B.2	Often roadcuts in coastal bluff scrub, coastal prairie, and North Coast coniferous forest; 45–2,885 ft. Blooming period: (April) May–August	Low. Suitable habitat is present in the planning area however known occurrences within 10-miles of the Project are from a pre-1950 Tracy collections in Eureka and Table Bluff (CDFW 2022b).
Sidalcea oregana ssp. *eximia* (coast checkerbloom)	Malvaceae	perennial herb	None/None/1B.2	Lower montane coniferous forest, meadows and seeps, and North Coast coniferous forest; 15–4,395 ft. Blooming period: June–August	Moderate. Suitable habitat is present and a single occurrence within the planning area was documented from a 1907 Tracy collection along a ditch in the Elk River (CDFW 2022b).

Scientific name (Common name)	Family	Lifeform	Status (Federal, State, CRPR)	Habitat association and blooming period	Potential to occur
Silene scouleri ssp. *scouleri* (Scouler's catchfly)	Caryophyllaceae	perennial herb	None/None/2B.2	Coastal bluff scrub, coastal prairie, and valley and foothill grassland; 0–1,970 ft. Blooming period: (March–May) June–August (September)	Low. Suitable habitat is present however single documented occurrence within 10-miles of the Project is known form a 1904 Tracy Collection near Bucksport (Eureka) (CDFW 2022b).
Spergularia canadensis var. *occidentalis* (western sand-spurrey)	Caryophyllaceae	annual herb	None/None/2B.1	Coastal salt marshes and swamps; 0–10 ft. Blooming period: June–August	Moderate. Suitable habitat is present in the planning area and several documented occurrences within 5 miles of the Project.
Trichodon cylindricus (cylindrical trichodon)	Ditrichaceae	moss	None/None/2B.2	Sandy, exposed soil, roadbanks in broadleafed upland forest, meadows and seeps, and upper montane coniferous forest; 160–6,570 ft. Blooming period:	None: No suitable habitat is present within the planning area.
Usnea longissima (Methuselah's beard lichen)	Parmeliaceae	fruticose lichen (epiphytic)	None/None/4.2	On tree branches; usually on old growth hardwoods and conifers in broadleafed upland forest, and North Coast coniferous forest; 160–4,790 ft. Blooming period:	None: No suitable habitat is present within the planning area.
Viola palustris (alpine marsh violet)	Violaceae	perennial rhizomatous herb	None/None/2B.2	Bogs and fens (coastal) and coastal scrub (mesic); 0–490 ft. Blooming period: March–August	None. No suitable habitat is present in the planning area.

Table B-2. Comprehensive plant species list from botanical surveys conducted on May 12–14, 2021 and July 12–14, 2021 in Planning Area 1.

Species name	Common name	Family	Nativity	Cal-IPC Rating	Wetland rating (WMVC Region)
Abies grandis	grand fir	Pinaceae	native		FACU
Achillea millefolium	common yarrow	Asteraceae	native		FACU
Acmispon americanus var. americanus	deerweed	Fabaceae	native		FACU
Agrostis capillaris	colonial bentgrass	Poaceae	naturalized		FAC
Agrostis stolonifera	creeping bentgrass	Poaceae	naturalized	Limited	FAC
Aira caryophyllea	silver hairgrass	Poaceae	naturalized		FACU
Allium triquetrum	threecorner leek	Alliaceae	naturalized		NL/UPL
Alnus rubra	red alder	Betulaceae	native		FAC
Alopecurus geniculatus	water foxtail	Poaceae	native		OBL
Alopecurus pratensis	meadow foxtail	Poaceae	naturalized	Watch	FAC
Angelica lucida	seacoast angelica	Apiaceae	native		FAC
Anthemis cotula	stinking chamomile	Asteraceae	naturalized		FACU
Anthoxanthum odoratum	sweet vernalgrass	Poaceae	naturalized	Limited	FACU
Artemisia douglasiana	Douglas' sagewort	Asteraceae	native		FACW
Athyrium filix-femina var. cyclosorum	subarctic ladyfern	Athyriaceae	native		FAC
Atriplex prostrata	triangle orache	Chenopodiaceae	naturalized		FAC
Avena fatua	wild oat	Poaceae	naturalized	Moderate	NL/UPL
Baccharis pilularis	coyotebrush	Asteraceae	native		NL/UPL
Bellis perennis	lawndaisy	Asteraceae	naturalized		NL/UPL
Bolboschoenus maritimus subsp. paludosus	cosmopolitan bulrush	Cyperaceae	native		OBL
Bolboschoenus robustus	sturdy bulrush	Cyperaceae	native		OBL
Brassica rapa	field mustard	Brassicaceae	naturalized	Limited	NL/UPL
Briza maxima	big quakinggrass	Poaceae	naturalized	Limited	FACU
Briza minor	little quakinggrass	Poaceae	naturalized		FAC
Bromus diandrus	ripgut brome	Poaceae	naturalized	Moderate	FAC
Bromus hordeaceus	soft brome	Poaceae	naturalized	Limited	FACU
Bromus sitchensis var. carinatus	California brome	Poaceae	native		FACU
Callitriche heterophylla	twoheaded water-starwort	Plantaginaceae	native		OBL
Capsella bursa-pastoris	shepherd's purse	Brassicaceae	naturalized		OBL
Cardamine oligosperma	little western bittercress	Brassicaceae	native		FACU

Species name	Common name	Family	Nativity	Cal-IPC Rating	Wetland rating (WMVC Region)
Carduus pycnocephalus subsp. pycnocephalus		Asteraceae	naturalized	Moderate	FAC
Carex lyngbyei	Lyngbye's sedge	Cyperaceae	native		OBL
Carex obnupta	slough sedge	Cyperaceae	native		OBL
Carex pachystachya	chamisso sedge	Cyperaceae	native		OBL
Carex praegracilis	clustered field sedge	Cyperaceae	native		FAC
Castilleja ambigua subsp. humboldtiensis	Humboldt Bay owl's-clover	Orobanchaceae	native		FACW
Cerastium fontanum subsp. vulgare	big chickweed	Caryophyllaceae	naturalized		FACW
Chamerion angustifolium subsp. circumvagum	fireweed	Onagraceae	native		FACU
Cichorium intybus	chicory	Asteraceae	naturalized		FACU
Cirsium arvense	Canada thistle	Asteraceae	naturalized	Moderate	FACU
Cirsium vulgare	bull thistle	Asteraceae	naturalized	Moderate	FAC
Claytonia perfoliata	miner's lettuce	Montiaceae	native		FACU
Conium maculatum	poison hemlock	Apiaceae	naturalized	Moderate	FAC
Convolvulus arvensis	field bindweed	Convolvulaceae	naturalized		FAC
Convolvulus arvensis	field bindweed	Convolvulaceae	naturalized		NL/UPL
Cortaderia jubata	purple pampas grass	Poaceae	naturalized	High	FACU
Cotoneaster franchetii	orange cotoneaster	Rosaceae	naturalized	Moderate	NL/UPL
Cotula coronopifolia	common brassbuttons	Asteraceae	naturalized	Limited	OBL
Crataegus monogyna	oneseed hawthorn	Rosaceae	naturalized	Limited	FAC
Crocosmia x crocosmiiflora	montbretia	Iridaceae	naturalized	Limited	FAC
Cuscuta pacifica var. pacifica	dodder	Convolvulaceae	native		NL/UPL
Cyperus eragrostis	tall flatsedge	Cyperaceae	native		FACW
Cytisus scoparius	Scotch broom	Fabaceae	naturalized	High	NL/UPL
Dactylis glomerata	orchardgrass	Poaceae	naturalized	Limited	FACU
Danthonia californica	California oatgrass	Poaceae	native		FAC
Daucus carota	Queen Anne's lace	Apiaceae	naturalized		FACU
Deschampsia cespitosa	tufted hairgrass	Poaceae	native		FACW
Digitalis purpurea	purple foxglove	Plantaginaceae	naturalized	Limited	FACU
Dipsacus fullonum	Fuller's teasel	Dipsacaceae	naturalized	Moderate	FAC
Distichlis spicata	saltgrass	Poaceae	native		FACW
Dryopteris arguta	coastal woodfern	Dryopteridaceae	native		NL/UPL
Dryopteris expansa	spreading woodfern	Dryopteridaceae	native		FACW
Eleocharis macrostachya	pale spikerush	Cyperaceae	native		OBL

Species name	Common name	Family	Nativity	Cal-IPC Rating	Wetland rating (WMVC Region)
Elymus triticoides	beardless wildrye	Poaceae	native		FAC
Epilobium ciliatum subsp. ciliatum	fringed willowherb	Onagraceae	native		FACW
Equisetum arvense	field horsetail	Equisetaceae	native		FACW
Erica lusitanica	Spanish heath	Ericaceae	naturalized	Limited	FAC
Erodium cicutarium	redstem stork's bill	Geraniaceae	naturalized	Limited	NL/UPL
Erythranthe dentata	coastal monkeyflower	Phrymaceae	native		OBL
Festuca arundinacea	tall fescue	Poaceae	naturalized	Moderate	
Festuca bromoides	brome fescue	Poaceae	naturalized		FAC
Festuca microstachys	desert fescue	Poaceae	native		FAC
Festuca myuros	rat-tail fescue	Poaceae	naturalized	Moderate	FACU
Festuca perennis	Italian ryegrass	Poaceae	naturalized	Moderate	FACU
Foeniculum vulgare	sweet fennel	Apiaceae	naturalized	Moderate	FAC
Frangula purshiana	Cascara buckthorn	Rhamnaceae	native		FAC
Galium aparine	stickywilly	Rubiaceae	native		FAC
Genista monspessulana	French broom	Fabaceae	naturalized	High	FACU
Geranium dissectum	cutleaf geranium	Geraniaceae	naturalized	Limited	NL/UPL
Glyceria ×occidentalis	northwestern mannagrass	Poaceae	naturalized		OBL
Glyceria declinata	western manna grass	Poaceae	naturalized	Moderate	FACW
Grindelia stricta	Oregon gumweed	Asteraceae	native		FACW
Hedera helix	English ivy	Araliaceae	naturalized	High	FACW
Helminthotheca echioides	bristly oxtongue	Asteraceae	naturalized	Limited	FACU
Heracleum maximum	common cowparsnip	Apiaceae	native		FAC
Hesperocyparis macrocarpa	Monterey cypress	Cupressaceae	native		FAC
Hirschfeldia incana	shortpod mustard	Brassicaceae	naturalized	Moderate	NL/UPL
Holcus lanatus	common velvetgrass	Poaceae	naturalized	Moderate	FAC
Hordeum brachyantherum	meadow barley	Poaceae	native		FAC
Hordeum jubatum subsp. jubatum	foxtail barley	Poaceae	native		FACW
Hordeum murinum	mouse barley	Poaceae	naturalized	Moderate	FAC
Hydrocotyle ranunculoides	floating marshpennywort	Araliaceae	native		FAC
Hypochaeris glabra	smooth cat's ear	Asteraceae	naturalized	Limited	OBL
Hypochaeris radicata	hairy cat's ear	Asteraceae	naturalized	Moderate	FACU
Iris douglasiana	Douglas iris	Iridaceae	native		FACU
Isolepis cernua	low bulrush	Cyperaceae	native		OBL
Jaumea carnosa	marsh jaumea	Asteraceae	native		OBL

Species name	Common name	Family	Nativity	Cal-IPC Rating	Wetland rating (WMVC Region)
Juncus balticus subsp. ater	mountain rush	Juncaceae	native		OBL
Juncus bolanderi	Bolander's rush	Juncaceae	native		FACW
Juncus breweri	Brewer's rush	Juncaceae	native		OBL
Juncus bufonius	toad rush	Juncaceae	native		FACW
Juncus effusus subsp. pacificus	Pacific rush	Juncaceae	native		FACW
Juncus ensifolius	swordleaf rush	Juncaceae	native		FACW
Juncus hesperius	lamp rush	Juncaceae	native		FACW
Juncus lescurii	salt rush	Juncaceae	native		FACW
Juncus patens	spreading rush	Juncaceae	native		FACW
Juncus xiphioides	irisleaf rush	Juncaceae	native		FACW
Lathyrus latifolius	perennial pea	Fabaceae	naturalized		FACW
Lathyrus latifolius	perennial pea	Fabaceae	naturalized		OBL
Lemna minor	common duckweed	Araceae	native		OBL
Leontodon saxatilis	lesser hawkbit	Asteraceae	naturalized		OBL
Lepidium didymum	lesser swinecress	Brassicaceae	naturalized		FACU
Leucanthemum vulgare	oxeye daisy	Asteraceae	naturalized	Moderate	FACU
Linum bienne	pale flax	Linaceae	naturalized		FACU
Lonicera involucrata	twinberry honeysuckle	Caprifoliaceae	native		FAC
Lotus corniculatus	bird's-foot trefoil	Fabaceae	naturalized		FAC
Lotus uliginosus	big trefoil	Fabaceae	naturalized		FAC
Lupinus bicolor	miniature lupine	Fabaceae	native		FAC
Lupinus rivularis	riverbank lupine	Fabaceae	native		FAC
Lysichiton americanus	American skunkcabbage	Araceae	native		FAC
Lysimachia arvensis	scarlet pimpernel	Myrsinaceae	naturalized		OBL
Madia gracilis	grassy tarweed	Asteraceae	native		NL/UPL
Madia sativa	coast tarweed	Asteraceae	native		NL/UPL
Malus sp.	apple	Rosaceae	naturalized		NL/UPL
Malva neglecta	common mallow	Malvaceae	naturalized		NL/UPL
Malva parviflora	cheeseweed mallow	Malvaceae	naturalized		NL/UPL
Marah oregana	coastal manroot	Cucurbitaceae	native		NL/UPL
Matricaria discoidea	disc mayweed	Asteraceae	native		FACU
Medicago polymorpha	burclover	Fabaceae	naturalized	Limited	FACU
Melianthus major	honey flower	Melianthaceae	naturalized		NL/UPL
Melilotus albus	white sweetclover	Fabaceae	naturalized		FACU
Melilotus officinalis	yellow sweetclover	Fabaceae	naturalized		FACU
Mentha spicata	spearmint	Lamiaceae	naturalized		FACU
Modiola caroliniana	Carolina bristlemallow	Malvaceae	naturalized		FACW

Species name	Common name	Family	Nativity	Cal-IPC Rating	Wetland rating (WMVC Region)
Morella californica	California wax myrtle	Myricaceae	native		FACU
Narcissus pseudonarcissus	daffodil	Amaryllidaceae	naturalized		FACW
Nasturtium officinale	watercress	Brassicaceae	native		OBL
Navarretia squarrosa	skunkbush	Polemoniaceae	native		FACU
Oenanthe sarmentosa	water parsely	Apiaceae	native		OBL
Opuntia ficus-indica	Barbary fig	Cactaceae	naturalized		NL/UPL
Oxalis purpurea	purple woodsorrel	Oxalidaceae	waif		NL/UPL
Parapholis strigosa	strigose sicklegrass	Poaceae	naturalized		OBL
Parentucellia viscosa	yellow glandweed	Orobanchaceae	naturalized	Limited	FAC
Persicaria maculosa	spotted ladysthumb	Polygonaceae	naturalized		FACW
Phalaris arundinacea	reed canarygrass	Poaceae	native/nonnative where introduced	Introduced species wetland invasive in region	FACW
Phleum pratense	timothy	Poaceae	naturalized		FAC
Picea sitchensis	Sitka spruce	Pinaceae	native		FAC
Pinus contorta subsp. contorta	beach pine	Pinaceae	native		FAC
Pinus radiata	Monterey pine	Pinaceae	native		NL/UPL
Plantago coronopus	buckhorn plantain	Plantaginaceae	naturalized		FAC
Plantago lanceolata	narrowleaf plantain	Plantaginaceae	naturalized	Limited	FACU
Plantago major	common plantain	Plantaginaceae	naturalized		FAC
Plectritis congesta	shortspur seablush	Valerianaceae	native		FACU
Poa annua	annual bluegrass	Poaceae	naturalized		FAC
Poa palustris	fowl bluegrass	Poaceae	naturalized		FAC
Poa pratensis subsp. pratensis	Kentucky bluegrass	Poaceae	naturalized	Limited	FAC
Polygonum aviculare	prostrate knotweed	Polygonaceae	naturalized		FAC
Polypogon australis	Chilean rabbitsfoot grass	Poaceae	naturalized		FACW
Polypogon monspeliensis	annual rabbitsfoot grass	Poaceae	naturalized	Limited	FACW
Polystichum munitum	western swordfern	Dryopteridaceae	native		FACU
Potentilla anserina	silverweed cinquefoil	Rosaceae	native		OBL
Prunella vulgaris	common selfheal	Lamiaceae	native		FACU
Pteridium aquilinum var. pubescens	hairy brackenfern	Dennstaedtiaceae	native		FACU
Ranunculus occidentalis	western buttercup	Ranunculaceae	native		FACW

Species name	Common name	Family	Nativity	Cal-IPC Rating	Wetland rating (WMVC Region)
Ranunculus repens	creeping buttercup	Ranunculaceae	naturalized	Limited	FAC
Raphanus raphanistrum	wild radish	Brassicaceae	naturalized		NL/UPL
Raphanus sativus	cultivated radish	Brassicaceae	naturalized	Limited	FAC
Ribes divaricatum	spreading gooseberry	Grossulariaceae	native		FAC
Ribes sanguineum	redflower currant	Grossulariaceae	native		FACU
Rosa nutkana subsp. nutkana	Nootka rose	Rosaceae	native		FAC
Rosa sp.	rose cultivar	Rosaceae	naturalized		NL/UPL
Rubus armeniacus	Himalayan blackberry	Rosaceae	naturalized	High	FAC
Rubus leucodermis	whitebark raspberry	Rosaceae	native		FACU
Rubus parviflorus	thimbleberry	Rosaceae	native		FACU
Rubus spectabilis	salmonberry	Rosaceae	native		FAC
Rubus ursinus	California blackberry	Rosaceae	native		FACU
Rumex acetosella	common sheep sorrel	Polygonaceae	naturalized	Moderate	FACU
Rumex conglomeratus	clustered dock	Polygonaceae	naturalized		FACW
Rumex crispus	curly dock	Polygonaceae	naturalized	Limited	FAC
Rumex pulcher	fiddle dock	Polygonaceae	naturalized		FAC
Salicornia pacifica	Pacific swampfire	Chenopodiaceae	native		OBL
Salix hookeriana	dune willow	Salicaceae	native		FACW
Salix lasiandra	Pacific willow	Salicaceae	native		FACW
Salix scouleriana	Scouler's willow	Salicaceae	native		FAC
Salix sitchensis	Sitka willow	Salicaceae	native		FACW
Sambucus racemosa	red elderberry	Adoxaceae	native		FACU
Sanguisorba minor	small burnet	Rosaceae	naturalized		NL/UPL
Sanicula crassicaulis	Pacific blacksnakeroot	Apiaceae	native		NL/UPL
Schoenoplectus acutus var. occidentalis	tule	Cyperaceae	native		OBL
Schoenoplectus pungens var. longispicatus	common threesquare	Cyperaceae	native		OBL
Scirpus microcarpus	panicled bulrush	Cyperaceae	native		OBL
Scrophularia californica	California figwort	Scrophulariaceae	native		FAC
Senecio minimus	coastal burnweed	Asteraceae	naturalized		FACU
Sequoia sempervirens	redwood	Cupressaceae	native		NL/UPL
Silybum marianum	blessed milkthistle	Asteraceae	naturalized	Limited	NL/UPL
Sisymbrium officinale	hedgemustard	Brassicaceae	naturalized		NL/UPL
Solanum americanum	American black nightshade	Solanaceae	native		FACU

Species name	Common name	Family	Nativity	Cal-IPC Rating	Wetland rating (WMVC Region)
Sonchus asper subsp. asper	spiny sowthistle	Asteraceae	naturalized		FACU
Sonchus oleraceus	common sowthistle	Asteraceae	naturalized		UPL
Sparganium emersum	European bur-reed	Typhaceae	native		OBL
Spartina densiflora	dense-flowered cordgrass	Poaceae	naturalized	High	OBL
Spergula arvensis	corn spurry	Caryophyllaceae	naturalized		NL/UPL
Spergularia canadensis var. occidentalis	western sandspurry	Caryophyllaceae	native		FACW
Spergularia macrotheca var. macrotheca	sticky sandspurry	Caryophyllaceae	native		FAC
Spergularia rubra	red sandspurry	Caryophyllaceae	naturalized		FAC
Stachys chamissonis	coastal hedgenettle	Lamiaceae	native		FACW
Stachys mexicana	Mexican hedgenettle	Lamiaceae	native		FACW
Stellaria media	common chickweed	Caryophyllaceae	naturalized		FACU
Stellaria media	common chickweed	Caryophyllaceae	naturalized		FACU
Symphyotrichum chilense	Pacific aster	Asteraceae	native		FAC
Taraxacum officinale	common dandelion	Asteraceae	naturalized		FACU
Tolmiea diplomenziesii	pig a back plant	Saxifragaceae	native		FACW
Toxicodendron diversilobum	Pacific poison oak	Anacardiaceae	native		FAC
Trifolium angustifolium	narrowleaf crimson clover	Fabaceae	naturalized		NL/UPL
Trifolium arvense	rabbitfoot clover	Fabaceae	naturalized		NL/UPL
Trifolium dubium	suckling clover	Fabaceae	naturalized		FACU
Trifolium fragiferum	strawberry clover	Fabaceae	naturalized		FACU
Trifolium pratense	red clover	Fabaceae	naturalized		FACU
Trifolium repens	white clover	Fabaceae	naturalized		FAC
Trifolium subterraneum	subterranean clover	Fabaceae	naturalized		NL/UPL
Trifolium wormskioldii	cows clover	Fabaceae	native		FACW
Triglochin maritima	common arrowgrass	Juncaginaceae	native		OBL
Triglochin concinna	seaside arrowgrass	Juncaginaceae	native		OBL
Triglochin striata	three-rib arrowgrass	Juncaginaceae	native		OBL
Tropaeolum majus	nasturtium	Tropaeolaceae	naturalized		UPL
Typha latifolia	broadleaf cattail	Typhaceae	native		OBL
Urtica dioica	stinging nettle	Urticaceae	native		FAC
Urtica urens	dwarf nettle	Urticaceae	naturalized		NL/UPL
Veronica americana	American speedwell	Plantaginaceae	native		OBL
Vicia gigantea	giant vetch	Fabaceae	native		NL/UPL
Vicia hirsuta	tiny vetch	Fabaceae	naturalized		NL/UPL

Species name	Common name	Family	Nativity	Cal-IPC Rating	Wetland rating (WMVC Region)
Vicia sativa	garden vetch	Fabaceae	naturalized		UPL
Vicia tetrasperma	lentil vetch	Fabaceae	naturalized		NL/UPL
Vinca major	bigleaf periwinkle	Apocynaceae	naturalized	Moderate	FACU
Woodwardia fimbriata	giant chainfern	Blechnaceae	native		FACW
Zantedeschia aethiopica	calla lily	Araceae	naturalized	Limited	OBL
Zostera marina	Pacific eelgrass	Zosteraceae	native		OBL

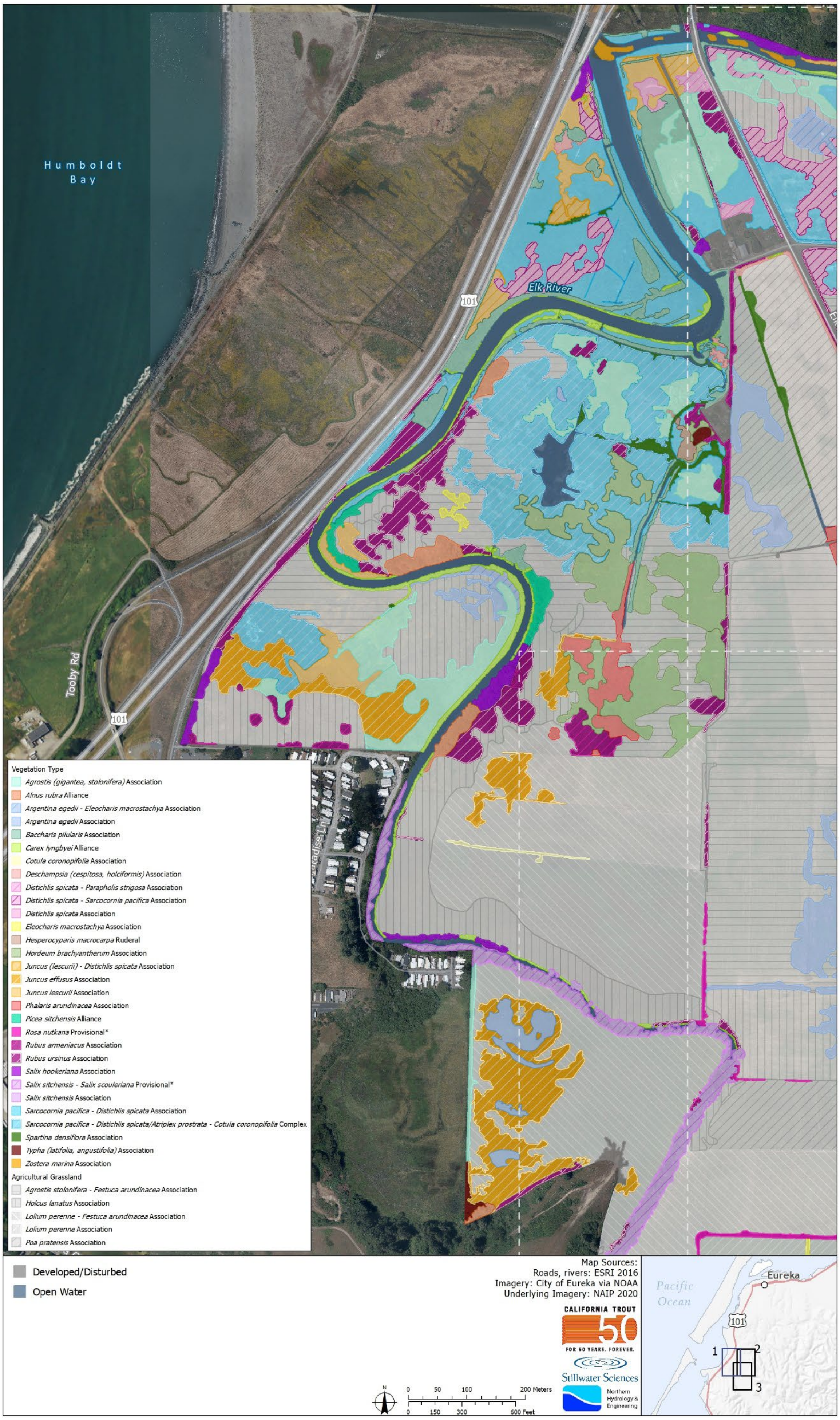


Figure B-1. Vegetation cover types within the Elk River Planning Area 1, Tile 1 of 3.

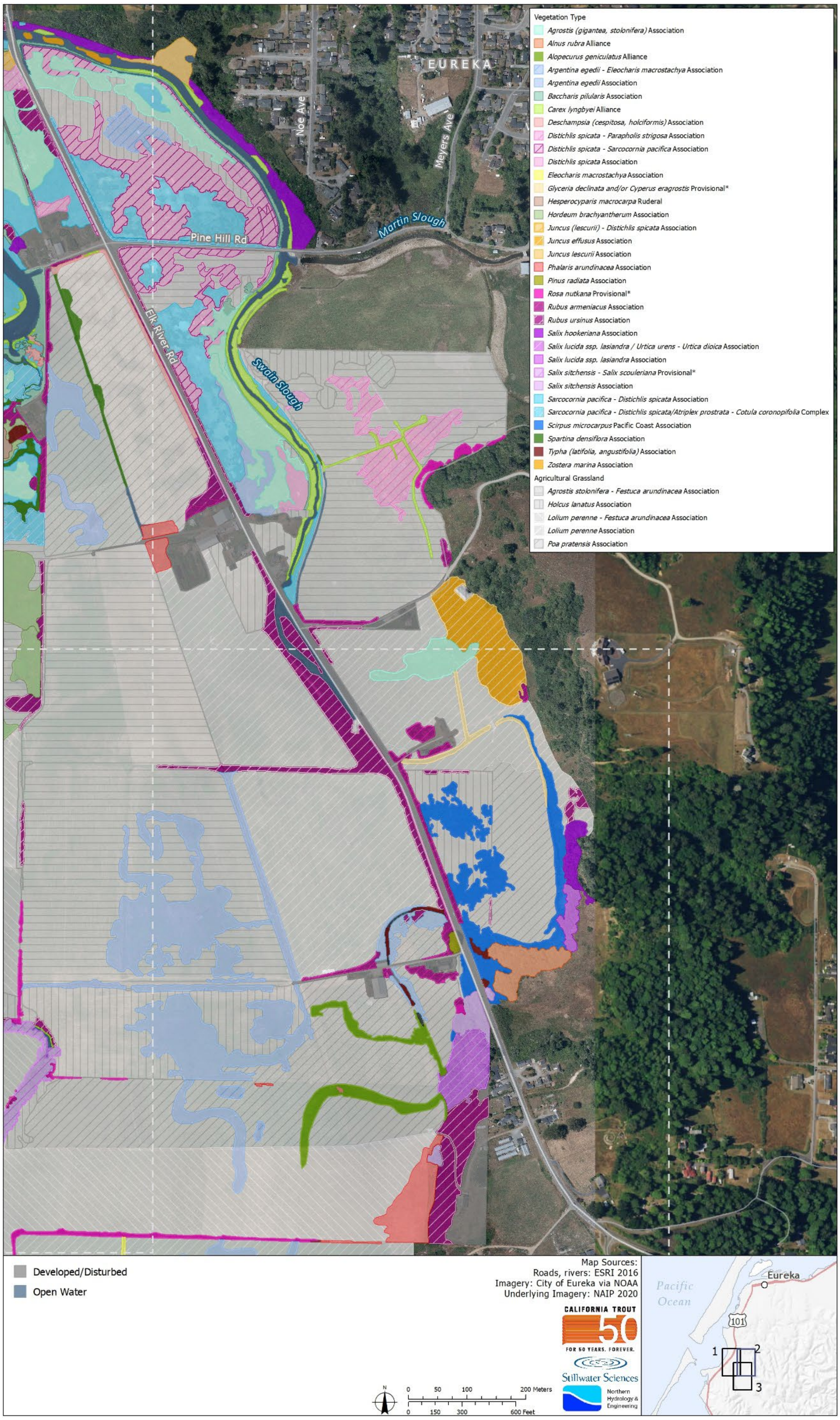


Figure B-2. Vegetation cover types within the Elk River Planning Area 1, Tile 2 of 3.

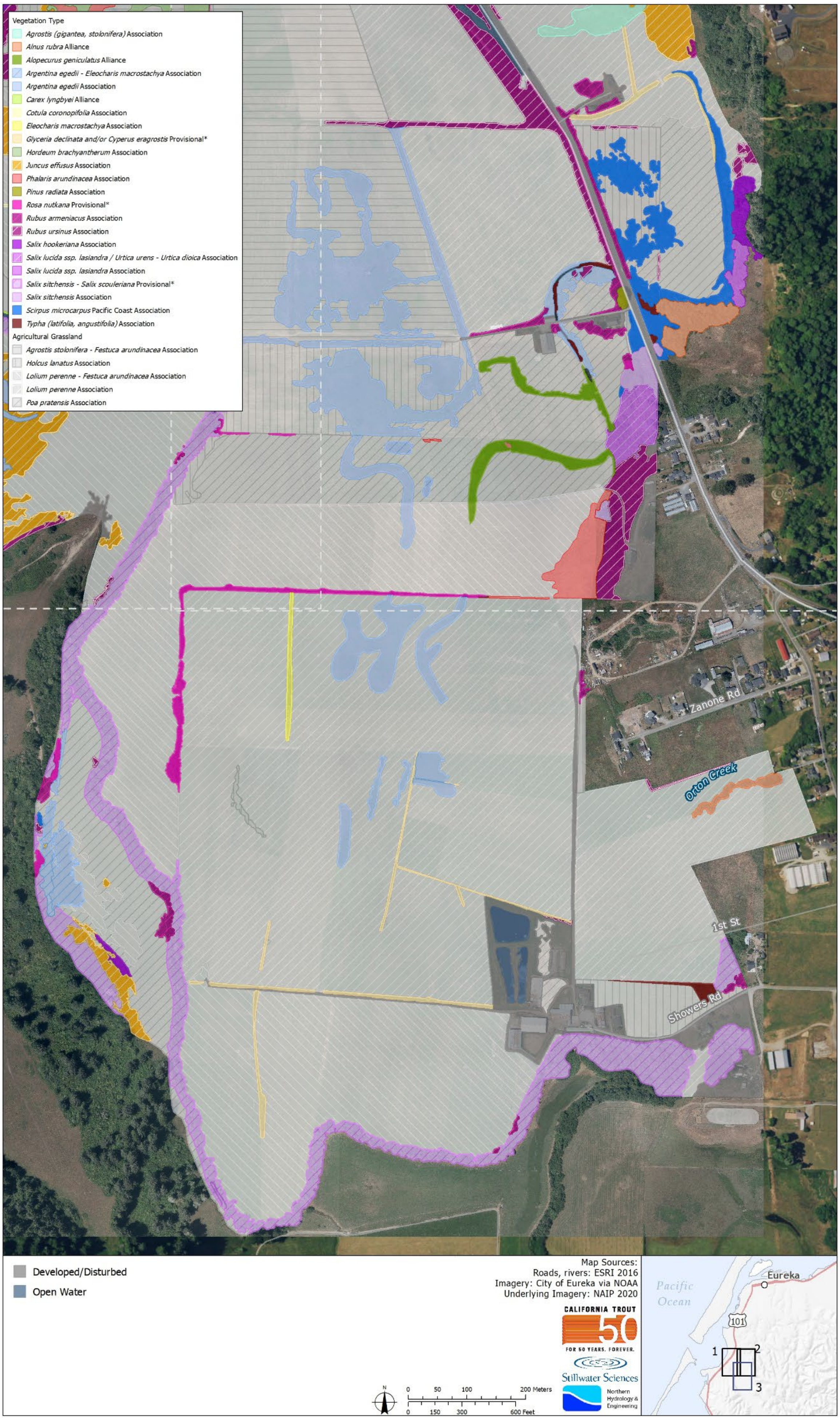


Figure B-3. Vegetation cover types within the Elk River Planning Area 1, Tile 3 of 3.

CNDDB Forms

Documented Special-status Plants in Planning Area 1

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk Estuary City/County: Humboldt / Elk River Sampling Date: 10/18/2021

Applicant/Owner: Alexandre State: CA Sampling Point: WPT 1

Investigator(s): EPC, EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): floodplain / agri Local relief (concave, convex, none): undulating Slope (%): 0

Subregion (LRR): LRR A Lat: ______ Long: ______ Datum: WGS84

Soil Map Unit Name: Weott 0-2% Slope NWI classification: PEM1B

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.) ~5.5" acc.

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ______	Is the Sampled Area within a Wetland?	Yes X No ______
Hydric Soil Present?	Yes X No ______		
Wetland Hydrology Present?	Yes X No ______		

Remarks: Three parameter wetland confirmed

Camera # Arc Ø PHOTO # 1016-1020

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	Ø	= Total Cover	
Sapling/Shrub Stratum (Plot size: 4m²)			
1.			
2.			
3.			
4.			
5.			
	Ø	= Total Cover	
Herb Stratum (Plot size: 4m²)			
1. Festuca perenne	80	Yes	FAC
2. Trifolium ~~pratense~~ repens	5	No	FAC
3. Ranunculus repens	5	NO	FAC
4. Atriplex prostrata	2	NO	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	92	= Total Cover	
Woody Vine Stratum (Plot size: 4m²)			
1.			
2.			
	Ø	= Total Cover	

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks: pasture grassland, Dominant vegetation composed of common pasture grasses and forbs (FAC)

SOIL

Sampling Point: WPT 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8"	10YR 2.5/1	95	7.5YR 4/6	5	C	PL	silty clay loam	
8-19"	2.5Y 4/1	88	10YR 4/6	10	C	PL	silty clay	
			5YR 3/4	2	C	PL	"	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? Yes X No ___

Remarks: Redox dark surface confirmed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2) floodplain
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) NO
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: C3 confirmed @ site 1

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk Estuary City/County: Humboldt Sampling Date: 10/18/21

Applicant/Owner: Alexandre State: CA Sampling Point: WPT 2

Investigator(s): EPC, EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): undulating Slope (%): 0

Subregion (LRR): LRRA Lat: ______ Long: ______ Datum: WGS

Soil Map Unit Name: Weott 0-2% slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks: Three parameter wetland confirmed.
Camera Ave Ø
PHOTOS 1022-27

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover	Ø		
Sapling/Shrub Stratum (Plot size: 4m²)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	Ø		
Herb Stratum (Plot size: 4m²)			
1. Plantago major	2	NO	FAC
2. Ranunculus repens	5	NO	FAC
3. Trifolium repens	10	NO	FAC
4. Cirsium arvense	5	NO	FAC
5. Festuca perenne	85	Yes	FAC
6. Trifolium pratense	5	NO	FACU
7.			
8.			
9.			
10.			
11.			
= Total Cover	112		
Woody Vine Stratum (Plot size: 4m²)			
1.			
2.			
= Total Cover	Ø		

% Bare Ground in Herb Stratum 2

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: Wetland hydrophytic pasture grass near drainage/swail

SOIL

Sampling Point: WPT 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/3	98	7.5YR 4/6	2	C	PL	~~[illegible]~~ clay loam	
4-16"	2.5Y 4/1	85	7.5YR 5/6	15	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ~~M~~ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: N/A
Depth (inches): N/A

Hydric Soil Present? Yes ~~M~~ X No ___

Remarks:
F3 confirmed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) NO
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
C3 confirmed

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk Estuary City/County: Humboldt Sampling Date: 10/18/2021

Applicant/Owner: Alexandre State: CA Sampling Point: WPT 3

Investigator(s): EPC, EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): undulating Slope (%): 0

Subregion (LRR): A Lat: ______ Long: ______ Datum: WGS 84

Soil Map Unit Name: Weott, 0-2% slopes NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes Y No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes ____	No X
Is the Sampled Area within a Wetland?	Yes ____	No X

Remarks: am ArcØ photos 1028-1033 ~ above 5ft. No wetland hydrology observed and sampled area is not within a wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	Ø	= Total Cover	
Sapling/Shrub Stratum (Plot size: 4m²)			
1.			
2.			
3.			
4.			
5.			
	Ø	= Total Cover	
Herb Stratum (Plot size: 4m²)			
1. Festuca perenne	~~75~~ 80	Yes	FAC
2. Ranunculus repens	10	NO	FAC
3. Taraxacum officinale	5	NO	FACU
4. Trifolium repens	10	NO	FAC
5. Trifolium pratense	10	NO	FACU
6. Cyperus eragrostis	1	NO	FACW
7. Malva neglecta	2	NO	NL/UPL
8.			
9.			
10.			
11.			
	118	= Total Cover	
Woody Vine Stratum (Plot size: 4m²)			
1.			
2.			
	Ø	= Total Cover	
% Bare Ground in Herb Stratum 2			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: FAC grass dominant in pasture

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5YR 3/2	97	7.5YR 4/4	3	C	PL	clay loam	chalk-substance
4-16"	10YR 4/1	95	7.5YR 4/6	5	C	PL	Silty clay loam	mixed in layers

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: n/a

Depth (inches): n/a

Hydric Soil Present? Yes X No ___

Remarks: Depleted matrix confirmed at site

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10) X
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) - NO
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Some oxidized rhizospheres , less than 2% in upper 12" and C3 was not confirmed

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk Estuary City/County: Humboldt Sampling Date: 10/18/21

Applicant/Owner: Alexandre State: CA Sampling Point: WPT 4

Investigator(s): KPC, EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): undulating Slope (%): 0

Subregion (LRR): LRR A Lat: ______ Long: ______ Datum: WGS 84

Soil Map Unit Name: Weott, 0-2% slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ______
Hydric Soil Present?	Yes X	No ______
Wetland Hydrology Present?	Yes ______	No X

Is the Sampled Area within a Wetland? Yes ______ No X

Remarks: No wetland hydrology, sampled area not within 3 parameter wetland. photos 1034-1040

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 3m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 3m²)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 3m²)			
1. Plantago major	2	No	FAC
2. Bellis perennis	5	No	NL/UPL
3. Trifolium repens	30	Yes	FAC
4. Trifolium pratense	10	No	FACU
5. Ranunculus repens	30	Yes	FAC
6. Festuca perennis	40	Yes	FAC
7. Cyperus eragrostis	5	No	FAC
8.			
9.			
10.			
11.			
	122 = Total Cover		
Woody Vine Stratum (Plot size: 3m²)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 15

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks: Dominant Hydrophytic vegetation is composed of common agricultural pasture species (FAC).

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2"	7.5YR 3/2	99	5YR 5/8	1	C	PL	silty clay loam	
2-16"	10YR 4/1	95	10YR 4/6	5	C	PL	silty clay ~~loam~~	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

F3 confirmed

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) NO
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Some oxidized rhizosphere" not 2% in upper 12"

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Estuary City/County: Humboldt Sampling Date: 10/14/2021

Applicant/Owner: Alexandre State: CA Sampling Point: 5

Investigator(s): EPC, EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): 0

Subregion (LRR): A Lat: ______ Long: ______ Datum: WGS 84

Soil Map Unit Name: Weott 0-2% slopes NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ______	Is the Sampled Area within a Wetland? Yes ______ No X
Hydric Soil Present?	Yes ______	No X	
Wetland Hydrology Present?	Yes ______	No X	

Remarks: one parameter observed; Not a three-parameter wetland

photos 1041-1047

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 3m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover	Ø		
Sapling/Shrub Stratum (Plot size: 3m²)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	Ø		
Herb Stratum (Plot size: 3m²)			
1. Cirsium arvence	15	yes	FAC
2. Trifolium repens	15	yes	FAC
3. Taraxacum officinale	5	no	FACU
4. Festuca perennis	40	yes	FAC
5. Rumex pulcher	2	no	FAC
6. Trifolium pratense	5	no	FACU
7. Bellis perennis	5	no	NL/UPL
8. Malva neglecta	2	no	NL/UPL
9. Ranunculus repens	15	yes	FAC
10.			
11.			
= Total Cover	102		
Woody Vine Stratum (Plot size: 3m²)			
1.			
2.			
= Total Cover	Ø		

% Bare Ground in Herb Stratum 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ______	x 1 = ______
FACW species ______	x 2 = ______
FAC species ______	x 3 = ______
FACU species ______	x 4 = ______
UPL species ______	x 5 = ______
Column Totals: ______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks: facultative grassland; composed of common pasture grasses and forbs

SOIL

Sampling Point: WPT5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/3	100					clay loam	
4-16	2.5Y 4/3	94	10YR 4/6	4	C	PL	silt/clay loam	
			10YR 7/1	2	D	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3) ; NO
- __ Redox Dark Surface (F6) NO
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- __ 2 cm Muck (A10)
- __ Red Parent Material (TF2)
- __ Very Shallow Dark Surface (TF12)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: n/a

Depth (inches): n/a

Hydric Soil Present? Yes ____ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- __ Surface Water (A1)
- __ High Water Table (A2)
- __ Saturation (A3)
- __ Water Marks (B1)
- __ Sediment Deposits (B2)
- __ Drift Deposits (B3)
- __ Algal Mat or Crust (B4)
- __ Iron Deposits (B5)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Sparsely Vegetated Concave Surface (B8)
- __ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- __ Salt Crust (B11)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Tilled Soils (C6)
- __ Stunted or Stressed Plants (D1) (**LRR A**)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Geomorphic Position (D2) —
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5) Fails
- __ Raised Ant Mounds (D6) (**LRR A**)
- __ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Some oxidized rhizospheres ~~not~~ but less than 2%
no other hydrology indicators observed

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk Estuary City/County: Humboldt Sampling Date: 10/18/2021

Applicant/Owner: Alexandre State: CA Sampling Point: WPT 6

Investigator(s): EPC, EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): 0

Subregion (LRR): A Lat: ______ Long: ______ Datum: WGS 84

Soil Map Unit Name: Weott 0-2% slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes ____	No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks: No wetland hydrology observed and a 3 parameter wetland was not present

Cam Arc Ø 1048-1055

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 3m²)			
1.			
2.			
3.			
4.			
	Ø = Total Cover		
Sapling/Shrub Stratum (Plot size: 3m²)			
1.			
2.			
3.			
4.			
5.			
	Ø = Total Cover		
Herb Stratum (Plot size: 3m²)			
1. Cirsium arvence	15	no	
2. Trifolium repens	35	yes	FAC
3. Ranunculus repens	20	no	
4. Taraxacum officinale	5	no	
5. Festuca perenne	60	yes	FAC
6.			
7.			
8.			
9.			
10.			
11.			
	135 = Total Cover		
Woody Vine Stratum (Plot size: 3m²)			
1.			
2.			
	Ø = Total Cover		

% Bare Ground in Herb Stratum Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: Hydrophytic Vegetation dominance composed of FAC pasture species. Managed landscape.

SOIL

Sampling Point: WPT 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y4/2	98	7.5YR4/6	2	C	PL	clay loam	
4-18	2.5Y4/2	96	10YR4/6	4	C	PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6) ND
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks: Depleted matrix = 4/2 w/ redox concentrations

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3) none
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) ND
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No wetland hydrology present

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: [redacted] ElkRiv PAI City/County: Elk River [redacted]/ Humboldt Sampling Date: 10/18/21

Applicant/Owner: [redacted] Private / CalTrout State: CA Sampling Point: WPT 7

Investigator(s): Emmalien Craydon/Emily King Teraoka Section, Township, Range: ~~CA T6N (R1E)~~

Landform (hillslope, terrace, etc.): ~~Coastal flat~~ floodplain Local relief (concave, convex, none): Undulating Slope (%): 0

Subregion (LRR): LRRA Lat: See GPS WPT Long: See GPS WPT Datum: WGS 84

Soil Map Unit Name: Weott, 0-2 % NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks: Three parameter wetland confirmed.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 3m²)			
1.			
2.			
3.			
4.			
	∅ = Total Cover		
Sapling/Shrub Stratum (Plot size: 3m²)			
1.			
2.			
3.			
4.			
5.			
	∅ = Total Cover		
Herb Stratum (Plot size: 3m²)			
1. Festuca perenne	80	yes	FAC
2. Alopecurus gen.	20	yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 3m²)			
1.			
2.			
	∅ = Total Cover		
% Bare Ground in Herb Stratum ∅			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☒ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: Dominant wetland vegetation composed of FAC & FACW species, dominance test passes for hydrophytic veg.

SOIL

Sampling Point: WPT 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 4/2	98	10YR 4/6	2	C	PL	clay loam	
4-18	2.5Y 4/1	90	10YR 4/6	10	C	PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____

Depth (inches): —

Hydric Soil Present? Yes X No ____

Remarks:

F3 confirmed

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (**LRR A**)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

C3 confirmed

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Estuary City/County: Humboldt Sampling Date: 10/18/2021

Applicant/Owner: Alexandre State: CA Sampling Point: WPT 8

Investigator(s): EPC, EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): floodplain slope Local relief (concave, convex, none): gradient slope Slope (%): 1

Subregion (LRR): LRR A Lat: ______ Long: ______ Datum: WGS 84

Soil Map Unit Name: Weott 0-2% slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland?	Yes ____ No X
Hydric Soil Present?	Yes X No ____		
Wetland Hydrology Present?	Yes ____ No X		

Remarks: Camera #1060-1064 No wetland hydrology observed.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	Ø = Total Cover		
Sapling/Shrub Stratum (Plot size: 4 m²)			
1.			
2.			
3.			
4.			
5.			
	Ø = Total Cover		
Herb Stratum (Plot size: 4 m²)			
1. Ranunculus repens	30	yes	FAC
2. Festuca perenne	55	yes	FAC
3. Trifolium repens	10		
4. Trifolium pratense	5		
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 4 m²)			
1.			
2.			
	Ø = Total Cover		
% Bare Ground in Herb Stratum 5			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: Dominant Hydrophytic vegetation composed of pasture grasses and forbs (FAC)

SOIL

Sampling Point: WPt 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	7.5YR 3/1	99	10YR 4/6	1	C	PL	clay loam	
4-16	2.5Y 4/1	92	5YR 5/8	8	C	PL	Sandy clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6) NO
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks: Depleted matrix confirmed

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4) NO
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10) —
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2) —
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) NO
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No wetland hydrology indicators

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Planning Area 1, Estuary City/County: Eureka, Elk River/Humboldt Sampling Date: 11/30/2021

Applicant/Owner: CalTrout/Private landowners, State of California State: CA Sampling Point: WPT 100

Investigator(s): E. Craydon, E. Teraoka Section, Township, Range: ____

Landform (hillslope, terrace, etc.): valley bottom Local relief (concave, convex, none): flat/none Slope (%): 0

Subregion (LRR): LRRA Lat: ____ Long: ____ Datum: WGS 84

Soil Map Unit Name: Weott, 0-2% slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks: All three parameters observed and sampled area in wetland. photos 1079-1086 (additional verification @ WPT 102 = photo 1094) = same conditions

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover	Ø		
Sapling/Shrub Stratum (Plot size: 4m²)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	Ø		
Herb Stratum (Plot size: 4m²)			
1. Festuca perenne	35	yes	FAC
2. Holcus lanatus	45	yes	FAC
3. Festuca arundinaceae	5		FAC
4. Agrostis stolonifera	20		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	105		
Woody Vine Stratum (Plot size: 4m²)			
1.			
2.			
= Total Cover	Ø		

% Bare Ground in Herb Stratum Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ____ (A)

Total Number of Dominant Species Across All Strata: ____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: Dom. Facultative grasses associated w/ pasture management; Agrostis = associated w/ wetter conditions (transitional)

SOIL

Sampling Point: WPT 100

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/2	97	10YR 4/6	3	C	PL	clay loam	
2-18	10 YR 4/2	65	10YR 4/6	35	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): n/a

Hydric Soil Present? Yes X No ___

Remarks: depleted matrix w/ redox concentrations

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: C3 observed; hydrology confirmed.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Estuary City/County: Eureka / Humboldt Sampling Date: 11/30/2021

Applicant/Owner: Prior State: CA Sampling Point: wpt 101

Investigator(s): EPC, EKT Section, Township, Range: ____

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): Flat Slope (%): 2

Subregion (LRR): A Lat: ____ Long: ____ Datum: WGS 84

Soil Map Unit Name: Weott ; 0-2% slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes ____	No X
Wetland Hydrology Present?	Yes ____	No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks: Photos 1087-1092 pasture grasses are facultative - ONE PARAMETER no hydric soils or hydrology

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover	Ø		
Sapling/Shrub Stratum (Plot size: 4m²)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	Ø		
Herb Stratum (Plot size: 4m²)			
1. Festuca perennis	45	yes	FAC
2. Ranunculus repens	25	yes	FAC
3. Trifolium repens	15		FAC
4. Taraxicum officianale	5		FACU
5. Holcus lanatus	10		FAC
6. Sonchus asper	2		
7. Cirsium arvense	2		
8.			
9.			
10.			
11.			
= Total Cover	104		
Woody Vine Stratum (Plot size: 4m²)			
1.			
2.			
= Total Cover	Ø		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: Dominant grasses and forbs FAC, common to pasture

SOIL

Sampling Point: WPT 101

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-13	2.5Y 3/2	100	—	—	—	—	Silty clay loam	
13-18	2.5Y 3/1	96	10YR 4/6	4	C	PL	Silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): n/a

Hydric Soil Present? Yes ___ No X

Remarks:

No hydric soil indicators

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2) NO
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) NO
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River estuary City/County: Eureka / Humboldt Sampling Date: 11/30/2021

Applicant/Owner: Vroman State: CA Sampling Point: 103

Investigator(s): EPC / EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): Flat Slope (%): 1%

Subregion (LRR): A Lat: ______ Long: ______ Datum: WGS 85

Soil Map Unit Name: Weott, 0-2% slope) NWI classification: freshwater emergent

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ______
Hydric Soil Present?	Yes ______	No X
Wetland Hydrology Present?	Yes ______	No X

Is the Sampled Area within a Wetland? Yes ______ No X

Remarks: Camera ARC Ø grazing by cattle
Photos 1095-1100
Site Not in a wetland, only one-parameter

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover	Ø		
Sapling/Shrub Stratum (Plot size: 4 m²)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	Ø		
Herb Stratum (Plot size: 4 m²)			
1. Trifolium repens	10		
2. Festuca perennis	75	D	FAC
3. Taraxacum officinale	3		
4. Cirsium arvense	5		
5. Holcus lanatus	2		
6. Agrostis stolonifera	5		
7.			
8.			
9.			
10.			
11.			
= Total Cover	100		
Woody Vine Stratum (Plot size: 4 m²)			
1.			
2.			
= Total Cover	Ø		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- X 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks: Dominant vegetation indicative of managed grassland FAC species; common forage species

SOIL

Sampling Point: 103

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	100					Clay loam	
4-12	10YR 3/2	98	10YR 4/6	2	C	PL	Silty clay loam	
12-16	10YR 3/2	20	10YR 4/2	50	D	M	↓	
12-16			7.5YR 4/6	30	C	PL		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ____ No X

Remarks:

No Hydric Soil indicators

HYDROLOGY

Wetland Hydrology Indicators: NONE

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)

NO

- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ________

Water Table Present? Yes ____ No X Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ________

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Estuary City/County: Eureka, Humboldt Sampling Date: 11/30/2021
Applicant/Owner: Vroman State: CA Sampling Point: 104
Investigator(s): EPC, EKT Section, Township, Range: ____
Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): Flat Slope (%): 0
Subregion (LRR): A Lat: ____ Long: ____ Datum: WGS 84
Soil Map Unit Name: Weott, 0-2% Slopes NWI classification: freshwater emergent
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? NO Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes ____ No X	

Remarks: Camera – ARC Ø Photos 1101 - 1105 No wetland hydrology indicators; 3 parameter not present. Cattle grazing in area

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 4m²)			
1.			
2.			
3.			
4.			
= Total Cover	Ø		
Sapling/Shrub Stratum (Plot size: 4m²)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	Ø		
Herb Stratum (Plot size: 4m²)			
1. Festuca perennis	60	D	Fac
2. Trifolium repens	40	D	Fac
3. Cirsium arvense	20		
4. Agrostis stolonifera	5		
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	125		
Woody Vine Stratum (Plot size: 4m²)			
1.			
2.			
= Total Cover	Ø		

% Bare Ground in Herb Stratum Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: hydric vegetation present. composed entirely of pasture grasses and forbs

SOIL

Sampling Point: 104

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR3/2	97	10YR4/6	3	C	PL	Clay loam	
6-15	10YR 3/2	15	10YR 4/2	70	D	M	silty clay loam	
			7.5YR 4/6	15	C	PL	↓	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ~~X~~ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes X No ___

Remarks:

Hydric Soils present, F6 redox dark surface

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) NO
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators present

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Estuary City/County: Eureka / Humboldt Sampling Date: 11/30/2021

Applicant/Owner: Vroman State: CA Sampling Point: 105

Investigator(s): EPC, EKT Section, Township, Range: ____

Landform (hillslope, terrace, etc.): Flat, valley bottom Local relief (concave, convex, none): Flat Slope (%): 1

Subregion (LRR): A Lat: ____ Long: ____ Datum: WGS 84

Soil Map Unit Name: Weott, 0-2% slopes NWI classification: freshwater wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? NO Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No
Hydric Soil Present?	Yes X	No
Wetland Hydrology Present?	Yes X	No

Is the Sampled Area within a Wetland? Yes X No ____

Remarks: Camera Arc Ø Photos 1106-1112 Three parameter pasture confirmed a wetland. Cattle grazing on site

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover	Ø		
Sapling/Shrub Stratum (Plot size: 4 m²)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	Ø		
Herb Stratum (Plot size: 4 m²)			
1. Festuca Perenis	60	D	FAC
2. Trifollum Repens	40		
3. Cirsium arvense	2		
4. Taraxacum officinal	1		
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	103		
Woody Vine Stratum (Plot size: 4 m²)			
1.			
2.			
= Total Cover	Ø		

% Bare Ground in Herb Stratum Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: Dominant vegetation confirms Wetland Vegetation present; composed of all pasture grasses/forbs (FAC)

SOIL

Sampling Point: 105

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/1	80	10 YR 4/6	10	C	PL	Clay loam	
~~0-8~~	10 YR 3/2	10	~~10 YR 3/~~					
8-18	10 YR 3/1	15	10 YR 4/1	80	D	M	silty clay loam	
			10 YR 3/6	5	C	PL		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ~~X~~ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

hydric soils present, F6 confirmed

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2) NO
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______
Water Table Present? Yes ___ No X Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Hydrology indicators present, C3 confirmed

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Estuary City/County: Eureka / Humboldt Sampling Date: 11/30/2021

Applicant/Owner: CDFW State: CA Sampling Point: 10B

Investigator(s): EPC, EKT Section, Township, Range: S4,9,10,15,16 T4N R01W

Landform (hillslope, terrace, etc.): on lower slope of levee Local relief (concave, convex, none): Convex Slope (%): 35

Subregion (LRR): A Lat: ______ Long: ______ Datum: WGS 85

Soil Map Unit Name: Weott, 0-2% slopes NWI classification: estuarine

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? NO Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
on lower slope of levee in salt marsh ~17 inches below plot 10B
Camera Arc 0
Photos 1122-1124

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover	Ø		
Sapling/Shrub Stratum (Plot size: 4m²)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	Ø		
Herb Stratum (Plot size: 2m²)			
1. Salicornia pacifica	40		
2. Distichlis spicata	60	D	FACW
3. Spartina densiflora	20		
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	120		
Woody Vine Stratum (Plot size: 4m²)			
1.			
2.			
= Total Cover	Ø		
% Bare Ground in Herb Stratum Ø			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: 10B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 4/1	85	10YR 3/6	15	C	PL	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

hydric soil present, depleted matrix confirmed

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ______

Water Table Present? Yes ___ No ___ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0 in to surface

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Saturated to surface from recent high tide

Remarks:

wetland hydrology present

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Estuary City/County: Eureka | Humboldt Sampling Date: 11/30/2021

Applicant/Owner: CDFW State: CA Sampling Point: ~~106~~ 107

Investigator(s): EPC, EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): slope of levee Local relief (concave, convex, none): convex Slope (%): 5%

Subregion (LRR): A Lat: ______ Long: ______ Datum: WGS 84

Soil Map Unit Name: Weott, 0-2% slopes NWI classification: estuarine wet

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? NO Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X
Hydric Soil Present?	Yes ___	No Ø
Wetland Hydrology Present?	Yes ___	No Ø
Is the Sampled Area within a Wetland?	Yes ___	No X

Remarks: plot at top of levee ~~near salt marsh~~ Veg plot upland verification Arco camera photo 1120-21

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover	Ø		
Sapling/Shrub Stratum (Plot size: 4m²)			
1. Baccharis pilularis	50	D	NL→upl
2.			
3.			
4.			
5.			
= Total Cover	50		
Herb Stratum (Plot size: 4m²)			
1. Plantago lanceolata	10		
2. Symphyotrichum chilense	20	D	FAC
3. Achillea millefolium	15	D	FACU
4. Bromus diandrus	4		
5. Anthoxanthum odoratum	2		
6. Daucus carota	15	D	FACU
7. Elymus [repens or triticoides]	10		
8. Festuca perennis	5		
9.			
10.			
11.			
= Total Cover	81		
Woody Vine Stratum (Plot size: 4m²)			
1. Rubus armeniacus	25	D	FAC
2.			
= Total Cover	25		

% Bare Ground in Herb Stratum Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 40 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50% NO

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: Dom. Vegetation upland rated, dominance test failed

SOIL

Sampling Point: ~~106~~ 107

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	100					loam	
8-15	10YR 3/2	100					loam gravel	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: gravel mixed

Depth (inches): 15"

Hydric Soil Present? Yes ___ No X

Remarks: No redox in soil sample.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10) – NO
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2) – NO
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) – NO
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No hydrology observed.

verification

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Estuary City/County: Eureka / Humboldt Sampling Date: 11/30/2021

Applicant/Owner: CDFW State: CA Sampling Point: 10 -lower

Investigator(s): Epc, EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Slope of levee Local relief (concave, convex, none): Convex Slope (%): 80

Subregion (LRR): A Lat: ______ Long: ______ Datum: WGS 86

Soil Map Unit Name: Weott 0-2 % slopes NWI classification: estuarine

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? NO Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No X	Is the Sampled Area within a Wetland?	Yes ____ No X
Hydric Soil Present?	Yes X No ____		
Wetland Hydrology Present?	Yes ____ No X		

Remarks: Plot at lower slope of levee ~~near~~ above salt marsh in between salt marsh and coastal scrub | Camera Arc Ø photos 1114-1119

VEGETATION – Use scientific names of plants. lower verification point

Tree Stratum (Plot size: 2 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover	Ø		
Sapling/Shrub Stratum (Plot size: 2 m²)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	Ø		
Herb Stratum (Plot size: 2 m²)			
1. Distichlis spicata	2		
2. Symphyotrichum chilense	5		
3. Atriplex prostrata	20		
4. Juncus lescurii	2		
5. Bromus hordeaceous	5		
6. Salicornia pacifica	5		
7. Festuca Rubra	10		
8. Festuca bromoides	40	D	Facu
9.			
10.			
11.			
= Total Cover	89		
Woody Vine Stratum (Plot size: 2 m)			
1.			
2.			
= Total Cover	Ø		

% Bare Ground in Herb Stratum 15

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL

Sampling Point: 1017 lower

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/2	100					loam	
5-18	10YR 4/1	90	10 YR 4/6	10	C	PL	silty clay loam	(depleted matrix)

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- __ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- __ 2 cm Muck (A10)
- __ Red Parent Material (TF2)
- __ Very Shallow Dark Surface (TF12)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): —

Hydric Soil Present? Yes X No ____

Remarks:

hydric soils F3 present

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- __ Surface Water (A1)
- __ High Water Table (A2)
- __ Saturation (A3)
- __ Water Marks (B1)
- __ Sediment Deposits (B2)
- __ Drift Deposits (B3)
- __ Algal Mat or Crust (B4)
- __ Iron Deposits (B5)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Sparsely Vegetated Concave Surface (B8)
- __ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- __ Salt Crust (B11)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Tilled Soils (C6)
- __ Stunted or Stressed Plants (D1) (**LRR A**)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Geomorphic Position (D2)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)
- __ Raised Ant Mounds (D6) (**LRR A**)
- __ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Planning Area 1, Estuary City/County: Eureka, Elk River/Humboldt Sampling Date: 10/18/2021
Applicant/Owner: CalTrout/Private landowners, State of California State: CA Sampling Point: 109
Investigator(s): E. Craydon, E. Teraoka Section, Township, Range: S49, 10, 15, 16 T4N R01W
Landform (hillslope, terrace, etc.): levee crest Local relief (concave, convex, none): Sloped Slope (%): 25
Subregion (LRR): LRRA Lat: ______ Long: ______ Datum: WGS 84
Soil Map Unit Name: Weott 0-2% slopes NWI classification: Freshwater emergent
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No X	Is the Sampled Area within a Wetland?	Yes ___ No X
Hydric Soil Present?	Yes ___ No X		
Wetland Hydrology Present?	Yes ___ No X		

Remarks: No wetland parameters are present and site is an upland

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	Ø = Total Cover		
Sapling/Shrub Stratum (Plot size: 4m²)			
1. Baccharis pilularis	15	Yes	NL/UPL
2. Lonicera involucrata	10	yes	FAC
3.			
4.			
5.			
	25 = Total Cover		
Herb Stratum (Plot size: 4m²)			
1. Achillea millifoliata	15	Yes	FACU
2. Raphanus sativus	15	Yes	NL/UPL
3. Angelica lucida	5		
4. Oenanthe sarm (@ lower end)	10	Yes	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	45 = Total Cover		
Woody Vine Stratum (Plot size: 4m²)			
1. Rubus ursinus	100	yes	FACU
2.			
	100 = Total Cover		

% Bare Ground in Herb Stratum Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50% NO
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: Dominant species do not pass dominance test for hydrophytic vegetation

SOIL

Sampling Point: 109

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 3/2	100					loam	
14-18	10YR 4/1	92	10YR 4/6	8	C	PL	Silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) FAILED
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No X Depth (inches): ______

Water Table Present? Yes ______ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ______ No X Depth (inches): ______

Wetland Hydrology Present? Yes ______ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk Estuary City/County: Eureka / CA Sampling Date: 12/1/2021

Applicant/Owner: Shanahan State: CA Sampling Point: 200

Investigator(s): EPC, EK1 Section, Township, Range: ______

Landform (hillslope, terrace, etc.): floodplain/pasture Local relief (concave, convex, none): ______ Slope (%): 0

Subregion (LRR): A Lat: ______ Long: ______ Datum: WGS84

Soil Map Unit Name: Weott 0-2% slopes NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ______		Is the Sampled Area within a Wetland? Yes X No ______
Hydric Soil Present? Yes X No ______		
Wetland Hydrology Present? Yes X No ______		

Remarks: Three parameter wetland confirmed, ARC Ø photos 1134-1140

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	Ø = Total Cover		
Sapling/Shrub Stratum (Plot size: 4m²)			
1. Rosa (nutkana)	5	yes	FAC
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: 4m²)			
1. Agrostis stolonifera	45	yes	FAC
2. Phalaris arundinacea	20	yes	(FAC)
3. Trifolium repens	10		
4. Festuca perenne	5		
5. Rumex acetosella	5		
6. Rumex crispus	1		
7. Holcus lanatus	20	yes	FAC
8.			
9.			
10.			
11.			
	106 = Total Cover		
Woody Vine Stratum (Plot size: 4m²)			
1.			
2.			
	Ø = Total Cover		
% Bare Ground in Herb Stratum 5			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ______	x 1 = ______
FACW species ______	x 2 = ______
FAC species ______	x 3 = ______
FACU species ______	x 4 = ______
UPL species ______	x 5 = ______
Column Totals: ______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks: pasture grassland predominant facultative grassland

SOIL

Sampling Point: 200

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y4/2	80	10YR 5/8	20	C	PL	clay loam	
6-16	2.5Y4/2 (depleted)	60	10Y4/6	40	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): n/a

Hydric Soil Present? Yes X No ___

Remarks:

F3 confirmed

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2) floodpl.
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

C3 confirmed

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Estuary City/County: Eureka / Humboldt Sampling Date: 01 Dec 2021

Applicant/Owner: Shanahan State: ____ Sampling Point: 201

Investigator(s): EPC, EKT Section, Township, Range: ____

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Flat Slope (%): 2

Subregion (LRR): A Lat: ____ Long: ____ Datum: WGS 84

Soil Map Unit Name: Wrott 0-2% Slopes NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes ____	No X
Wetland Hydrology Present?	Yes ____	No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks: ARC - Ø One-parameter observed.
photos 1141 – 1146

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	Ø = Total Cover		
Sapling/Shrub Stratum (Plot size: 4m²)			
1.			
2.			
3.			
4.			
5.			
	Ø = Total Cover		
Herb Stratum (Plot size: 4m²)			
1. Cirsium arvense	2		
2. Dactylus glomerata	4		
3. Trifolium repens	10		
4. Ranunculus repens	15		
5. Rumex pulcher	2		
6. Festuca perennis	50	D	FAC
7. Agrostis stolonifera	30	D	FAC
8.			
9.			
10.			
11.			
	113 = Total Cover		
Woody Vine Stratum (Plot size: 4m²)			
1.			
2.			
	Ø = Total Cover		

56.5
22.6

% Bare Ground in Herb Stratum Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: Hydrophytic Veg present; dominant species associated w/ common grazed pasture lands pasture grass & forbs

SOIL

Sampling Point: 201

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-13	2.5Y 3/2	99	2.5Y 4/4	1	C	PL	clay loam	
13-17	2.5Y 3/2	55	2.5Y 4/2	40	D	M	clay loam	
			10YR 5/8	5	C	PL	"	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6) (Not enough redox %.)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No X

Remarks:

No hydric soil indicators

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- NO ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No redox along living roots – NO hydrology indicators

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Estuary City/County: Eureka / Humboldt Sampling Date: 12/1/2021

Applicant/Owner: ______ State: CA Sampling Point: 202

Investigator(s): EPC / EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): A Lat: ______ Long: ______ Datum: WGS 85

Soil Map Unit Name: Weott 0-2% slopes NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? NO Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______ No X	Is the Sampled Area within a Wetland? Yes ______ No X
Hydric Soil Present?	Yes X No ______	
Wetland Hydrology Present?	Yes ______ No X	

Remarks: Camera ARC-Ø photos 1147-1153. Sampled area not within a 3-parameter wetland. agricultural (irrigated)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	Ø = Total Cover		
Sapling/Shrub Stratum (Plot size: 4m²)			
1.			
2.			
3.			
4.			
5.			
	Ø = Total Cover		
Herb Stratum (Plot size: 4m²)			
1. Festuca arundinacea	60	yes	FAC
2. Holcus lanatus	5		
3. Ranunculus repens	10		
4. Trifolium (repens)	10		
5. Agrostis stolonifera	20		
6. P			
7.			
8.			
9.			
10.			
11.			
	105 = Total Cover		
Woody Vine Stratum (Plot size: 4m²)			
1. Rubus ursinus	8	yes	FACU
2.			
	8 = Total Cover		

% Bare Ground in Herb Stratum 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50% NO
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No X

Remarks: Not >50% concluded. Dominance test Inconclusive, Hydrophytic vegetation not confirmed;

SOIL

Sampling Point: 202

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	2.5Y 4/2	60	10YR 5/8	40	C	PL	silty clay loam	
8-17	2.5Y 4/2	65	7.5YR 5/8	35	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): n/a

Hydric Soil Present? Yes X No ___

Remarks:

F3, confirmed

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2) X
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) No
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Estuary City/County: Eureka, Humboldt Sampling Date: 12/1/2021

Applicant/Owner: Shanahan State: CA Sampling Point: 203

Investigator(s): EPC, EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): berm Local relief (concave, convex, none): – Slope (%): –

Subregion (LRR): A Lat: ______ Long: ______ Datum: WGS84

Soil Map Unit Name: Weott 0-2% slopes NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes ___ No X	

Remarks:

photos 1155-1161 No wetland hydrology observed.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	Ø = Total Cover		
Sapling/Shrub Stratum (Plot size: 4m²)			
1.			
2.			
3.			
4.			
5.			
	Ø = Total Cover		
Herb Stratum (Plot size: 4m²)			
1. Festuca arundinacea	80	FAC	Yes
2. Agrostis stolonifera	10		
3. Festuca perenne	10		
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 4m²)			
1.			
2.			
	Ø = Total Cover		

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

Dominant hydrophytic vegetation composed of common pasture forbs/grasses (FAC)

SOIL

Sampling Point: 203

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-19"	2.5Y 4/2	65	7.5YR 4/6	35	C	PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): n/a

Hydric Soil Present? Yes X No ___

Remarks:

F3 confirmed

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) X
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators present

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ~~WA~~ Elk River Estuary City/County: Eureka, Humboldt Sampling Date: 12/1/2021

Applicant/Owner: Prior State: CA Sampling Point: 204

Investigator(s): LPC, EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): coastal Local relief (concave, convex, none): — Slope (%): 0

Subregion (LRR): A Lat: ______ Long: ______ Datum: WGS 84

Soil Map Unit Name: Weott, 0-2% Slopes NWI classification: freshwater emergent

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______	No X	Is the Sampled Area within a Wetland? Yes ______ No X
Hydric Soil Present?	Yes X	No ~~X~~	
Wetland Hydrology Present?	Yes ______	No X	

Remarks: Only one wetland parameter observed.

1162-1167

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover	Ø		
Sapling/Shrub Stratum (Plot size: 4m²)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	Ø		
Herb Stratum (Plot size: 4m²)			
1. Poa pratensis	5		
2. Anthoxanthum odoratum	35	yes	FACU
3. Rumex acetosella	20	yes	FACU
4. Ranunculus repens	20	yes	FAC
5. Taraxacum officinale	5		
6. Achillea millifolium	10		
7. Juncus effusus	15		
8. ~~B~~ Symphyotrichum chilense	5		
9.			
10.			
11.			
= Total Cover	115		
Woody Vine Stratum (Plot size: 4m²)			
1.			
2.			
= Total Cover	Ø		

% Bare Ground in Herb Stratum 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No X

Remarks: Dominant vegetation not hydrophytic

Sampling Point: 204

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 4/2	99	7.5YR 5/8	1	C	PL	clay loam	
14-17	10YR 4/2	75	7.5YR 5/8	25	C	PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): n/a

Hydric Soil Present? Yes X No ___

Remarks: Depleted matrix confirmed

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) X
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No wetland hydrology observed.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Elk River Estuary City/County: Eureka Humboldt Sampling Date: 12/1/2021

Applicant/Owner: Prior State: CA Sampling Point: 205

Investigator(s): ERC, EKT Section, Township, Range: ______

Landform (hillslope, terrace, etc.): floodplain / marsh Local relief (concave, convex, none): concave Slope (%): 0-1

Subregion (LRR): A Lat: ______ Long: ______ Datum: WGS 84

Soil Map Unit Name: Weott 0-2% slopes NWI classification: freshwater emergent

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ` No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___
Is the Sampled Area within a Wetland?	**Yes** X	**No** ___

Remarks: PHOTOS 1168-1172 3-parameter wetland observed.
edge of inundated area

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	Ø = Total Cover		
Sapling/Shrub Stratum (Plot size: 4m²)			
1.			
2.			
3.			
4.			
5.			
	Ø = Total Cover		
Herb Stratum (Plot size: 4m²)			
1. Potentilla anserina	30	yes	FACW
2. Agrostis stolonifera	60	yes	FAC
3. Eleocharis macrostachya	5		
4. Armeria sp	5		
5. Festuca arundinacea	5		
6.			
7.			
8.			
9.			
10.			
11.			
	105 = Total Cover		
Woody Vine Stratum (Plot size: 4m²)			
1.			
2.			
	Ø = Total Cover		
% Bare Ground in Herb Stratum 5			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

SOIL

Sampling Point: 205

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR3/1	98	7.5YR 5/8	2	C	PL	Silty clay loam	
10-17	10YR3/2	92	7.5YR 5/8	8	C	PL	silty clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- __ 2 cm Muck (A10)
- __ Red Parent Material (TF2)
- __ Very Shallow Dark Surface (TF12)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): N/A

Hydric Soil Present? Yes X No ____

Remarks:

F6 confirmed

17
9.5

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- __ Surface Water (A1)
- X High Water Table (A2)
- __ Saturation (A3)
- __ Water Marks (B1)
- __ Sediment Deposits (B2)
- __ Drift Deposits (B3)
- __ Algal Mat or Crust (B4)
- __ Iron Deposits (B5)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Sparsely Vegetated Concave Surface (B8)
- __ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- __ Salt Crust (B11)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Tilled Soils (C6)
- __ Stunted or Stressed Plants (D1) (**LRR A**)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- __ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- __ Raised Ant Mounds (D6) (**LRR A**)
- __ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes X No ____ Depth (inches): 5" from surface

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): ____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

High water table and two secondary indicators present.

Appendix C

Preliminary Wetland Delineation for the Elk River Recovery Plan Planning Area 1, California

DRAFT REPORT ◦ JULY 2022

Preliminary Wetland Delineation for the Elk River Recovery Plan Planning Area 1, California

PREPARED FOR

California Trout
615 11th Street
Arcata, CA 95521

PREPARED BY

Stillwater Sciences
850 G Street, Suite K
Arcata, CA 95521

Stillwater Sciences

Suggested citation:
Stillwater Sciences. 2022. Preliminary Wetland Delineation for the Elk River Recovery Plan Planning Area 1, California. Draft Report. Prepared by Stillwater Sciences, Arcata, California for CalTrout, Arcata, California.

Cover photos: View of the Elk River Planning Area 1, Humboldt County, California.

Table of Contents

Tables

Figures

Appendices

1 INTRODUCTION

1.1 Project Description and Proponent

The Elk River watershed is currently the focus of intensive efforts to resolve very complex land use and water quality impairment issues. Collectively, these efforts include: (1) the Elk River Sediment Total Maximum Daily Load (TMDL) regulatory program led by the North Coast Regional Water Quality Control Board (NCRWQCB or Regional Water Board) and associated Waste Discharge Requirements (WDRs) for timber companies in the upper watershed; (2) the Elk River Recovery Assessment (CalTrout et al. 2019), which was a technical feasibility study of large-scale sediment remediation completed in 2019 by California Trout (CalTrout) and a team of engineers and scientists (Project Team); and now (3) the Elk River Watershed Stewardship Program for which our Project Team has developed a Draft Recovery Plan.

The Elk River Watershed Stewardship Program (Stewardship Program), with CalTrout and a Project Team providing technical capacity and facilitation support, has now become the center of a broad community-based effort to restore beneficial uses of water in Elk River, improve water quality conditions, reduce nuisance flooding, rehabilitate habitat for native salmonids and other aquatic resources, expand riparian habitat, and improve overall ecosystem health in the Elk River.

The Stewardship Program has been coordinating extensively with watershed residents and other stakeholders throughout 2018–2021 to solicit input and transmit information on Recovery Program activities that are ongoing throughout the watershed. The Draft Elk River Recovery Plan presents the results of ongoing planning, analysis, and design activities, and lays out the technical and regulatory feasibility of implementing these remediation and restoration actions throughout four Planning Areas (PA). Currently, conceptual designs are in development for Planning Area 1 (PA1), the Plan area that includes Tidal and Lower Valley Reaches, under two grants to CalTrout and the Project Team provided by the State Coastal Conservancy and Wildlife Conservation Board. This delineation has been conducted as part of the detailed baseline surveys within PA1 to support the development of a 10% engineering design level plan. Information presented within this report are summarized within the baseline condition section of the 10% Conceptual Design Report (in development, anticipated to be completed in early 2023).

As noted in the Draft Elk River Recovery Plan, the primary restoration actions proposed in PA1 include (a) maintaining and reconnecting the floodplain and marsh plains to Elk River and tidal slough channels; (b) enhancement of the tidal slough and creek drainage network, and off-channel ponds, to provide seasonally variable freshwater, brackish, and tidal aquatic habitat; (c) vegetation management, minor recontouring of the floodplain, and extension and expansion of Swain Slough further up the valley, to facilitate better flood-flow conveyance; and (d) eradication of nonnative vegetation and replacement/enhancement of wetland and riparian vegetation with native plant and tree species. Habitat restoration and infrastructure improvements are proposed for the state-managed Elk River Wildlife Area (Figure 1). Several slough channel enhancements and ponds at the Wildlife Area, the extension of Swain Slough, and reconnection of an abandoned freshwater slough channel connected to Swain Slough will provide aquatic habitat benefits. Wetland and riparian vegetation enhancement, and nonnative vegetation removal opportunities are included at numerous locations where landowners are supportive.

The Project proponent, CalTrout, may be contacted at:

Katy Gurin
Project Manager
CalTrout, North Coast Region
1380 9th Street
Arcata, CA 95521
(707) 496-8554 (direct)
kgurin@caltrout.org

1.2 Project Location and Survey Area

The planning area encompasses the lower-most reaches of the Elk River mainstem at the downstream (north-westerly) end of the Elk River valley (Figure 1). It spans approximately 857 acres of former tidal and brackish wetlands, riparian forest, and coastal grasslands, and was historically interspersed with mixed conifer forest stands. The western edge of the planning area is bordered by US Highway 101 (US 101), although this is an artificial boundary; there are additional tidal wetlands on the west side of US 101 owned by the City of Eureka that are hydraulically interconnected with PA1 but are transected by US 101. Those western-most tidal wetlands are concurrently undergoing restoration planning and design by the City of Eureka and are not part of the Stewardship Program Area. The planning area can be accessed from US-101 just south of City of Eureka by heading east after exiting Herrick Avenue and turning south on Elk River Road into the planning area (Figure 1).

PA1 is generally bounded to the south-west by the Elk River itself and to the north-east by Swain Slough and Elk River Road. The Elk River – Swain Slough confluence is at the very downstream end of PA1, just upstream of US 101 at Station (Sta.) 7800; PA1 extends up the sinuous Elk River to approximately Sta. 26000 at the Sea Mist Dairy (a total length of 18,200 feet [ft] or 3.4 miles). Martin Slough branches off Swain Slough but is not considered part of the Stewardship Area or Recovery Plan. The US 101 Bridge is the only bridge crossing of Elk River in this area; Elk River Road crosses Swain Slough near the downstream end of the slough, and again at Sta. 12500. It includes 35 landowners and eight parcels.

The planning area is in Sections 4, 9, 10, 15, and 16 of Township 4N, Range 01 West in the Fields Landing and Eureka U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles. It has an approximate elevation of 0 to 50 feet above mean sea level.

1.3 Purpose of the Wetland Delineation

The purpose of this delineation is to: (1) assess the geographic extent of water and wetland resources in PA1; (2) delineate any waters of the U.S., including wetlands, potentially subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA) and/or Section 10 of the Rivers and Harbors Act of 1899; (3) delineate any additional waters of the State that may be subject to the jurisdiction of the State Water Resources Control Board (SWRCB), California Department of Fish and Wildlife (CDFW), And California Coastal Commission (CCC). The wetland features in the PA1 are considered preliminary until verified by the San Francisco Regulatory Branch of the USACE. The USACE determines CWA jurisdiction of the wetland features in PA1.

Figure 1. Location of the Elk River Planning Area 1

2 METHODS

2.1 Existing Conditions

Prior to the delineation of jurisdictional waters and wetlands, existing information on soils, hydrology, and precipitation in PA1 was evaluated. Information on potential jurisdictional waters and wetlands was obtained from the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) online application, *Wetlands Mapper* (USFWS 2021). Available data from the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Web Soil Survey website were reviewed for the surveyed area and nearby vicinity (NRCS 2021). Precipitation and climate records from weather stations Eureka Weather Forecast Office Woodley Island, CA (WFO) (Station USW00024213) and Eureka 3.0 SSW, CA US (Station US1CAHM0041) were reviewed (NCDC 2021).

2.2 Field Delineation

A delineation of potential jurisdictional waters and wetlands and their transition to upland condition was conducted by wetland delineators Emmalien Craydon and Emily Teraoka on October 18, November 30, and December 1, 2021, in accordance with the *Corps of Engineers Wetlands Delineation Manual* (1987 Manual, USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (WMVC Supplement; USACE 2010). The delineation included any feature that could potentially meet the definition of a water protected under the Clean Water Act (and thus be subject to USACE-jurisdiction), Rivers and Harbors Act (USACE-jurisdiction), the Porter Cologne Act (SWRCB [State]-jurisdiction), Section 1602 of Streambed Alteration Agreement (CDFW-jurisdiction) and the California Coastal Act (CC-jurisdiction). USACE has jurisdiction over Waters of the U.S., including wetlands, pursuant to Section 404 of the CWA. Section 404 of the CWA applies to all Waters of the U.S., including wetlands, which are defined in the U.S. Code of Federal Regulations (33 CFR 328.3 and 40 CFR 120.2). Additionally, per Section 10 of the Rivers and Harbors Act, the USACE has jurisdiction over all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide (i.e., navigable waters of the United States [U.S.]) as defined in 33 CFR 328.3 and 40 CFR 120.2.

2.2.1 Waters determination

Under Section 10 of the Rivers and Harbors Act of 1899, for activities in tidal navigable waters of the U.S. the limits of USACE Section 10 jurisdiction is defined by the Mean High Water (MHW) line. Under Section 404 of the CWA, the limits of USACE jurisdiction of Other Waters of the U.S. (Other Waters) is defined by the High Tide Line (HTL) for tidal waters and the Ordinary High Water Mark (OHWM) for non-tidal waters. Furthermore, waters of the State include any surface water or groundwater, including saline waters, within the boundaries of the state (Porter-Cologne Act, Section 13050).

The USACE San Francisco District Regulatory Branch *Navigable Waterways List* (USACE 1971) and accompanying 2004 USACE guidance memorandum was reviewed to assess upstream limits of listed navigable waters of the U.S. in the planning area. As stated in the USACE (2004) guidance document, the "determination of navigability, once made ... is not extinguished by later actions or events which impede or destroy navigable capacity" (33 C.F.R. §329.4) and "if a waterway at one time was navigable in its natural or improved state, or was susceptible to navigation by way of reasonable improvement, it retains its navigable status even though it is not presently used for commerce, or is presently incapable of use because of changed conditions or the presence of obstructions. United States v. Appalachian Elec. Power Co., 311 U.S. 377, 408 (1940).” As such, any waterways listed on the 1971 *Navigable Waterways List* and its upstream limit, referred to as head of navigation, was used to determine Section 10 waters in the planning area. Section 10 jurisdictional waters were characterized by the MHW extent. To assess the MHW line in the planning area, the MHW elevation for the nearby tidal water level station, Humboldt Bay North Spit, CA (Station ID 9418767) was queried and the LiDAR derived topography for PA1 were reviewed to assess elevation around waterways.

The extent of Other Waters of the U.S. subject to Section 404 jurisdiction (tidal and non-tidal waters of the U.S.) in PA1 were delineated by the location of the HTL or OHWM. 33 CFR 328.3(d) defines the HTL as the line of intersection of the land with the water’s surface at the maximum height reached by a rising tide and may be determined, in the absence of actual data, by: (a) a line of oil or scum along shore objects; (b) a more or less continuous deposit of fine shell or debris on the foreshore or berm; (c) other physical markings or characteristics; (d) vegetation lines; or (e) tidal gages, or other suitable means that delineate the general height reached by a rising tide. The HTL encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm. The OHWM is defined as the elevation established on the shore by water fluctuations and is indicated by physical characteristics such as: (a) a clear, natural line impressed on the bank; (b) shelving; (c) changes in the character of soil; (d) destruction of terrestrial vegetation; (e) the presence of litter and debris; or (f) other appropriate means that consider the characteristics of the surrounding areas. The OHWM was identified in accordance with the USACE RGL 05-05 (USACE 2005) and the OHWM Guide (Mersel and Lichvar 2014).

Tidal waters of the U.S. were further characterized in PA1 into estuarine and riverine systems following Federal Geographic Data Committee (FGDC 2013) classifications (i.e., ocean-derived salts measure >0.5 ppt [estuarine] or <0.5 ppt [riverine] during the period of average annual low flow) using salinity measurements (i.e., monthly average daily salinity values) recorded from continuous monitoring stations deployed by Northern Hydrology and Engineering (NHE) in Elk River and Swain Slough between 2021 through 2022. In general, tidal waters were delineated based on attributes noted in the field for HTL and OHWM characteristics described above as well as from the desktop assessment of tidal datums and site topography.

The HTL elevations used to define the Section 404 estuarine tidal waters of the U.S. in PA1 were characterized from the estimated 2022 tidal mean high high water (MHHW) elevations within Elk River and Swain Slough. The 2022 MHHW, along with other tidal elevations and annual extreme high water level probability estimates for present day conditions were developed by NHE based on model updates to the 2012 published Humboldt Bay tidal estimates (NHE 2015). The 2022 tidal estimates were adjusted for vertical land motion per Patton et al. (2017). The Elk River 2022 MHHW elevations at monitoring sites positioned less than two miles upstream of Hwy 101 Bridge ranged from 7.05 to 7.13 ft (NAVD88). The Swain Slough monitoring sites had 2022 MHHW elevation estimates of 7.04 to 7.06 ft (NAVD88) (Figure 1). Furthermore, the 2022 MHHW extent was projected to reach 8.5 to 8.6 ft elevation at all monitoring sites when the Elk River annual (1.01-year) flood recurrence was included (Figure 1). As such, all estuarine tidal waters in the PA1 were delineated at or below the HTL elevations of 7–8.6 ft.

Per USACE guidance, the MHW and HTL were adjusted so that vegetated areas (i.e., estuarine wetlands, or eelgrass beds) were mapped separately as either wetlands or special habitat areas, depending on site specific observations. These intertidal features were classified under their associated wetland category per the *Classification of Wetlands and Deepwater Habitats of the United States* (FGDC 2013) (see Section 2.2.2).

Tidal waters of the U.S. in the Elk River transitioned to non-tidal waters near the uppermost channel extent in the planning area, upstream of station 25,000 where the bed elevation of the channel is the equal to the highest tide on record (Figure 1).

Prior to the wetland delineation surveys, aerial photographs and topographic maps were reviewed to identify limits and connections of potential wetlands to Elk River or Swain Slough, the lowermost tributary to Elk River. During the wetland delineation waters in PA1 were further reviewed for their connectivity via culvert connections and the existing drainage network. Supplemental data received from the 2021 infrastructure surveys in PA1 conducted by the Project Team were also used to inform on these connections.

2.2.2 Wetland determination

Wetlands were delineated in accordance with the 1987 Manual (USACE 1987) and WMVC Supplement (USACE 2010). The 1987 Manual and WMVC Supplement provide technical guidelines and methods for the three-parameter approach to determining the location and boundaries of USACE jurisdictional wetlands. This approach requires that an area must support positive indicators of hydrophytic vegetation, hydric soils, and wetland hydrology to be considered a jurisdictional wetland. Additionally, the California Coastal Commission ‘s *Procedural Guidance for the Review of Wetland Projects in California's Coastal Zone* (CCC 1994) was used to identify waters/wetlands in the California coastal zone potentially subject to regulation under the California Coastal Act (1976). This approach requires one positive indicator to be present at the sampled location for an area to be delineated as a water or wetland.

The delineation focused on sampling the upland-wetland boundary to delineate the extent of wetlands and uplands in PA1. A total of 23 data points were sampled in potential USACE- and CC-jurisdictional wetlands in PA1. If a data point met all three wetland parameters, it was considered an USACE wetland; if a point met two or less wetland parameters it was considered upland, or if within the Coastal Zone a preliminary CC-jurisdictional wetland. Potential wetland areas were identified based on information generated from the pre-field review (e.g., the NWI *Wetland Mapper* results), the topographic landscape, and observations of hydrology and vegetation in the field. If a data point met all three parameters for a USACE jurisdictional wetland, then a paired data point was placed along the preliminary transition zone (the area in which a change from wetland to non-wetland conditions occurs) to determine the wetland/upland boundary. Where dominant vegetation was considered problematic in identifying the wetland-upland boundary along the valley floor (i.e., managed/grazed/irrigated agricultural grasslands), data point sampling locations were preselected based on a desktop assessment of the planning areas topography and the relative elevation above the valley floor (see Appendix D). This method ensured that data points would be sampled along the gradual elevation gradient in the planning area to detect variance in soils and hydrology. At each data point, a soil core was taken, and the following information was recorded using the USACE (2010) data forms:

1. **Vegetation**: Dominant plant species for each stratum (i.e., tree, sapling/shrub, herb, woody vine) by scientific name (genus and species) following the taxonomy the online *Jepson eFlora* (Jepson Flora Project 2022). Absolute percent cover and dominance were

determined using the 50/20 rule outlined in the *WMVC Supplement*, and the wetland indicator status (OBL [obligate], FACW [facultative-wet], FAC [facultative], FACU [facultative-upland], and UPL [upland]) defined for the WMVC Region in the *National Wetland Plant List: 2020 Wetland Ratings* (USACE 2020). Plant species not listed in the *2020 National Wetland Plant List* were considered upland (UPL) species. A dominance test was performed to determine if the data point exhibited hydrophytic vegetation. If the dominance test was not conclusive and wetland hydrology and hydric soils were present, then the prevalence index was calculated.

2. **Hydrology**: Presence and depth of surface water, groundwater, and/or soil saturation were recorded. In addition, if primary (e.g., oxidized rhizospheres along living roots) and secondary indicators (e.g., drainage patterns, saturation visible on aerial imagery, FAC-neutral test) were observed, then they were also recorded at each data point.
3. **Soils**: Moistened soil matrix descriptions were recorded for each data point using the following: depth of the sample, color (as defined in Munsell soil color charts [Munsell Color 2000]), and texture. If present, redox features were then described by type (e.g., concentration, depletion, reduced matrix) and location (e.g., pore lining, root channel, or matrix). Hydric soils were determined using the *WMVC Supplement* primary indicators, such as depleted dark surface (F7) as well as referencing *Field Indicators of Hydric Soils in the United States* (Vasilas et al. 2010). In addition, mapped soil units (described in Section 3.1.2) were considered, and the current National List of Hydric Soils (NRCS 2021) was consulted.

The location of each data point and adjacent wetland/upland boundaries were recorded using a sub-meter accuracy GPS and photographs were taken of the representative site characteristics. In general, the wetland-upland boundary was delineated based on data point results, fine-scale elevation contours derived from LiDAR, and observed site characteristics throughout the PA1 (i.e., dominant vegetation cover, landform position, inundation frequency, and relative elevation above the valley floor). All GPS data were post-processed, corrected, and incorporated into GIS. Mapped wetlands were classified according to the *Classification of Wetlands and Deepwater Habitats of the United States* (FGDC 2013) based on the vegetation composition and areal cover within each strata to identify the dominant life form at the data points.

3 RESULTS

3.1 Historical Conditions

The Elk River watershed, the largest tributary to Humboldt Bay, has been extensively altered over the past 170 years since European-American settlers first arrived in the North Coast region. The watershed was aggressively and rapidly transformed from a mosaic of forest, wetland, and aquatic ecosystems to a working landscape, providing timber resources, agricultural and grazing lands, and rural residential homesteads as part of the rapidly expanding Humboldt County economy and land development process. The logging of old-growth redwoods began as early as the late 1860's and Elk River was a focal point of environmental activism in the 1990s, when the watershed, its river courses, and Endangered Species Act-listed salmon and steelhead were severely degraded by operations of Pacific Lumber Co from 1988–2000. In PA1, dikes were built to hold back extreme high tides around the turn of the 20th century and much of the Elk River estuary tidelands and floodplain habitats were converted for agricultural use.

Protected areas continue to be used for agricultural land practices, mainly cattle and dairy ranching. Exceptions to the otherwise typical agricultural land use include the Elk River Wildlife Area and several parcels at the northwesterly end of the valley where regular tidal inundation has been reintroduced from unmaintained earthen dikes and drainage infrastructure (e.g., leaky tide gates). Numerous rural residential properties are scattered along Elk River Road, generally on upland areas above the 12–15 ft MSL elevation contour. The abandoned Elk River railroad grade traverses the agricultural features running up the valley parallel and to the west of Elk River Road.

The historic conversion of Elk River and Swain Slough tidelands to agricultural land use has altered the natural vegetation, hydrology, and soils in the PA1. Over a century has occurred since the initial tideland disturbance and grasslands that remain under active agricultural management were considered typical for the region and normal circumstances exist. Parcels now receiving tidal influence have been converting back to estuarine habitats and remnants of the agricultural land practices at these locations were evident only along elevated berms that were still vegetated by introduced grassland forage species.

3.2 Existing Conditions

3.2.1 Hydrology

The Elk River is the largest tributary to Humboldt Bay and drains a 58.3 square mile (mi^2) watershed from the Coast Range, traversing across a coastal plain and joining Humboldt Bay just south of the City of Eureka. PA1 includes the mainstem Elk River from the confluence at Humboldt Bay up to approximately 3.4 miles upstream. The mainstem Elk River downstream of the North Fork and South Fork confluence consists of low-gradient, alluvial channel types with a narrow riparian canopy, transitioning to tidally influenced freshwater, brackish, and tidal slough channels.

The planning area is located in the Elk River Subwatershed (Hydrologic Unit Code [HUC] 12: 180101020603) of the Humboldt Bay-Frontal Pacific Ocean watershed in the North Coast Hydrologic Region and within Lower Elk River and Martin Slough of the Elk River Watershed in the Eureka Plain Hydrologic Unit No. 110.00. The Lower Elk River and Martin Slough waterbody is a Clean Water Act 303(d) listed impaired water (for cold freshwater habitat [sediment], and water contact recreation [pathogens]) (USEPA 2022, Assessment unit ID CAR1100004020140113044906).

The planning area is hydraulically and hydrologically inter-connected and is characterized by broad and flat low-elevation marsh plains that are variably protected from tidal inundation by unmaintained earthen dikes, ditches, tide gates and other drainage infrastructure. Eight tide gates operate in PA1, several of which are dysfunctional. Prior to land conversion of the Elk Valley bottom, Swain Slough and Elk River and their tributaries traversed the valley bottom. Evidence of these pathways remain evident by landform (shallow swale formations), hydrology (seasonal inundation), and vegetation assemblage signatures.

Continuous monitoring measurements recorded in 2021 within estuarine tidal waters of Elk River and Swain Slough measured monthly maximum daily salinities. The records from period June through November characterize typical salinities during low-flow conditions. The maximum monthly daily average salinities during this period ranged from 24 to 31 psu (practical salinity units) and were classified as polyhaline (18–30 ppt [parts per thousand]) to euhaline (30–40 ppt) (FGDC 2013). During spring and winter months, water salinity measured monthly daily means as low as 8 psu (classified as mesohaline [5–18 ppt]) (FGDC 2013). Although water remained tidal for most of the planning area reach, salinities decreased upstream of MSR 2 in Elk River and freshwater (<0.5 ppt) was prevalent most of the year (excluding June–October that recorded monthly daily averages of up to 3 ppt)

The NWI *Wetlands Mapper* includes various palustrine and estuarine wetlands in the planning area (Figure 2). These features largely correlate with the wetland boundaries however, estuarine wetland coverage had a greater extent in PA1 when compared to the NWI map and palustrine wetlands had a larger footprint in the upstream region since these wetlands were delineated throughout most of the valley floor (Figure 2, Section 3.3).

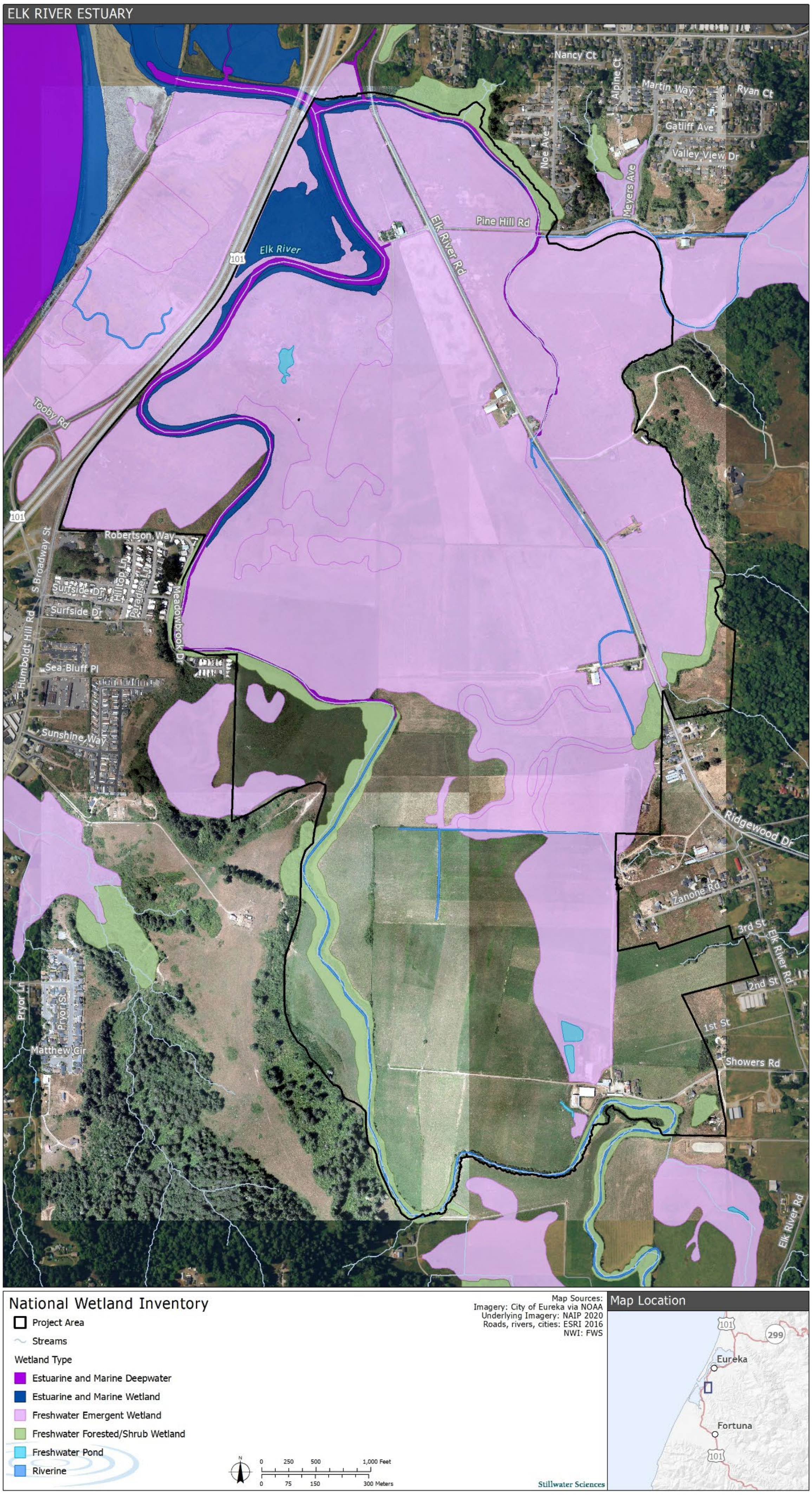


Figure 2. National Wetlands Inventory map of Elk River Planning Area 1 (Source: USFWS 2021).

3.2.2 Soil units

The primary soil unit in PA1 was Weott, 0 to 2 percent slopes (Figure 3). The Weott (0 to 2% slope) map unit is located from 0 to 150 ft elevation above mean sea level and has a mean annual precipitation of 35–80 inches, a mean annual air temperature of 50–55º F, and a frost-free period of 275–330 days (NRCS 2021). It is associated with prime farmland if irrigated and drained and used for pasture, hay, and wetland wildlife habitat. As most of these soils have been cleared it is estimated the natural vegetation was rushes, cinquefoil, and other marsh species (NCRS 2016).

The Weott series is positioned along the backslope or tread of backswamps, depressions, and floodplain steps on alluvial plains (NRCS 2016, 2021). The typical profile is comprised of a silt loam with an Ap horizon from 0 to 12 inches and a Bg1 and Bg2 horizon extending from 12 to 60 inches. It has a drainage class of very poorly drained with a depth to water table and redoximorphic features ranging from 0–4 inches (NRCS 2021, 2016). It frequently ponds and is occasionally flooded with a nonsaline to very slightly saline profile. The Weott, 0 to 2 percent slopes map unit is listed as a hydric soil in the region with an aquic soil regime and it is associated with marshland ecological sites (NRCS 2016, 2021). The soils are occasionally flooded in January through March, with soils frequently ponded 1 to 6 inches for long durations between December through February (NRCS 2016). All sampling locations occurred within this mapped soil unit. Minor components of this map unit include the Worswick (5%), Swainslough (4%), Arylanda (3%) and Ferndale (3%). All except Ferndale are listed as hydric soils in the region.

In general, all data points in PA1 had soil colors similar to the hydric soil Weott series, with matrix soil colors of 10YR 3-4/1-3 and 2.5Y 3-4/1-2 in the upper 18 inches of a predominantly silty clay loam or clay loam profile. Redox concentrations were observed and included 7.5YR, 10YR, 2.5Y (4-5/4-6) colors. Soils were considered hydric when the positive primary indicator, depleted matrix (F3), redox dark surface (F6), or depleted dark surface (F7) were identified (Appendix A).

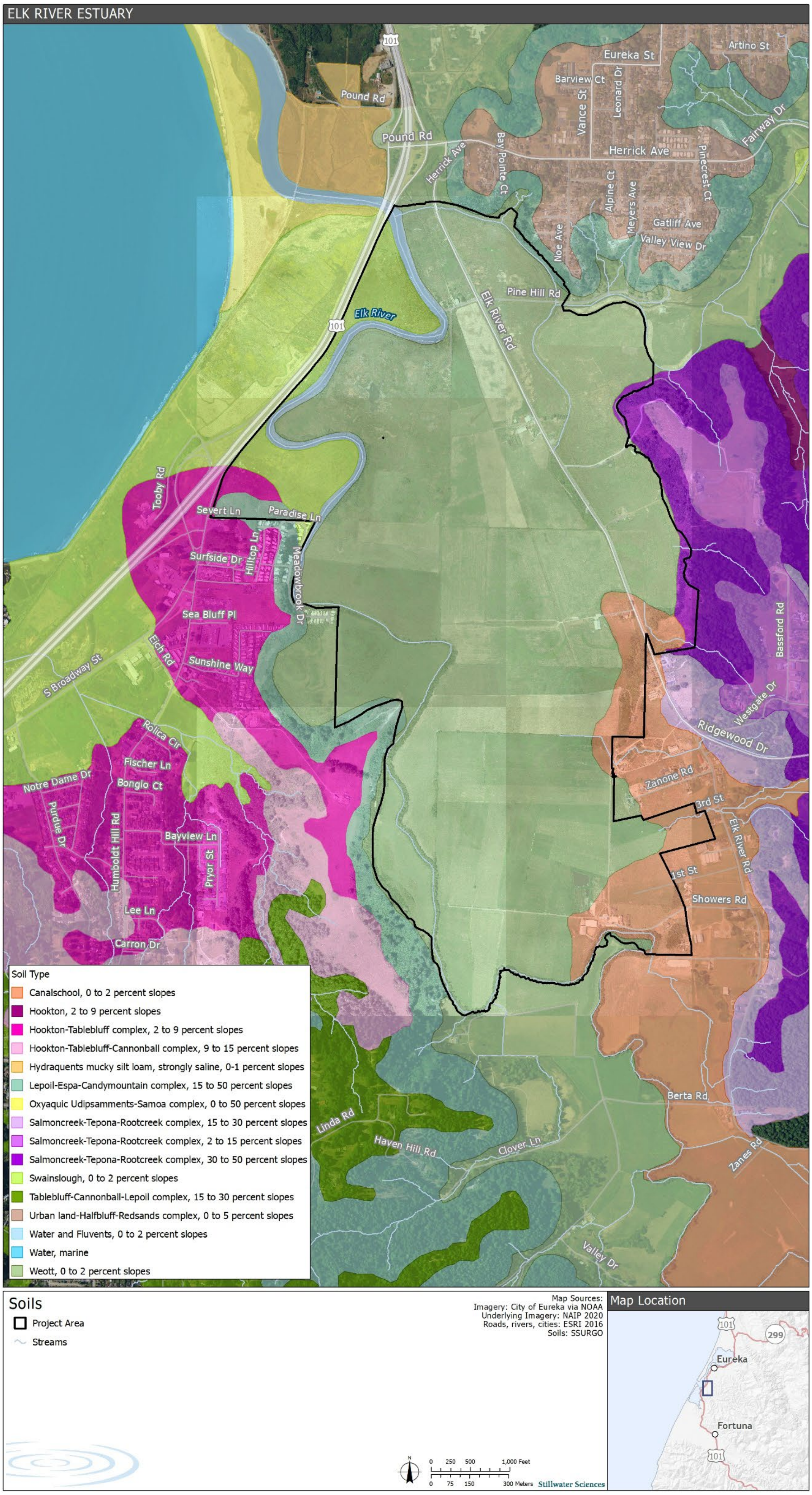


Figure 3. Mapped soil units in Elk River Planning Area 1.

3.2.3 Precipitation

The Elk River watershed has a maritime coastal climate with mild wet winters and a prolonged summer dry season. Mean air temperatures at the coast fluctuate from 47° F in January to 58° F in August (NCDC 2021b). Rainfall occurs primarily between October through March, with a mean annual rainfall of 40.3 inches (based on the 1981–2010 period of record monthly normal [normal] at the WFO weather station [NCDC 2021b]). The average growing season length in PA1 is early February through mid-December based on dates where the average mean temperature has a 50% probability to be above 32°F (Appendix B).

The wetland delineation surveys occurred in late October through December 2021. During this period, normal precipitation values totaled 2.24, 5.61, and 8.12 inches, respectively (NCDC 2022). The U.S. Drought Monitor indicated severe to moderate drought conditions for the region of Humboldt County between late October to early December 2021 (National Drought Mitigation Center 2022). Per the WFO weather station records, in 2021, October accumulated slightly above average rainfall (4.02 in) while in both November and December rainfall was below average (2.85 and 7.25 inches, respectively). Most of the recorded rainfall in October accumulated after the wetland delineation however a storm event one day prior contributed just over 0.7 inch of rainfall. Weather conditions during the delineation, however, were sunny with scattered clouds and dry with a high of 58° F and features did not appear atypically saturated. Very low rainfall occurred prior to the November 30 and December 1, 2021 wetland delineations with an accumulated 0.13 inch recorded at WFO weather station two weeks preceding the delineation (NCDC 2022). These drier and warmer conditions may have influenced the wetland hydrology, however other primary (i.e., redox along living roots) or multiple secondary hydrology indicators were present to confirm this indicator (Appendix B). Weather conditions during these surveys were sunny with highs of 56° F and 61° F.

3.2.4 Vegetation

Established vegetation communities within the PA1 were classified to the alliance, or finer associate-level, per the systematic approach defined in the *Manual of California Vegetation*, online edition. A detailed vegetation map will be provided in the existing conditions section of the *Planning Area 1 10% Conceptual Design Report.* These vegetation communities are associated with northern coastal saltmarsh, coastal grassland, freshwater marsh, coastal scrub, and narrow bands of riparian scrub/shrub and forest habitat types.

3.3 Preliminary Jurisdictional Waters and Wetlands

The Elk River PA1 contains 13.1 acres of USACE-jurisdictional tidal navigable waters subject to Section 10 of the Rivers and Harbors Act and Section 404 of the CWA, an additional 23.2 acres of Other Waters of the U.S. and 627.5 acres of potentially USACE-jurisdictional wetlands adjacent to these waters, both subject to Section 404 of the CWA (Table 1 and Figures 4–6, Appendix A). The potentially jurisdictional waters of the U.S. are also considered to be waters of the State under State- and CC-jurisdiction. In addition, there are 46.9 acres of wetlands and waters that are only subject to State- and/or CC-jurisdiction (Table 1 and Figures 4–6, Appendix A).

Table 1. Preliminary USACE-jurisdictional **features** in the Elk River Planning Area 1.

Description	Acreage
Navigable Waters of the U.S. (Section 10 and Section 404)	**13.1**
Elk River (tidal navigable waters) (W-1)	13.1
Other Waters of the U.S. (Section 404)	**23.2**
Elk River (estuarine tidal, excluding tidal navigable waters) (We1)	1.9
Swain Slough (estuarine tidal waters) (We2–We3)	3.9
Drainage (estuarine tidal waters) (We4–We8)	4.6
Elk River (riverine tidal) (Wr1)	5.8
Elk River (non-tidal waters) (Wn1)	2.5
Elk River Vegetated (woody riparian rooted within OHWM/HTL in estuarine/riverine tidal or non-tidal waters) (Wv1–Wv2)	4.4
Adjacent Wetlands (Section 404)	**627.5**
Estuarine Regularly/Irregularly Flooded Persistent Emergent (EF1–EF8)	83.9
Estuarine Aquatic Eelgrass Beds (EB1–EB2)[1]	0.5
Palustrine Seasonally Flooded-Saturated Persistent Emergent (SS1–SS7)	48.0
Palustrine Semipermanently Persistent Emergent (SP1–SP10)	26.3
Palustrine Seasonally-Flooded Persistent Emergent (SF1–SF7)	443.0
Intermittently Flooded Broadleaved Deciduous Scrub-Shrub (BS1–BS8)	17.4
Intermittently Flooded Broadleaved Deciduous Forested (BD1–BD5)	8.4
Additional Waters of the State[2]	**46.9**
One-parameter wetlands within the Local Coastal Zone (OP1–OP6)[3]	45.3
Agricultural water treatment ponds (AG1)	1.6

1 Defined as vegetated shallows and protected under the Section 404(b)(1) of the CWA as "special aquatic sites" (40 C.F.R. § 230.43)

2 In addition to all listed USACE-jurisdictional features. These features are considered jurisdictional by the State based on definitions provided in Section 2.2

3 Most of the planning area is located within Coastal Zone Categorical Exclusion areas associated with Categorical Exclusion E-86-4.

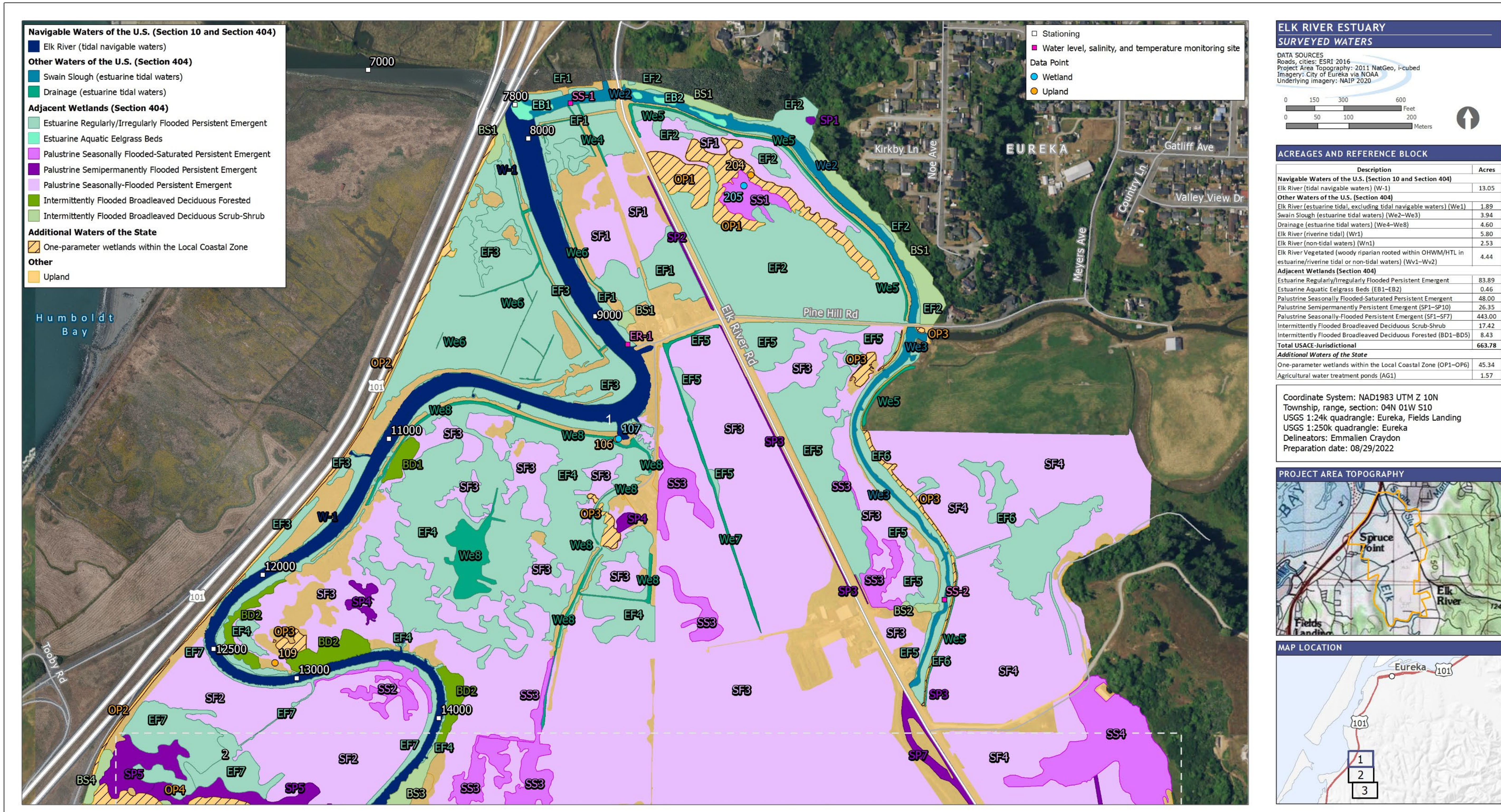
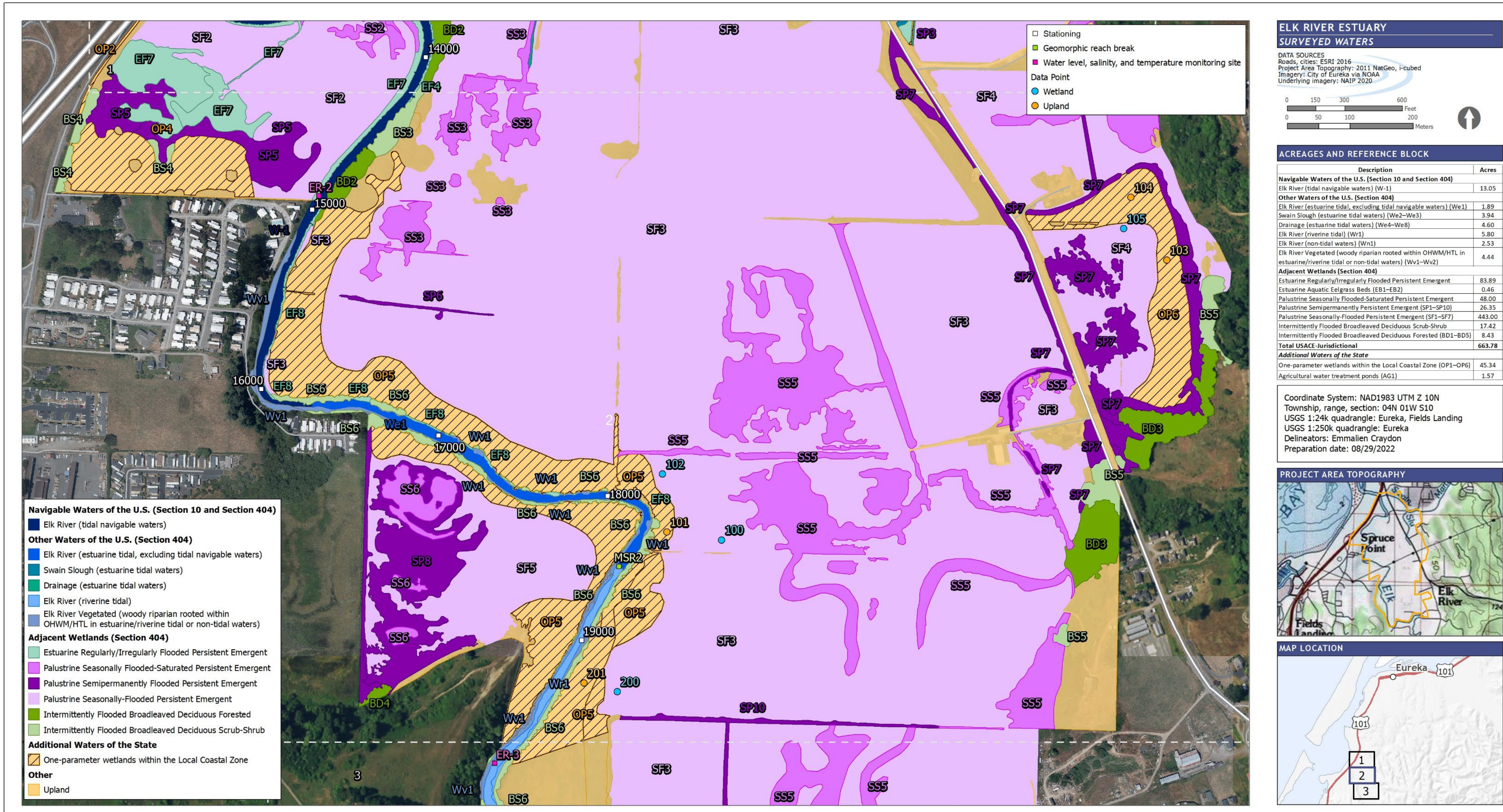


Figure 4. Preliminary jurisdictional waters and wetlands in the Elk River Planning Area 1. Tile 1 of 3.



Description	Acres
Navigable Waters of the U.S. (Section 10 and Section 404)	
Elk River (tidal navigable waters) (W-1)	13.05
Other Waters of the U.S. (Section 404)	
Elk River (estuarine tidal, excluding tidal navigable waters) (We1)	1.89
Swain Slough (estuarine tidal waters) (We2–We3)	3.94
Drainage (estuarine tidal waters) (We4–We8)	4.60
Elk River (riverine tidal) (Wr1)	5.80
Elk River (non-tidal waters) (Wn1)	2.53
Elk River Vegetated (woody riparian rooted within OHWM/HTL in estuarine/riverine tidal or non-tidal waters) (Wv1–Wv2)	4.44
Adjacent Wetlands (Section 404)	
Estuarine Regularly/Irregularly Flooded Persistent Emergent	83.89
Estuarine Aquatic Eelgrass Beds (EB1–EB2)	0.46
Palustrine Seasonally Flooded-Saturated Persistent Emergent	48.00
Palustrine Semipermanently Persistent Emergent (SP1–SP10)	26.35
Palustrine Seasonally-Flooded Persistent Emergent (SF1–SF7)	443.00
Intermittently Flooded Broadleaved Deciduous Scrub-Shrub	17.42
Intermittently Flooded Broadleaved Deciduous Forested (BD1–BD5)	8.43
Total USACE-Jurisdictional	**663.78**
Additional Waters of the State	
One-parameter wetlands within the Local Coastal Zone (OP1–OP6)	45.34
Agricultural water treatment ponds (AG1)	1.57

Figure 5. Preliminary jurisdictional waters and wetlands in the Elk River Planning Area 1. Tile 2 of 3.

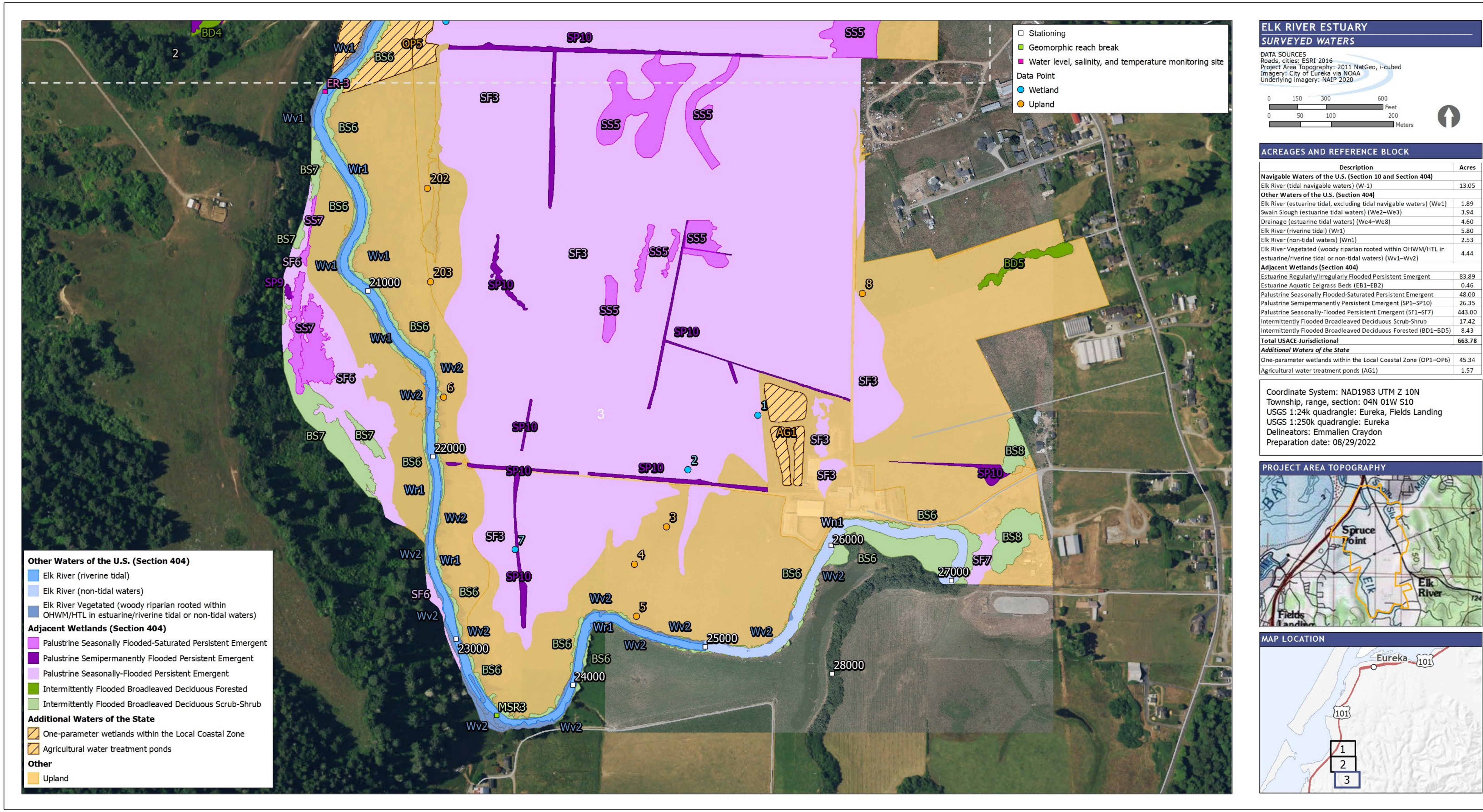


Figure 6. Preliminary jurisdictional waters and wetlands in the Elk River Planning Area 1. Tile 3 of 3.

3.3.1 Waters of the U.S.

Per the *Navigable Waterways List* (USACE 1971), Elk River is a tidal navigable water of the U.S. subject to Section 10 jurisdiction. Its documented navigable length is 1.6 miles upstream from the Humboldt Bay confluence to the head of navigation landmark referred to as "Elk River Corners" (USACE 1971). This portion of the Elk River is subject to USACE jurisdiction under both Section 10 (jurisdictional navigable waters) and Section 404 (tidal waters of the U.S.) and was delineated by the MHW defined by the unconsolidated bottom and unconsolidated shore of Elk River main channel for the entire 1.6-mile documented navigable length (Figures 4–5, Appendix C). Based on the topography derived from LiDAR at this location, the Elk River estimated MHW contour elevation occurred at or below the MHW elevation reported at the tidal water level station Humboldt Bay North Spit, CA (Station ID 9418767) of 5.8 ft, NAVD88 reported for the 1983–2001 Epoch. Navigable waters of the U.S. totaled 13.1 ac in the planning area and excluded subtidal and intertidal vegetation that appeared below the MHW elevation (W-1, Figures 4–5). These vegetated habitats were delineated separately and included *Zostera marina* (eelgrass, OBL) along the channel bed near the Swain Slough confluence (EB1–EB2, Figure 4) and the lower border of the intertidal *Carex lyngbyei* (Lyngbye's sedge, OBL) population along Elk River (grouped with EF1–8, Figures 4 and 5). Eelgrass habitat is defined as vegetated shallows and is protected under the Section 404(b)(1) of the CWA as "special aquatic sites" (40 C.F.R. § 230.43). The intertidal sedge population was characterized as adjacent estuarine persistent emergent wetlands (Section 3.3.2, Appendix C)

Other Waters of the U.S. subject to Section 404 jurisdiction were associated with tidal (estuarine and riverine) and non-tidal waters and totaled 23.2 ac in PA 1 (Table 1, Figures 4–6). Estuarine tidal waters in PA1 totaled 10.4 ac and included Swain Slough (3.9 ac) (We2–3), portions of Elk River–excluding waters already captured as tidal navigable waters (1.9 ac) (We1), and adjacent drainages with direct surface water connections (including leaky tide gates) to Elk River and Swain Slough (4.6 ac) (We4–We8) (Figures 4–5, Table 1, Appendix C). These tidal estuarine waters in PA1 measured monthly average daily salinity values of 10 to 31 throughout the year. The HTL in delineated estuarine tidal waters in PA1, often included coastal intertidal marsh habitat. These estuarine tidal wetlands were classified separately and as such, the transition to these intertidal wetlands defined the upper extent of estuarine tidal waters in the planning area.

In Elk River, estuarine tidal waters were estimated to transition to riverine tidal approximately two miles upstream from the HWY 101 bridge at MSR2 (Figure 5). The continuous monitoring measurements recorded in 2021 just upstream of this location (ES-3) measured monthly mean daily salinities of less than 0.5 ppt except from June–October that measured less than 3 ppt (Figure 5). Riverine tidal waters totaled 5.8 ac and were delineated by the OHWM using LiDAR-derived topography to assess break in slope of the channel bed and the top of bank locations along with site characterization (Wr1, Figures 5 and 6). Often narrowed riparian corridors had woody vegetation rooted along the sloped channel banks that occurred within the OWHM/HTL of Elk River (Appendix C). In PA1, those features were characterized as "Elk River Vegetated" waters (4.4 ac) in order to capture the waters extent as well as delineate the channel and riparian condition in the planning area (Wv1–2, Figures 5 and 6, Table 1, Appendix C). Tidal waters of the U.S. in the Elk River transitioned to non-tidal waters upstream of station 25,000 where the bed elevation of the channel was equal to the highest tide on record and totaled 2.5 ac in the planning area (Wn1, Figure 6, Table 1).

3.3.2 Wetlands

Wetland types within PA1 include both non-tidal (i.e., palustrine seasonally flooded, seasonally flooded-saturated persistent, and semipermanently flooded emergent wetlands and palustrine intermittently flooded broadleaved deciduous scrub-shrub or forested wetlands), and tidal (i.e., estuarine regularly/irregularly flooded persistent emergent wetlands). FGDC (2013) defines the palustrine system as all non-tidal wetlands dominated by trees, shrubs, persistent emergent plants, emergent mosses or lichens (i.e., non-vascular) and all similar wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 parts per thousand. Estuarine system is defined as consisting of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. Emergent wetlands are characterized by erect, rooted herbaceous hydrophytes, excluding mosses and lichens, that are the tallest life form, have at least 30% areal coverage, and are present for most of the growing season in most years (FGDC 2013). Broadleaved deciduous scrub-shrub and forested wetlands are characterized by woody plants of this leaf type that are less than 20 feet tall (scrub-shrub) or woody trees (at least 20 feet tall) (forested) that are the dominant life form with at least 30% areal coverage (FGDC 2013).

3.3.2.1 Palustrine seasonally flooded emergent wetlands

Palustrine seasonally flooded emergent wetlands were the most prevalent wetland type in the planning area totaling 443 ac, just over half of the planning area (SF1–SF7, Figures 4–6, Table 1). These wetlands were primarily coastal mesic grasslands actively used for cattle and dairy ranching and hay production. The grassland species assemblages had low plant diversity and were composed primarily by facultative pasture grasses and forbs, indicative of decades of controlled vegetation management in this region. Landforms were mostly flat with a gradual rise towards Elk River embankments or other surrounding infrastructure. These wetlands were best defined by data points 1 and 5 (Figure 4). At these locations, the herbaceous cover was high (>90% absolute cover) with dominant cover by the facultative grass species *Festuca perenn*is (rye grass, FAC), a common pasture forage species. Other species included facultative forbs typical of coastal agricultural fields such as *Trifolium repens* (white clover, FAC), *Ranunculus repens* (creeping buttercup, FAC), *Atriplex prostrata* (fat-hen, FAC), *Plantago major* (common plantain, FACU), and *Cirsium arvense* (Canada thistle, FACU). At data point 1, only one species, rye grass, was classified as dominant per the "50/20 rule," and the dominance test confirmed hydrophytic vegetation was present (Appendix A). The upper 8 inches of the soil profile consisted of silty clay loam with reduced matrix color of 10YR2.5/1 and contained common and prominent redox concentrations (5%) (7.5YR4/6), thereby confirming the primary hydric soil indicator redox dark surface (F6) (Appendix A). The primary wetland hydrology indicator, oxidized rhizospheres along living roots (C3) as well as the secondary indicator geomorphic position (D2) were present and wetland hydrology was confirmed at this location (Appendix A).

Uplands adjacent to palustrine seasonally flooded emergent wetlands were defined by landscape position (height above the valley floor) and adjacent infrastructure associated with development such as roads, highways, and roadside berms (Figures 4–6, Appendix D). In general, constructed features in PA1 (e.g., paved roadways, agricultural dirt or gravel access roads, barns, homes, water treatment ponds, substation) were delineated as uplands. Within agricultural grasslands upland habitat was best characterized by data points 6 and 101. Both data points had high cover by facultative pasture species (e.g., rye grass, white clover, creeping buttercup) but lacked one or both hydric soils and wetland hydrology indicators (Appendix A). These uplands were defined by the elevated raised berm surrounding the right bank of Elk River through much of the valley bottom (Figures 5 and 6). Forage grasses and forbs commonly found within North Coast pasture lands have facultative (FAC) wetland ratings. As such, dominant vegetation at data points sampled within pasture will often pass the dominance test for hydrophytic vegetation. When hydric soils and/or wetland hydrology indicators are lacking, the species assemblage was considered an artifact of decades of continuous agricultural management to maintain cover by these species, rather than these species growing as hydrophytes on the landscape. When dominant vegetation was not indicative of the wetland upland transition in the planning area, uplands were delineated based on topography (i.e., the height above the valley floor or elevation contour where data points lacked one or more wetland parameters) (see data points 3–6, 101, 201, 202, and 203; Figures 4–6, Appendices A and C). In the Coastal Zone, any vegetated feature with one or more observed wetland indicators were categorized as CC-jurisdictional wetlands (Table 1).

3.3.2.2 Palustrine seasonally flooded-saturated/semipermanently flooded emergent wetlands

Seasonally flooded-saturated emergent wetlands totaled 48 ac in PA1 and were characteristic of lowland areas within the palustrine seasonally flooded emergent wetlands (SS1–SS7, Figures 4–6, Appendix C). They were characterized by a mosaic of undulations and shallow swales along the valley floor formed by the historical flow pathways of Elk River, Swain Slough, Orton Creek, and other waters (Figures 5 and 6, Appendix C). Along the lower extent of PA1, these lowland features have formed over the last few decades from the reintroduction of daily tide cycles (Figure 4, Appendix C). Per FCDC (2013), these wetlands have surface water present for extended periods (>1 month) during the growing season, but absent by the end of the season in most years–though the substrate typically remains saturated at or near the surface. Vegetation in these wetlands were typically composed of hydrophytic forbs and graminoids common in freshwater to brackish conditions with varying cover. Data point 205 characterizes a typical seasonally flooded-saturated emergent wetland observed in PA1. Dominant species included *Potentilla anserina* (Pacific silverweed, FACW) and *Agrostis stolonifera* (creeping bentgrass, FAC) and the dominance test for hydrophytic vegetation was confirmed (Appendix A). Additional cover included *Eleocharis macrostachya* (pale spikerush, OBL) and *Festuca arundinacea* (tall fescue, FAC). The soil profile at data point 205 contained a silty clay loam with a matrix of 10YR3/1 in the upper ten inches below ground surface. Redox concentrations of 2% (7.5YR5/8) were documented in the soil matrix and the primary hydric soil indicator redox dark surface (F6) was confirmed. The primary wetland hydrology indicator, high-water table, was observed just five inches below the ground surface (Appendix A). At other sites in PA1, seasonally flooded-saturated emergent wetland vegetation was formed by hydrophytic grass assemblages, such as data point 07 that had a mixture of rye grass and *Alopecurus geniculatus* (water foxtail, OBL) occurring in a lowland swale. Similarly, other drainages and lowland sites contained *Glyceria declinata* (western manna grass, FACW) and *Phalaris arundinacea* (reed canarygrass, FACW).

Semipermanently flooded wetlands were in swale and roadside drainages often near infrastructure (roadways, berms), toe slopes (where the valley floor met hillsides or development), and agricultural ditches and composed 26.4 acres of the planning area (SP1–SP10, Figures 4–5). These sites often contained stout hydrophytic perennial graminoids like *Scirpus microcarpus*, *Carex obnupta*, *Juncus effusus, Typha latifolia*, *Deschampsia cespitosa,* along with *Oenanthe sarmentosa* (water parsley, OBL) (Appendix C). Hydrology was primarily attributed to surface runoff. Most of the vegetated drainage ditches in cattle pasture did not have surface water connections to Elk River (Figures 5 and 6). However, during infrastructure surveys in PA1, a few culvert connections were confirmed that directly connected these features to Elk River. Those without direct connection often had sheet flow connection to Elk River during flood events precipitated by high seasonal flow and high precipitation events. All agricultural ditches were excavated within the valley bottom and were variously maintained by landowners (e.g., vegetation management). The vegetated roadside ditch along Elk River Road contained intermittent patches of cattails and eventually connected to Swain Slough near the Elk River Road crossing (SP7; Figure 5).

Both wetland types were in lowland features and drainages within the planning area and therefore were bound by palustrine seasonally flooded emergent wetlands. Exceptions occurred where these features abutted infrastructure associated with development. At these locations the upland boundary was delineated by the edge of development (Figures 4–6, Appendix D).

3.3.2.3 Palustrine Intermittently Flooded Broadleaved Deciduous Scrub-Shrub and Forested Wetlands

Palustrine scrub-shrub (BS1–BS8) and forested (BD1–BD5) wetlands formed most of the riparian corridor along Elk River in PA1 and totaled 17.4 and 8.4 acres, respectively (Figures 4–6). Due to agricultural land practices the riparian corridor has been narrowed and woody vegetation was restricted to immediate channel banks along Elk River. Willows were most often rooted on the sloped channel banks of the Elk River channel, primarily below the top of bank or OHWM/HTL (Table 1, Appendix C). Acreage associated with vegetation rooted below top of bank was not included in these wetland categories but rather characterized as Vegetated-Other Waters of the U.S. (Wv1–5, Figures 5 and 6) (Section 3.3.1, Table 1). As such, inspection of this wetland type focused on documenting dominant vegetation and identification of primary wetland hydrology (i.e., saturation [A3], surface soil cracks [B6]). Hydric soils were presumed present along the riparian corridor due to hydric soil confirmation in nearby wetlands of comparable elevation and mapped soil series, the perennial access to water, and hydric soil confirmation of some adjacent uplands (those with one or two wetland parameters). Dominant hydrophytic wetland plant composition occurred within all strata (i.e., understory herbaceous, shrub/vine, and tree). Broadleaved deciduous scrub-shrub wetlands were primarily composed of *Salix hookeriana* (coastal willow, FACW), *Salix sitchensis* (Sitka willow, FACW), and *Salix scouleriana* (Scouler's willow, FAC). Herbaceous understory species included creeping buttercup, *Holcus lanatus* (velvet grass, FAC), rye grass, *Carex lyngbyei* (Lyngbye's sedge, OBL), *Dryopteris expansa* (expanding wood fern, FACW), and patches of *Rubus armeniacus* (Himalayan blackberry, FAC). Although the upper extent of jurisdictional waters may have included the root crown for individuals within these woody stands, the outer extent of these palustrine scrub-shrub and forested wetlands were captured by the edge of riparian canopy that typically extended beyond the top of bank (Figures 4–6, Appendix C). Palustrine broadleaved deciduous forested wetlands included mostly a patchwork of *Salix lasiandra* (Pacific willow, FACW) and *Alnus rubra* (red alder, FAC) but also a small *Picea sitchensis* (Sitka spruce, FAC) stand (Figures 4–6, Appendix C). Stands to the east occurred along toeslopes adjacent to Elk River Road and along the historic channel network of the valley floor (Figures 5 and 6). Other stands were immediately adjacent to Elk River bordering the estuarine wetlands just above benches composed of intertidal estuarine wetlands (Figures 4–6).

The upland border to scrub-shrub and forested wetland types in the planning area were defined by a distinct change in vegetation to pasture grassland or to coastal scrub habitat. Uplands defined in the elevated raised berm surrounding the right bank of Elk River have been or continue to be used for pasture (Appendix D). Data point 6 characterizes the upland grassland habitat that borders the woody wetland types in the planning area. At this location facultative pasture species were dominant (rye grass and *Trifolium repens* [white clover, FAC]) and vegetation passed the dominance test for hydrophytic vegetation. However, both hydric soils and wetland hydrology indicators were absent and the site was characterized as an upland (Appendices A and D). As discussed in Section 3.3.2.1, the common forage species observed at this data point were typical of North Coast pasture and since hydric soils and wetland hydrology were absent the species assemblage was considered an artifact of continuous agricultural management to maintain cover by these species, rather than these species growing as hydrophytes on the landscape. As such, the upland delineation in the pasture was characterized at the height above the valley floor where data points lacked hydric soils and/or wetland hydrology such as data points 6, 101, 103, 104, 201, 202, and 203 (Figures 4–6, Appendix D). Coastal scrub uplands were documented along raised berms and road prisms throughout the planning area. These features defined the typical upland boundary to palustrine forested/scrub-shrub wetlands in the vicinity of the Elk River Wildlife Area (Figures 4 and 5). Upland data point 109 best defines the areas associated with woody vegetation typical of coastal scrub habitats. At this location, dominant vegetative cover was composed of *Rubus ursinus* (California blackberry, FACU) and sporadic shrubs including coyote brush and *Lonicera involucrata* (twinberry, FAC) were observed throughout (Appendix A). Low cover by herbaceous species included *Achillea millefoliata* (common yarrow, FACU), nonnative *Raphanus sativus* (cultivated radish, NL/UPL) and water parsley was observed along the transition to adjacent wetland habitat. Both hydric soils and primary wetland hydrology indicators were lacking at data point 109 and the site was marked an upland (Appendix A).

3.3.2.4 Estuarine persistent emergent wetlands

Estuarine persistent emergent wetlands was the second most prevalent wetland type documented in the planning area with 83.9 acres, or 10% of the entire PA1 (EF1–EF8) (Figures 4 and 5, Table 1). The fine-scale vegetation community classification assessment conducted in the Elk River PA1 completed in 2022 was used to characterize the boundaries of regularly and irregularly flooded estuarine persistent emergent wetlands. Estuarine persistent emergent wetlands in PA1 ranged in ground surface elevation from 6.5 to 8.5 ft (NAVD88). This elevation range correlated with the 2022 estimated HTL/MHHW extent for Elk River and Swain Slough tidelands (7–8.6 ft) as described in Section 2.2.1. As such, tidal waters of the U.S. were adjusted to the lower extent of these estuarine wetlands so as to only include open waters and unvegetated mudflats and channels. These wetlands were delineated based on vegetation community types characterized by dominant halophytes including S*alicornia pacifica* (pickleweed, OBL), *Spartina densiflora* (dense-flowered cordgrass, OBL), *Distichlis spicata* (salt grass, FACW), *Juncus lescurii* (salt rush, FACW), *Triglochin maritima* (seaside arrowgrass, OBL), *Atriplex prostrata* (fat-hen, FAC), *Cotula coronopifolia* (common brass buttons, OBL), and *Carex lyngbyei* (Lyngbye's sedge, OBL).

Patches of eelgrass habitat were observed along the Swain Slough channel bed and remained submerged during low tide events based on 2021 site investigations (EB1 and EB 2) (Figure 4, Appendix C). The estuarine wetlands that occurred on intertidal benches immediately adjacent to Elk River and Swain Slough were regularly flooded by tidal waters. Low lying reclaimed tideland features subject to tidal influence due to malfunctioning tide gates and failing earthen berms were regularly and irregularly flooded depending on proximity to open water channels and rise in elevation (Figures 4 and 5). Drainages with muted or leaky tidal connections mostly east of Swain Slough, were considered irregularly flooded but with enough tidal influence to contain halophytic species assemblages (Appendix C). Data point 108 characterizes a typical estuarine wetland within PA1 (Appendix A). Dominant hydrophytic vegetation included pickleweed and salt grass with additional cover by dense-flowered cordgrass. The entire 16-inch soil profile was composed of clay with a matrix color of 10YR4/1 containing 15% redox concentrations occurring as pore linings (10YR3/6). Hydric soils were confirmed by the primary indicator depleted matrix (F3). Wetland hydrology was present by both saturation to soil surface (A3) and drift deposits (B3).

Uplands surrounding estuarine habitats in PA1 were delineated along the elevated features associated with relic earthen berms and existing levees. The upland levee crest boundaries surrounding Elk River and Swain Slough were sampled by data point 107 (Figure 6, Appendices A and D). This data point characterized the upland habitat surrounding the HTL and estuarine wetlands in the planning area. Dominant vegetation included coastal scrub species *Baccharis pilularis* (coyote brush, NL/UPL) along with herbaceous forbs, *Achillea millefoliata* (yarrow, FACU), *Daucus carota* (Queen Anne's lace, FACU), and *Symphyotrichum chilense* (Pacific aster, FAC). The soil profile in the upper five inches had a matrix color of 10YR3/2 composed of loam and a silty clay loam matrix (10YR 4/1) with 10% redoximorphic features (concentrations occurring as pore linings) from 5 to 18 inches below surface (Appendix A). No hydric soil indicators were confirmed as depleted matrix (F3) requires a low chroma band be, at minimum, six inches within the upper ten inches of the soil profile. No evidence of primary or secondary hydrology indicators were documented. Uplands associated with levees and earthen berms along Elk River and Swain Slough were delineated using LiDAR-derived topography along with coastal scrub vegetation polygons (e.g., coyote brush and *Rubus ursinus* [California blackberry, FACU] stands) and as such, excluded eroded or scoured areas transitioning towards wetland condition (Figures 4 and 5).

3.3.2.5 Additional State-Jurisdictional Wetlands

In addition to all potential USACE-jurisdictional waters and adjacent wetlands described in Sections 3.3.1 and 3.3.2, an additional 45.3 acres of potential CC-jurisdictional wetlands (OP1–6) and just under two acres of additional waters of the state (1.6 ac associated with agricultural water treatment ponds, AG1) were identified in the planning area (Table 1, Figures 4–6). These wetlands were delineated from data points with at least one positive primary wetland parameter located within the Coastal Zone.

One-parameter wetlands within the Coastal Zone of planning area, included features in the former tidelands that were in transition from agricultural grassland to estuarine wetland habitat due to increased tidal influence from malfunctioning tide gates and failure of earthen berms surrounding lower Swain Slough. Data point 204 indicated hydric soils were present however both wetland hydrology and dominant hydrophytic vegetation were lacking (Appendix A). Vegetation was composed of *Anthoxanthum odoratum* (sweet vernal grass, FACU), *Rumex acetosella* (sheep sorrel, FACU) and *Ranunculus repens* (creeping buttercup, FAC). Also present but with low cover included *Poa pratensis* (Kentucky blue grass, FAC), *Taraxacum officinale* (common dandelion, FACU), common yarrow, San Francisco rush, and Pacific aster (Appendix A). Hydric soils were indicated by depleted matrix (F3) with a matrix color of 10YR4/2 extending from the ground level to 14 inches below surface with one percent redox concentrations occurring as pore linings in the clay loam matrix. This one-parameter wetland was documented along an elevated band without hardscaped protection and surrounded by estuarine wetlands. These adjacent wetlands had converted from agricultural land use to coastal intertidal and brackish marsh communities.

Coastal scrub habitat along the levees lacked all three wetland parameters (data point 107, see description under Section 3.3.2.4) and were not considered state jurisdictional features in the Coastal Zone. Coastal scrub habitat composed most of the uplands along the elevated features along Elk River and some portions of the Swain Slough. Features attributed to agricultural pasture were included as one-parameter wetlands although their facultative grass/forb species composition was considered a product of land management rather than natural occupation by hydrophytic vegetation. No additional one or two parameter wetlands were identified in the

Coastal Zone as the other upland habitats delineated within the Coastal Zone were associated with development (Figures 4–6).

4 REFERENCES

California Trout, Stillwater Sciences, and Northern Hydrology & Engineering. 2019. Elk River Recovery Assessment: Recovery Framework. Prepared by California Trout, Arcata, California; Stillwater Sciences, Arcata, California; and Northern Hydrology & Engineering, McKinleyville, California for North Coast Regional Water Quality Control Board, Santa Rosa, California.

CCC (California Coastal Commission). 1994. Procedural guidance for the review of wetland projects in California's Coastal Zone. Prepared by California Coastal Commission. https://www.coastal.ca.gov/wetrev/wtexcsum.html

FGDC (Federal Geographic Data Committee). 2013. Classification of wetlands and deepwater habitats of the United States. Adapted from Cowardin et al. 1979. Prepared by the Wetlands Subcommittee, Federal Geographic Data Committee, Reston, Virginia.

Jepson Flora Project, editors. 2022. Jepson eFlora. Website. http://ucjeps.berkeley.edu/eflora/ [Accessed June 2022].

Mersel, M. K., and R. W. Lichvar. 2014. A guide to ordinary high water mark (OHWM) delineation for non-perennial streams in the Western Mountains, Valleys, and Coast Region of the United States. ERDC/CRREL TR-14-1. USACE, Hanover, New Hampshire.

Munsell Color. 2000. Munsell soil color charts, revised washable edition. Munsell Color, Grand Rapids, Michigan.

National Drought Mitigation Center. 2022. United States drought monitor, California. Query for October, November, and December 2021. National Drought Mitigation Center. https://droughtmonitor.unl.edu/.

NCDC (National Climatic Data Center). 2021. Climate data. Website. http://www.ncdc.noaa.gov/cdo-web/datatools/ [Accessed October 2021 and June 2022].

NHE (Northern Hydrology & Engineering). 2015. Humboldt Bay: sea level rise, hydrodynamic modeling, and inundation vulnerability mapping. Prepared for the State Coastal Conservancy, and Coastal Ecosystems Institute of Northern California. McKinleyville, California.

NRCS (U.S. Department of Agriculture Natural Resource Conservation Service). 2016. NRCS Official soil series description: Weott series. Website. Official Series Description - WEOTT Series (usda.gov).html [Accessed June 2021].

NRCS. 2021. Custom soil resource report for Humboldt County, California; Wetland Delineation for the Elk River Recover Plan, Planning Area 1, existing conditions assessment Downloaded from NRCS Websoil Survey website: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

Patton, J. R., T. B. Williams, J. K. Anderson, T. Leroy, K. Weiss, R. Burgette, E. Southwick, W. Gilkerson, E. Nelso, J. Stallman, S. Schlosser, M. Hemphill-Haley, D. Sutherland, and R. Weldon. 2017. Tectonic land level changes and their contribution to sea-level rise, Humboldt Bay region, Northern California: 2017 Final Report. Prepared for U.S. Fish and Wildlife Service Coastal Program. Cascadia GeoSciences, McKinleyville, California.

USACE (U.S. Army Corps of Engineers). 1971. Navigable waterways list. Prepared by San Francisco Regional Office, USACE, San Francisco, California. San Francisco District > Missions > Regulatory > Jurisdiction (army.mil)

USACE. 1987. Corps of Engineers wetlands delineation manual. Technical Report Y-87-1. USACE, Environmental Laboratory, Waterways Experiment Station, Vicksburg, Mississippi.

USACE. 2004. Subject: Determining the upstream limit of a navigable water of the U.S. Memorandum. Prepared by Chief, Regulatory Branch, and District Council to Regstaff, Office of Counsel, San Francisco District Regulatory Branch, USACE. 4 March 2004.

USACE. 2005. Subject: Ordinary High Water Mark Identification. Regulatory Guidance Letter 05-05. 7 December. https://www.nap.usace.army.mil/Portals/39/docs/regulatory/rgls/rgl05-05.pdf

USACE. 2010. Regional supplement to the Corps of Engineers wetland delineation manual: western mountains, valleys, and coast region (Version 2.0). Prepared by USACE, Vicksburg, Mississippi.

USACE. 2020. National wetland plant list, version 3.5. U.S. Army Corps of Engineers Engineer Research and Development Center Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire. http://wetland-plants.usace.army.mil/

USEPA. 2022. Eureka Plain HU, Elk River Watershed, Lower Elk River and Martin Slough. How's My Waterway - Waterbody Report (epa.gov) [Accessed in June 2022].

USFWS (United States Fish and Wildlife Service). 2021. National Wetlands Inventory (NWI) wetlands and riparian polygon data. Geospatial wetlands data. USFWS, Arlington, Virginia. Website. http://www.fws.gov/wetlands/

Vasilas, L. M., G. W. Hurt, and C. V. Noble, editors. 2010. Field indicators of hydric soils in the United States, Version 7.0. USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils.

Appendices

Appendix A

Wetland Delineation Datasheets

Appendix B

WETS Table

Table B-1. WETS table.

WETS Station: EUREKA WFO WOODLEY ISLAND, CA								
Requested years: 1990–2020								
Month	**Avg max Temp**	**Avg min Temp**	**Avg Mean temp**	**Avg Precip**	**30% chance precip less than**	**30% chance precip more than**	**Avg number Days precip 0.10 or more**	**Avg Snowfall**
Jan	55.5	41.4	48.5	6.68	4.10	8.09	12	0.0
Feb	55.7	41.8	48.8	5.60	3.36	6.79	10	0.0
Mar	56.5	43.0	49.7	5.67	3.86	6.76	11	0.0
Apr	57.8	44.9	51.3	3.57	2.38	4.27	8	0.0
May	60.1	48.3	54.2	1.72	0.75	2.10	5	0.0
Jun	62.4	50.7	56.5	0.69	0.22	0.79	2	0.0
Jul	63.6	52.9	58.3	0.18	0.05	0.19	0	0.0
Aug	64.7	53.6	59.1	0.19	0.05	0.20	1	0.0
Sep	64.4	51.2	57.8	0.67	0.16	0.74	2	0.0
Oct	62.1	47.4	54.7	2.29	0.90	2.78	5	0.0
Nov	58.2	43.6	50.9	4.83	3.11	5.81	9	0.0
Dec	55.0	40.4	47.7	7.90	4.47	9.62	12	0.0
Annual:					33.48	44.98		
Average	59.7	46.6	53.1	-	-	-	-	-
Total	-	-	-	39.98			76	0.1
Growing season dates								
Years with missing data:	24 deg = 0	28 deg = 0	32 deg = 0					
Years with no occurrence:	24 deg = 31	28 deg = 27	32 deg = 2					
Data years used:	24 deg = 31	28 deg = 31	32 deg = 31					
Probability	24 F or higher	28 F or higher	32 F or higher					
50 percent *	No occurrence	No occurrence	2/6 to 12/14: 311 days					
70 percent *	No occurrence	No occurrence	1/26 to 12/25: 333 days					

* Percent chance of the growing season occurring between the Beginning and Ending dates.

Table B-2. STATS table.

Total precipitation (inches)													
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annl**
1990	7.20	4.50	3.30	1.41	3.74	0.32	0.22	0.71	0.19	1.73	3.07	2.91	29.30
1991	1.65	2.75	6.94	2.52	2.16	0.26	1.13	0.37	T	1.06	1.95	2.36	23.15
1992	3.99	3.80	3.51	2.42	0.06	1.27	0.25	0.01	0.33	2.08	2.21	9.33	29.26
1993	7.15	5.93	4.72	5.94	4.44	1.23	0.37	0.54	0.03	0.56	1.35	7.12	39.38
1994	5.09	7.12	2.06	3.30	1.10	0.71	0.08	T	0.06	0.54	8.21	7.00	35.27
1995	12.74	1.40	11.18	7.47	1.21	1.85	0.08	0.22	0.	0.	2.	11.	51.
1996	10.74	8.11	3.51	4.64	2.40	0.05	0.03	T	1.21	3.50	5.16	21.26	60.61
1997	8.81	2.55	2.73	3.06	0.90	1.25	T	0.84	2.05	2.73	7.39	4.73	37.04
1998	13.42	13.95	7.83	2.23	3.12	0.33	0.16	0.01	0.08	3.06	14.09	5.40	63.68
1999	4.37	10.32	8.94	1.79	1.62	0.15	0.04	0.30	0.05	1.60	7.36	3.02	39.56
2000	9.71	7.00	2.81	2.15	1.86	0.54	0.04	T	0.55	2.99	3.51	1.97	33.13
2001	3.79	3.60	2.45	0.71	0.69	0.20	0.21	0.28	1.00	7.71	11.56	34.74	
2002	6.37	5.76	4.32	2.42	0.55	0.28	0.03	0.01	0.06	0.06	2.66	23.31	45.83
2003	5.51	3.84	4.91	11.25	1.74	0.04	0.02	0.49	0.35	0.55	5.78	11.35	45.83
2004	6.29	8.12	2.38	1.68	1.37	0.06	0.06	0.43	0.68	5.71	1.87	9.43	38.08
2005	5.91	2.41	6.24	4.70	3.90	3.08	0.05	0.07	0.08	2.40	8.52	12.72	50.08
2006	12.09	6.34	11.11	4.08	1.03	0.35	0.04	T	0.09	0.58	7.41	7.09	50.21
2007	1.86	11.86	2.51	2.72	0.86	0.46	0.97	0.08	0.60	4.92	2.33	7.30	36.47
2008	9.70	2.73	3.16	2.12	0.04	0.24	0.02	0.47	0.05	0.93	4.05	6.66	30.17

Total precipitation (inches)													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
2009	1.58	6.20	5.45	1.23	2.93	0.18	0.06	0.02	1.03	1.95	4.15	4.17	28.95
2010	9.29	4.20	6.06	7.76	3.51	2.31	0.04	0.15	1.39	4.26	4.69	10.08	53.74
2011	2.23	3.62	11.88	4.07	1.43	1.29	0.17	0.04	0.37	4.21	3.86	2.22	35.39
2012	7.76	2.63	12.02	4.76	0.77	2.00	0.67	0.07	0.04	2.72	6.36	10.97	50.77
2013	2.57	1.78	3.09	2.44	1.17	0.43	0.00	0.08	3.14	0.05	1.29	0.56	16.60
2014	1.35	6.09	6.25	1.37	0.58	0.35	0.02	0.02	3.09	4.74	3.89	9.75	37.50
2015	1.36	5.04	3.21	2.57	0.07	0.04	0.15	0.41	0.27	1.18	4.88	14.66	33.84
2016	12.06	2.98	8.11	2.84	0.76	0.02	0.54	0.04	0.01	10.92	6.98	7.87	53.13
2017	10.51	11.10	7.97	5.46	1.31	0.59	0.07	0.05	1.01	1.64	7.40	1.94	49.05
2018	7.86	2.87	8.50	5.02	0.79	0.70	0.03	0.05	0.19	0.85	4.94	4.95	36.75
2019	6.67	14.43	4.79	2.51	2.61	0.00	0.00	0.18	1.92	1.51	1.75	7.63	44.00
2020	7.50	0.60	3.69	2.05	4.73	0.20	0.03	0.08	0.74	0.41	2.55	3.96	26.54
2021	7.10	4.32	3.93	0.71	0.25	1.06	0.21	0.03	1.24	4.02	2.85	7.25	32.97
2022	1.90	0.54	1.49	4.57	1.36	M1.48							11.31

Notes: Data missing in any month have an "M" flag. A "T" indicates a trace of precipitation.

Appendix C

Field Delineation Photographs

Figure C-1. Photographs at wetland Data Point 02 illustrating conditions in a palustrine seasonally flooded-saturated persistent emergent wetland associated with historic flow paths of Swain Slough and other drainages throughout agricultural pasture lands within the valley floor in Planning Area 1.


2 3 4 5 6 7 8 9 10 11 12 13 14 15

Figure C-2. Photographs at wetland Data Point 205 illustrating conditions in palustrine seasonally flooded-saturated persistent emergent wetlands adjacent to estuarine wetlands within the tidally influenced parcel near Swain Slough in Planning Area 1.

Figure C-3. Photographs at Data Point 108 illustrating conditions in tidally influenced estuarine irregularly flooded persistent emergent wetlands adjacent to an unconsolidated bottom intertidal drainage (i.e., estuarine tidal Other Waters of the U.S) in the Elk River Wildlife Area in Planning Area 1.

Figure C-4. Photographs at Data Point 02 illustrating conditions in the palustrine seasonally flooded persistent emergent wetlands documented throughout agricultural pasture lands within the valley floor in Planning Area 1.

Figure C-5. Photographs at Data Point 05 illustrating conditions in the delineated uplands associated with the elevated raised berm surrounding the right bank of Elk River through much of the valley bottom in Planning Area 1.

Figure C-6. Photographs at Data Point 03 illustrating another example of conditions in the delineated uplands associated with elevated raised berm surrounding the right bank of Elk River through much of the valley bottom in Planning Area 1 (note the extent of this upland stops at the riparian corridor where broadleaved deciduous wetland types are delineated).

Figure C-7. Photographs illustrating conditions in the delineated palustrine semipermanently flooded persistent wetlands associated with vegetated drainages in agricultural pasturelands. Dominant emergent vegetation includes *Scirpus microcarpus* (small-fruited bulrush) (top left), San Francisco rush (top right), and Pacific cinquefoil (bottom).

Figure C-8. Photographs illustrating conditions in the delineated palustrine broadleaved deciduous scrub-shrub and forested wetlands throughout the valley floor in Planning Area 1.

Figure C-9. Photographs of Elk River, a listed navigable water of the U.S. within Planning Area 1. Mean high water line delineated at transition from unconsolidated shore to intertidal estuarine wetlands (visible in upper left and right photographs).

Figure C-10. Photographs of Swain Slough (estuarine tidal Other Waters of the U.S.) within Planning Area 1. Waters delineated to transition from unconsolidated shore to intertidal estuarine wetlands (visible in bottom photograph) since the HTL includes estuarine wetlands.

Figure C-11. Photographs of the intertidal aquatic eelgrass bed delineated in the Swain Slough channel within Planning Area 1.

Figure C-12. Photographs illustrating conditions of estuarine tidal drainages (Other Waters of the U.S.) with unconsolidated bottom associated with Swain Slough and Elk River in Planning Area 1.

Figure C-13. Photographs illustrating conditions of estuarine and riverine tidal waters of Elk River (Other Waters of the U.S.) in Planning Area 1. Where riparian woody vegetation was noted within the HTL/OHWM it was defined as Vegetated -Other Waters of the U.S.

Figure C-14. Photographs illustrating conditions of palustrine broadleaf deciduous scrub/shrub wetlands rooted below HTL/OHWM associated with Vegetated - Other Waters of the U.S in Planning Area 1.

Appendix D

Relative Elevation Model and Preliminary USACE-Jurisdictional Features in PA-1

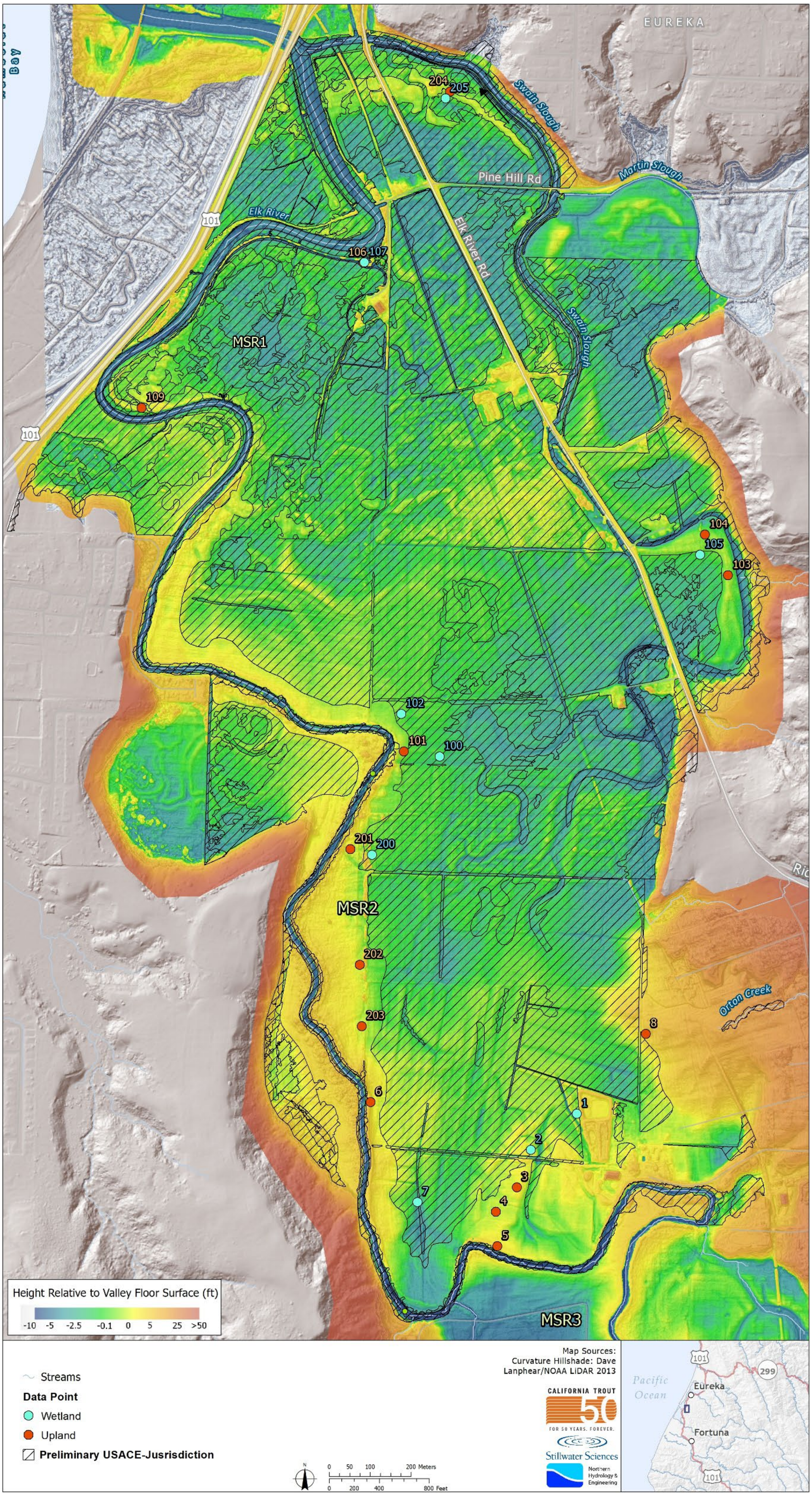


Figure C-1. The relative elevation model (height above the valley floor surface) in PA-1. The preliminary USACE-Jurisdictional features within PA-1 are shown with black hatching.

Appendix D

Water Quality

Supplementary Salinity Data

Table D-1. Monthly average of the daily minimum, mean, and maximum salinity values in Elk River.

Site	Month	Monthly average of daily salinity values (PSU)		
		Minimum	Mean	Maximum
ER-1	Jan	0.3	13.9	21.3
	Feb	8.0	21.9	25.3
	Mar	4.5	22.2	27.3
	Apr	0.2	14.4	23.2
	May	0.1	17.4	21.9
	Jun	21.7	29.9	32.3
	Jul	22.6	30.5	32.5
	Aug	25.5	29.1	30.6
	Sep	22.6	29.2	30.9
	Oct	6.7	28.7	31.2
	Nov	5.6	25.3	28.2
	Dec	0.1	16.8	23.7
ER-2	Jan	0.1	9.9	17.2
	Feb	1.7	22.1	26.5
	Mar	1.3	25.2	31.4
	Apr	0.1	11.8	19.3
	May	0.1	15.1	18.4
	Jun	16.9	25.4	26.9
	Jul	24.3	29.0	30.9
	Aug	21.3	29.2	31.3
	Sep*	22.4	28.8	31.3
	Oct*	3.0	28.2	30.5
	Nov	0.9	25.1	28.8
	Dec	0.0	13.7	18.7
ER-3	Jan	0.1	0.1	0.1
	Feb	0.1	0.1	0.1
	Mar	0.1	0.1	0.1
	Apr	0.1	0.1	0.1
	May	0.1	0.1	0.1
	Jun	0.1	1.6	9.6
	Jul	0.1	2.4	14.2
	Aug	0.1	3.0	14.0
	Sep	0.1	2.4	13.8
	Oct	0.1	1.3	8.0
	Nov	0.1	0.1	0.2
	Dec	0.0	0.5	3.4

* September and October values for ER-2 based on incomplete data (partial months of September and October) due to logger malfunction.

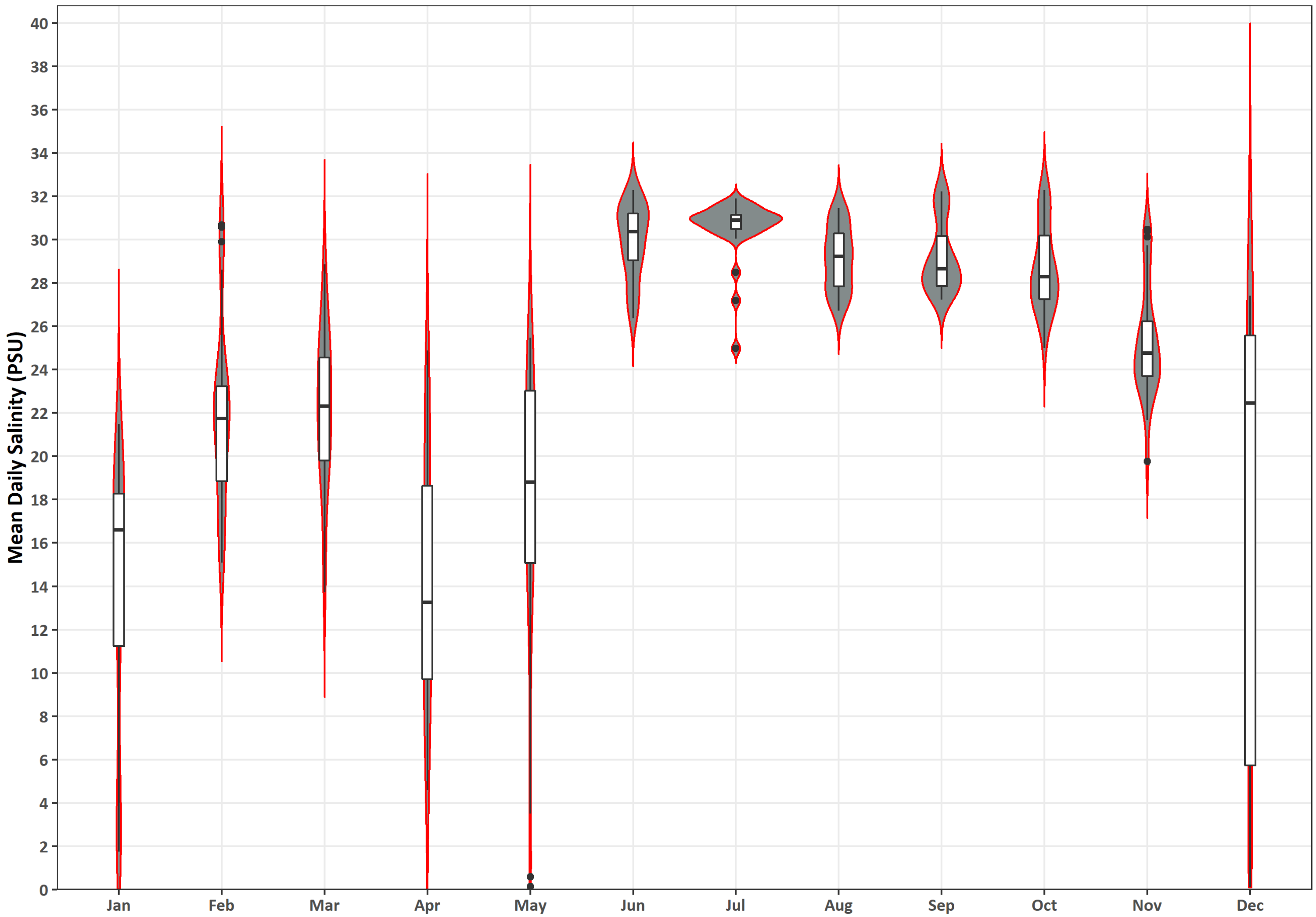


Figure D-1. Violin plot of monthly salinity data at ER-1.

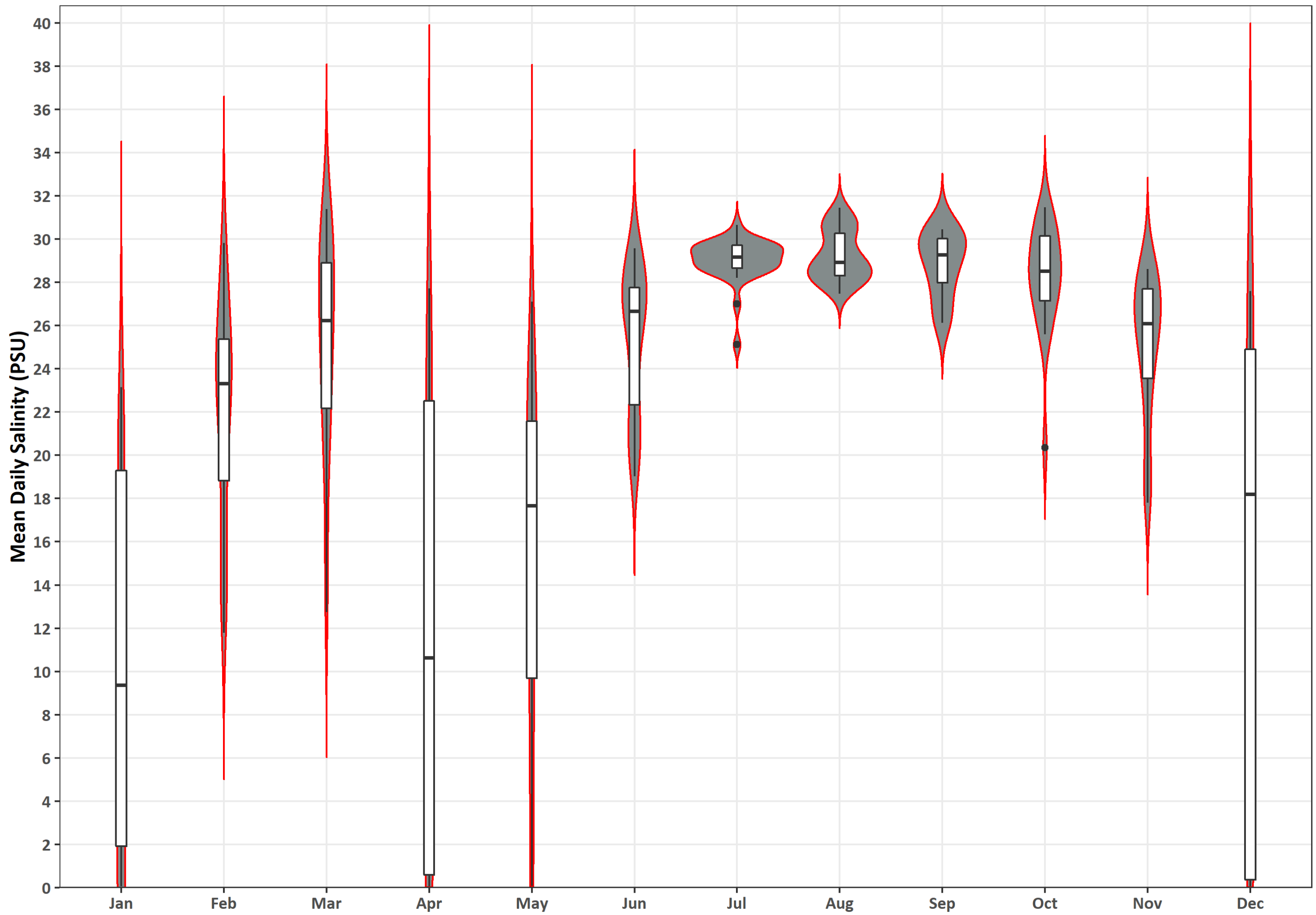


Figure D-2. Violin plot of monthly salinity data at ER-2.

Figure D-3. Violin plot of monthly salinity data at ER-3.

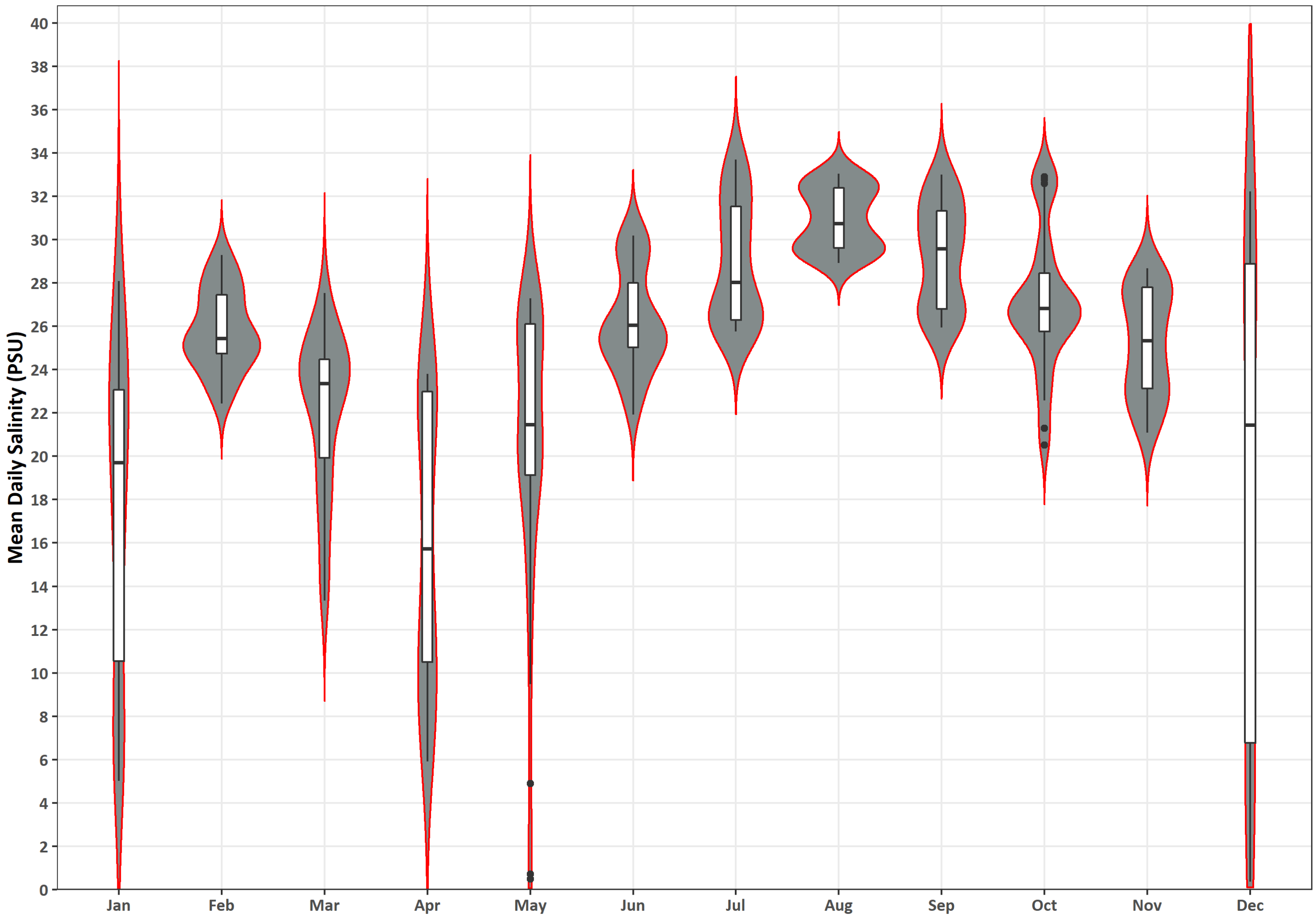


Figure D-4. Violin plot of monthly salinity data at SS-1.

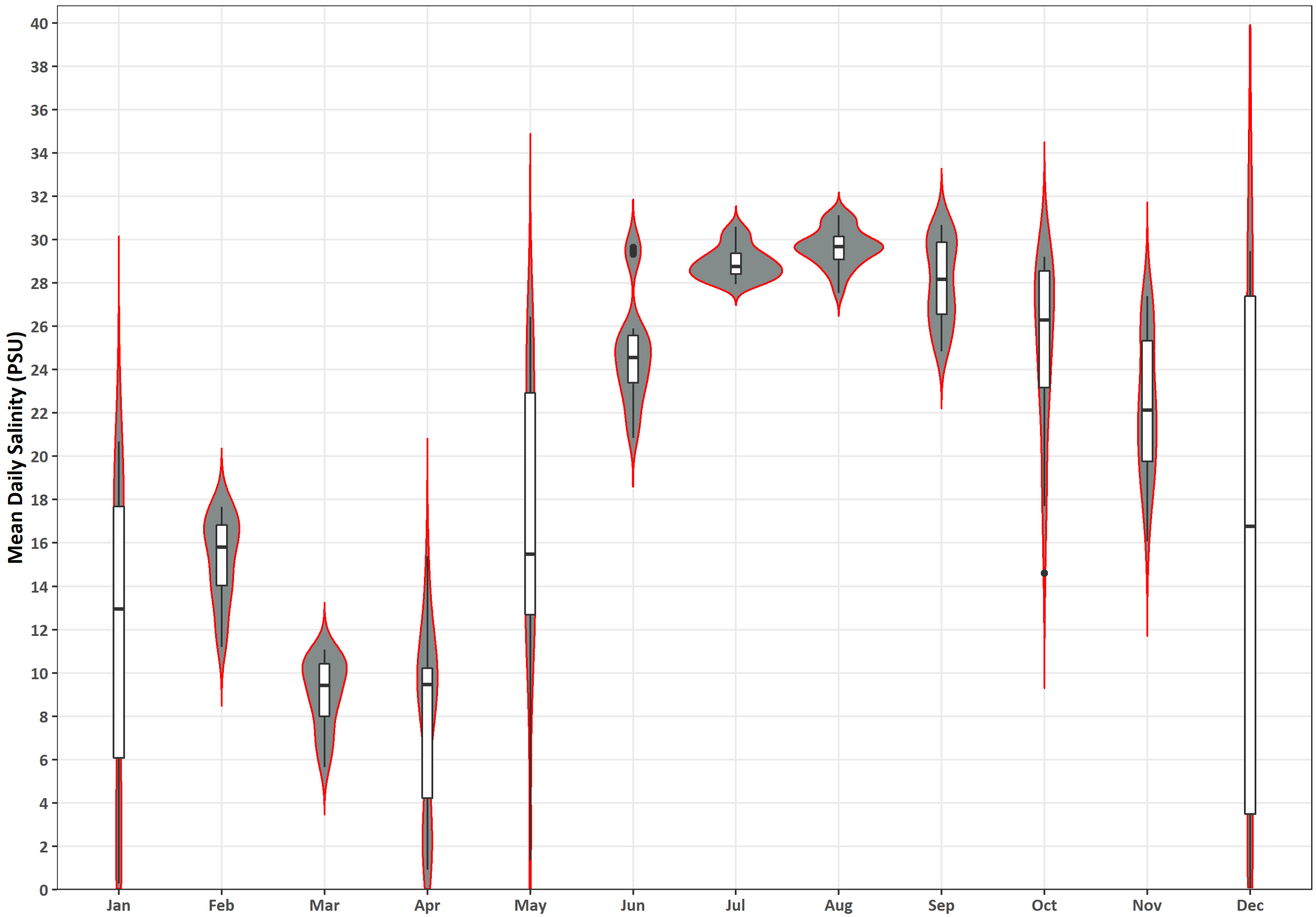


Figure D-5. Violin plot of monthly salinity data at SS-2.

Table D-2. Monthly average of the daily minimum, mean, and maximum salinity values in Swain Slough.

Site	Month	Monthly average of daily salinity values (PSU)		
		Minimum	Mean	Maximum
SS-1	Jan	0.2	17.6	30.7
	Feb	0.0	25.8	31.7
	Mar	8.6	22.1	26.2
	Apr	0.3	15.7	24.6
	May	0.2	20.4	26.9
	Jun	12.7	26.2	30.1
	Jul	21.6	28.9	32.0
	Aug	24.1	30.9	34.0
	Sep	19.0	29.2	31.6
	Oct	4.6	27.1	31.8
	Nov	5.2	25.2	34.6
	Dec	0.1	18.3	30.2
SS-2	Jan	0.1	11.9	19.1
	Feb	8.2	15.3	18.1
	Mar	3.8	9.1	10.2
	Apr	0.3	8.0	13.4
	May	0.8	16.9	21.5
	Jun	16.5	24.9	26.3
	Jul	25.5	28.9	30.3
	Aug	23.6	29.6	30.9
	Sep	19.7	28.0	29.9
	Oct	10.0	25.0	28.5
	Nov	6.1	22.3	27.3
	Dec	0.1	15.5	23.1

Supplementary Temperature Data

Table D-3. Monthly average of the daily minimum, mean, and maximum temperature values in Elk River.

Site	Month	Monthly average of daily temperature values (°C)		
		Minimum	Mean	Maximum
ER-1	Jan	5.6	9.7	10.5
	Feb	7.5	10.3	11.6
	Mar	8.5	11.9	13.9
	Apr	7.7	12.0	13.8
	May	8.8	14.3	16.3
	Jun	14.8	18.7	21.3
	Jul	13.7	18.0	20.2
	Aug	14.0	18.1	19.7
	Sep	13.7	15.6	16.8
	Oct	11.1	13.4	14.2
	Nov	9.4	12.3	12.8
	Dec	6.4	9.6	10.1
ER-2	Jan	5.5	9.1	9.9
	Feb	6.8	10.2	10.8
	Mar	8.4	12.0	12.6
	Apr	7.5	11.4	12.3
	May	8.8	14.1	15.1
	Jun	17.7	20.4	21.0
	Jul	16.5	19.5	20.2
	Aug	16.6	19.0	19.6
	Sep*	15.2	16.4	16.9
	Oct*	11.5	12.8	13.1
	Nov	9.0	12.2	12.5
	Dec	7.2	9.4	9.8

Site	Month	Monthly average of daily temperature values (°C)		
		Minimum	Mean	Maximum
ER-3	Jan	5.5	7.9	8.4
	Feb	4.5	7.7	8.6
	Mar	7.0	9.9	10.9
	Apr	7.5	9.8	10.4
	May	8.6	11.6	12.2
	Jun	11.1	14.3	16.4
	Jul	12.8	14.5	17.4
	Aug	11.4	14.6	17.4
	Sep	10.5	13.0	14.8
	Oct	8.7	11.7	12.6
	Nov	6.7	10.4	11.0
	Dec	7.0	8.7	9.2

* September and October values for ER-2 based on incomplete data (partial month) due to logger malfunction.

Table D-4. Monthly average of the daily minimum, mean, and maximum temperature values Swain Slough.

Site	Month	Monthly average of daily temperature values (°C)		
		Minimum	Mean	Maximum
SS-1	Jan	5.8	9.8	10.8
	Feb	7.3	10.4	12.4
	Mar	8.7	12.3	14.9
	Apr	8.0	12.7	15.8
	May	8.6	15.7	19.1
	Jun	14.1	19.1	22.2
	Jul	13.1	18.1	20.6
	Aug	13.4	18.0	20.2
	Sep	13.2	15.8	17.8
	Oct	10.9	13.6	15.0
	Nov	8.9	12.2	13.1
	Dec	6.2	9.5	10.2

Site	Month	Monthly average of daily temperature values (°C)		
		Minimum	**Mean**	**Maximum**
SS-2	Jan	5.9	9.7	10.9
	Feb	6.4	10.7	12.8
	Mar	8.2	12.9	16.2
	Apr	8.7	13.7	17.2
	May	10.9	17.4	20.9
	Jun	15.8	21.0	23.9
	Jul	16.3	19.8	22.4
	Aug	14.9	19.2	21.3
	Sep	11.9	16.3	17.8
	Oct	8.4	13.7	14.9
	Nov	5.7	12.1	12.9
	Dec	5.5	9.2	9.9

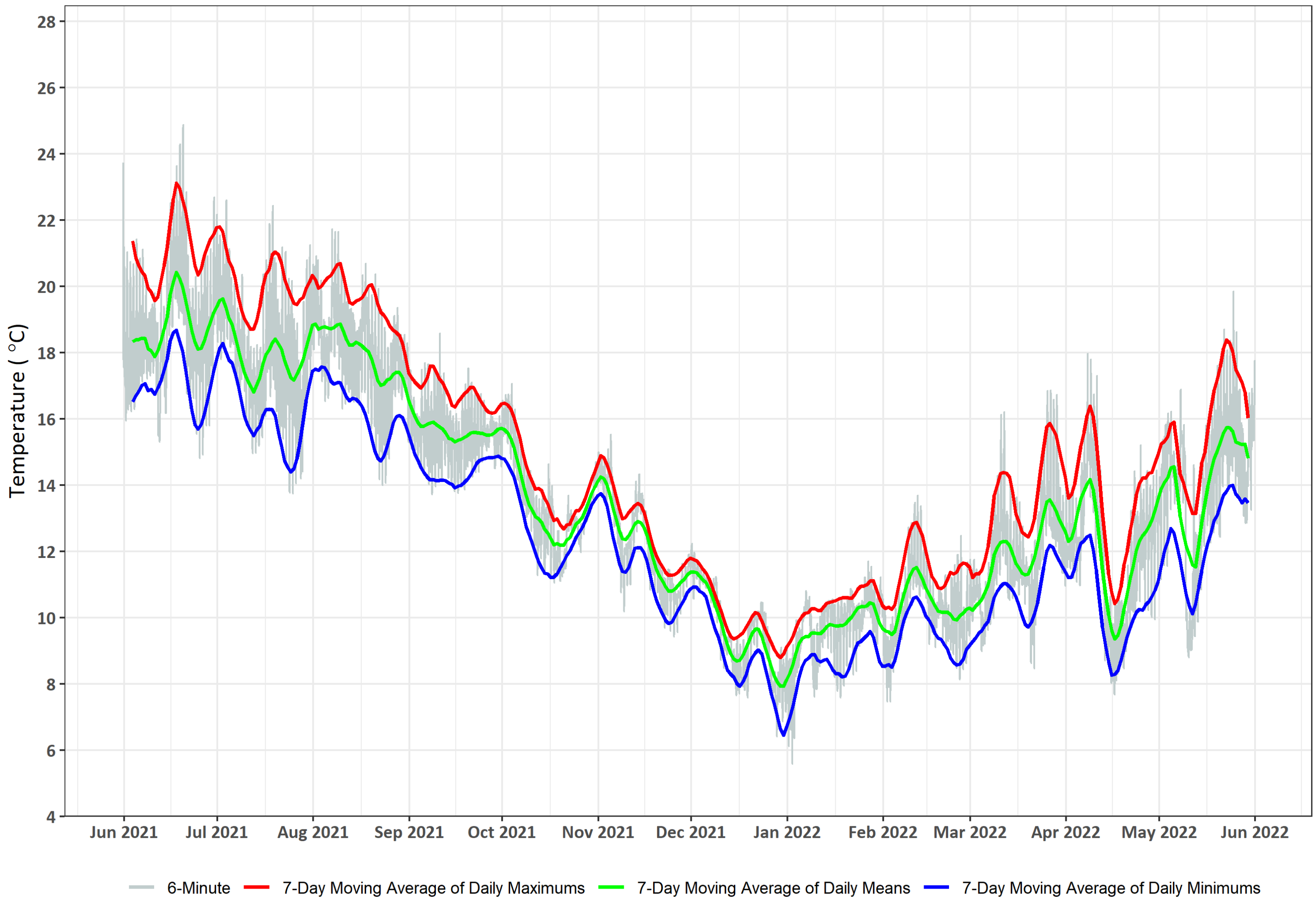


Figure D-6. Six-minute and 7-day average maximum, mean, and minimum temperatures at ER-1.

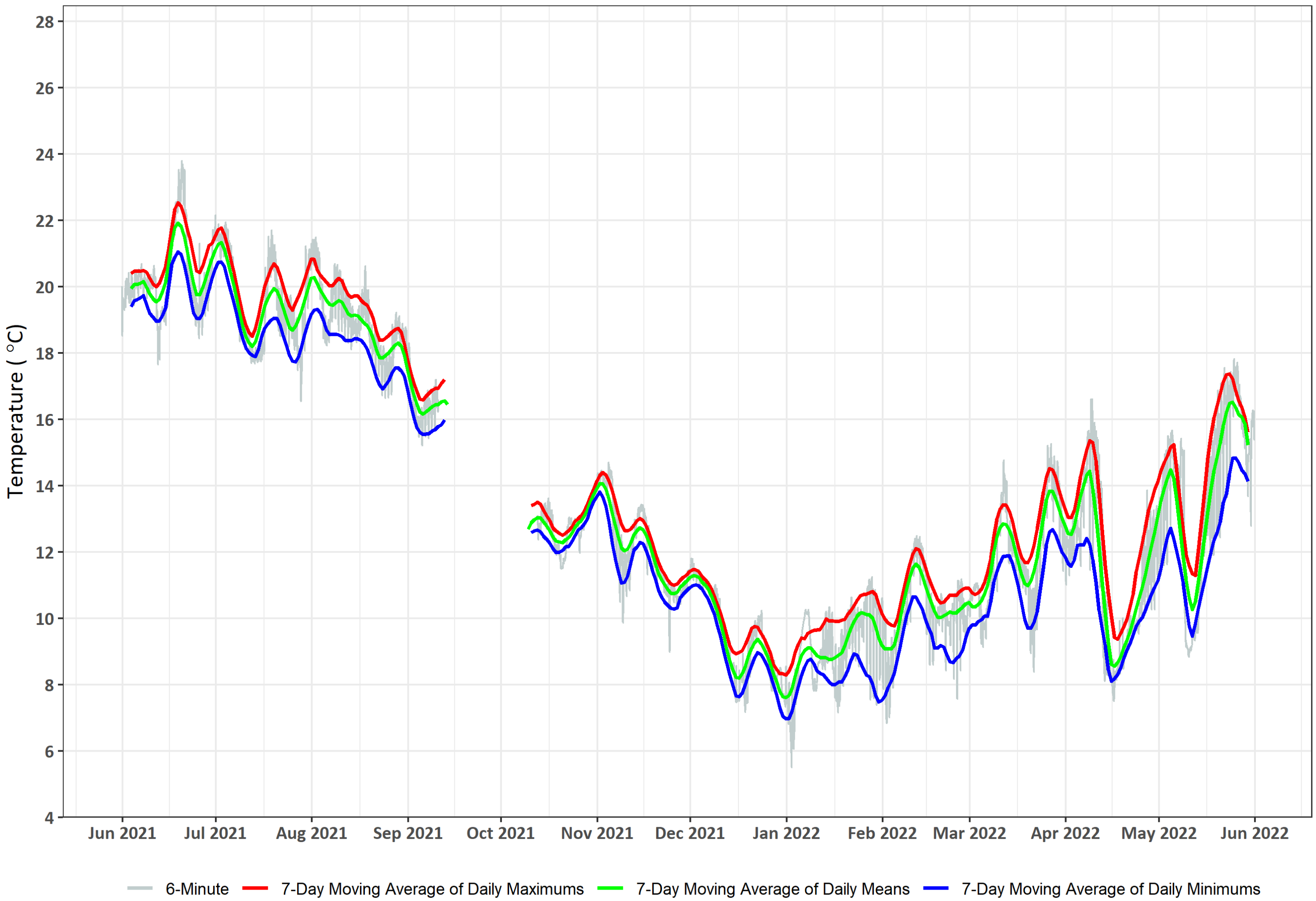


Figure D-7. Six-minute and 7-day average maximum, mean, and minimum temperatures at ER-2.

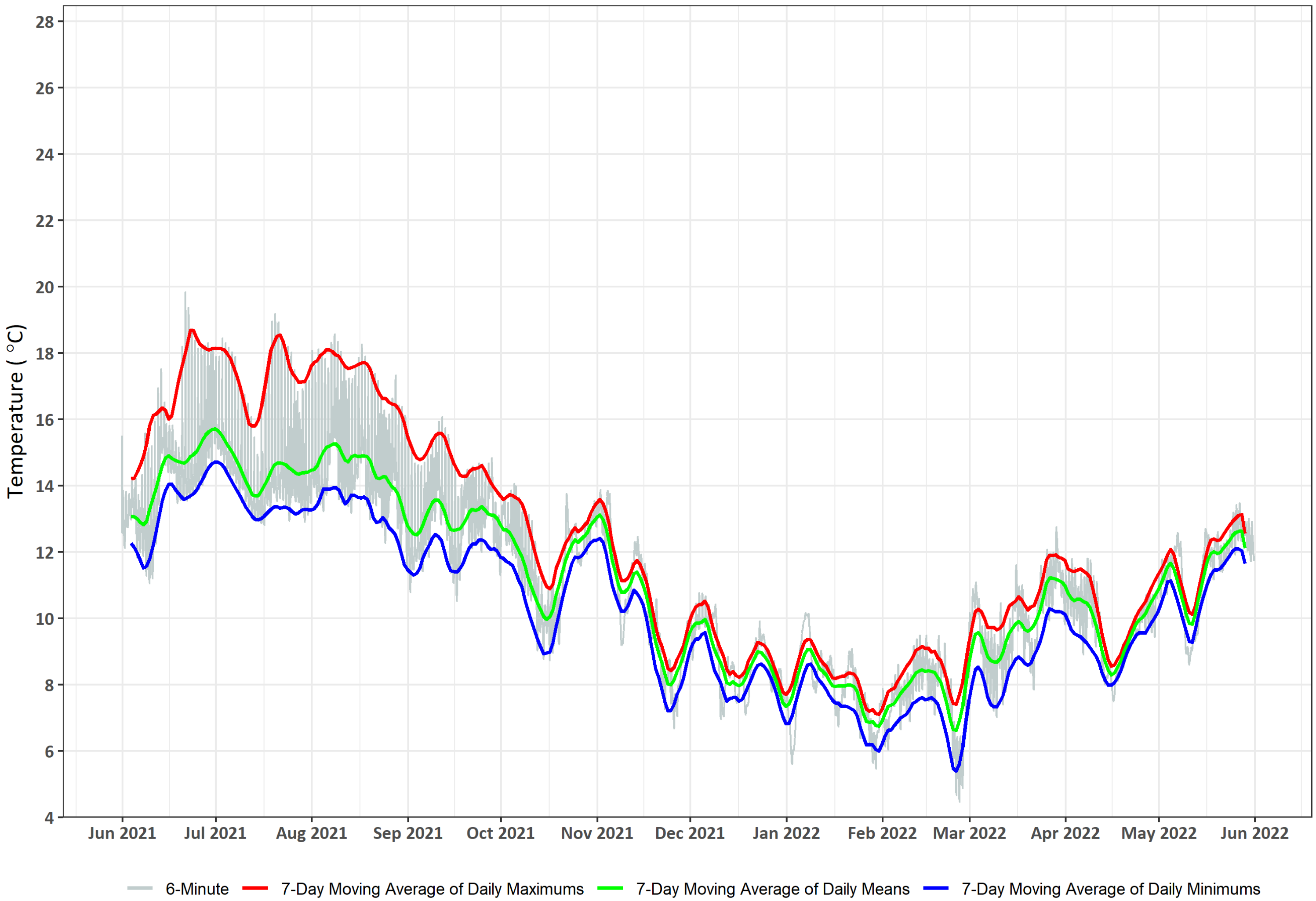


Figure D-8. Six-minute and 7-day average maximum, mean, and minimum temperatures at ER-3.

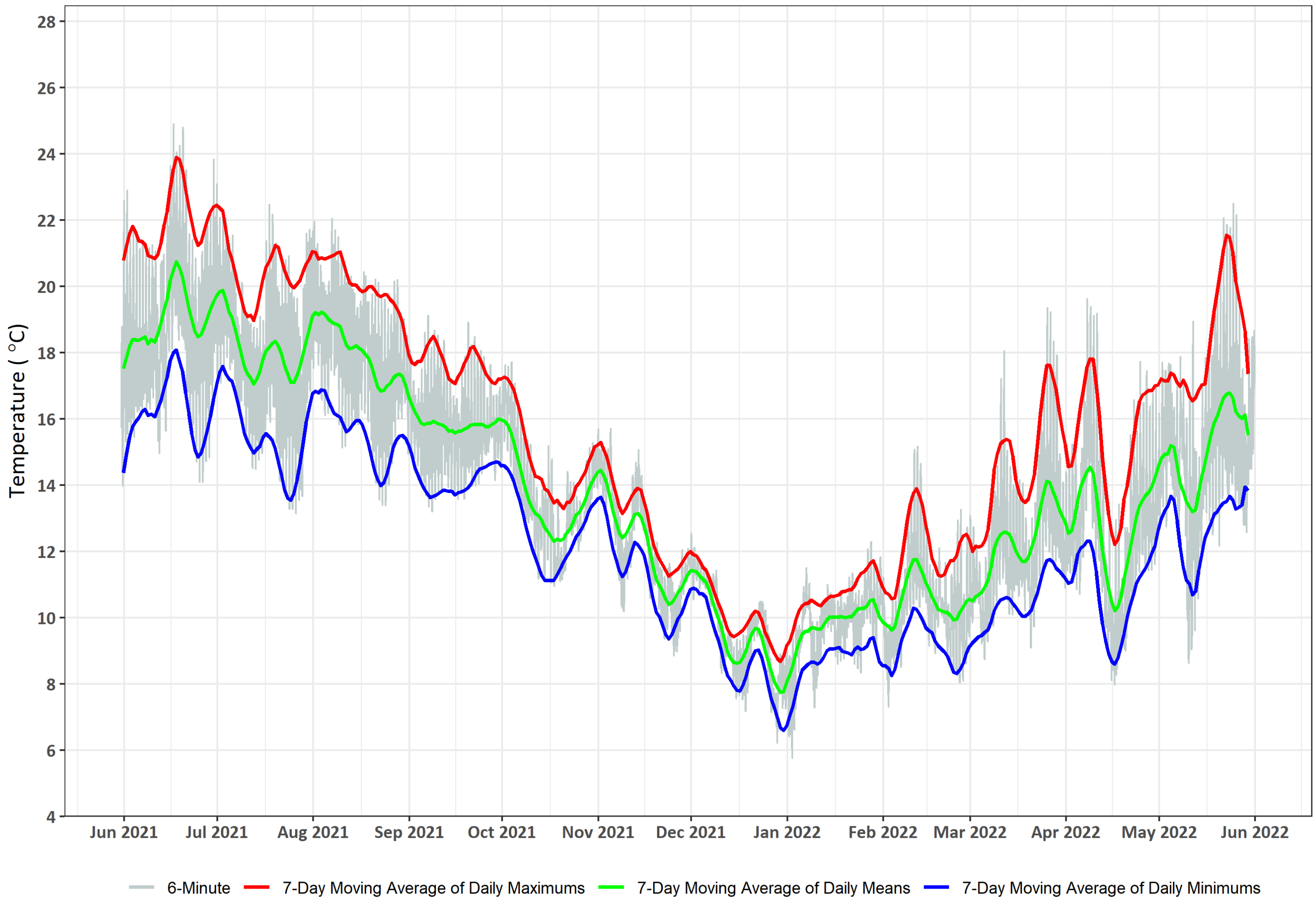


Figure D-10. Six-minute and 7-day average maximum, mean, and minimum temperatures at SS-1.

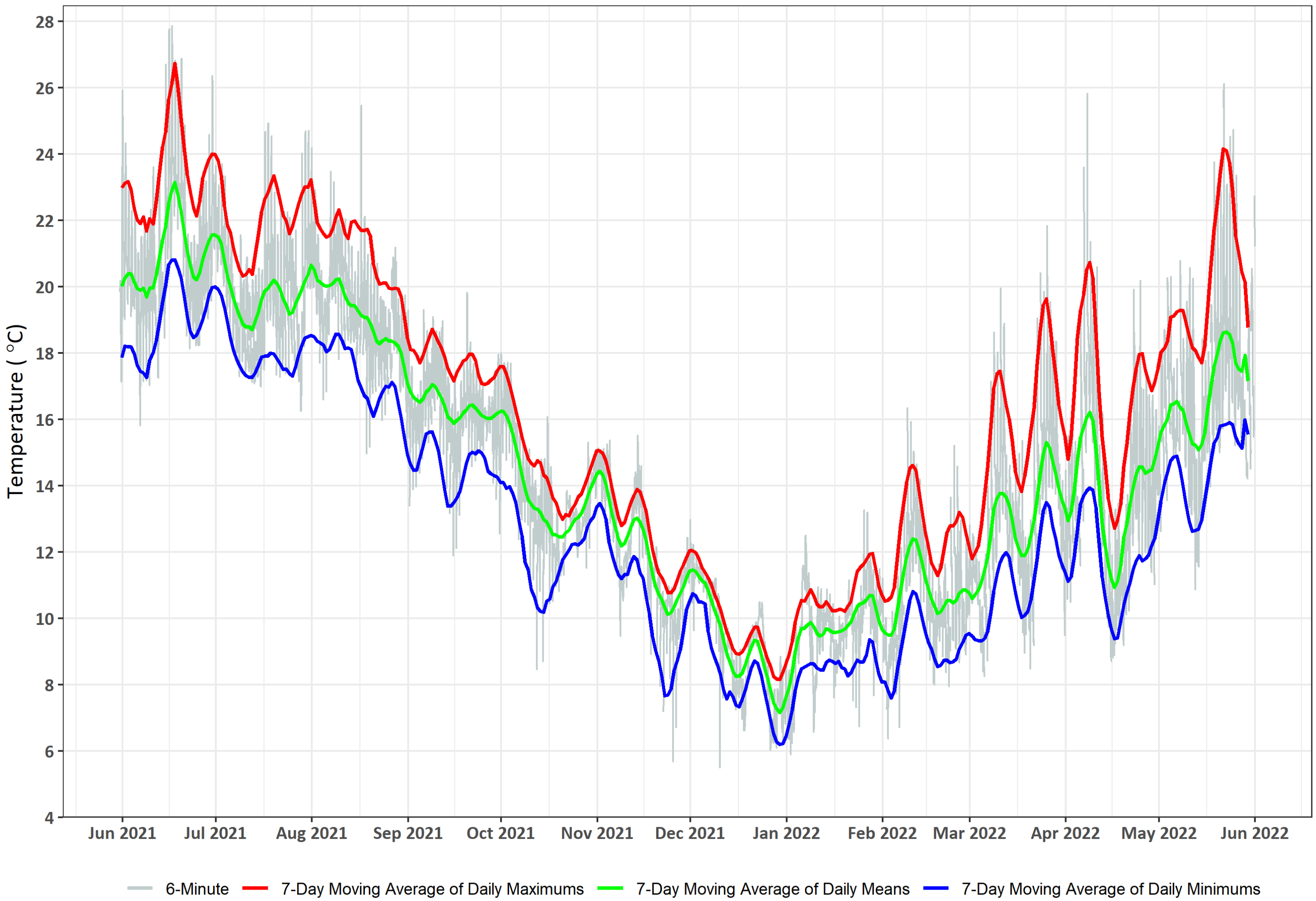


Figure D-11. Six-minute and 7-day average maximum, mean, and minimum temperatures at SS-2.

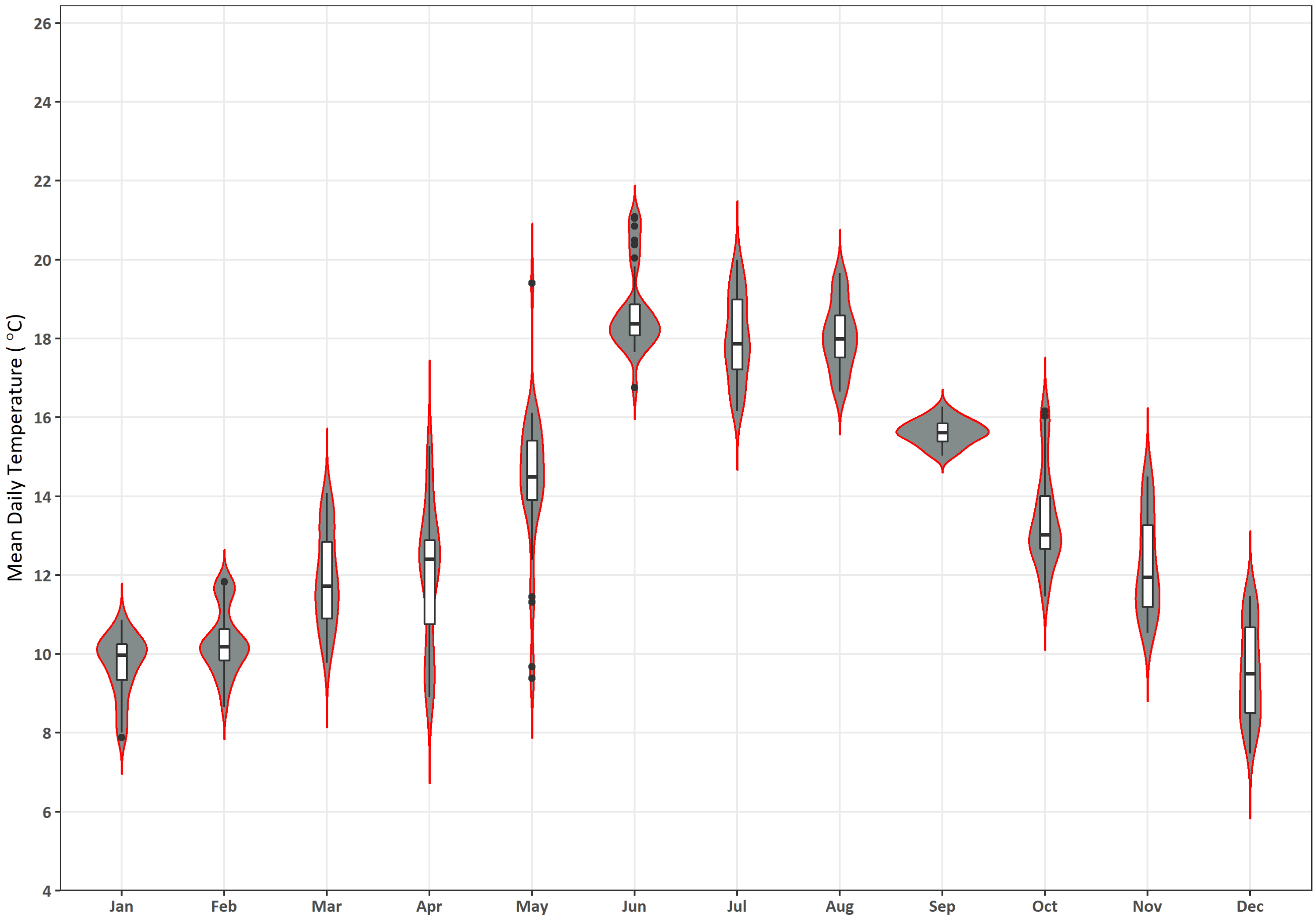


Figure D-12. Violin plot of mean daily temperature summarized by month at ER-1.

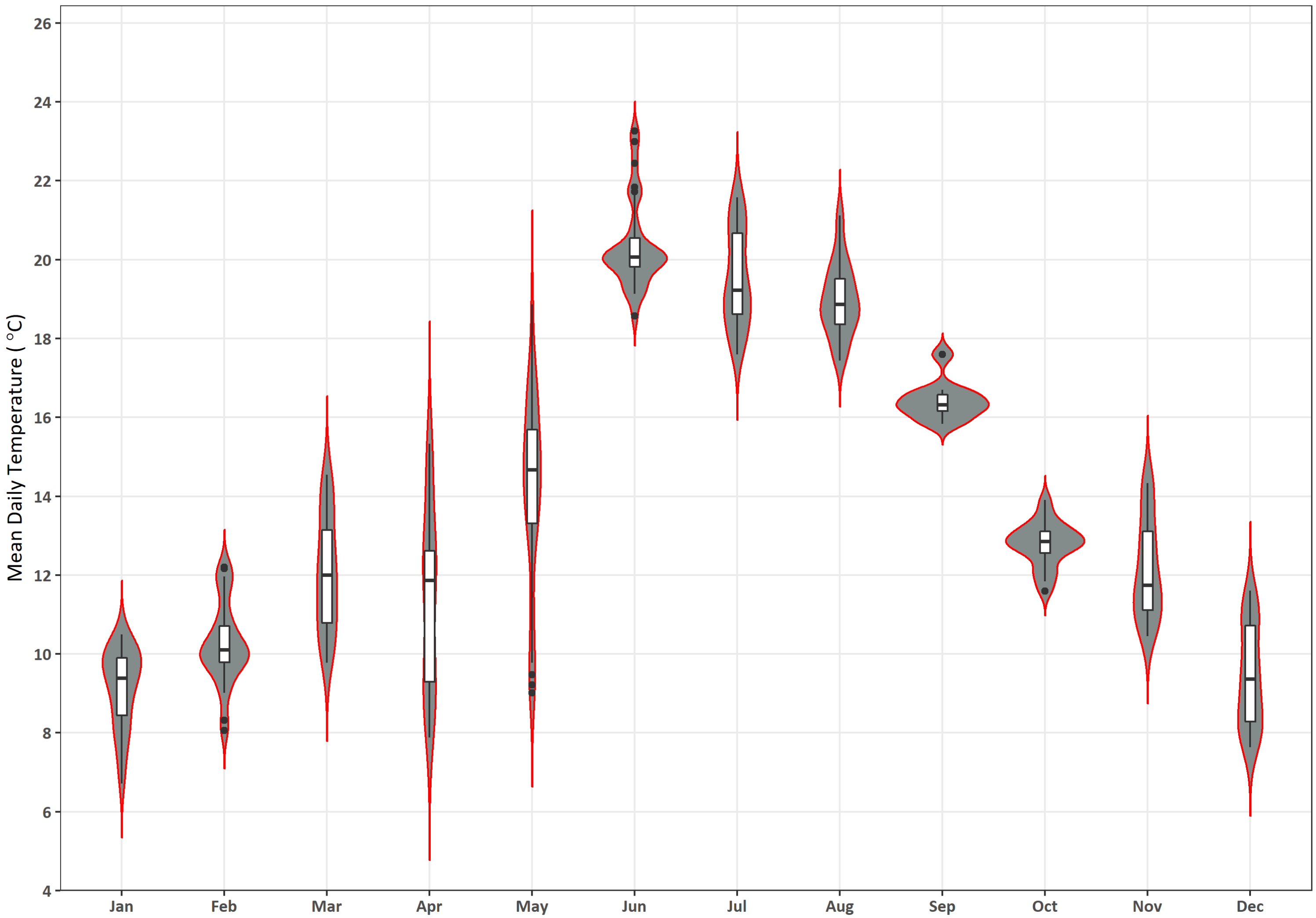


Figure D-13. Violin plot of mean daily temperature summarized by month at ER-2.

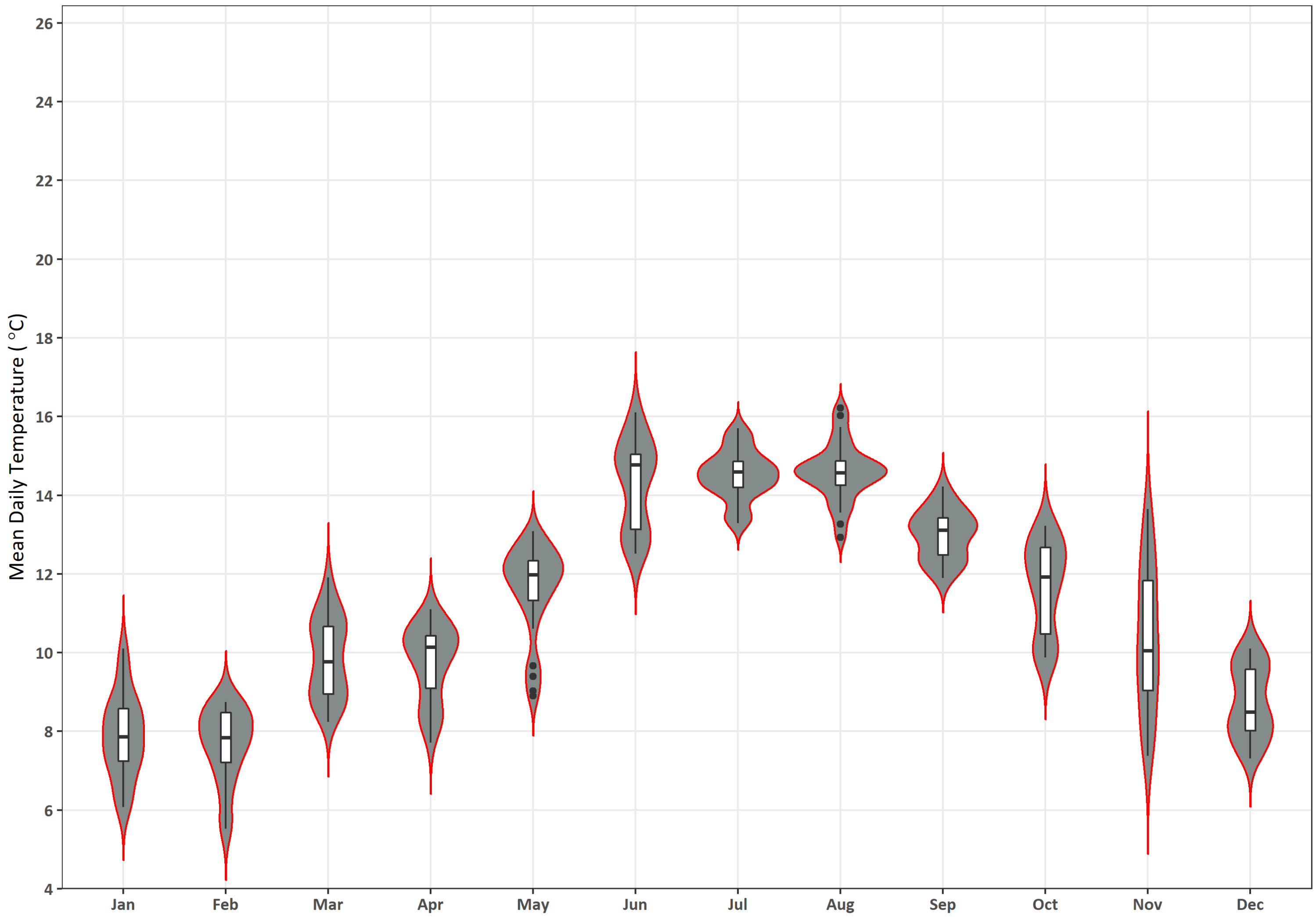


Figure D-14. Violin plot of mean daily temperature summarized by month at ER-3.

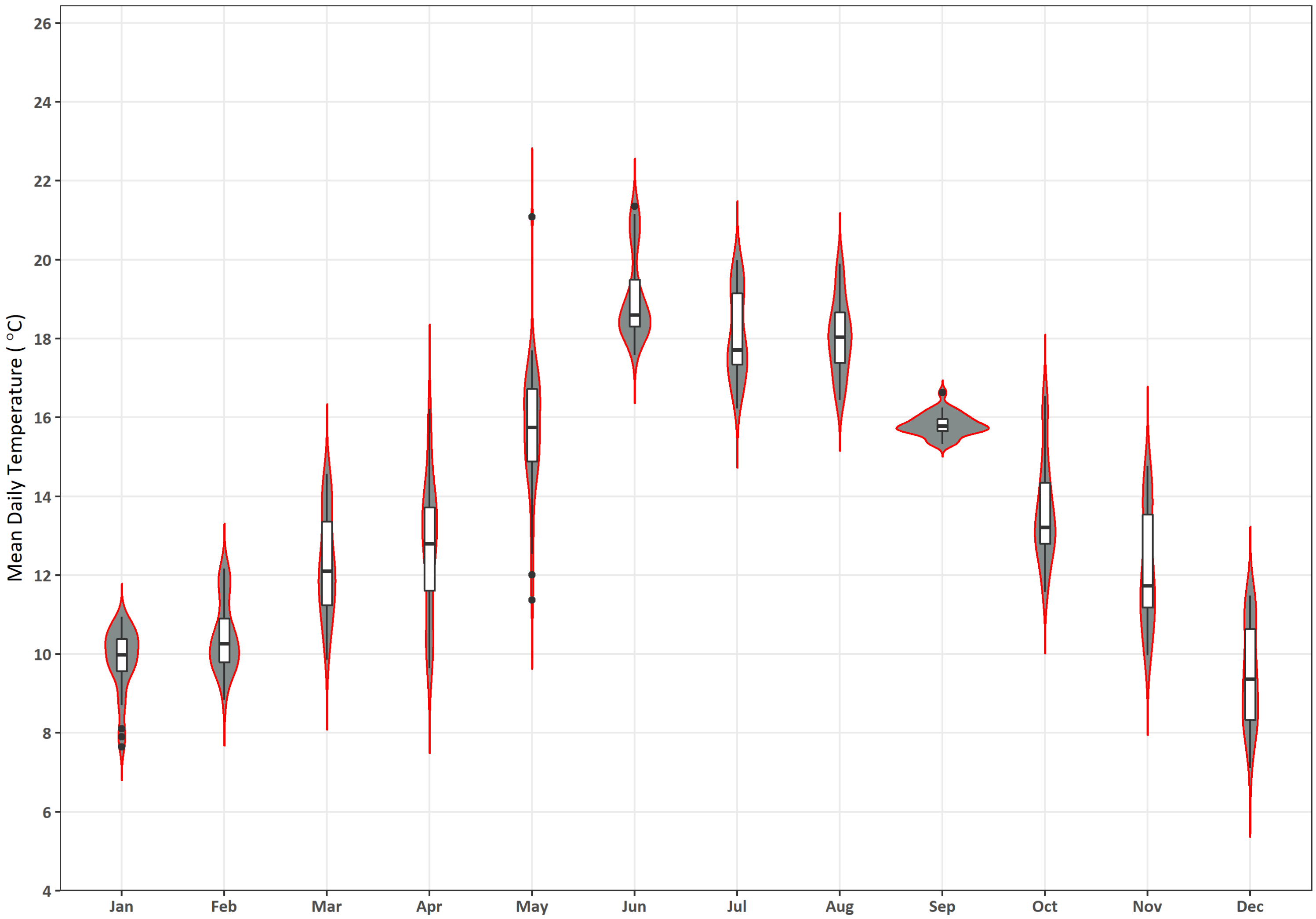


Figure D-15. Violin plot of mean daily temperature summarized by month at SS-1.

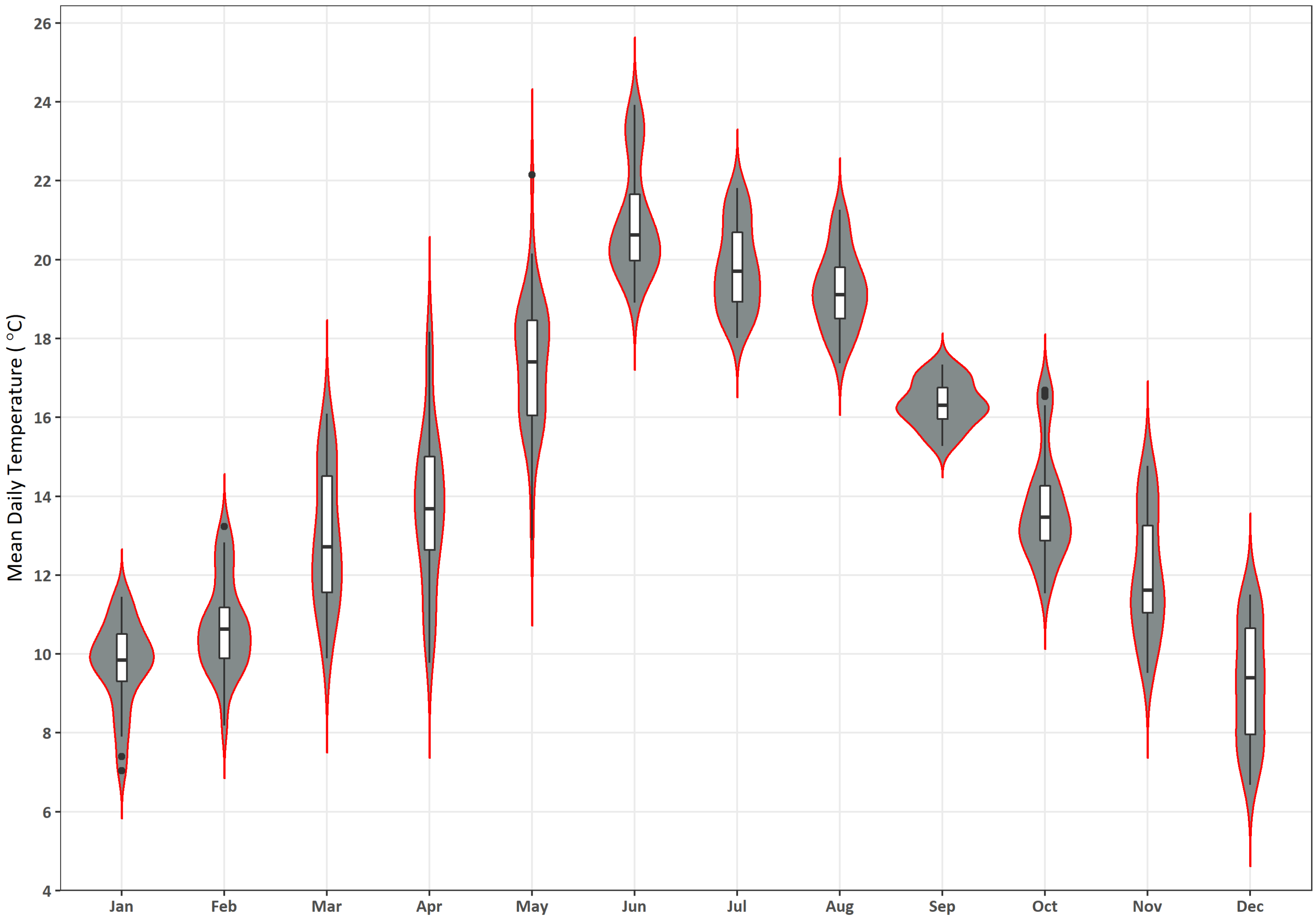


Figure D-16. Violin plot of mean daily temperature summarized by month at SS-2.

Appendix E

Enhancement Site Table

Table E-1. Summary of key enhancement site attributes, including descriptions of proposed actions and constraints for each action category as well as relevant dimensions and earthmoving quantities. Sensitive cultural constraints are not identified at the site level to ensure protection of the sites.

Enhancement site	Name	Areas of interest	Channel segment/s	Type	Action category	Proposed action(s) description	Length (ft)	Area (acres)	Cut (CY)	Fill (CY)	Volume notes
M1-FP-1.5	ERWA North	A	Elk River Wildlife Area (North) (adjacent to ER1-ER3)	Tidal marsh enhancement	Earthmoving	Remove levee to allow full tidal exchange onto property and increase marsh inundation frequency.	2706	17.3	-3,500	3,500	Some fill may be used to plug or fill portion of the inboard ditch.
					Invasive species	Manage invasive weed stands, Spartina densiflora.			TBD		
					Vegetation	High salt marsh/brackish marsh plantings along Spartina removal zone. Native vegetation communities are intact throughout so no additional interplanting necessary.					
					Infrastructure	Remove culvert to restore natural tidal regime (C-602). See earthmoving regarding levee removal.					
M1-FP-1.8	ERWA South	A	Elk River Wildlife Area (South) (adjacent to ER3-ER5)	Tidal marsh enhancement	Earthmoving	(1) Remove river-front levee to allow unimpeded tidal exchange into ERWA and facilitate salt/brackish marsh restoration and fish access. (2) Remove existing levees within property (3) Add alcoves that extend from Elk River main channel into tidal marsh. (4) Construct eco-levee along southern property boundary to prevent saltwater inundation onto adjacent private parcels. (5) Remove abandoned buildings (B-1) and associated fill.	Ecoberm: 4,267 DS Levee: 2,158 Interior Levee: 1,100 Building Pad: 418	84.7	Levee removal: -13,400 Tidal slough network: -75,000	88,400	Tidal slough network based on Williams (2002).
					Invasive species	(1) Manage invasive weed stands: Spartina densiflora, reed canarygrass, and Himalayan blackberry. (2) Reduce nonnative naturalized vegetation community stand size. Remove and revegetate creeping bentgrass stands and mixed fat-hen/brass button stands.	TBD		TBD	TBD	TBD
					Vegetation	Revegetate design footprint with coastal native marsh species assemblages to expand sensitive and native vegetation communities. Establish conifer component along ecoberm (shade control for invasives). Plantings to include special-status plant species to expand and retain existing populations. Retain/salvage native plant material for planting.					
					Infrastructure	(1) Remove all tide gates and culverts. (2) Replace HCSD water line. See Earthmoving regarding levee removal.					

Enhancement site	Name	Areas of interest	Channel segment/s	Type	Action category	Proposed action(s) description	Length (ft)	Area (acres)	Cut (CY)	Fill (CY)	Volume notes
M1-FP-2.5 & M1-FP-2.7	Western Tidal Marsh	D		Tidal marsh enhancement	Earthmoving	Restore tidal marsh and slough channel network.	2000	M1-FP-2.5 Tidal marsh: 26.9 M1-FP-2.7 Coastal scrub: 7.9	-20,000	20,000	Tidal slough network based on Williams (2002).
					Invasive species	(1) Manage invasive Spartina densiflora and Himalayan blackberry. (2) Reduce nonnative naturalized vegetation stand size. Remove and revegetate creeping bentgrass stands and mixed fat-hen/brass button stands with native coastal marsh species.			TBD	TBD	
					Vegetation	Revegetate with native marsh species in the low elevation areas and transition to coastal scrub/grassland in higher elevation areas. Expand and retain existing special-status plant species populations. Retain/salvage native plant material for planting.					
					Infrastructure	Remove infrastructure (culverts and tide gate: C-600, C-601, TG-604). Replace HCSD water line.					
SS-FP-0.3	SS NE Tidal Marsh	B	SS3.1	Tidal marsh enhancement	1	Remove levee/berm, fill existing borrow ditch and excavate natural slough channel to connect with freshwater sources draining adjacent hillslopes and provide access to existing brackish pond. Restore tidal connectivity to larger salt marsh by removing levee. Developing a new, small, freshwater-dominate pond at base of hillslope that is fed by freshwater drainage and connects with new slough channel and/or existing brackish pond.	341	0.8	-1,500	250	
					Invasive species	Manage invasive weed stands, focused on Spartina densiflora.	TBD		TBD	TBD	
					Vegetation	Revegetate design footprint with coastal native marsh species to expand sensitive and native vegetation and reduce nonnative species recruitment.					
					Infrastructure	Remove failed tide gate (TG-600). See earthmoving regarding levee removal.					

Enhancement site	Name	Areas of interest	Channel segment/s	Type	Action category	Proposed action(s) description	Length (ft)	Area (acres)	Cut (CY)	Fill (CY)	Volume notes
SS-FP-0.4	SS Tidal Marsh	B	SS2, SS3	Tidal marsh enhancement	Earthmoving	Remove levee along Swain Slough and restore tidal prism and slough channel network in former tidal marsh.	2007	21.1	Levee removal: -700 Tidal slough network: -15,000	15,700	Tidal slough network based on Williams et al. (2004).
					Invasive species	(1) Manage Spartina densiflora. (2) Reduce nonnative naturalized vegetation community stand size. Remove and revegetate creeping bentgrass stands and naturalized grassland stands.	TBD		TBD	TBD	
					Vegetation	Revegetate design footprint with coastal native marsh species to expand sensitive and native vegetation communities. Interplant with native plants in sparse native vegetation communities to increase vegetative cover and species richness.					
					Infrastructure	Remove derelict culvert (C-24). See earthmoving regarding levee removal.					
SS-FP-0.7	SS Tidal Marsh	B	SS4	Tidal marsh enhancement	Earthmoving	Remove levee along Swain Slough and restore tidal prism and slough channel network in former tidal marsh. Note: cut is levee removal only.	Levee: 1,705	16.0	Levee removal: -1400 Tidal slough network: 11,000	12,400	Tidal slough network based on Williams et al. (2002).
					Invasive species	(1) Manage Spartina densiflora. (2) Reduce nonnative naturalized vegetation community stand size. Remove and revegetate creeping bentgrass stands and naturalized grassland stands.	TBD		TBD	TBD	
					Vegetation	Revegetate design footprint with coastal native marsh species to expand sensitive and native vegetation communities. Interplant with native plants in sparse native vegetation communities to increase vegetative cover and species richness.					
					Infrastructure	See earthmoving regarding levee removal.					

Enhancement site	Name	Areas of interest	Channel segment/s	Type	Action category	Proposed action(s) description	Length (ft)	Area (acres)	Cut (CY)	Fill (CY)	Volume notes
M1-FP-3.1	Western Off-Channel Habitat	E	ER9, ER9.1	Off-channel habitat enhancement	Earthmoving	Expand off-channel habitat in existing drainage ditches by increasing sinuosity, adding ponds and scallops and planting riparian vegetation along the new channel. The upper pond/wetland is fed by freshwater springs at the base of the hillslope. Add fencing to exclude cattle. Remove emergent vegetation with invasive tendencies from existing ditch. Minor floodplain recontouring to concentrate overbank flows into high quality design habitat features.	Channel:1,540 Pond: 230 Alcove: 64	Total: 2.12 Pond: 0.63	-4,300	1,100	
					Invasive species	(1) Remove/reduce competitive and fast growing broad-leaved cattail to promote establishment of more heterogenous marshes (limited in the Elk River floodplain) and retain open water habitat. (2) Remove/reduce nonnative naturalized creeping bentgrass stands from the channel and revegetate with native hydrophytic emergent species.	TBD	TBD	TBD	TBD	
					Vegetation	Plant native brackish/freshwater emergent hydrophytic species with varied water tolerances in and adjacent to the pond. Establish native shrubs and trees along the channel. Add fencing to exclude cattle.		2.8			
					Infrastructure	Replace existing tide gate (TG-601) with a fish friendly tide gate with an expanded alcove connected to Elk River. Allow a muted tidal prism through the new tide gate. Remove segment of abandoned PG&E gas line.		TBD			
M2-FP-3.9	Western Off-Channel Habitat	E	ER12, ER12.1	Off-channel habitat enhancement	Earthmoving	Expand alcove connected to Elk River. Improve off-channel habitat by adding sinuosity to existing drainage ditches and creating or deepening ponds that are fed by freshwater springs at base of hillslope.	Channel: 1,097 Pond 1: 300 Pond 2: 130	Total: 1.80 Pond 1: 0.56 Pond 2: 0.14	-4,900	360	
					Invasive species	(1) Manage Himalayan blackberry. (2) Reduce nonnative naturalized grasslands by revegetating borders around off-channel drainage ditches and ponds.	TBD	TBD	TBD	TBD	
					Vegetation	Plant native freshwater emergent hydrophytic species with varied water tolerances in/adjacent to ponded features. Establish native trees and shrubs along drainage, including evergreen conifers. Add fencing to exclude cattle.					
					Infrastructure	Remove tide gate and culvert (TG-7 / C-25).					

Enhancement site	Name	Areas of interest	Channel segment/s	Type	Action category	Proposed action(s) description	Length (ft)	Area (acres)	Cut (CY)	Fill (CY)	Volume notes
M1-FP-1.6	Floodplain Corridor	F	ER1/SS1	Off-channel habitat enhancement	Earthmoving	Expand off-channel habitat and improve drainage to reduce upstream flooding by excavating a channel and ponds. The existing levee around the action area will be raised from ~8.5 feet to 10 feet.	Channel: 1340 Pond 1 (big): 320 Pond 2 (sm): 150	Total: 2.76 Pond 1 (big): 1.2 Pond 2 (sm): 0.23	-3,200	650	
					Invasive species	(1) Manage reed canary grass and Himalayan blackberry, (2) Manage nonnative manna grass in drainage ditches throughout pasture, (3) Convert nonnative naturalized grassland to native hydrophytic emergent herbaceous vegetation communities.	TBD	TBD	TBD	TBD	
					Vegetation	Re-establish/enhance wetlands by planting native hydrophytic emergent and aquatic species in channel and pond features. Retain and/or salvage native hydrophytic species for planting.					
					Infrastructure	Connect channel and ponds during high flows via a new crossing (C-DG1) at Pine Hill Road (M1-I-1.76) allowing floodwaters to inundate constructed features. Add a culvert to facilitate drainage through the railroad prism (C-DG2). Replace and move an existing tide gate (TG-1) to provide drainage through the modified levee and create a fish-friendly connection to Swain Slough. Add a side-hinge tide gate TG-3 to facilitate fish passage to/from Elk River.					
M2-FP-4.0	Floodplain Corridor	F	Floodplain Channel	Floodplain connectivity & recontouring	Earthmoving	Develop a high flow floodplain valley with fish friendly flow paths connecting to restored Orton Creek (M2-TB-3.8). Fill selected drainage ditches and associated culverts. Add alcoves along the channel to expand high flow refugia.	Channel: 2,898	3.1	-5,700	500	
					Invasive species	(1) Manage invasive weed patches of reed canary grass and Himalayan blackberry, (2) Manage nonnative manna grass in drainage ditches throughout pasture, (3) Convert nonnative naturalized grassland to native hydrophytic emergent herbaceous vegetation communities.	TBD	TBD	TBD	TBD	
					Vegetation	Landowner-approved livestock forage seed mix in combination with some native palustrine emergent vegetation plantings similar in species assemblage to the seasonally flooded swales in the Elk River valley bottom.		3.5			
					Infrastructure	Remove culverts on cross-valley ditches and slope cross-valley ditches toward the new floodplain channel (C-202 to C-206).		TBD			

Enhancement site	Name	Areas of interest	Channel segment/s	Type	Action category	Proposed action(s) description	Length (ft)	Area (acres)	Cut (CY)	Fill (CY)	Volume notes
M2-FP-3.0	Floodplain Corridor	F	Floodplain Channel	Floodplain connectivity & recontouring	Earthmoving	Develop a high flow floodplain valley with fish friendly flow paths connecting to restored Orton Creek (M2-TB-3.8). Fill selected drainage ditches and associated culverts. Add alcoves along the channel to expand high flow refugia.	Channel: 1570	1.2	-1,600	TBD	
					Invasive species	Low manna grass forms moderate to dense stands within the existing drainage ditches throughout the actively grazed agricultural pasture in the Elk River floodplain. Control and management of this invasive weed is anticipated to occur during construction, when the above- and below-ground plant biomass can be fully removed during excavation and recontouring of the channel surfaces. Measures to limit the spread of this invasive plant throughout the planning area will be applied during planned earthwork and ground moving activities	TBD	TBD	TBD	TBD	
					Vegetation	Landowner-approved livestock forage seed mix in combination with some native palustrine emergent vegetation plantings similar in species assemblage to the seasonally flooded swales in the Elk River valley bottom.					
					Infrastructure	Remove culverts on cross-valley ditches and slope cross-valley ditches toward the new floodplain channel (C-202 to C-206).					
M2-FP-2.7	Eastern Freshwater Habitat	G	n/a	Off-channel habitat enhancement	Earthmoving	Excavate an off-channel pond.	Pond: 273	0.4	-1,300	TBD	
					Invasive species	(1) Manage nonnative manna grass in drainage ditches throughout pasture, (2) Convert nonnative naturalized grassland to native hydrophytic emergent herbaceous vegetation, (3) Manage invasive Himalayan blackberry.	TBD	TBD	TBD	TBD	
					Vegetation	Retain native emergent vegetation, interplant with native emergent vegetation to reduce manna grass re-establishment. Create wetland habitat in the footprint of the old barn. Restore to native hydrophytic plant assemblages.		0.4			
					Infrastructure	Modify tide gate (SS-TG-20) to improve fish access (install side-hinge flap). Remove two abandoned buildings and associated fill (B-2 & B-3).	B-2 Pad: 85 B-3 Pad: 44	B-2 Pad: 0.12 B-3 Pad: 0.027	B-2 Pad: 200 B-3 Pad: 50		

Enhancement site	Name	Areas of interest	Channel segment/s	Type	Action category	Proposed action(s) description	Length (ft)	Area (acres)	Cut (CY)	Fill (CY)	Volume notes
M2-TB-3.8	Tributary	H and F	Orton Creek	Tributary Restoration	Earthmoving	Daylight and reconnect Orton Creek to the Swain Slough channel. The connecting channel will have inset floodplains, small alcoves, and large wood to provide higher quality, low velocity habitat and escape cover for fish.	8670	9.9	-31,000	1400	
					Invasive species	(1) Manage invasive weed patches of reed canary grass and Himalayan blackberry, (2) Manage nonnative manna grass in drainage ditches throughout pasture, (3) Convert nonnative naturalized grassland to native hydrophytic emergent herbaceous vegetation communities.		TBD			
					Vegetation	Create a tall riparian overstory canopy with a low midstory near the channel, and high herbaceous/coastal grassland understory amenable to flash grazing. Plant tall, single stem deciduous and evergreen trees to establish shaded riparian channel (habitat enhancement and control for reed canary grass).		12.8			
					Infrastructure	Remove existing Orton Creek culverts (C-105) and (C-211). Modify the tide gate in Swain Slough at Elk River Road (TG-100) to be a fish friendly and allow a muted tidal prism into the lower reaches of Orton Creek. Install a flap gate on culvert C-210 to help eliminate fish stranding potential during high flows and mitigate flooding of southern portions of AOI H.		TBD			
					Wood	Add wood to provide predator escape cover and velocity refugia.					
M1-MC-1.7		A, D	ER1-ER7	Mainstem Corridor Enhancement	Wood	Augment fish habitat in the low flow tidal channel to provide predator escape and velocity cover during lower tides. Actions will be prioritized to areas adjacent to high quality habitat on channel margins/off-channel (alcoves, slough confluences, etc.).	7140	18.8	TBD	TBD	
SS-MC-0.5		B	SS1-SS6	Mainstem Corridor Enhancement	Wood	Augment fish habitat in the low flow tidal channel to provide predator escape and velocity cover during lower tides. Actions will be prioritized to areas adjacent to high quality habitat on channel margins/off-channel (alcoves, slough confluences, etc.).	4840	6.3	TBD	TBD	
					Invasive species	Invasive dense-flowered cordgrass has established on intertidal benches and channel banks of Swain Slough. It has invaded sensitive natural communities (e.g., Lyngbye's sedge association) and occurs alongside special-status plants, Lyngbye's sedge, western sand-spurrey, and Humboldt Bay owl's clover. Long-term management along with revegetation efforts within the treatment footprint will promote the recovery of sensitive natural communities and reduce the re-establishment and further spread of invasive weeds. Special-status plant occurrences will be preserved and, when possible, propagated and planted in suitable restored habitats, expanding population extents throughout the planning area.					

Enhancement site	Name	Areas of interest	Channel segment/s	Type	Action category	Proposed action(s) description	Length (ft)	Area (acres)	Cut (CY)	Fill (CY)	Volume notes
M2-MC-4.1		E, F	ER 10 and ER-12	Mainstem Corridor Enhancement	Earthmoving	Alcove(s), lay back banks	9200	7.3	TBD	TBD	
					Invasive species	Remove nonnative invasive weeds concurrent with tree removal to discourage further establishment in disturbed sites.					
					Vegetation	Reduce clonal homogenous willow shrub vegetation and enhance the riparian corridor by: (1) removing/pruning channel-spanning live wood, (2) removing select trees rooted in the channel bed that do not provide high-quality aquatic habitat, (3) thin willow growth surrounding existing native trees to promote increased basal and height growth and natural recruitment, and (4) Expand and interplant riparian corridor with native tall overstory hardwoods and evergreen conifers (e.g., Sitka spruce).					
					Infrastructure	Remove culverts C-102, C-207 and C-250-E to eliminate backwatering/flooding of floodplain ditches. Build fences to exclude cattle from riparian corridor.					
					Wood	In tandem with vegetation management, consider installing instream large wood pieces or jams to provide velocity refugia and promote access to floodplain or adjacent off-channel features in uniform, straight portions of the channel that lack instream wood. Where possible, lay back bank slopes. Consider creating small alcove habitats in areas with shallower banks. Augment existing large willows or instream wood with logs.					
M2-FL-3.7	Fill	F		Fill	Earthmoving	Place shallow fill from excavated areas.	4292	53.6	0	44,500	
					Invasive species	Nonnative thistles, including Cirsium vulgare (bull thistle), have established in the actively grazed agricultural pasture. Nonnative weed management is recommended prior to sediment application. Pairing pre-treatments in bull thistle-infested areas (e.g., mowing and removing seed heads) prior to application of sediment will reduce nonnative weed prevalence in active pasture. Depending on depth of fill, other pre-treatment activities could include thatching (e.g., sheet mulching) in weed-infested areas to effectively smother weeds and increase forage plant quality and recovery.			TBD	TBD	
					Vegetation	Landowner-approved livestock forage seed mix in combination with some native palustrine emergent vegetation plantings similar in species assemblage to the seasonally flooded swales in the Elk River valley bottom.			0	0	

Enhancement site	Name	Areas of interest	Channel segment/s	Type	Action category	Proposed action(s) description	Length (ft)	Area (acres)	Cut (CY)	Fill (CY)	Volume notes
M2-FL-4.0	Fill	E		Fill	Earthmoving	Place shallow fill from excavated areas.	2085	9.2	0	4,000	
					Invasive species	Nonnative thistles, including Cirsium vulgare (bull thistle), have established in the actively grazed agricultural pasture. Nonnative weed management is recommended prior to sediment application. Pairing pre-treatments in bull thistle-infested areas (e.g., mowing and removing seed heads) prior to application of sediment will reduce nonnative weed prevalence in active pasture. Depending on depth of fill, other pre-treatment activities could include thatching (e.g., sheet mulching) in weed-infested areas to effectively smother weeds and increase forage plant quality and recovery.			TBD	TBD	
					Vegetation	Landowner-approved livestock forage seed mix in combination with some native palustrine emergent vegetation plantings similar in species assemblage to the seasonally flooded swales in the Elk River valley bottom.			0	0	
M2-FL-3.5	Fill	E		Fill	Earthmoving	Place shallow fill from excavated areas.	2027	24.3	0	18,300	
					Invasive species	Nonnative thistles, including Cirsium vulgare (bull thistle), have established in the actively grazed agricultural pasture. Nonnative weed management is recommended prior to sediment application. Pairing pre-treatments in bull thistle-infested areas (e.g., mowing and removing seed heads) prior to application of sediment will reduce nonnative weed prevalence in active pasture. Depending on depth of fill, other pre-treatment activities could include thatching (e.g., sheet mulching) in weed-infested areas to effectively smother weeds and increase forage plant quality and recovery.			TBD	TBD	
					Vegetation	Landowner-approved livestock forage seed mix in combination with some native palustrine emergent vegetation plantings similar in species assemblage to the seasonally flooded swales in the Elk River valley bottom.			0	0	

Appendix F

Hydraulic Model Development and Results

Appendix F
2D Hydraulic Model Development and Results

1 INTRODUCTION AND BACKGROUND

This technical memorandum summarizes a 2-Dimensional hydraulic model constructed to simulate a range of design flows through a ~19,000 ft reach of the Elk River within the Recovery Program Planning Area 1 (PA-1). The goal of the modeling exercise was to simulate existing and 10% design conditions to evaluate the hydraulic effects of proposed restoration designs in the project reach. The design conditions model incorporated a suite of design concepts, including: i) modification of drainage infrastructure (e.g., levees, tide gates, culverts, drainage ditches), ii) minor recontouring of floodplains, iii) mainstem corridor enhancement, iv) daylighting of Orton Creek and connection with Swain Slough, v) creation of off-channel habitat (e.g., alcoves and floodplain ponds and wetlands), and vi) re-establishment of selected tidal slough channels. Collectively, these actions are intended to increase juvenile salmonid summer and winter habitat by improving lateral connectivity and restoring natural tidal and fluvial processes that will increase channel and marsh habitat quantity and quality. The restoration of more natural flow pathways and drainage characteristics is also intended to facilitate better flood-flow conveyance, thereby reducing the frequency, magnitude and duration of nuisance flooding for adjacent property owners.

Primary design concepts to be evaluated included: i) modification or removal of derelict hydraulic structures (e.g., altering dimensions, locations and/or functions of culverts, tide gates and levees), ii) excavation of new or modification of existing channel networks in existing marsh plains and floodplains, iii) daylighting of Orton Creek and connection with Swain Slough, iv) vegetation management within the Elk River mainstem, v) minor recontouring of floodplains (e.g., placement of fill) to help concentrate diffuse overland into high quality habitat, and vi) excavation of off-channel habitat in the form of alcoves, and floodplain wetlands and ponds. Collectively, these actions are intended to increase juvenile salmonid summer and winter habitat by improving aquatic connectivity and restoring natural tidal and fluvial processes that will increase channel and marsh habitat quantity and quality. The restoration of more natural flow pathways and drainage characteristics is also intended to facilitate better flood-flow conveyance, thereby reducing the frequency, magnitude, and duration of nuisance flooding for nearby property owners.

The following sections provide an overview of the hydrologic analyses necessary to define boundary conditions, hydraulic model development, inputs, assumptions, and model results. The 2D hydraulic model results will be used by the design team to help inform the selection of preferred design alternatives, which will be the subject of further analysis and refinement moving forward.

2 METHODS

The key steps of the modeling exercise included: i) creating high-resolution terrain surfaces of the existing and design channel, drainage network and floodplains from a combination of LiDAR and field survey data, ii) 2D modeling of existing and design terrains - including existing and design hydraulic structures, iii) analysis of key existing ground (EG) and design ground (DG) hydraulic results (e.g., inundation extent &

duration, flow velocity, depth, and water surface elevations) over a suite of habitat and design flows to quantify hydraulic impacts and habitat benefits of 10% design concepts.

2.1 PROJECT AREA MODELING DOMAIN AND EXTENTS

The modeling domain encompasses the PA-1 project area and includes a roughly 3.6 mile reach of the lower Elk River, as well as Swain Slough, Martin Slough, a number of smaller Elk River tributaries and a small portion of Humboldt Bay (Figure F-1). The model domain is bounded by Elk River Court along most of the southern boundary, the western and eastern Elk River valley walls along the westerly and easterly boundaries and Humboldt Bay along the north-westerly boundary. Although not within the PA-1 boundary, a number of slough channels, including Turner Slough and tidal wetland areas west of Hwy 101 were included in the model domain to facilitate integration of related ongoing restoration projects (e.g., Elk River Estuary Intertidal Wetlands Enhancement and Coastal Access Project; NHE 2021) in future modelling efforts.

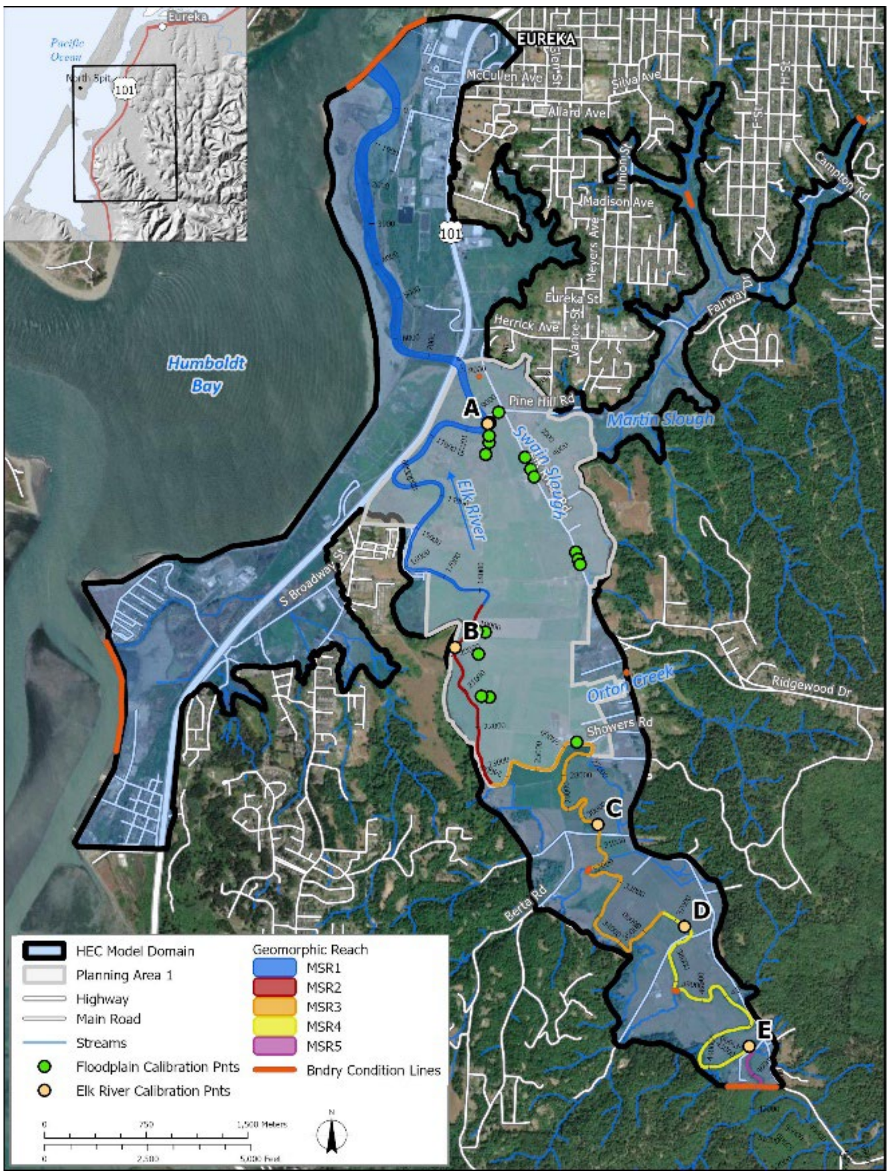


Figure F-1. Model domain illustrating the location of continuous in-channel calibration points, discrete high water mark calibration points on the floodplain and boundary condition lines.

2.2 TOPOGRAPHIC DATA & TERRAIN SURFACES

A high-resolution digital elevation model (DEM) for the existing and design conditions (EG vs. DG, respectively) was constructed using a combination of Light Detection and Ranging (LiDAR) and field survey data. More specifically, the terrain surface for all overbank and floodplain areas was created using 2019 LiDAR data (OCM Partners, 2023) to create a 3.28 ft (1m) resolution DEM. Terrain data from a 2010 LiDAR dataset (Office for Coastal Management, 2023) was used to fill in gaps in the 2019 LiDAR surface to ensure topographic coverage over the entire model domain. The existing channel bathymetry within the wetted channel was created using a combination of 2012 field survey data of the channel thalweg, as well as topographic data from the 2019 DEM and a separate 2005 LiDAR DEM (Sanborn, 2005). The 2019 DEM better represented current conditions in the Elk River floodplain around ditches, canals, and levees compared to the 2005 DEM, but did not represent the top of bank and channel characteristics of the Elk River as well. LiDAR data used to create the 2019 DEM was not carefully filtered in the areas of heavy vegetation around the channel which resulted in large interpolations between the floodplain and areas in the channel picked up by the LiDAR. In contrast, LiDAR data used to create the 2005 DEM was more rigorously filtered and resulted in a better representation of key channel characteristics. Since the channel extents have remained stable, the 2005 DEM was used to represent the channel starting at approximately 16,250 ft upstream of the mouth of the Elk River to the top of the model domain. The 2019 DEM was used to represent the floodplain and channel starting from the mouth of the Elk River to where the 2005 channel begins. A trapezoidal “low-flow” channel was created that is set at the elevation of the 2012 thalweg survey points.

The 10% design terrain was subsequently generated by modifying the EG terrain surface in RAS Mapper to reflect the suite of proposed 10% design elements (see section 2.4.7). All geospatial data associated with the 2D hydraulic model were projected in the following coordinate system: NAD 1983 (2011) State Plane California I FIPS 0401 (US Feet). Elevations are referenced to the North American Vertical Datum of 1988 (NAVD88) in ft.

2.3 HYDROLOGIC ANALYSES

The hydrologic analyses described below were conducted in order to establish upstream boundary conditions to support 2D model construction, calibration and validation. The hydrologic computations included: (1) a flood-frequency analysis of annual peak flows; (2) extension of the peak flow analysis to estimate the magnitude of smaller, more frequent storms via a Log-Pearson III curve fitting procedure; and (3) a flow-duration analysis of mean daily flows.

2.3.1 PEAK FLOW ANALYSIS

Freshwater design flows used to define the upstream boundary conditions of the PA-1 hydraulic model were derived from a flood-frequency analysis (FFA) and a Log-Pearson III curve fitting procedure conducted to estimate peak-flood flows at specified return intervals and select locations within the project reach (Table F-1; NHE, 2020; CalTrout, 2021). Please refer to section 2.4.6 of this appendix and section 2.2 of the main report for additional detail regarding model boundary conditions and hydrologic characteristics of PA-1.

Table F-1. Flood-frequency, percent exceedance and observed peak flow estimate at two locations along the Elk River mainstem and four key tributaries. Note: the Calibration-Decay storm represents a modified version of the 2,256 cfs Calibration storm, wherein the recession limb of the calibration storm was allowed to exponentially decay to better simulate drain-off within PA-1.

Model Run		Discharge (cfs)						Downstream Boundary Condition
		Elk River Ct	PA-1	Orton Creek	Martin Slough	Unnamed Trib 1	Shaw Gulch	
Peak Flows	100	12,300	12,900	257	1,640	298	224	Steady-State tidal boundary condition @ 8.33ft
	50	10,700	11,200	218	1,400	253	190	
	25	9,060	9,510	181	1,170	210	158	
	10	6,940	7,280	133	867	154	116	
	5	5,300	5,560	97	640	113	85	
	2	2,970	3,110	48	327	56	42	
	1.75*	2,547	2,668	40	276	47	35	
	1.5*	2,071	2,169	31	217	37	28	
	1.25*	1,443	1,510	20	144	24	18	
	1.11*	949	992	12	89	15	11	
	1.053*	655	684	8	58	9	7	
Exceedence Flows	10% Exceedence	466.7	--	5.2	44.9	6.0	4.3	Unsteady tidal boundary condition (-2.5 to 8.2ft)
	25% Exceedence	169.8	--	1.9	16.5	2.2	1.6	
	50% Exceedence	53.1	--	0.5	4.5	0.6	0.4	
	75% Exceedence	18.8	--	0.1	1.2	0.2	0.1	
	90% Exceedence	6.3	--	0.1	0.7	0.1	0.1	
Observed Hydrograph	Calibration	2,256	--	107	253	62	49	Observed unsteady tidal bounary conditions
	Validation	718	--					
	Calibration - Decay	2,256	--	107	253	62	49	

* Estimated via fitted LP3 curve.

Peak flows for the Elk River at Elk River Court and at four key tributaries (i.e., Orton Creek, Martin Slough, Unnamed Trib. 1 and Shaw Gulch) were determined via USGS regional flood-frequency regression equations for the 2 – 500yr flood events (Table F-2; Gotvald et al. 2012). Regional flood frequency equation parameters and revised regional skew estimates were determined from the USGS StreamStats program (http://water.usgs.gov/osw/streamstats/). Upstream flows in Martin Slough were split between two headwater subbasins via drainage area ratio to prevent backwatering in the unnamed tributary located in the northwestern subbasin.

Table F-2. Regional regression parameters used to estimate peak flows in the Elk River and several key tributaries.

Site	Basin area (mi^2)	Annual precipitation (in)	Mean basin elevation (ft)	% Forest	Revised USGS regional skew
Elk River Ct	45.0	55.9	875	78.8	-0.597
PA-1 Boundary	47.9	55.3	836	77.2	-0.599
Orton Creek	0.6	44.6	250	63.1	-0.618
Martin Slough	5.2	43.1	145	46.1	-0.619
Shaw Gulch	0.5	46.3	350	71.6	-0.616
Unnamed Trib 1	0.7	45.6	376	64.3	-0.616

In addition to the peak flows listed in Table F-1, we also modeled several exceedance flows to evaluate hydraulic conditions during lower discharges and to support the evaluation of habitat benefits associated with proposed design features (see seasonal flow-duration analysis below).

2.3.2 SEASONAL FLOW-DURATION ANALYSIS

Unlike the above flood-frequency analysis of annual peak flows, a flow-duration analysis computes the likelihood that a particular discharge was equaled or exceeded using mean daily flows (MDF) from the full period of record. To do so, MDFs are ranked by magnitude and the annual exceedance probability of each discharge value is computed. The result is a flow-duration or cumulative frequency curve that illustrates how flow is distributed over a period (usually a year). For example, a 95% annual exceedance flow (Q95), which is often taken as the characteristic value of the minimum river flow, indicates that level of flow will be available for 95% of the year. The shape of the flow duration curve (FDC) can be affected by geology, vegetation, catchment shape, and anthropogenic disturbance and can reveal much about the hydrologic characteristics and processes in the watershed of interest. For instance, a FDC with a consistently steep slope indicates a flashy system characterized by quick runoff of excess rainfall to the stream. Conversely, flat slopes often indicate groundwater dominated systems with slower moving springs or diffuse inflow occurring along the length of the stream.

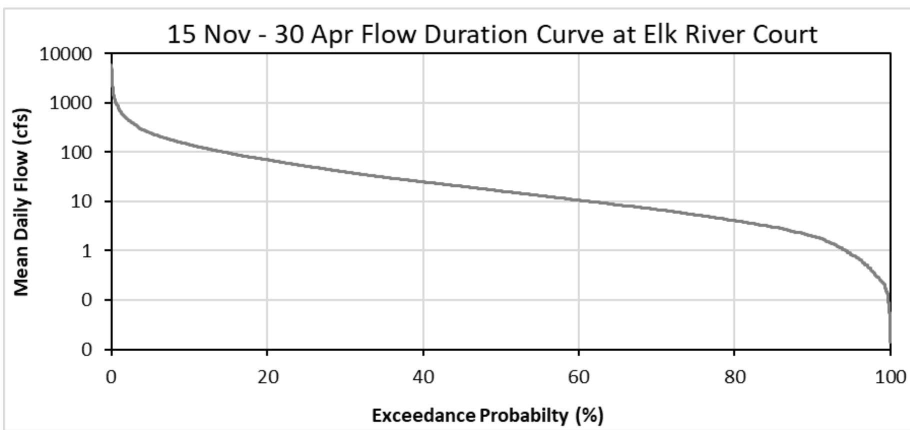


Figure F-2. Seasonal flow duration curve for the Elk River at Elk River Court determined via drainage area ratio adjustment of observed flows at Steel Bridge (HRC 509), which were originally scaled by watershed to the Little River.

Annual and seasonal FDCs were estimated for the Elk River at Steel Bridge (HRC509; Figure F-2) using Humboldt Redwood Company streamflow data for Water Year (WY) 2002 to 2015. The 13-year MDF short-records at each site were extended to 64 years (WY 1956–2019) using the maintenance of variance extension Type 1 (MOVE1) technique (Hirsch 1982) and the long-record USGS Little River near Trinidad station (11481200). Correlation coefficients (r) ranged from 0.90 to 0.92 between the Elk River sites and Little River near Trinidad indicating reasonable correlation between concurrent mean daily flows. The extended MDF records were then used to estimate the annual and seasonal FDC (November 15 to April 30) for the Steel Bridge site. Finally, the FDC estimates at Elk River Court were computed by adjusting the Steel Bridge FDC via drainage area ratio. All tributary inflows were estimated by scaling the exceedance estimates at Elk River Court by drainage area (Table F-1).

2.3.3 CALIBRATION AND VALIDATION FLOWS

The 2D HEC model was calibrated and validated using freshwater inflows estimated from a calibrated 2D hydrodynamic and sediment transport model of the Elk River (HST) during two February 2015 storm events (California Trout et al. (2018). Tributary inflows for the calibration and validation storms were estimated by either scaling flows to Railroad Gulch or to the North Fork Elk River Gauge (Table F-3). Please refer to Section 2.4.5 for a detailed outline of the boundary conditions used in model calibration and validation.

Table F-3. Methods and parameters for estimating upstream boundary conditions for the calibration and validation storms.

Boundary Condition	Approach for Estimating Parameters	Drainage Area (km^2)	Drainage Area Ratio*	Time Lag (hrs)
Shaw Gulch	Scaled to Railroad Gulch	1.4	0.46	0
Unnamed Trib. 1	Scaled to Railroad Gulch	1.79	0.588	0
Orton Creek	Scaled to Railroad Gulch	1.62	0.533	0
Martin Slough	Scaled to NF Elk River gauge (HRC 511)	13.55	0.282	0
Elk River - Main Channel	Extracted from ER-HST Model	--	--	--
Elk River - Left Floodplain	Extracted from ER-HST Model	--	--	--
Elk River - Right Floodplain	Extracted from ER-HST Model	--	--	--

* relative to Railroad Gulch

2.4 HYDRAULIC ANALYSES

This section outlines the hydraulic analyses conducted for existing and 10% design conditions over a range of typical low flows and peak design flows in PA-1. All hydraulic analyses were conducted via the U.S. Army Corps of Engineers' (COE) HEC-RAS River Analysis System Version 6.2 (COE, 2021), which solves the 2D (depth-averaged) Saint Venant shallow water equations. Reference can be made to the HEC-RAS manual (COE, 2016) for information specific to 2-dimensional hydraulic modeling. The 2D HEC-RAS model is preceded by a 2D HST model, which was constructed by NHE to aid in the Elk River Recovery Assessment. Please refer to California Trout et al. (2018) for a detailed description of the 2D model.

The 2D solution algorithm requires the following: i) 2D computational mesh, ii) digital elevation model (terrain), iii) land cover dataset (Manning's roughness coefficient), iv) hydraulic table properties for 2D computational cells and cell faces, and v) boundary conditions (time-series of tidal elevations and riverine inflows).

2.4.1 COMPUTATIONAL MESH

The 2D PA-1 model domain begins approximately 1,100 ft upstream of the Elk River Court Bridge and extends roughly 9,000 ft downstream of the Route 101 Bridge (Figure F-1). The 2D computational mesh was generated using a combination of breaklines and refinement regions to ensure appropriate cells sizes and to ensure that cell face orientation is perpendicular to flow. Identifying an appropriate cell size for 2D computational meshes is an iterative process that depends on flow velocities, complexity of underlying terrain and the spatial extent of the model. HEC-RAS preprocesses the terrain to develop a series of detailed cross-sections that describe hydraulic properties at each cell face (e.g., elevation versus area, volume, wetted perimeter, and roughness). Cells can be partially dry with the correct water volume for a given water surface elevation based on the underlying terrain data. This technique allows for the application of larger computational cell sizes while still accurately capturing underlying terrain features. A single water surface elevation is computed in the center of each cell, so the larger the cell size, the farther apart the computed values of the water surface. Thus, the slope of the water surface is averaged over longer distances (in two dimensions). If the water surface slope varies rapidly, smaller cell sizes must be used in that area to capture the changing water surface and its slope.

Another important feature of the HEC-RAS 2D mesh is that it allows the modeler to vary the cell size, shape and orientation at all locations withing the model domain, which can be important for capturing high ground features and ensuring efficient model run-times. After some iteration, NHE selected a base cell size of 200 x 200 ft. This was further refined in the main channel and tributaries, as well as along levees, roads, hydraulic structures and select drainage ditches using refinement regions and breaklines (Figure F-3). More specifically, NHE selected a 25 x 25 ft cell size in the main and slough channels, which was enforced with a refinement region that extended from the top of left bank to top of right bank. Defining the channel refinement region in this fashion ensured that the cell faces were suitably aligned with the high ground at the main channel bank – which ensures flow does not spill out of the channel until the water is high enough to cross over the outer cell faces representing the high ground of the channel bank lines. This channel cell size struck a balance between computational efficiency and model precision.

After enforcing the channel refinement region, we then drew and enforced channel centerlines as breaklines, which served to re-align the channel cells such that the cell faces were perpendicular to flow. Additional breaklines (15-25 ft cell size) were added on the centerlines of levees and other important infrastructure to better define high ground areas and key terrain features. Additional refinement regions (25 ft cell size) were added to select floodplain areas to better represent the drainage characteristics of key locations (Figure F-3).

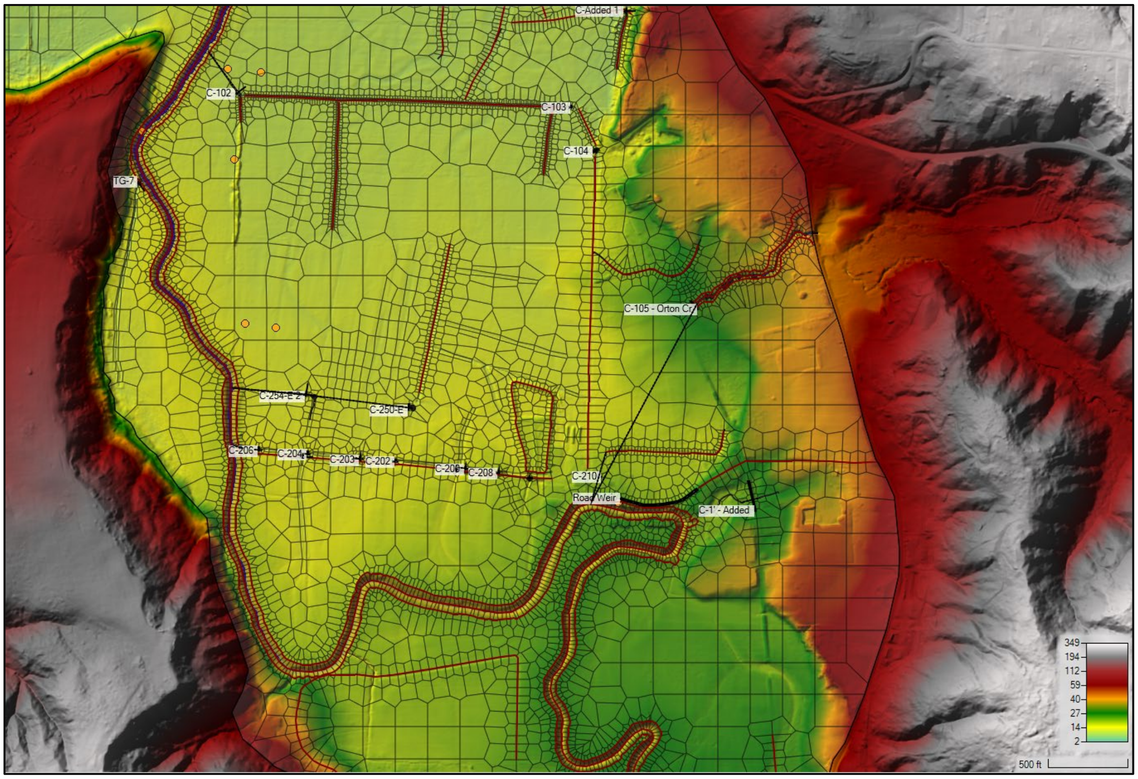


Figure F-3. Example of computational mesh for the existing conditions HEC-RAS 2D model of PA-1 illustrating refined 25 x 25 ft cells in the channels and coarser scale floodplain cells (25 – 200 ft cells). Red lines represent breaklines and refinement regions while black cells represent computational mesh.

The DG computational mesh was generated by modifying the EG mesh to reflect new channel alignments and floodplain drainage features, as well as changes to hydraulic structures (e.g., tide gates and levees).

2.4.2 COMPUTATIONAL SETTINGS

Computational time-steps were chosen to ensure adherence to the Courant condition and to achieve a balance between numerical accuracy and computational time. For some model scenarios, a variable time-step method was chosen wherein the model monitors Courant numbers and adjusts the time-step to ensure the Courant condition is met. For other scenarios, a constant time-step of 2 seconds was identified via sensitivity analysis wherein the time-step was systematically refined until hydraulic results stabilized.

HEC-RAS can solve either the Diffusive Wave Equations or the Full Momentum Equations (i.e., full Saint Venant or Shallow Water Equations) in order to route flows in the model. Preliminary model development runs employed the Diffusive Wave equations as this affords shorter model run times. Final production runs of EG and DG conditions utilized the Shallow Water Equations, Eulerian-Lagrangian Method in order to better capture tidal dynamics, super elevation in meander bends, and better simulate velocity distributions and water surface elevations near hydraulic structures and other key design features.

2.4.3 HYDRAULIC STRUCTURES

A total of 67 hydraulic structures were included in the EG model. All culverts and tide gates were modeled as Storage Area/2D connections (SA/2D) within the 2D computational mesh. The normal 2D equation domain was used to solve for structure overflow as opposed to the weir equation. Invert elevations and other relevant dimensions for each culvert and tide gate were extracted from field surveys conducted by NHE staff. Levees were not explicitly modeled as SA/2D connections due to a bug in HEC-RAS 6.3. Instead, their hydraulic effects were evaluated via the normal 2D equation domain.

The Martin Slough tide gate was simulated via a combination of standard 6 ft culverts with flaps, as well as several sluice gates controlled by headwater and tailwater elevations to simulate the function of muted tide regulators (MTRs) installed as part of the 2013 Martin Slough Enhancement Project (Michael Love and Associates 2013).

Topographic constrictions (road approaches) of three bridge crossings located on the elk River mainstem (Elk River Courts Road, Berta Road, Zanes Road, and HWY 101) were incorporated into the model, but the bridge piers and decks were not. Bridges upstream of the Martin Slough tide gate were excluded from the model because: i) survey data describing their physical dimensions were unavailable and ii) their hydraulic impacts are minor and localized outside of project area.

2.4.4 MANNING'S ROUGHNESS COEFFICIENTS

Channel Roughness Values

Preliminary Manning's n roughness values for each geomorphic reach in the Elk River mainstem (Figure F-15) as well as Martin and Swain Sloughs were estimated by converting calibrated roughness height values (Z_0) from the two-dimensional hydrodynamic model of the Elk River (Table F-4; California Trout et al., 2018). Several additional Manning's n roughness zones were introduced between MSR1 and MSR2 to provide a more gradual transition between the geomorphic reaches.

Table F-4. Calibrated roughness heights from the HST model (NHE, 2019), equivalent Manning's n values used to establish initial roughness values for the 2D HEC-RAS model and final HEC-RAS calibrated Manning's n values.

Location or Geomorphic Reach	Final EFDC Calibrated Zo (ft)	Equivalent Manning's n	Final HEC Calibrated Manning's n
MSR1	0.05	0.05	0.02
MSR2	1.31	0.56	0.16
MSR3	1.31	0.56	0.16
MSR4	0.49	0.14	0.10
MSR5	0.20	0.08	0.10
Swain Slough	0.05	0.05	0.05
Martin Slough	0.20	0.08	0.08
Orton Creek, Ditches	--	--	0.05

Floodplain Roughness Values

Roughness coefficients for existing conditions in the PA-1 floodplain (Table F-5) were derived from a land cover layer based on an analysis of vegetation and land use maps, aerial photography and site reconnaissance and used in two previous hydraulic modeling efforts by NHE (i.e., California Trout et al., 2018; NHE, 2021). For the design condition model, the roughness values were adjusted as needed to reflect design alterations to the land use and vegetation associated with proposed vegetation management, channel network alterations, floodplain terrain modifications, etc.

Table F-5. Initial and final calibrated Manning's n values for overbank/floodplain areas of the EG model based on the February 2015 calibration event.

Floodplain Land Cover	Initial Manning's n	Final HEC Calibrated Manning's n
Mixed Riparian (Alder-Willow-Elderberry)	0.013	0.15
Mixed Riparian (Cottonwood-willow-alder)	0.013	0.15
Pastures and Crop Agriculture	0.08	0.1
Pickleweed - Cordgrass	0.1	0.12
Red Alder	0.1	0.12
Redwood	0.1	0.12
Reservoir	0.05	0.05
Riparian Tree	0.1	0.12
Annual Grasses and Forbs	0.08	0.1
River-Stream-Canal	0.05	0.05
Sitka Spruce	0.08	0.1
Sitka Spruce - Grand Fir	0.08	0.1
Sitka Spruce - Redwood	0.08	0.1
Urban-Developed (General)	0.15	0.2
Willow	0.15	0.2
Willow (Shrub)	0.15	0.2
Young Redwood	0.1	0.1
North Coast Mixed Shrub	0.15	0.2
Perennial Lake or Pond	0.07	0.07
Urban-related Bare Soil	0.07	0.07
Perennial Grasses and Forbs	0.07	0.07
Barren	0.07	0.07
Beach Sand	0.07	0.07
Coyote Brush	0.1	0.12

These initial in-channel and floodplain Manning's n roughness values served as a reasonable starting point and were further adjusted via a calibration process wherein roughness values were iteratively modified to minimize differences in simulated and observed water levels during a February, 2015 storm event. Refer to section 2.4.6 for a detailed outline of the calibration and validation process.

2.4.5 BOUNDARY CONDITIONS

The 2D HEC model was forced with a combination of external and internal boundary conditions (BCs) grouped into three "Event Scenarios" based on whether the upstream and downstream BCs were steady-state or unsteady (time-variable):

- Event Scenario I (steady-state upstream and downstream BCs): steady-state upstream riverine flooding across a range of peak flows (i.e., 1.053 - 100yr flood events) - coupled with a steady-state tidal stage at the downstream boundary condition equivalent to MMMW (8.33ft). This was intended to simulate a representative maximum case (Figure F-4).

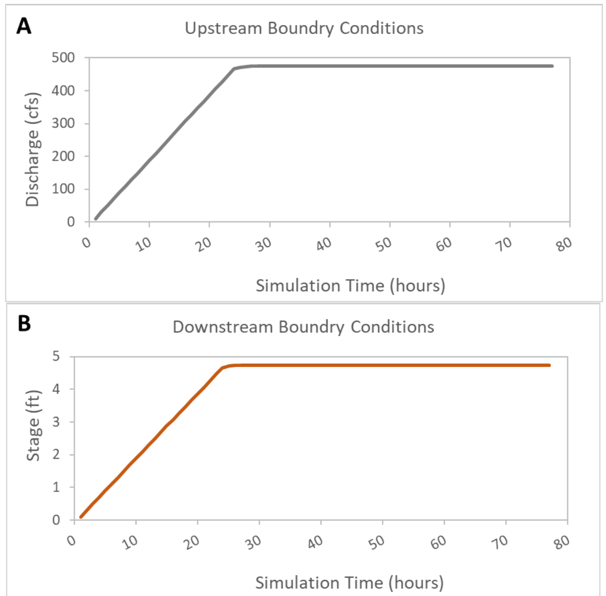


Figure F-4. Examples of upstream and downstream boundary conditions used for Event Condition I (A and B, respectively).

- Event Scenario II (steady-state upstream and unsteady downstream BCs): steady-state upstream riverine flows from a flow-duration analysis (i.e., 10-90% exceedance flows) - coupled with a representative spring tide tidal series at the downstream boundary (-2.5 – 8.2ft; Figure F-5).

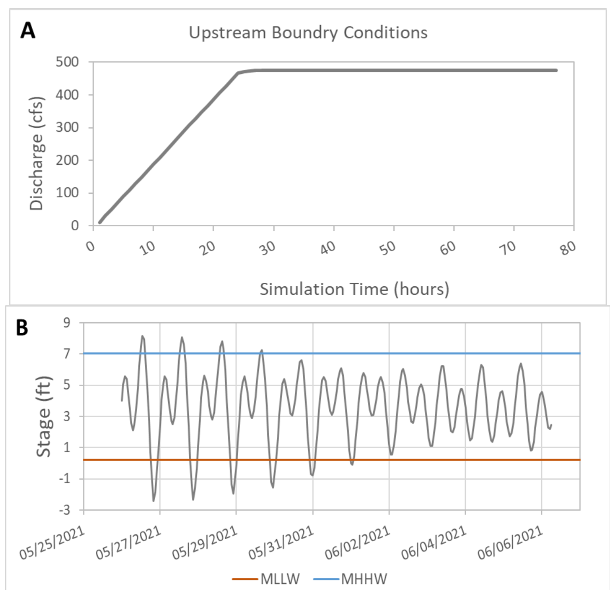


Figure F-5. Examples of upstream and downstream boundary conditions used for Event Condition II (A and B, respectively).

- Event Scenario III (unsteady upstream and downstream BCs): unsteady observed riverine flows and downstream tidal series for two February 2015 storm events. This scenario was used for model calibration and validation (Figure F-6).

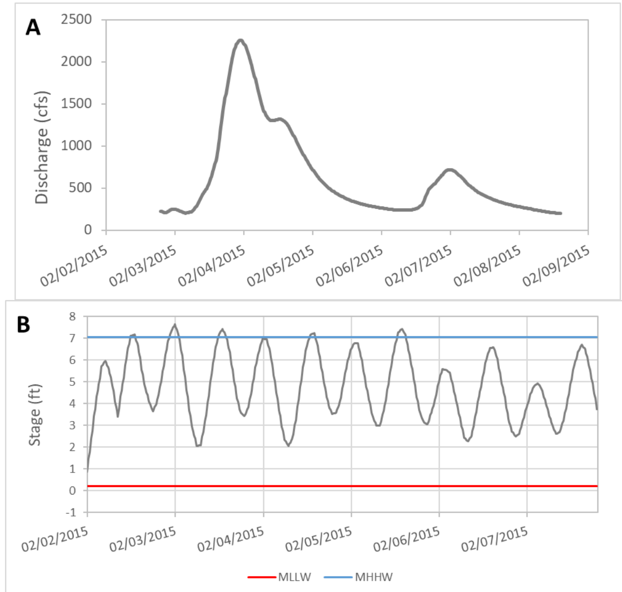


Figure F-6. Examples of upstream and downstream boundary conditions used for Event Condition II (A and B, respectively).

All presented water surface elevations are in feet referenced to NAVD88, unless otherwise noted.

2.4.5.1 Upstream Boundary Conditions

External upstream boundary conditions for the 10% design model runs consisted of steady-state peak flow estimates (Table F-1) for the Elk River at Elk River Court, as well as Martin Slough and Orton Creek (Figure F-1). Internal boundary conditions were added to represent inflows from an unnamed tributary to Martin Slough, Shaw Gulch, and Unnamed Tributary 1 (Figure F-1). In addition to the steady-state peak flows listed in Table F-1, unsteady freshwater discharge values were extracted at all external flux lines from calibrated HST model runs (California Trout et al., 2018) during two February 2015 storm events to provide boundary conditions for unsteady HEC model calibration and validation runs (Figures F-7 & F-8). The peak flow magnitude of the calibration and validation storms were roughly equivalent to the 1.65-yr and 1-yr storms, respectively (Figures F-7 & F-8).

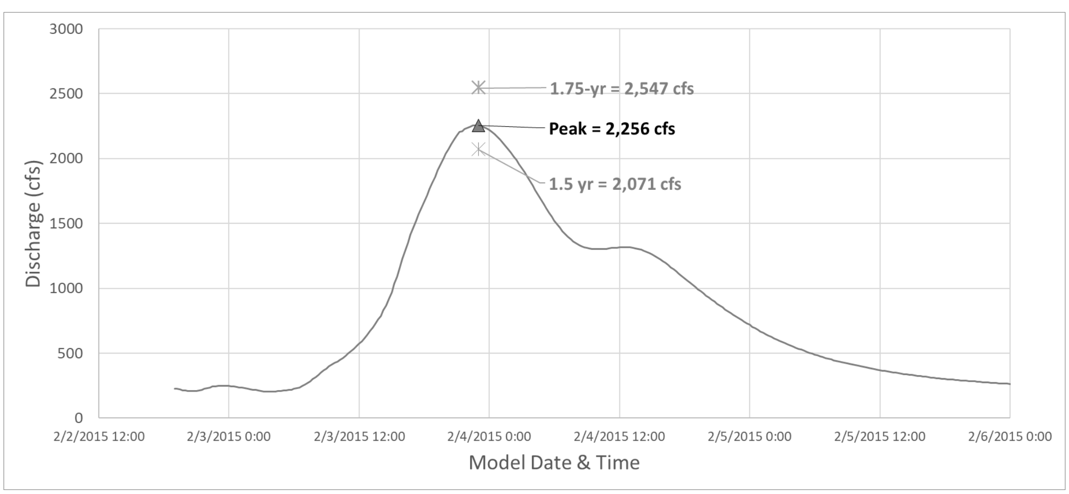


Figure F-7. Calibration hydrograph for the HEC-RAS 2D model extracted from the HST model at the upstream boundary condition for the Elk River main channel. Peak flow magnitude is roughly equivalent to the 1.65yr storm.

To more accurately simulate out-of-bank flows at the upstream boundary condition, separate flux line extractions were performed for the left and right floodplains and main channel at the upstream extent of the model domain. Please refer to NHE (2018) for a detailed description of HST model boundary conditions used to force the February 2015 calibration and validation runs.

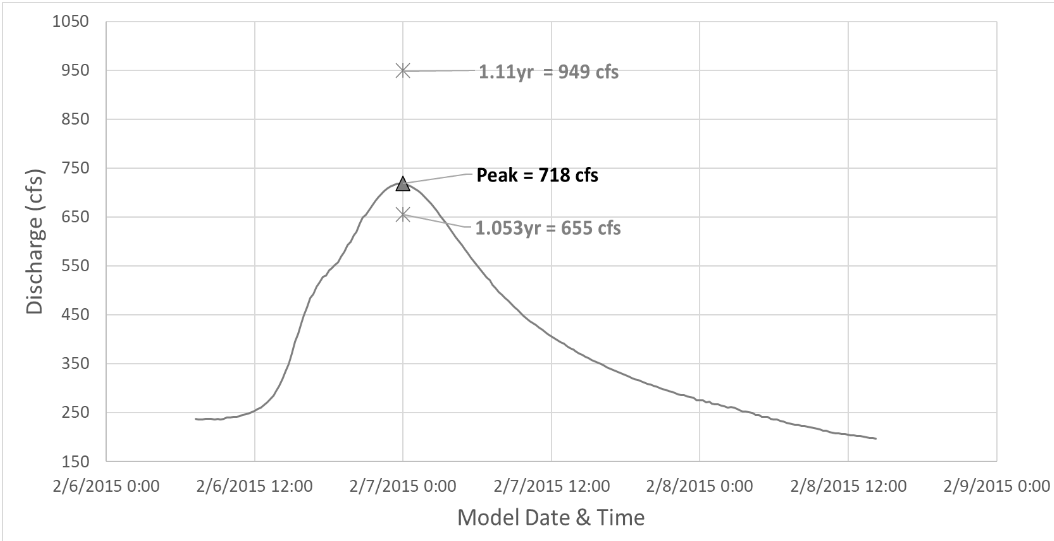


Figure F-8. Validation hydrograph for the HEC-RAS 2D model extracted from the HST model at the upstream boundary condition for the Elk River main channel. Peak flow magnitude is roughly equivalent to the 1-yr storm.

2.4.5.2 Downstream Tidal Boundary Conditions

NOAA tidal data used to define the downstream boundary conditions were downloaded from the closest tidal gage located near the North Spit of Humboldt Bay, CA (station ID: 9418767). Steady state simulations (Event Scenario I) were run assuming a constant tidal level equivalent to the sea-level-rise-adjusted MMMW (8.33ft). Tidal estimates were adjusted to reflect 2.28 mm/yr of regional sea level rise and vertical land motion of -1.82 mm/yr (Patton et al., 2017). This translates to a roughly 6-inch increase in the tidal levels at the downstream tidal boundaries of the model domain. Model runs with steady-state freshwater inflows and unsteady (time varying) downstream boundary conditions (Event Scenario II) used a representative tidal sequence ranging from roughly the Mean Monthly Minimum – Mean Monthly Maximum (~ -2.5 – 8.2 ft; Figure F-9).

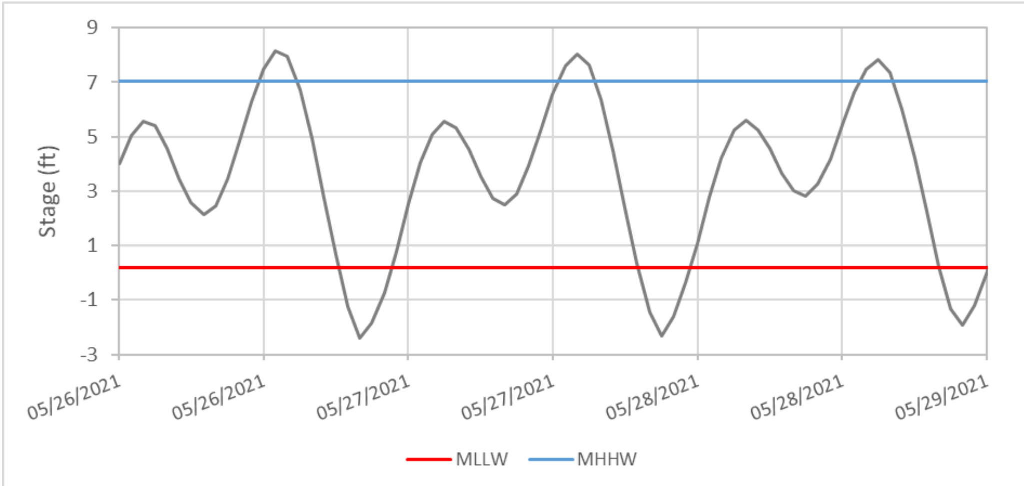


Figure F-9. Representative spring tide tidal series extracted from the NOAA North Spit tide station for 05/26/2021 – 05/29/21 (station # 9418767).

Unsteady tidal water surface levels for the 2015 calibration and validation model runs (Event Scenario III) were extracted from the calibrated HST model. Observed water levels over the course of these storms generally ranged from 2ft to just over MHHW (~7ft; Figure F-10).

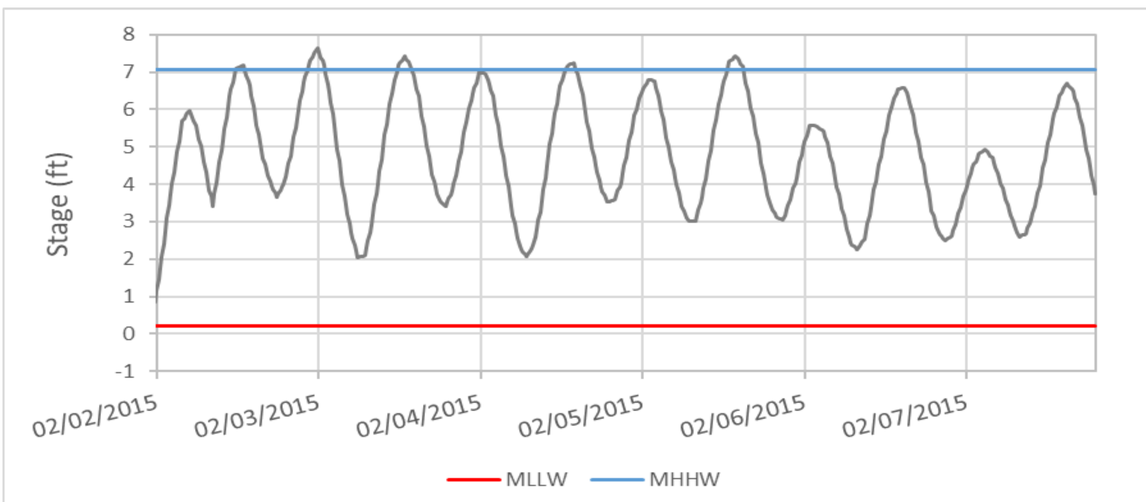


Figure F-10. Tidal sequence used to define downstream tidal boundary conditions for the February 2015 calibration and validation runs.

2.4.6 MODEL CALIBRATION & VALIDATION

The 2D model was calibrated by iteratively adjusting the initial Manning's n values outlined in Tables F-4 and F-5 to minimize differences in simulated and observed water levels during a February 2015 storm event. Observed water level data included continuous stage data collected at 5 locations in the Elk River mainstem during the February 2015 calibration storm. While this calibration procedure was sufficient for the 10% planning level analysis, it is recommended that future modeling efforts expand the calibration to a wider range of observed flows and events, as well as incorporate observed stage data in Martin and/or Swain Slough.

After calibration, the performance of the model was validated via comparison of predicted water surface elevations with both continuous in-channel and 18 discreet floodplain high water mark observations for a separate 2015 storm event (see Figure F-1 for locations). Model performance was evaluated via qualitative (graphical) and quantitative methods that included time-series and correlation plots and a variety of performance metrics such as percent bias, absolute and median relative errors, percent error in peak, root-mean-square error, R^2 and Nash-Sutcliff efficiency coefficient.

Model performance criteria or targets provide a basis from which to evaluate whether the model is adequately calibrated and validated, and whether model results are suitable for study goals and objectives. While specific performance targets were not established for this study, Table F-6 provides qualitative rankings of the relative accuracy level of several of the performance metrics evaluated in this study.

Table F-6. Model performance metrics and qualitative assessments of accuracy level used for evaluating model calibration and validation (Moriasi et al., 2007).

Accuracy Level	Percent Bias (%)	Nash-Sutcliffe
Very Good	< ±10	> 0.75
Good	±10 - ±15	0.75 - 0.65
Satisfactory	±15 - ±25	0.65 - 0.5
Unsatisfactory	> ±25	< 0.5

Figures F-11 and F-12 illustrate observed and predicted water surface elevations for the calibration event and strongly suggest the model calibrated well to observed data. For instance, the timing and magnitude of the peak flows at each in-channel monitoring location were well simulated by the model (Figure F-11) and the model achieved high correlations with observations (Figure F-13A). It is evident, however, that the model systematically over-predicts water surface elevations at lower flows during the falling limb of the storm hydrograph. The decline in model performance for lower flows is most likely related to the lack of high-quality low flow channel bathymetry. Future modeling efforts focused on lower habitat flows should consider prioritizing the collection of high-resolution channel bathymetry.

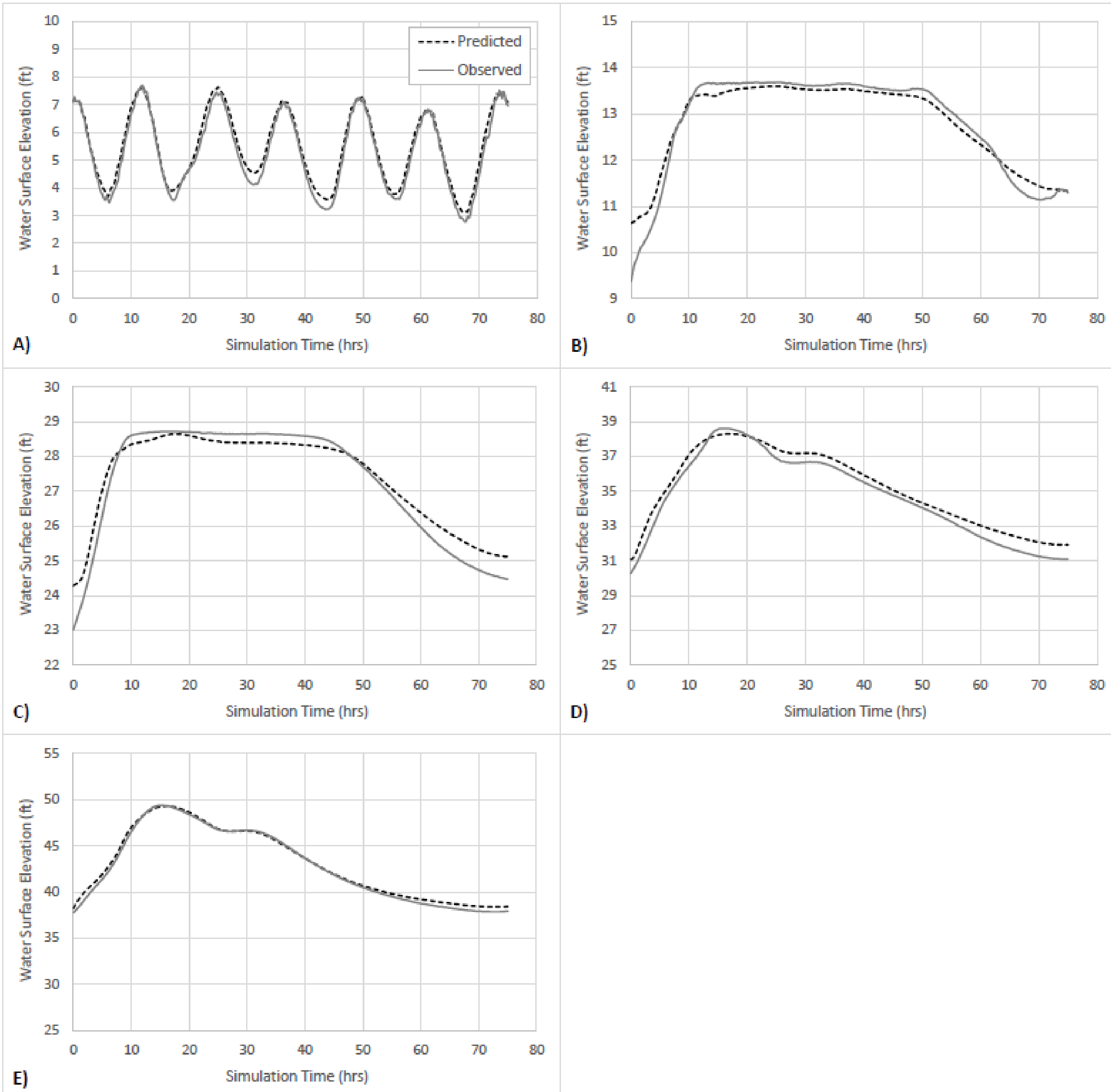


Figure F-11. Observed and predicted water surface elevations (ft) at five monitoring locations within PA-1 for the 2015 calibration run: MSR1 (A), MSR2 (B), MSR3 (C), MSR4 (D & E). Refer to Figure F-1 for monitoring locations.

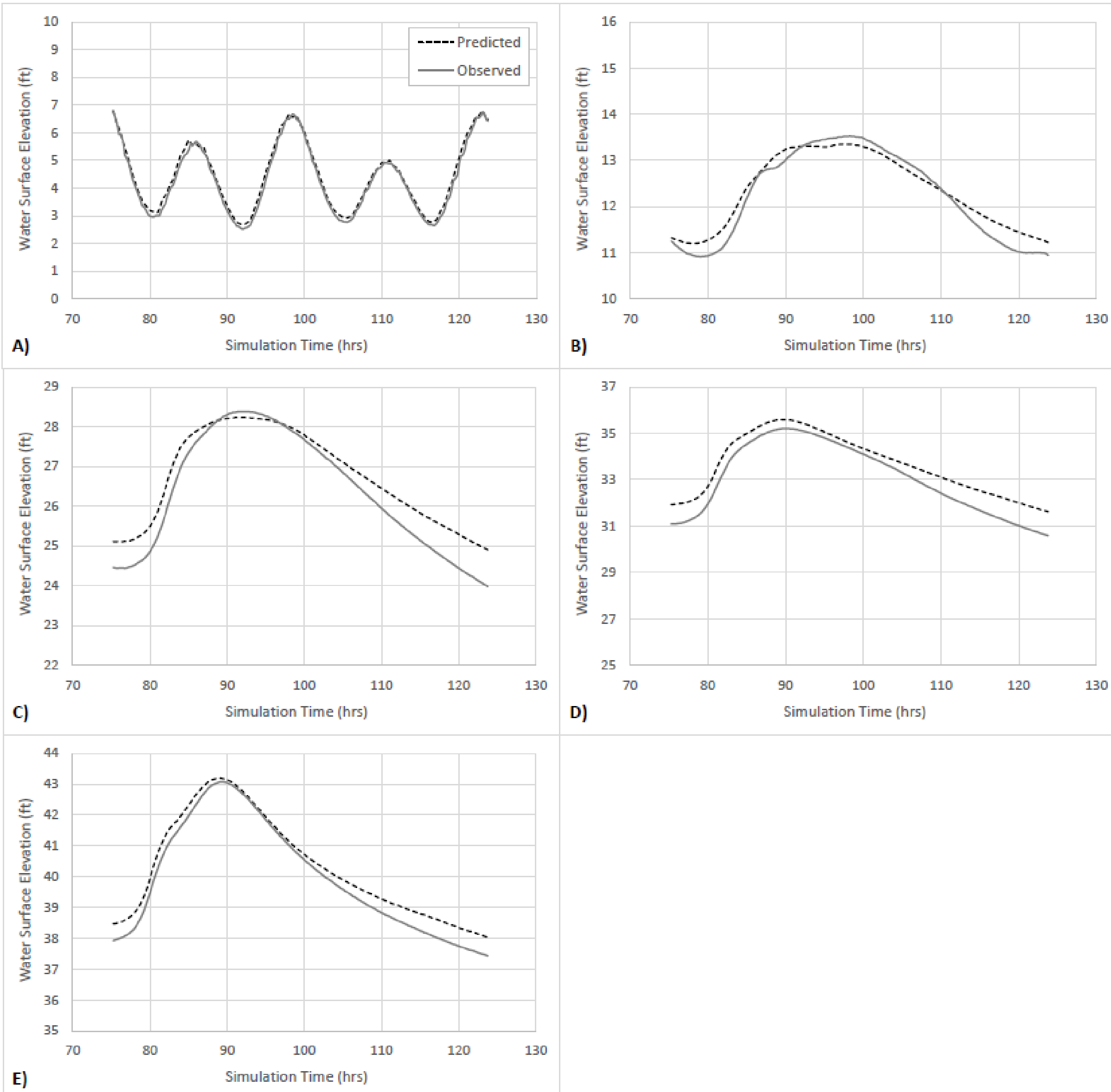


Figure F-12. Observed and predicted water surface elevations (ft) at five monitoring locations within PA-1 for the 2015 validation run: MSR1 (A), MSR2 (B), MSR3 (C), MSR4 (D & E). Refer to Figure F-1 for monitoring locations.

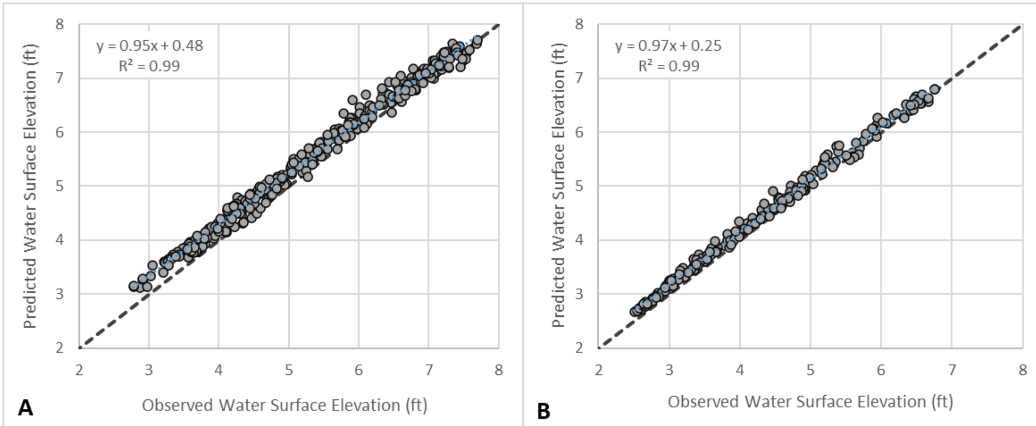


Figure F-13. Observed and predicted water surface elevations for the 2015 calibration and validation event (A & B, respectively) for in-channel stage data collected at monitoring site in MSR 1.

Table F-7 provides a more quantitative assessment of model performance and suggests the model simulated observed flows with very good skill across both the calibration and validation storms (i.e., high correlation coefficients, percent biases < 4% and Nash-Sutcliffe Coefficients > 0.8 at all monitoring locations in PA-1). Generally, model predictions of stage are within 0.2 to 0.3 ft of measured stage, although more significant deviations (> 0.5ft) were noted in MSR 4a for both calibration and validation model runs.

Table F-7. Model performance metrics at five monitoring locations within PA-1 for the 2015 calibration run: MSR1 (A), MSR2 (B), MSR3 (C), MSR4 (D & E). Refer to Figure F-1 for monitoring locations.

Model Run	Location	Correlation Coefficient	RMSE	R^2	Percent Bias	Nash-Sutcliffe	Peak Diff (ft)	Abs Mean Diff (ft)	Median Error (ft)	Percent Error Peak
Calibration	MSR1	0.995	0.230	0.991	-3.801	0.973	0.010	0.196	0.170	0.130
	MSR2	0.991	0.248	0.982	0.011	0.950	-0.090	0.183	-0.090	-0.657
	MSR3	0.996	0.396	0.993	-0.259	0.941	-0.070	0.326	-0.070	-0.244
	MSR4a	0.996	0.553	0.992	-0.828	0.947	-0.310	0.507	0.480	-0.803
	MSR4b	0.999	0.360	0.997	-0.352	0.992	-0.060	0.288	0.220	-0.122
Validation	MSR1	0.997	0.168	0.995	-3.230	0.981	0.040	0.128	0.140	0.592
	MSR2	0.990	0.241	0.981	-0.885	0.938	-0.180	0.186	0.130	-1.330
	MSR3	0.997	0.516	0.994	-1.511	0.876	-0.150	0.380	0.450	-0.529
	MSR4a	0.996	0.647	0.993	-1.790	0.816	0.380	0.520	0.580	1.079
	MSR4b	0.999	0.403	0.997	-0.901	0.949	0.130	0.316	0.390	0.302

Similar to the continuous stage measurements, the model achieved "very good" performance (Tables F-6 & F-9) across all discreet high-water mark observation during the 2015 validation run (i.e., percent bias < 1% and Nash-Sutcliffe > 0.99). The average absolute difference between observed and predicted high water mark elevations was only 0.21 ft or ~2.5 inches – indicating that the model accurately simulated water surface elevations on the floodplain (Tables F-8 & F-9 and Figure F-14).

Table F-8. Model performance metrics at five monitoring locations within PA-1 for the 2015 calibration run: MSR1 (A), MSR2 (B), MSR3 (C), MSR4 (D & E). Refer to Figure F-1 for monitoring locations.

Observation ID	Observation Time	Observed WSE (ft)	Predicted WSE (ft)	WSE Difference (ft)	Percent Difference
15048	4:49:34 PM	12.62	12.41	-0.21	-1.64
15047	2:43:37 PM	8.84	9.05	0.21	2.40
15046	2:41:12 PM	8.69	9.07	0.38	4.41
15045	2:39:30 PM	8.56	8.49	-0.07	-0.83
15044	2:37:50 PM	8.81	9.07	0.26	2.92
15043	2:37:22 PM	6.80	6.83	0.03	0.49
15042	2:34:43 PM	8.85	9.07	0.22	2.49
15041	2:28:12 PM	8.82	9.09	0.27	3.01
15040	2:26:56 PM	8.79	9.09	0.30	3.39
15039	2:25:51 PM	8.85	9.13	0.28	3.13
15038	2:10:46 PM	9.36	9.44	0.08	0.84
15037	2:09:55 PM	9.35	9.47	0.12	1.26
15036	2:08:45 PM	9.39	9.45	0.06	0.67
15035	1:53:38 PM	24.38	24.92	0.54	2.21
15051	5:01:34 PM	10.77	10.41	-0.36	-3.37
15052	5:03:09 PM	10.67	10.43	-0.24	-2.25
15050	4:56:44 PM	10.85	10.84	-0.01	-0.07
15049	4:51:20 PM	12.36	12.43	0.07	0.53
			Ave	**0.11**	**1.09**
			Ave Abs	**0.21**	**1.99**

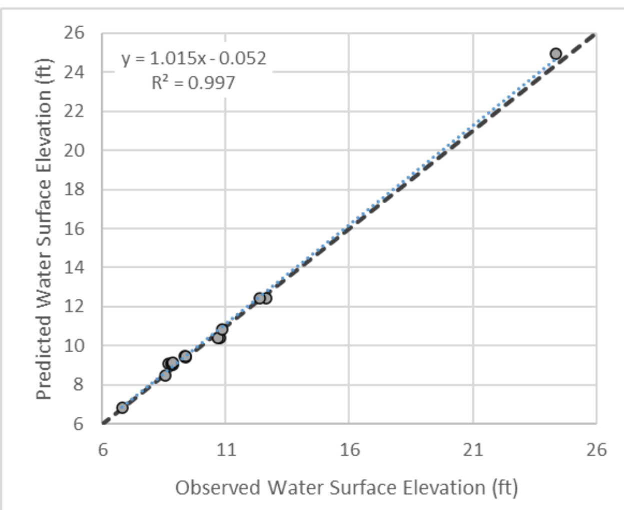


Figure F-14. Correlation plot of predicted vs. observed high-water mark elevations for the validation model run.

Table F-9. Performance metrics for the validation model run.

Performance Metric	Value
Correlation Coefficient	0.998
RMSE	0.247
R^2	0.997
Percent Bias	-1.029
Nash-Sutcliffe	0.995
Mean Difference (ft)	0.107
Abs Mean Difference (ft)	0.205

Notably, existing condition model results were also qualitatively validated via consultation with local landowners whose long-term observations of flooding and drainage characteristics closely matched model results.

2.4.7 DESIGN ACTIONS INCORPORATED INTO THE MODEL

The majority of the design elements outlined in section 3.4 of the main report were explicitly simulated in the 2D model through manipulation of the computational mesh as well as modification of the terrain surface and/or hydraulic structures. All design features related to hydraulic structures (e.g., removal, modification and/or installation of culverts and tide gates) were included in the 2D model either by modifying existing or creating new SA/2D connections to reflect proposed design specifications. The adjustable opening in the Swain Slough tide gate at Elk River Road (TG-100B) was simulated as a single 1 ft x 1ft box culvert with an invert elevation of 3.26 ft, installed roughly 1ft south of the existing tide gate. This configuration facilitated fish passage and allowed for a muted tide upstream of TG-100 that minimized saltwater intrusion on upstream properties. All earthwork-related design elements (e.g., eco-levee) were incorporated into the model through modification of the EG terrain surface. For example, existing levees were lowered or removed by lowering the terrain such that the levee crest was set to the design elevation. Similarly, all design channels, alcoves, floodplain ponds, etc. were simulated via terrain modification. Where necessary, Manning's n coefficients were altered to reflect design roughness characteristics (e.g., within design channels; refer to Table F-4 for DG Manning's values). Preliminary design dimensions (e.g., top width, side slopes, depth, etc.) for the proposed restored Orton Creek channel were estimated using the existing channel as a guide. The upstream portion of the main floodplain channel (M2-FP-4.0) was sized by expanding an existing drainage ditch, which then meanders and gradually enlarges in depth and width until it meets with the newly daylighted Orton Creek channel. Channel alignment and planform was designed to accommodate existing infrastructure and property constraints while maximizing opportunities for habitat creation and enhancement, as well as flood flow conveyance. At the 10% design stage, DG channels are modeled as a simple trapezoidal channel with uniform dimensions. Future modeling phases will incorporate additional channel complexity such as pool-riffle sequences, bars, inset benches, large woody debris structures, etc. Alcove features were designed such that bottom elevations matched the elevations of the adjacent channel thalweg and were sized to create a suitable range of elevations to support habitat complexity and promote establishment of important native plants such as Lyngbye's sedge (*Carex lyngbyei*). Where possible, alcove openings were sited in non-depositional areas (e.g., outside of meander bends) to minimize sedimentation. Preliminary 1st-order DG tidal slough channels in Elk River Wildlife Area (M1-FP-1.8) were designed with simple trapezoidal geometries and sized to achieve a full tidal prism. The full mature channel network depicted in (Figure 3-2) is not currently incorporated into the model for the Elk River Wildlife Area. A tidal channel network was not included for AOI B or D due to landowner preferences at the time of the modeling. AOI B and D are part of a potential land acquisition that would allow full tidal restoration. Future design work will follow empirical hydraulic geometry relations (e.g., NHE, 2009; PWA, 1995 & 2004; Williams et al., 2002) to establish a more rigorous estimate of key slough design specifications (channel width, depth, and cross-sectional area) that promote evolution of a complex drainage system to support an ecological rich and diverse tidal marsh community.

Elk River Manning's n values for the 10% design model were determined based on tabular and photographic guidance found in several seminal guides for selecting roughness coefficients in natural channels (Barnes, 1967, Arcement and Schneider, 1989). Figure F-15 provides examples of natural stream channels with roughness characteristics similar to those of the design Elk River channel as it is currently conceptualized. Future design phases will likely refine these initial estimates and will supplement the qualitative approach of the 10% design with more quantitative methodologies (e.g., Limerinos, 1970; Rickenmann & Recking, 2011).

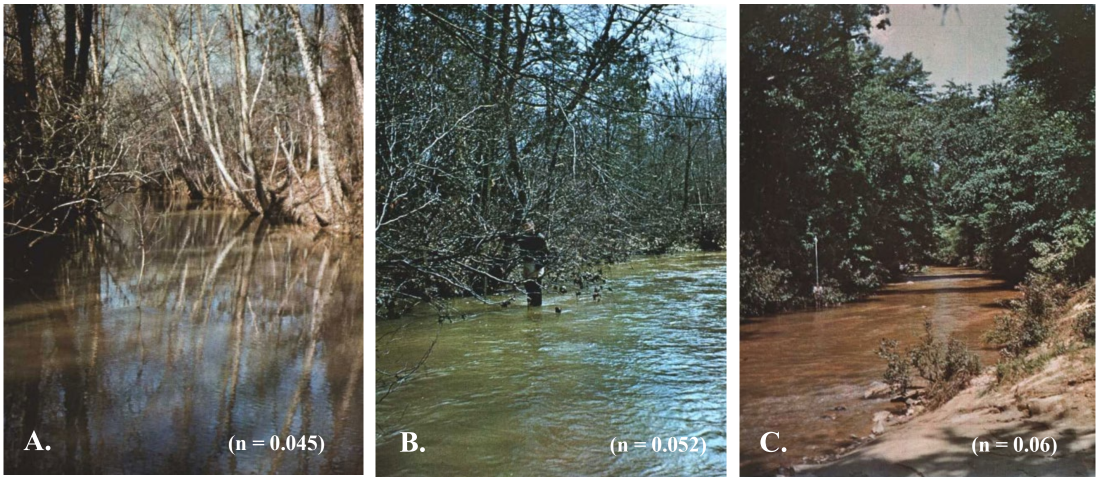


Figure F-15. Reference for Manning's n roughness coefficients in Murder Creek near Monticello, GA (A; n = 0.045), South Beaverdam Creek near Dewy Rose, GA (B; n = 0.052) and Hominy Creek in Candler, NC (C; n = 0.06; Barnes, 1967).

The following design elements were not explicitly simulated in the 10% design model either because their hydraulic impacts were minimal and highly localized or their design specifications and/or location were the subject of ongoing design discussions:

- Removal of small building in AOI C
- In-channel and off-channel large woody debris structures
- Channel bedform complexity (pools, riffles, bars, etc.)
- Fully developed tidal slough network in AOI A, B and D
- Vegetation expansion along the main channel corridor and Orton Creek.

2.5 RESULTS

The following sections provide an overview of the hydraulic model results for both the existing and design conditions scenarios. Results will generally be presented and summarized in the context of different areas of interest (AOIs) – as well as the three key geomorphic reaches in the project area (Figure F-16).

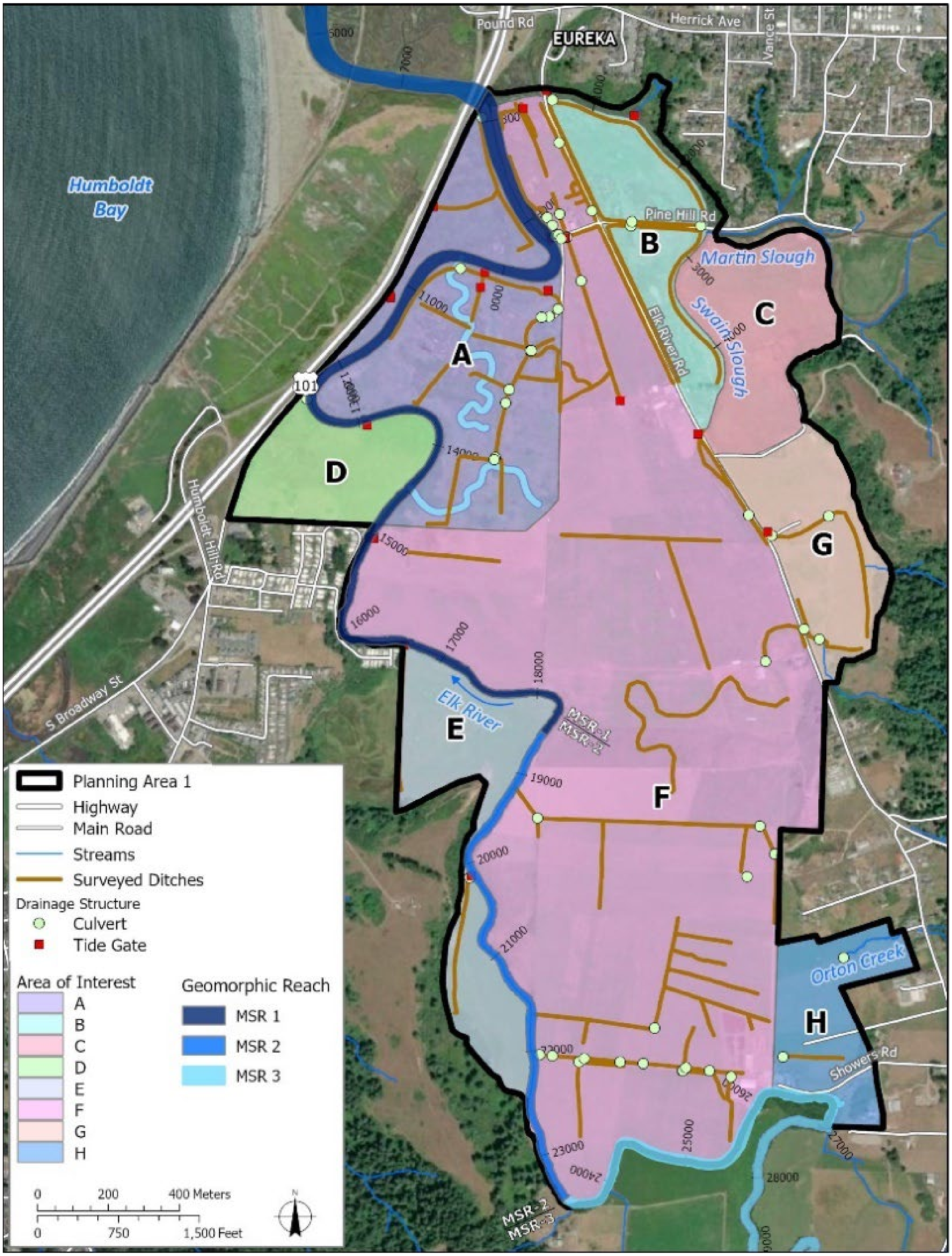


Figure F-16. Overview of the Planning Area 1 project site, including Areas of Interest (AOI), geomorphic reaches (MSR) and surveyed drainage infrastructure.

2.5.1 EXISTING CONDITIONS

2.5.1.1 Inundation Extents

An examination of inundation boundaries across a range of selected seasonal exceedance and peak flows helps to elucidate patterns of flooding extent under existing conditions. Flows with an exceedance probability less than or equal to 50% that coincide with a spring tide are generally contained within the Elk River main channel - though some minor backwatering associated with broken or missing tide gates on select floodplain ditches in MSR-2 occurs at the 50% exceedance flow (see callout in Figure F-17). As evidenced by Figure F-17, the 50% exceedance flow is also associated with moderate inundation (depths ~0.1 – 2.5ft) of the Elk River Wildlife Area, Swain Slough Tidal Wetlands and Western Off Channel Habitat (AOI A, B & C, respectively) due primarily to failed infrastructure (e.g., tide gates and levees) and overbanking of the Elk River (red circles in Figure F-17). At the 25% exceedance flow (170 cfs), ditch related backwatering and flooding of adjacent floodplains becomes more pronounced. At the 10% exceedance flow, flooding extents increase to cover much of the Floodplain Corridor (AOI F) due to more significant ditch overbank flows, as well as overbanking of the Elk River main channel near the downstream end of MSR-3 (see larger red circle in Figure F-17). Of additional note at the 10% exceedance flow is substantial overbank flooding of the existing ditch on the southern parcel of AOI E due to overtopping of the tide gate (TG-601). Importantly, these floodplain flows are shallow and poorly connected to the Elk main channel and thus represent low quality habitat with significant probability of fish stranding and mortality.

The extensive flooding of PA-1, during even relatively small flood events (i.e.,10% exceedance flows), indicates limited channel capacity of the Elk River and is consistent with previous model results (California Trout et al., 2018). It is also in agreement with longstanding anecdotal observations of frequent flooding of much of PA-1. Naturally, as flow magnitude increases, both the area inundated and flow depth increase – however, the extent of flooding does not change significantly at flows ≥ 2yr (Figure F-18 and Table F-10).

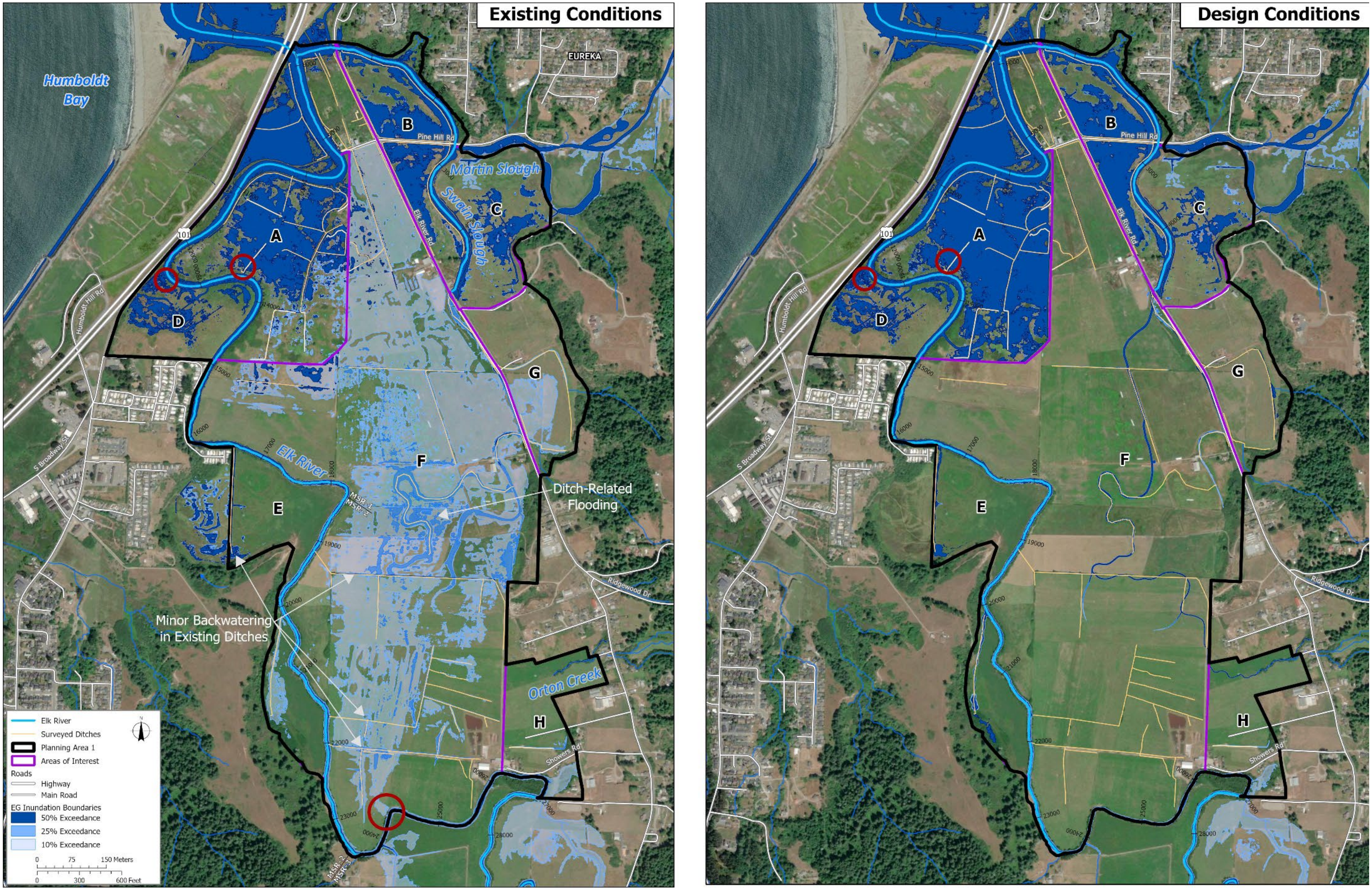


Figure F-17. Inundation boundaries for select exceedance flows indicating whether any cell was wet during the simulation under existing and design conditions.

At the 1.053-yr event (655 cfs), overbanking of the Elk River, as well as Swain and Martin Sloughs becomes substantially more pronounced. Notably, roughly half of the 1.053-yr overbank flows in the floodplain corridor (AOI F) stem from backwatering of the existing ditch network in the southern portion of the corridor – while the bulk of the remaining flooding stems from overtopping of the Elk River near the MSR-2 and MSR-3 boundary (Figure F-18). During the 1.053-yr event, the Elk River also overtops at several other locations along the river-left bank adjacent to AOI E (red circles in Figure F-18). As previously mentioned, at the 2-yr peak flood event and above, there is very little difference in inundation extent, though water depths increase with increasing flow magnitude (Tables F-10 & F-12). The primary exception to the limited expansion of inundation extents is overtopping of Route 101 at the 100-yr flow (Figure F-18). Of additional note is the fact that Orton Creek overtops its banks at roughly a 1.25-yr event (1,443 cfs) for existing conditions and inundates the adjacent floodplain/pasture primarily to the northwest (please refer to the Orton Creek area in AOI H for the 2-yr flood event in Figure F-18).

As indicated by Table F-10, large portions (>50%) of the downstream most AOIs (A & B) are inundated even at the lower exceedance flows when accompanied by a typical spring tide. With the exception of AOI H, nearly the entire area of each AOI is inundated at the 100-yr event (Figure F-18 & Table F-10). Considerable portions of AOI H remain dry even at the 100-yr flow due to high topographic relief of the upper Orton Creek area. Although it is difficult to directly compare exceedance flows with unsteady downstream boundary conditions to those of the peak flows with steady-state boundary conditions, it is evident from Figures F-17 & F-18 and Table F-10 that inundation areas increased dramatically in many AOIs between the 10% exceedance and the 1.053-yr flow. This is especially the case for AOIs C, E and G, which collectively average over a 250% increase in inundated area between these flows. The floodplain corridor (AOI F), by contrast, experiences the largest relative increase in inundation between the 25% and 10% exceedance flows under existing conditions (Figure F-17 and Table F-10).

Table F-10. Total area and inundated area of each AOI (acres) at select modeled flows for existing conditions.

AOI	AOI Area (ac)	Exceedance Flows				Peak Flows		
		90%	50%	25%	10%	1.053-yr	2-yr	100-yr
A	105	58	58.2	58.6	62.6	86.4	95.9	103.7
B	40	24	24.4	24.5	24.9	31.3	37.2	40.3
C	44	8	8	8.4	12.3	41.6	43.2	44
D	34	11	11.4	11.8	12.3	19.5	26.1	28
E	52	1	1.1	1.1	4.8	22.4	35.8	47.2
F	460	13	13.1	33.4	227.5	319.1	423.7	446.9
G	44	0	0	0	8.4	24.2	33.7	39.7
H	34	0	0	0.1	2.1	3.2	14	18.5
Total	**813**	**115**	**116**	**138**	**355**	**548**	**710**	**768**

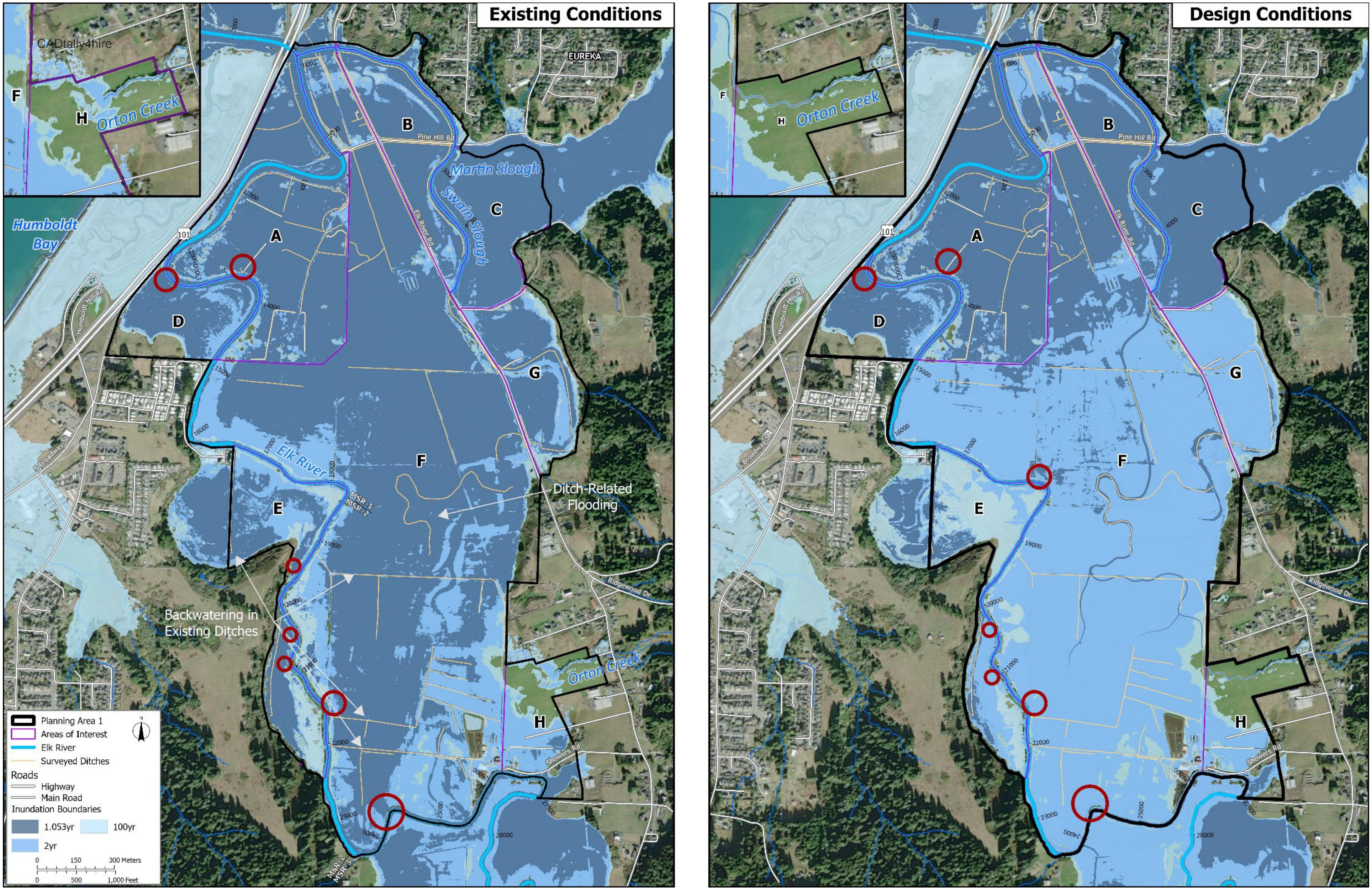


Figure F-18. Inundation boundaries for select peak flows indicating whether any cell was wet during the simulation under existing and design conditions.

2.5.1.2 Flow Depths

In-channel and floodplain maximum flow depths across a suite of discharge values and locations were examined for existing conditions. Median in-channel flow depths generally ranged from ~6 – 11 ft for all peak flows across the three geomorphic reaches within PA-1 (Table F-11). Depths were greatest in MSR 1 due to existing channel geometry and the tidal nature of this reach. Even at lower flows (i.e., < 1.053-yr), in-channel flow depths in all geomorphic reaches were often substantial (> 3 ft), which is consistent with field observations (California Trout et al., 2019). Higher flow depths in the lowest geomorphic reach (MSR 1) are related to its location in the coastal plain where tidal backwater effects are strong.

Table F-11. Median flow depths for existing conditions in all geomorphic reaches in PA-1 across a range of modeled flows.

Area of Interest	90% Exceedance	50% Exceedance	10% Exceedance	1.053-yr	2-yr	5-yr	25-yr	50-yr	100-yr
MSR 3	1.35	3.09	6.62	6.33	6.61	6.90	7.31	7.47	7.61
MSR 2	2.77	3.56	6.24	6.15	6.10	6.08	6.10	6.11	6.20
MSR 1	7.28	7.28	7.48	7.33	7.74	8.35	9.68	10.25	10.75

Floodplain flows across the range of more frequent storm events (i.e., ≤ 2yr) suggest that when the Elk River overtops its banks within PA-1, flows are generally shallow and slow moving (Table F-12). This is especially the case for AOIs D, E, F and G where well over 50% of the areas were inundated with flows < 1ft during the relatively common 1.053-yr event (Table F-12). Such diffuse, shallow overbank flows are consistent with historic flood observations and suggest a high probability of fish stranding and mortality.

Table F-12. Median flow depths for existing conditions in all Areas of Interest across a range of modeled flows.

Area of Interest	50% Exceedance	10% Exceedance	1.053-yr	5-yr	25-yr	50-yr	100-yr
A	0.65	0.63	1.27	3.03	4.42	4.99	5.47
B	0.76	0.78	1.11	2.89	4.20	4.77	5.26
C	0.26	0.28	1.47	3.66	5.03	5.59	6.07
D	0.33	0.35	0.59	2.44	3.86	4.42	4.90
E	0.54	0.38	0.36	1.55	2.21	2.62	3.00
F	0.25	0.39	0.70	2.73	3.83	4.29	4.70
G	0.16	0.38	0.68	2.63	4.06	4.60	5.06
H	0.00	2.03	2.18	1.42	1.68	1.77	1.85
PA-1	**0.33**	**0.39**	**0.91**	**2.68**	**3.96**	**4.51**	**4.98**

During the 100-yr flood event, the median EG flow depth across PA-1 was roughly 5 ft and the majority of all AOIs were inundated with > 3 ft of water (Tables F-12 & F-13). Only AOIs E and H still had significant areas with EG flow depths < 3 ft during the 100-yr event (Table F-13).

Table F-13. Percent of AOI covered by a range of flow depths during the 1.053- & 100-yr event for existing conditions.

Area of Interest	1.053-yr				100-yr			
	< 1ft	1 - 2ft	2 - 3ft	> 3ft	< 1ft	1 - 2ft	2 - 3ft	> 3ft
A	27.37	45.45	8.14	1.5	1.04	2.1	2.77	92.72
B	35.18	26.5	14.74	1.38	0.12	0.52	2.41	96.95
C	20.22	54.41	18.4	0.75	0.28	0.27	0.59	98.11
D	44.52	11.8	0.61	0.05	1.22	1.85	1.5	77.06
E	32.76	8.72	1.28	0.61	16.01	10.96	18.45	45.46
F	46.54	16.57	5.7	0.83	1.52	3.43	7	85.29
G	42.28	11.5	2.39	1.22	2.06	2.78	3.83	82.46
H	3.62	0.99	1.32	3.62	17.7	12.39	16.35	8.01

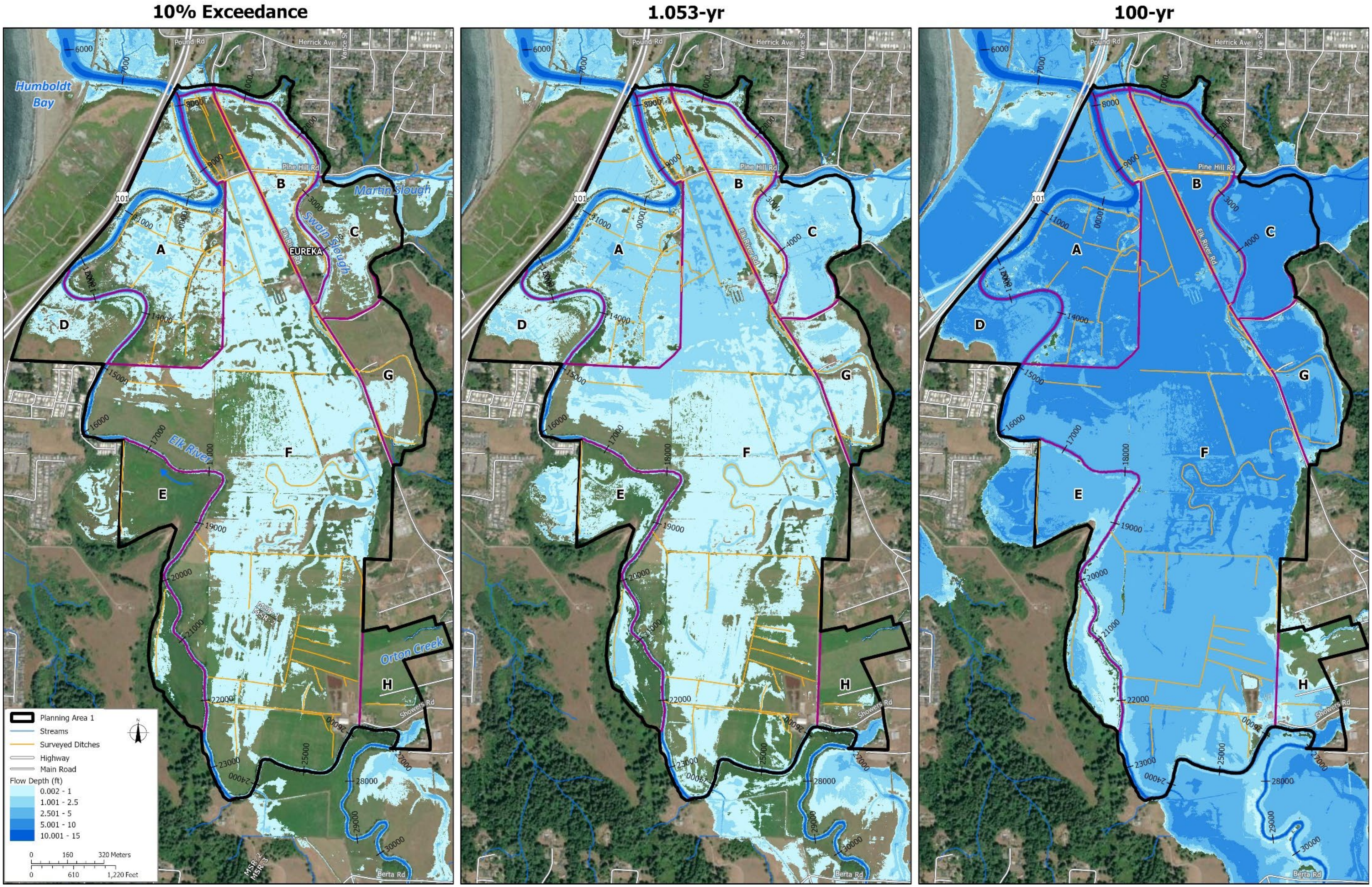


Figure F-19. Existing condition flow depths in PA-1 during select flood events.

2.5.1.3 Flow Velocities

All velocity-related hydraulic model results for the seasonal exceedance flows were extracted during mid-ebb tide when the water surface elevation near the downstream end of PA-1 was at approximately 4ft. Median in-channel flow velocities in all geomorphic reaches in PA-1 were generally mild-moderate – even at high flows (i.e., < 2 ft/s up to the 100-yr event; Table F-14). This is consistent with the 2D HST model, which indicated similar, unusually low channel velocities (California Trout et al., 2018). Generally speaking, maximum in-channel velocities were highest in MSR 1 and lowest in MSR 2 due primarily to differences in the degree of tidal influence, as well as channel roughness and geometries in these two reaches (see Table F-14 below for example at 100-yr flow). Higher median 100-yr flow velocities in MSR 3 are likely attributable to steeper channel slopes in this reach.

Table F-14. Mean, median, minimum and maximum in-channel flow velocities during the 100-yr event for existing conditions.

MSR	Mean	Median	Min	Max
MSR - 3	1.63	1.58	0.23	4.50
MSR - 2	1.14	1.13	0.04	2.15
MSR - 1	1.37	0.93	0.00	8.19

As indicated by Table F-15, median flow velocities in MSR 1 were greater for the 10% exceedance flow than for the larger 1.053-yr and 100-yr events. This is due to the fact that the downstream boundary conditions for the 10% exceedance were comprised of unsteady tidal sequences – whereas the downstream boundary conditions for the 1.053- and 100-yr flood events were steady state at roughly the MMMW (8.33 ft).

Table F-15. Median flow velocities in each geomorphic reach within PA-1 for existing conditions across a range of flows.

Area of Interest	90% Exceedance	50% Exceedance	10% Exceedance	1.053-yr	100-yr
MSR 3	0.26	0.59	1.09	1.18	1.58
MSR 2	0.30	0.57	1.10	1.13	1.13
MSR 1	0.52	0.64	1.46	0.73	0.93

Median overbank velocities were quite slow (≤ 1 ft/s) over the full suite of modeled flows in all Areas of Interest and generally did not exceed 0.5 ft/s until the 100-yr flood (Table F-16).

Table F-16. Median overbank flow velocities in each Area of Interest within PA-1 for existing conditions across a range of flows.

Area of Interest	90% Exceedance	50% Exceedance	10% Exceedance	1.053-yr	100-yr
A	0.02	0.02	0.02	0.06	0.57
B	0.02	0.02	0.02	0.01	0.64
C	0.00	0.00	0.00	0.01	0.41
D	0.01	0.02	0.02	0.01	0.32
E	0.11	0.12	0.11	0.02	0.28
F	0.04	0.04	0.15	0.16	0.91
G	0.00	0.00	0.05	0.01	0.41
H	--	--	0.03	0.01	1.07
PA-1	**0.02**	**0.02**	**0.03**	**0.01**	**0.57**

At flows greater than the 2-yr, some localized areas of AOI H experienced flows in excess of 1-2 ft/s due predominantly to overtopping of Showers Road and higher overbank flows from Orton Creek (Table F-17 & Figure F-20). Similarly, some portions of AOI F experienced higher flow velocities due to: i) overbanking flows between Elk River stations 23,500 – 25,500 ft and ii) higher velocity ditch flows at the southern end of the floodplain corridor (see 100-yr flow velocity plot in Figure F-20 and Table F-17).

Table F-17. Percent of AOI covered by a range of flow velocities for the 1.053- and 100-yr event.

Area of Interest	1.053-yr				100-yr			
	< 1ft/s	1-2 ft/s	2-3 ft/s	> 3 ft/s	< 1ft/s	1-2 ft/s	2-3 ft/s	> 3 ft/s
A	82.2	0.0	0.0	0.0	92.7	5.9	0.1	0.0
B	77.7	0.0	0.0	0.0	99.0	1.0	0.0	0.0
C	93.7	0.0	0.0	0.0	99.0	0.3	0.0	0.0
D	56.9	0.0	0.0	0.0	81.1	0.6	0.0	0.0
E	43.1	0.0	0.0	0.0	90.6	0.3	0.0	0.0
F	69.3	0.1	0.0	0.0	55.2	37.9	3.9	0.2
G	55.6	0.0	0.0	0.0	90.4	0.7	0.0	0.0
H	9.5	0.0	0.0	0.0	25.6	25.7	3.1	0.2

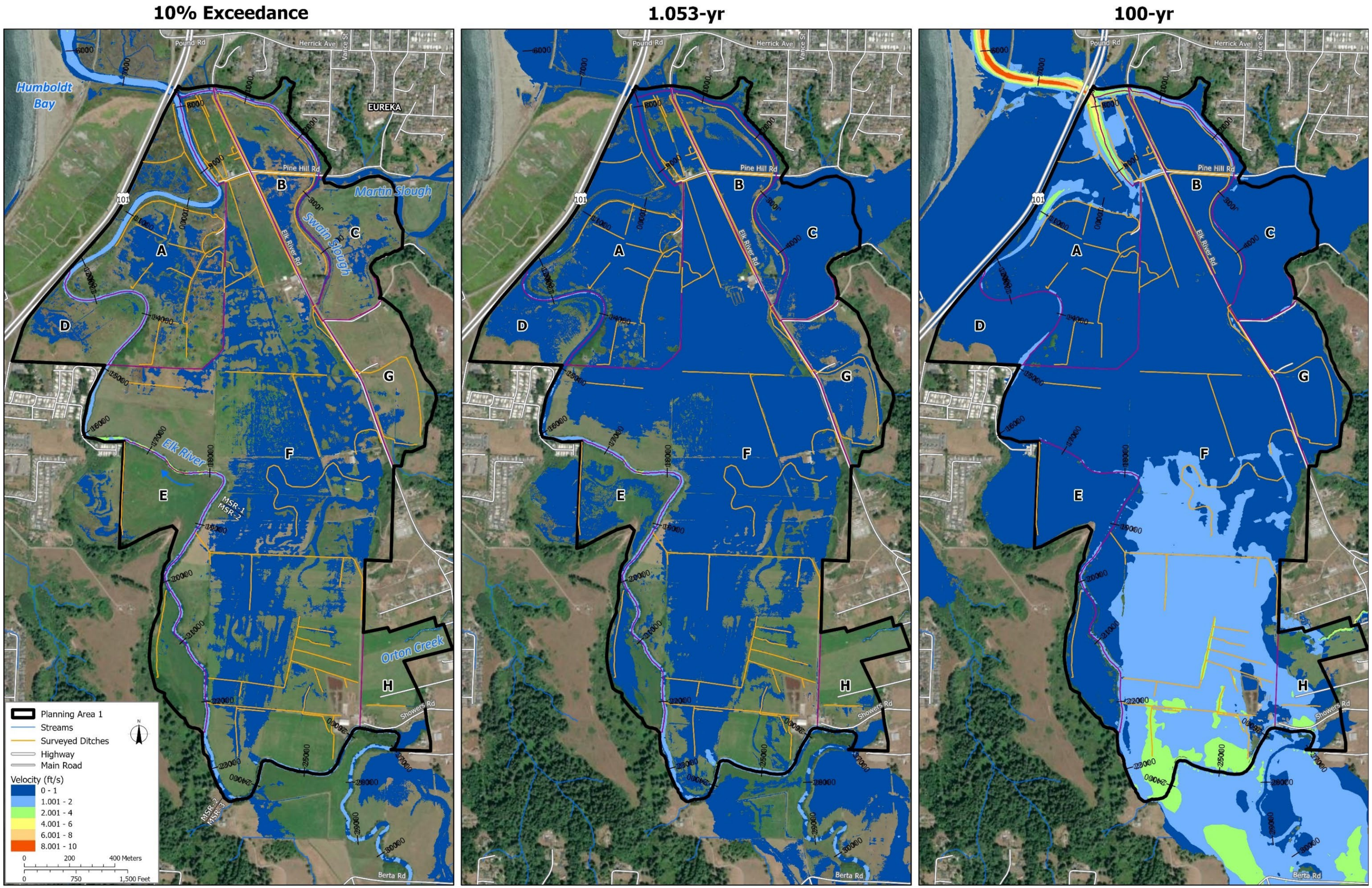


Figure F-20. Exiting condition flow velocities over select flood events in PA-1.

2.5.1.4 Duration of Inundation

Examination of the 2015 Calibration-Decay storm event helps to reveal patterns of flow inundation in different areas of PA-1 under existing conditions during a real-world flood event (peak flow ~2,400 cfs). As evidenced by Figure F-21, large portions of PA-1 are flooded for long periods of time during such relatively moderate storm events, which is consistent with historic observations of slow drainage characteristics. In fact, over the 4.5-day Calibration-Decay event, the average period of floodplain inundation was roughly 1.5 days over PA-1 and some AOIs were substantially slower draining (Table F-18). For example, the floodplain corridor (AOI F -the largest AOI) demonstrated a median time of inundation of approximately 2 days and central portions of the floodplain corridor and associated grassy swales were inundated for well over 3 days (Table F-18 & Figure F-21). Areas within AOI F experiencing the least amount of time inundated were generally associated with natural sediment levees proximal to the Elk River main channel (Figure F-21). Importantly, much of the existing shallow, long-duration inundation patterns are attributable to anthropogenic alterations within PA-1, such as failed and/or undersized drainage infrastructure that disrupts natural flow paths and limits floodplain connectivity. This is exemplified by the contrast in inundation duration between the northern and southern parcels of AOI A due to the far greater floodplain connectivity of the northern portion, which facilitates more frequent, short-duration tidal inundation typical of natural tidal hydrologic regimes (see inset of Figure F-21). AOI D exhibited the lowest duration of inundation due to the fact that it possesses a natural sediment levee and is on the inside of a tight meander bend on the opposite side of the Elk River as the bulk of overbank flood flow (i.e., majority of floodplain flows are shunted down AOI F on the opposing bank; Table F-18 & Figure F-21).

Table F-18. Median time of inundation for all Areas of Interest in PA-1 for existing conditions during the 2015 Calibration-Decay event.

Area of Interest	Median (days)	Median (hrs)
D	0.34	8.2
H	1.33	32.0
C	1.57	37.8
E	1.66	39.8
G	1.84	44.3
F	2.09	50.3
A	2.10	50.5
B	3.20	76.8
PA-1	**1.8**	**42.0**

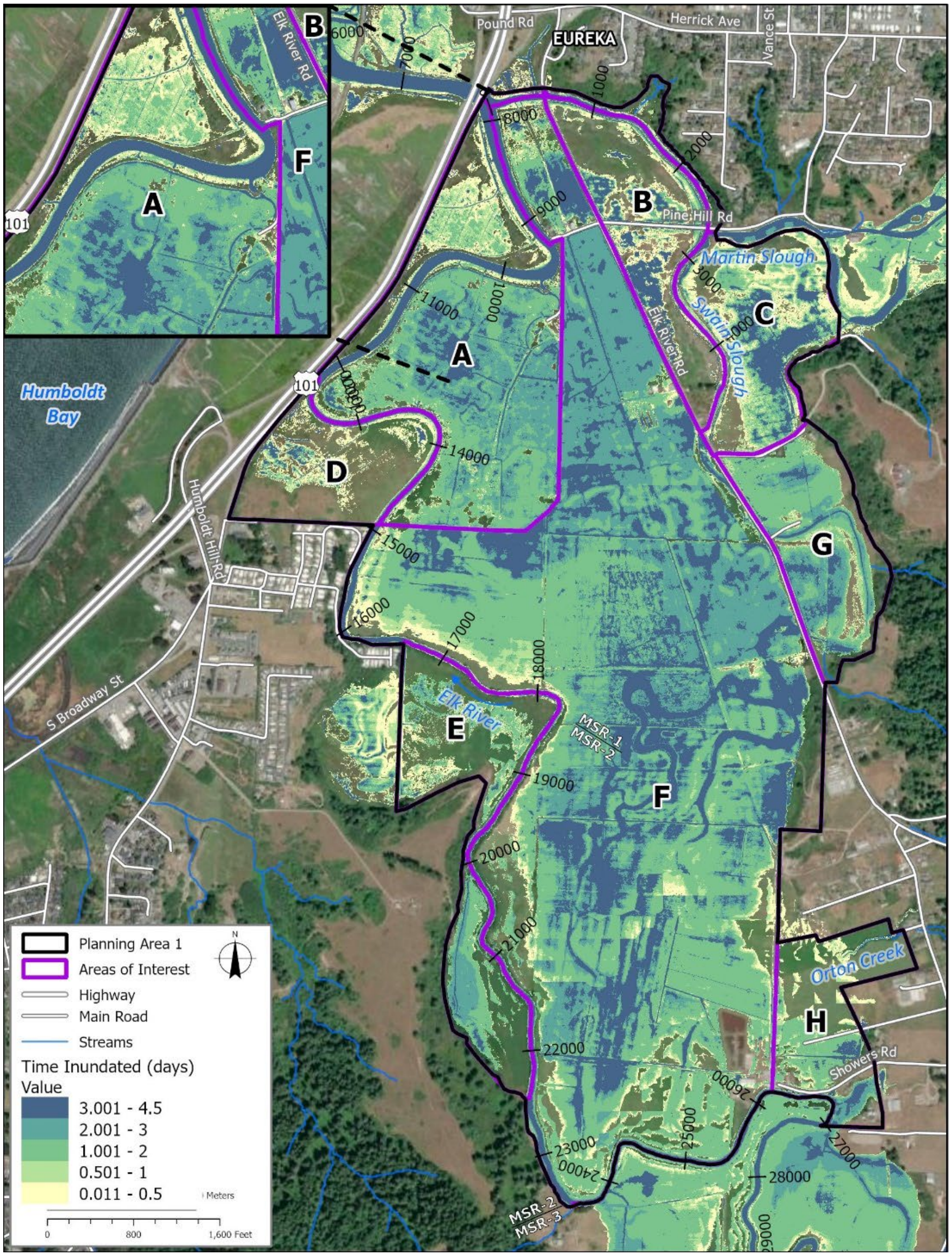


Figure F-21. Duration of inundation (days) for existing conditions during the 2015 Calibration-Decay event.

2.5.2 DESIGN CONDITIONS

The hydraulic impacts of the suite of design elements were evaluated across a similar range of steady-state and unsteady upstream and downstream boundary conditions. It is difficult to succinctly describe the impact of all design features for the full range of flood conditions due to the size and complexity of the model and the nature of temporal solutions. Consequently, modeling results for design conditions are described in a general manner and summarized primarily by contrasting DG conditions with EG.

2.5.2.1 Inundation Extents

Figures F-17 – F-18 and Tables F-19 – F-20 illustrate the significant difference in inundation extents between existing and 10% design conditions. This is especially the case for lower, more frequent flows (i.e., ≤ 1.053-yr) in the floodplain corridor (AOI F) where the design actions (e.g., in-channel vegetation management, disconnection of floodplain ditches) work in concert to: i) reduce early shallow inundation of the floodplain due to backwatering of existing drainage ditches with failed tide gates and ii) to concentrate overbank flows into a hydrologically connected channel network with improved habitat complexity and cover (Table F-20).

Table F-19. Total area and inundated area of each AOI (acres) at select modeled flows for design conditions.

AOI	AOI Area (ac)	Exceedance Flows				Peak Flows		
		90%	50%	25%	10%	1.053-yr	2-yr	100-yr
A	105	80	79.6	79.9	80.7	86.5	94.5	103.7
B	40	27	26.5	26.7	27.1	31.5	38.8	40.3
C	44	6	5.7	6.4	10.1	41.5	43.5	44
D	34	10	10.6	11.3	12.2	19.7	25.2	28
E	52	2	2.1	2.1	2.5	5.8	20.8	47.6
F	460	3	3.6	4.6	5.9	63.9	423.6	445.8
G	44	1	0.8	0.8	0.8	1.1	35.1	39.7
H	34	0	0.1	0.1	1.1	1.3	10.7	15.4
Total	**813**	**128**	**129**	**132**	**140**	**251**	**692**	**765**

AOIs E and G also demonstrated reductions in inundated area during moderately high flow events (~10% exceedance – 2-yr; Table F-20). In the case of AOI E, declines are due primarily to placement of fill on the floodplain, alteration of an existing left-bank levee crest and tide gate repair in the northern parcel. On the other hand, reduced DG inundation in AOI G is a result of redirecting DG floodplain flows away from AOI G and into the design channel network in AOI F, which conveys it more directly to Swain Slough – creating opportunities for high quality habitat with less probability of stranding. Areal reductions in inundation in AOI C for events ≤ 10% exceedance are primarily related to the elimination of overbank flows in AOI F that drain into Swain Slough – raising water surface elevations and increasing inundation under EG conditions. However, during flood events ≥ 1.053-yr event, significant overbank flooding occurs in AOI F in both EG and DG scenarios which reduces the magnitude of differences.

The only areas with substantially increased inundation extent (9 – 91%) were AOIs A, B and E – suggesting that 10% design features were promoting tidal marsh restoration and creation of off-channel habitat through improvements to lateral floodplain connectivity (Table F-20). However, these increases were only pronounced during lower flows (≤ 25% exceedance), because during higher flows, widespread, shallow EG floodplain inundation occurs that begins to overshadow inundation gains from design actions. For example, gains in inundated area in AOI E are related to the fact that DG floodplain ponds/wetlands in the AOI are inundated during lower flows yet are dry in EG. However, at ≥ 10% exceedance flows, widespread, but shallow EG floodplain inundation occurs due to overtopping of an existing tide gate and overbank flows along the left-bank Elk River – leading to reductions in wetted area in the DG scenario (Table F-20). Thus, it is important to emphasize that although total area inundated is reduced in some AOIs at certain flows, the area of deeper well-connected flow that is conducive to good habitat quality is generally increased.

Overall, the DG model results suggest the total area of inundation in PA-1 was reduced for all storm events with significant overbank flow (i.e., ≥ 25% exceedance; see "Total" in Table F-20). These reductions in wetted area were principally related to significant declines in AOIs E, F, G and H (~24 – 96% reductions). Conversely, flow events that are more confined to the Elk mainstem (≤ ~50% exceedance) demonstrated a net increase in inundated area over PA-1 (11.4%) – driven mostly by increases in AOIs A and E.

Importantly, significant overbank flooding occurs in the EG scenario at roughly the 10% exceedance flow (467 cfs), whereas in the DG scenario, overbank flooding does not occur until the ~2% exceedance flow (1,443 cfs, equivalent to the 1.25-yr event). This suggests a ~5-fold decrease in the frequency of occurrence of significant overbank flooding due to design actions.

Table F-20. Percent difference in DG vs. EG areas of inundation. Positive values indicate increased DG area of inundation.

AOI	Exceedance Flows				Peak Flows		
	90%	**50%**	**25%**	**10%**	**1.053-yr**	**2-yr**	**100-yr**
A	37.3%	36.8%	36.3%	28.9%	0.1%	-1.5%	0.0%
B	9.1%	8.6%	9.0%	8.8%	0.6%	4.3%	0.0%
C	-29.1%	-28.8%	-23.8%	-17.9%	-0.2%	0.7%	0.0%
D	-7.1%	-7.0%	-4.2%	-0.8%	1.0%	-3.4%	0.0%
E	90.9%	90.9%	90.9%	-47.9%	-74.1%	-41.9%	0.8%
F	-73.6%	-72.5%	-86.2%	-97.4%	-80.0%	0.0%	-0.2%
G	--	--	--	-90.5%	-95.5%	4.2%	0.0%
H	--	--	0.0%	-47.6%	-59.4%	-23.6%	-16.8%
Total	**11.4%**	**11.0%**	**-4.4%**	**-60.4%**	**-54.1%**	**-2.5%**	**-0.5%**

Points at which flows overtop the Elk main channel are roughly similar for existing vs. design conditions (red circles in Figure F-17). The principal exceptions are the southernmost and central overbank points in the floodplain corridor during the 10% exceedance and 2-yr flows, respectively (red circles in Figures F-17 and F-18). The elimination of the southernmost overbank point in AOI F during the 10% exceedance flow is due primarily to reduced in-channel roughness in MSR 3 during design conditions, which leads for lower water surface elevations (see Figure F-22). The introduction of a new overbank point in the central portion of the floodplain corridor during flows ≥ 2-yr for design conditions (river station ~18,000 ft) is attributable to: i) less water being shunted to the floodplain through failed tide gate structures, ii) slightly raised design levee along the river left-bank on AOI E, and iii) vegetation management in the Elk main channel. Together, these design alterations serve to both enhance channel conveyance capacity and increase the volume and velocity of water in-channel where it eventually overbanks due to the sharp meander bend at this location (Figure F-18).

It should also be noted that flooding of the pastures adjacent to Orton Creek in AOI H is significantly reduced under the 10% design scenario (see existing and design insets of Figure F-18 and Table F-19 above). This is due to removal of the undersized Orton Creek culvert (C-105) and daylighting of the Creek, which substantially increases conveyance capacity and reduces frequency and magnitude of overbank flows.

2.5.2.2 Flow Depths

In-channel

Relative to existing conditions, design in-channel maximum flow depths for the Elk mainstem were moderately lower in MSR 1, 2 & 3 during the more frequent storm events (< 2-yr) primarily due to reduced design channel roughness (Table F-21). It should be noted however that added design channel roughness from large woody debris structures and additional channel complexity (e.g., design pool & riffle features) have not been explicitly simulated in the 10% design model runs. Thus, differences between EG and DG flow depths may be less in future modeling phases that incorporate these additional roughness elements.

Table F-21. Existing and design condition median flow depths (ft) in the three geomorphic reaches in PA-1 across a range of modeled flows. Positive values of depth difference represent increased flow depths under design conditions.

Scenario	Geomorphic Reach	Exceedance Flows			Peak Flows					
		90%	50%	10%	1.053-yr	2-yr	5-yr	25-yr	50-yr	100-yr
Existing Condition	MSR 3	1.35	3.09	6.62	6.33	6.61	6.90	7.31	7.47	7.61
	MSR 2	2.77	3.58	6.24	6.15	6.10	6.08	6.10	6.11	6.20
	MSR 1	7.28	7.28	7.48	7.33	7.74	8.35	9.68	10.25	10.75
Design Condition	MSR 3	0.95	2.05	5.14	5.84	6.26	6.56	7.31	7.47	7.61
	MSR 2	2.78	3.05	5.33	5.95	5.98	5.97	6.10	6.11	6.20
	MSR 1	7.19	7.19	7.23	7.30	7.63	8.33	9.68	10.25	10.75
Difference in Design vs. Existing	MSR 3	-0.40	-1.04	-1.48	-0.50	-0.35	-0.34	0.00	0.00	0.00
	MSR 2	0.01	-0.53	-0.91	-0.20	-0.13	-0.11	0.00	0.00	0.00
	MSR 1	-0.09	-0.09	-0.26	-0.03	-0.11	-0.02	0.00	0.00	0.00

The differences in EG vs. DG maximum channel depths and water surface elevations were greatest for the lower exceedance flows in between MSR 2 & 3 (river station 20,000 ft to 27,000 ft; Figure F-22). Once the Elk River overtops its banks at flows ≥ the 2-yr event, the relative differences in EG vs. DG flow depths and water surface elevations decrease significantly (Table F-20; Figure F-20). With the exception of slightly higher DG water surface elevations in MSR 2 (~0.2 ft; river station 18,500 – 22,500 ft), EG vs. DG differences were minimal at the 100-yr event (< 0.1 ft; Table F-20 & Figure F-22).

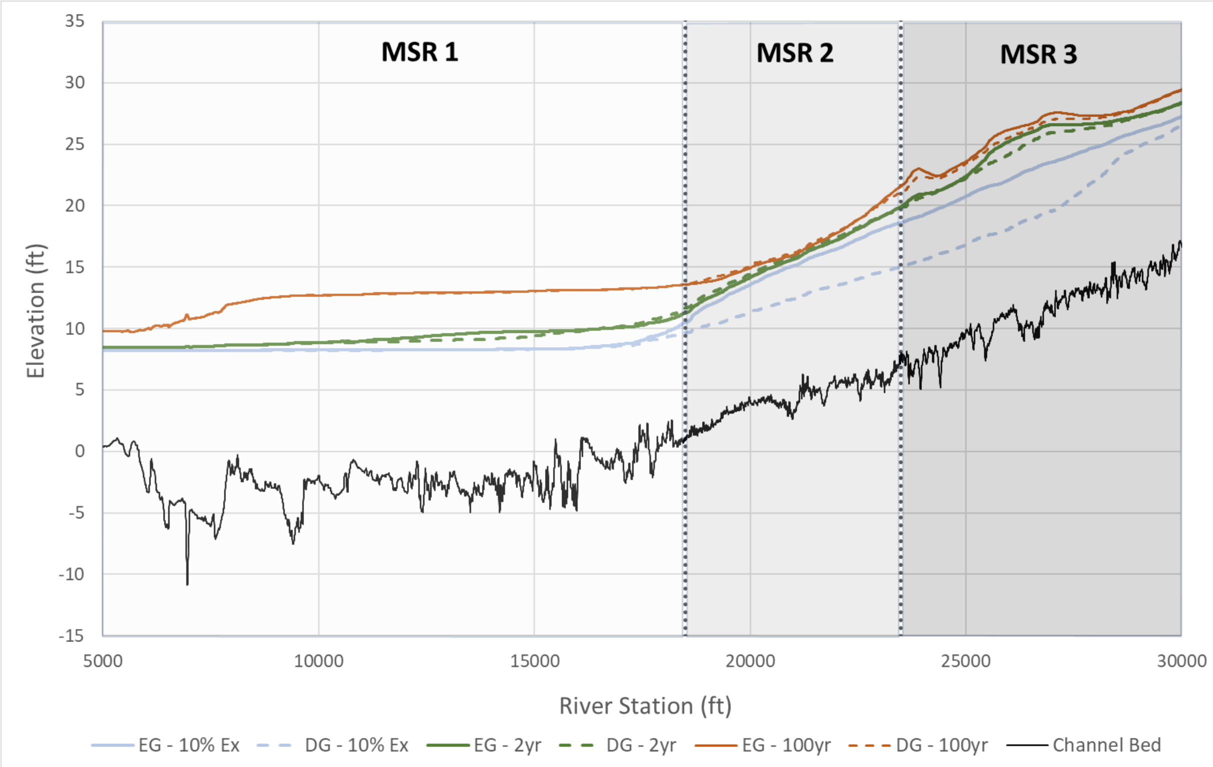


Figure F-22. Channel bed and water surface elevations for existing and design conditions during the 10% exceedance, 2-yr and 100-yr flows.

Floodplain

Differences in maximum EG vs. DG floodplain flow depths varied substantially across the various Areas of Interest (Table F-23), but generally decreased with increasing discharge – as these large magnitude flows began to overshadow the impact of smaller-scale design actions. In most cases, DG flow depths were either unchanged or greater than EG conditions for the lower, more frequent exceedance flows (e.g., 10% exceedance flow in Table F-22). This is exemplified by the higher DG flow depths in AOIs E & F for the 10% exceedance flow (Table F-22). Increased flow depths in AOI F are mainly due to design actions (e.g., fill placement, channel excavation, etc.), which serve to concentrate diffuse overland flows into higher quality, deeper channel habitat in the central floodplain corridor. Increased depths in AOI A & E are attributable to the addition of several key design elements, including: i) floodplain pond/wetlands, ii) tidal/floodplain channels with enhanced habitat complexity (pools, woody debris structures, off-channel features), iii) alcoves at the confluence with the Elk mainstem, and iv) levee modification to increase lateral connectivity. In contrast, DG floodplain flow depths in AOI H were consistently lower across the suite of modeled discharges due to the removal of the undersized Orton Creek culvert which leads to backwatering of the Creek and nearby drainage ditch to the south under existing conditions (Figure F-23; Table F-22). Of additional note is the fact that at higher flows (≥ 2-yr), median DG flow depths in AOI E are roughly 0.5 ft lower than EG conditions. This is related to the placement of fill on the DG floodplains and to minor increases in levee elevation along the left-bank Elk River which reduces overbank flooding depth and extent in the northern parcel of E (Figure F-23).

Table F-22. Difference in median flow depth (ft) for existing vs. design conditions over a range of modeled discharge events. Positive values indicate increased depth under the design scenario.

Area of Interest	50% Exceedance	10% Exceedance	1.053-yr	5-yr	25-yr	50-yr	100-yr
A	0.28	0.33	-0.06	-0.23	-0.04	-0.01	0.01
B	0.15	0.15	0.00	-0.01	-0.06	-0.04	-0.03
C	0.01	-0.01	-0.02	-0.03	-0.09	-0.06	-0.04
D	-0.01	0.00	0.00	-0.27	-0.10	-0.07	-0.05
E	0.36	0.76	0.10	-0.50	-0.46	-0.45	-0.44
F	1.02	1.02	-0.17	-0.16	-0.13	-0.11	-0.10
G	0.39	0.17	-0.05	-0.05	-0.09	-0.07	-0.05
H	0.15	-1.45	-1.52	-0.41	-0.23	-0.17	-0.12
PA-1	**0.39**	**0.36**	**-0.26**	**-0.10**	**-0.10**	**-0.07**	**-0.05**

While patterns of DG overbank flow depths were generally similar to existing conditions across the suite of modeled flows (e.g., flows depths increased non-linearly with increasing discharge), Tables F-21 and F-22 suggest there are important distinctions. For example, median DG flow depths in AOIs E and F decreased by roughly 1 ft between the 10% exceedance and 1.053-yr flows. This is because, at the 10% flow, design actions in these AOIs serve to focus flows in deeper, higher quality habitat features (channels, pools, alcoves), but at higher flows (~ > 10% exceedance), more water goes out of bank - causing median flow depths to decline as the shallow flood waters spread out over adjacent floodplains. Of additional note, is the fact that the larger EG and DG floodplain flows (≥ 1.053-yr) are consistently the deepest in AOI C due to numerous existing well-connected floodplain depressions and lower overall site elevation.

Table F-23. Median flow depths (ft) for design conditions in all Areas of Interest across a range of modeled flows.

Area of Interest	50% Exceedance	10% Exceedance	1.053-yr	5-yr	25-yr	50-yr	100-yr
A	0.93	0.97	1.20	2.80	4.38	4.98	5.48
B	0.91	0.93	1.11	2.88	4.14	4.73	5.24
C	0.27	0.27	1.45	3.63	4.94	5.53	6.03
D	0.33	0.36	0.59	2.17	3.76	4.35	4.84
E	0.90	1.14	0.46	1.05	1.75	2.16	2.56
F	1.27	1.41	0.54	2.57	3.70	4.17	4.60
G	0.55	0.55	0.62	2.58	3.97	4.53	5.02
H	0.15	0.57	0.67	1.01	1.45	1.61	1.73
PA-1	**0.72**	**0.75**	**0.64**	**2.58**	**3.86**	**4.44**	**4.93**

Design actions resulted in the largest reductions (roughly 33 - 51%) in inundated area of shallow flow (< 2 ft) in AOIs E, F and G during the smaller 1.053-yr overbank flows (Table F-24). It is also evident from Table F-23, that the overall reduction in floodplain flow depth across much of PA-1 (~-0.26 ft; Table F-22), was focused on reducing flows < 1ft deep. Reductions in the percent of AOIs inundated with deeper flows (i.e., > 2 ft) under design conditions reflects decreased depth of isolated, poorly hydrologically connect floodplain depressions in the EG scenario.

Table F-24. Percent of AOI covered by a range of flow depths during the 1.053-yr event for design conditions. The right side of table summarizes the differences between DG and EG percent areas of inundation.

Area of Interest	Design Conditions				Difference in DG vs. EG			
	< 1ft	1 - 2ft	2 - 3ft	> 3ft	< 1ft	1 - 2ft	2 - 3ft	> 3ft
A	30.3%	43.2%	6.1%	2.7%	3.0%	-2.2%	-2.1%	1.2%
B	34.8%	26.8%	15.1%	1.4%	-0.4%	0.3%	0.4%	0.0%
C	21.1%	54.4%	17.4%	0.7%	0.9%	0.0%	-1.1%	-0.1%
D	44.8%	12.0%	0.7%	0.1%	0.3%	0.2%	0.1%	0.0%
E	7.3%	1.3%	0.8%	1.7%	-25.4%	-7.4%	-0.4%	1.1%
F	10.8%	2.1%	0.5%	0.6%	-35.8%	-14.5%	-5.2%	-0.2%
G	1.8%	0.6%	0.1%	0.1%	-40.5%	-10.9%	-2.3%	-1.1%
H	2.8%	1.0%	0.1%	0.0%	-0.8%	0.0%	-1.2%	-3.6%

Similar to the existing conditions scenario, the median 100-yr DG flow depth across PA-1 was roughly 5 ft, with the majority of all AOIs inundated with more than 3 ft of water (Table F-23 and 25). Only AOIs E and H still had significant areas with flow depths < 3 ft during the 100-yr event (Table F-25). Overall, there were little differences in patterns of flow depth between the existing and design scenarios at the 100-yr flow (Table F-25).

Table F-25. Percent of AOI covered by a range of flow depths during the 100-yr event for design conditions. Right side of table summarizes the differences between DG and EG percent areas of inundation.

Area of Interest	Design Conditions				Difference in DG vs. EG			
	< 1ft	1 - 2ft	2 - 3ft	> 3ft	< 1ft	1 - 2ft	2 - 3ft	> 3ft
A	1.0%	1.9%	2.6%	93.2%	-0.1%	-0.2%	-0.1%	0.4%
B	0.1%	0.5%	2.5%	96.9%	0.0%	0.0%	0.1%	-0.1%
C	0.3%	0.3%	0.6%	98.1%	0.0%	0.0%	0.0%	0.0%
D	1.3%	1.8%	1.5%	77.0%	0.1%	0.0%	0.0%	-0.1%
E	16.6%	14.0%	25.0%	35.9%	0.5%	3.1%	6.6%	-9.5%
F	1.8%	4.5%	7.7%	83.0%	0.3%	1.1%	0.7%	-2.3%
G	2.1%	2.8%	3.9%	82.2%	0.0%	0.0%	0.1%	-0.2%
H	11.6%	18.5%	8.6%	6.8%	-6.1%	6.1%	-7.8%	-1.2%

It is also important to highlight the fact that in AOIs A, E, F and G in particular, significant declines in area of shallow flow (< 1ft) under design conditions are accompanied by increases in percent inundated area deeper than 1 ft for flows < 1.053-yr.

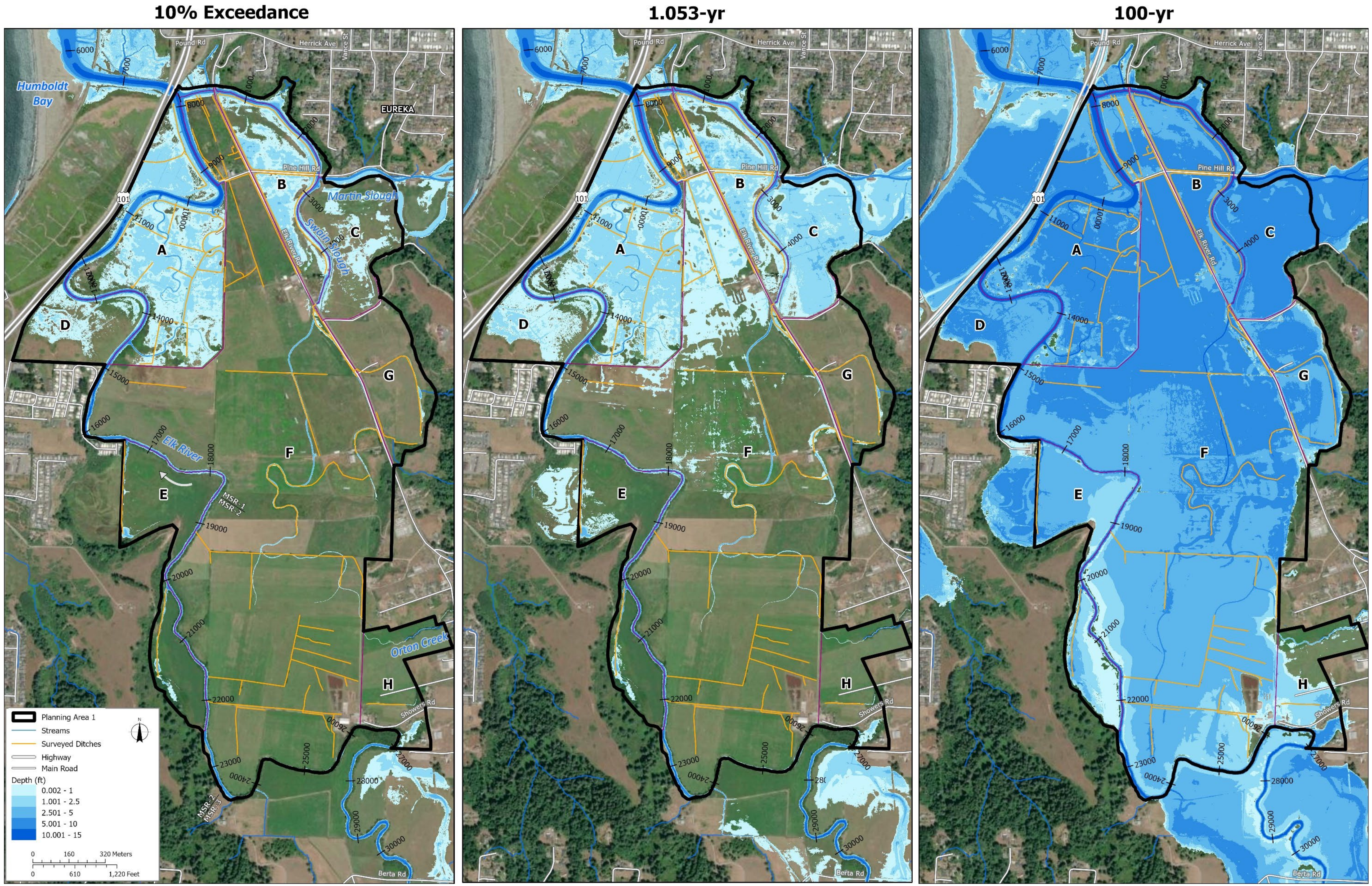


Figure F-23. Design condition flow depths in PA-1 during select flood events.

Apart from mainstem channel velocities, the differences in EG vs. DG hydraulics generally declined with increasing storm magnitude. Additionally, besides some localized increases in water surface elevations due to specific actions (e.g., floodplain recontouring), differences between EG and DG 100-yr water surface elevations were negligible, mostly resulting in a decrease in DG water depths (Figure F-24).

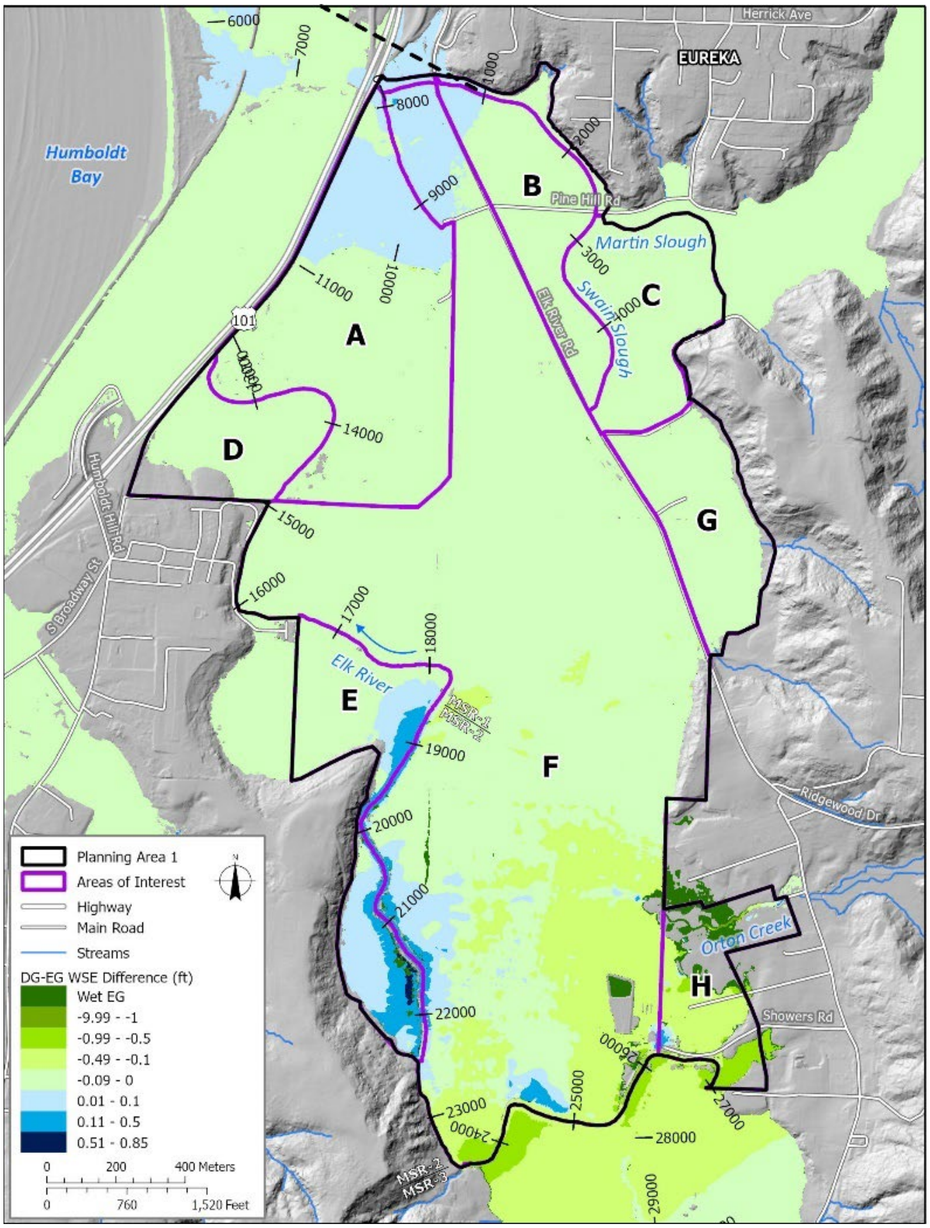


Figure F-24. Difference in 100-year water surface elevations between 10% design (DG) existing conditions (EG).

2.5.2.3 Flow Velocities

In-channel

In-channel flow velocities were moderately greater for the design vs. existing scenarios in all geomorphic reaches across the range of modeled flows – particularly in MSR 2 & 3 (Table F-26).

While this is primarily attributable to in-channel vegetation management, other design actions, such as levee modification and disconnection of existing drainage ditches that promote backwatering and flooding of adjacent floodplains, serve to concentrate more flood waters within the Elk main channel – thus contributing to increased channel velocities.

Under existing conditions, channel velocities increase in the downstream direction (MSR 3 → MSR 1) during the lower exceedance flows with unsteady tidal boundary conditions due primarily to significant decreases in channel roughness which override reductions in channel slope in the downstream direction. However, under design conditions (i.e., with significant in-channel vegetation management in MSR 2 & 3), this trend in reverses for the 50% and 10% exceedance flows such that median channel velocities decrease in the downstream direction.

Interestingly, median channel velocities decline in the downstream direction for all steady-state peak flows under both existing and design scenarios. This highlights how the hydraulic influence of the steady-state 8.33 ft tidal boundary condition, which is disproportionately large near the downstream model boundary, diminishes in the upstream direction.

Table F-26. Median flow velocities in each geomorphic reach within PA-1 for existing and design conditions across a range of flows. Positive values of velocity difference represent increased velocities under design conditions.

Scenario	Area of Interest	90% Exceedance	50% Exceedance	10% Exceedance	1.053-yr	100-yr
Existing Condition	MSR 3	0.26	0.59	1.09	1.18	1.58
	MSR 2	0.30	0.57	1.10	1.13	1.13
	MSR 1	0.52	0.64	1.46	0.73	0.93
Design Condition	MSR 3	0.42	1.13	2.23	2.39	2.96
	MSR 2	0.54	1.11	2.15	2.33	2.76
	MSR 1	0.57	0.70	1.76	0.78	1.08
Difference in Design vs. Existing	MSR 3	0.16	0.54	1.14	1.22	1.38
	MSR 2	0.23	0.54	1.06	1.20	1.64
	MSR 1	0.05	0.06	0.29	0.05	0.15

As evidenced by Figures F-22 and F-25, the areas of MSR 2 and 3 with decreased DG depths coincide with zones of elevated DG channel velocity in DG – indicating enhanced channel conveyance capacity from reduced bed roughness. Indeed, the total volume of flow accumulated in the Elk River mainstem at river station 11,000 ft is over 30% higher in the design vs. existing scenario (Figure F-26).

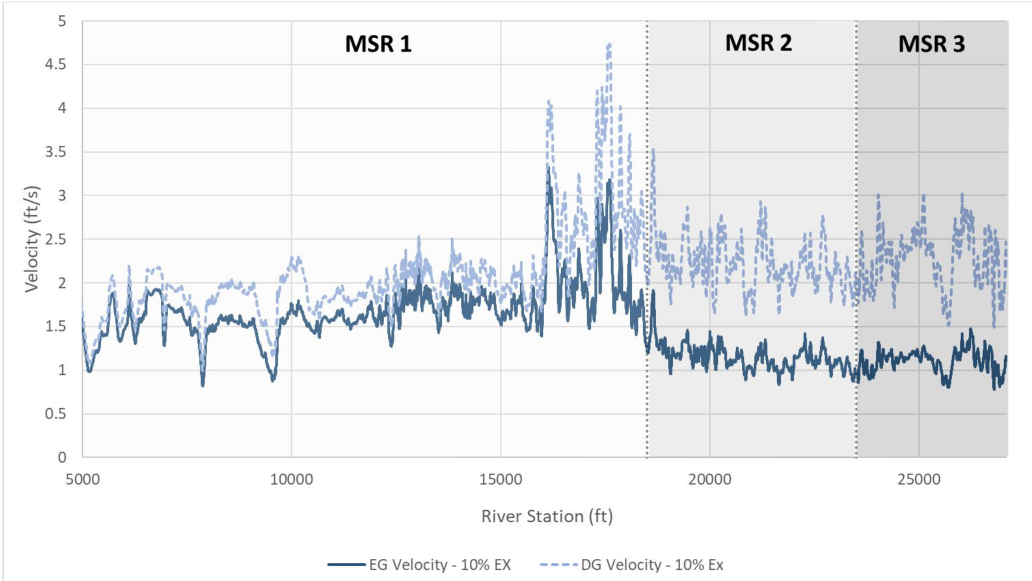


Figure F-25. Flow velocities for existing and design conditions during the 10% exceedance flow.

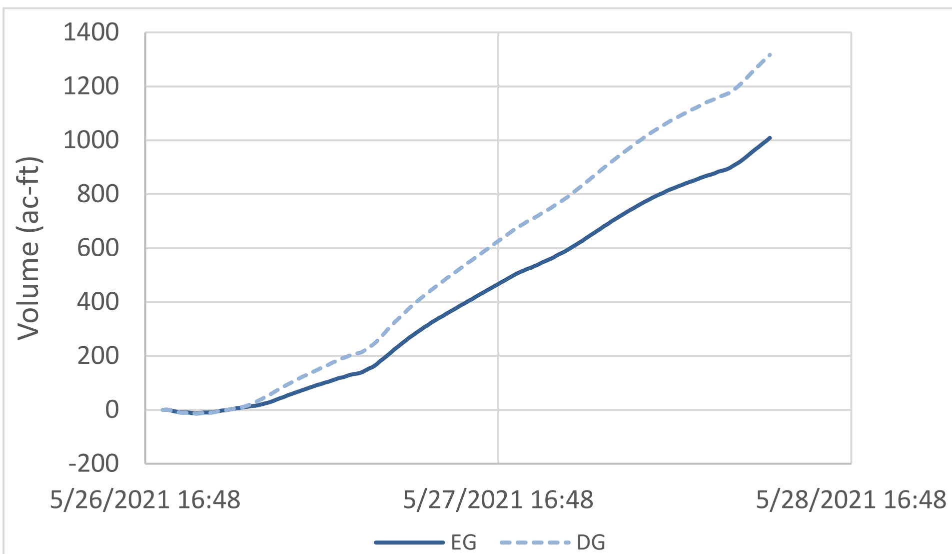


Figure F-26. Total volume of in-channel flow accumulated during the 10% exceedance event for existing and design conditions near river station 11,000 ft.

Floodplain

Similar to the existing condition model results, median overbank velocities were generally very slow and rarely exceeded 0.5 ft/s until the 100-yr flood (Table F-27 and Figure F-28). This is not to suggest that there are not localized zones of higher velocity. Indeed, Figure F-28 illustrates several areas of elevated floodplain velocities exceeding 2 ft/s. These occur mainly in the design channels in AOI F and in pockets of localized higher velocity overbanking flows upstream of river station 23+500 at the southern end of AOI F (Figure F-28).

Overall, median floodplain flow velocities changed very little as a result of design actions across all modeled flows in all AOIs (Table F-27). For instance, the maximum change in median flow velocity in any AOI was 0.15 ft/s and some AOIs experienced no change in median flow velocities at any flow (e.g., AOIs C & D; Table F-27).

Table F-27. Median overbank flow velocities in each Area of Interest within PA-1 for design conditions across a range of flows. Right side of table summarizes the differences between DG and EG median flow velocities (positive values indicate increased DG velocity).

Area of Interest	Median Design Floodplain Velocities					Difference in Design vs. Existing Conditions				
	90% Exceedance	50% Exceedance	10% Exceedance	1.053-yr	100-yr	90% Exceedance	50% Exceedance	10% Exceedance	1.053-yr	100-yr
A	0.06	0.06	0.06	0.05	0.57	0.04	0.04	0.04	-0.01	0.01
B	0.02	0.02	0.02	0.00	0.61	0.00	0.00	0.00	0.00	-0.03
C	0.00	0.00	0.00	0.01	0.41	0.00	0.00	0.00	0.00	0.00
D	0.01	0.02	0.02	0.01	0.33	0.00	0.00	0.00	0.00	0.00
E	0.00	0.00	0.00	0.00	0.32	-0.11	-0.11	-0.11	-0.02	0.04
F	0.12	0.15	0.30	0.01	0.87	0.08	0.11	0.15	-0.15	-0.04
G	0.01	0.01	0.01	0.00	0.40	0.01	0.01	-0.04	-0.01	-0.01
H	0.39	0.93	0.02	0.04	1.03	--	--	-0.01	0.03	-0.04
PA-1	**0.02**	**0.02**	**0.02**	**0.01**	**0.49**	**0.00**	**0.00**	**-0.01**	**0.00**	**-0.08**

Again, this is not to suggest that design actions did not result in localized changes in flow velocity. For example, while Table F-27 suggests that the median difference in EG vs. DG flow velocity in AOI F should be < 0.15 ft/s, Figure F-27 illustrates how velocities in the design central floodplain channel in AOI F are approximately two times higher than in the existing conditions scenario.

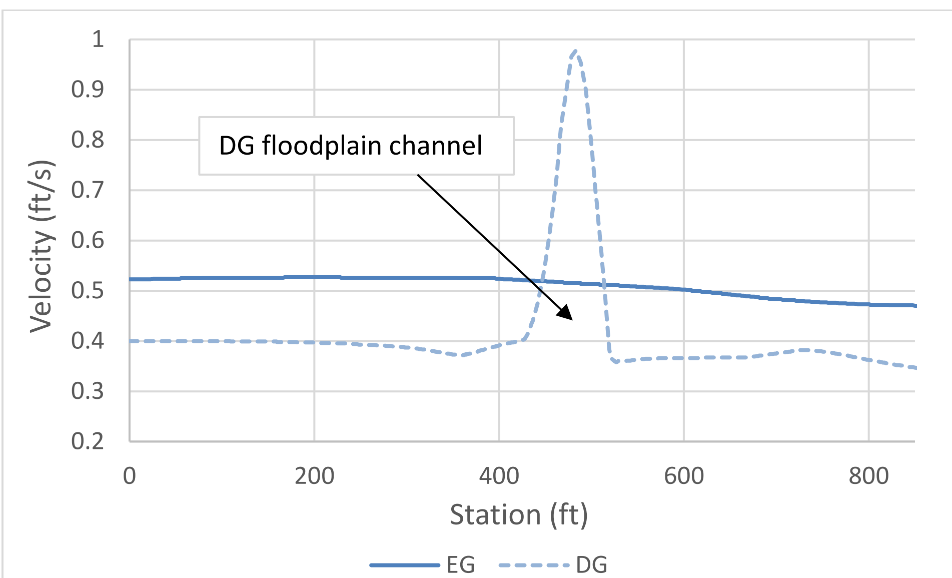


Figure F-27. Flow velocities for existing and design conditions during the 2-yr flood along a roughly 850ft flux line located in the central portion of AOI F.

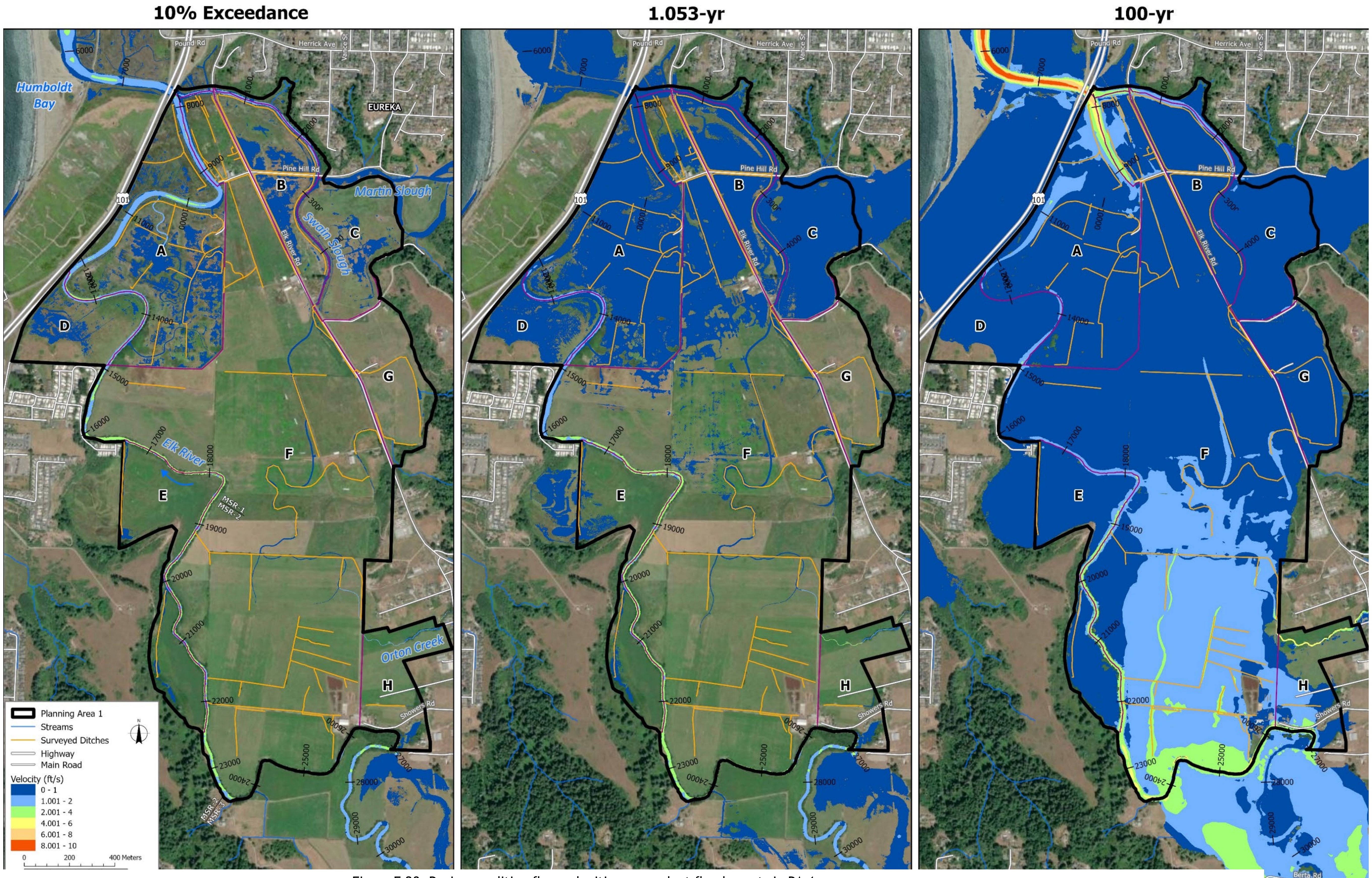


Figure F-28. Design condition flow velocities over select flood events in PA-1.

2.5.2.4 Duration of Inundation

Under design conditions, the median duration of inundation across PA-1 as a whole was approximately 29 hours over the course of the 106-hour 2015 Calibration-Decay event (Table F-28). AOI H exhibited the least time of inundation (10 hrs) which is consistent with its topographic position in PA-1 and the restoration of Orton Creek which promotes more natural drainage characteristics (Table F-28). In contrast, AOIs A and B had the longest DG duration of inundation (> 68 hrs) because of: i) strong tidal influences and ii) design actions that enhance marsh and floodplain connectivity in these areas.

Table F-28. Median time of inundation for all Areas of Interest in PA-1 for design conditions during the 2015 Calibration-Decay event.

Area of Interest	Median (days)	Median (hrs)
H	0.42	10.0
G	1.15	27.5
D	1.17	28.0
F	1.19	28.5
E	1.21	29.0
C	1.59	38.3
B	2.85	68.5
A	3.14	75.3
PA-1	**1.20**	**28.8**

Figure F-29 and Table F-29 underscore the considerable reduction in the duration of inundation across PA-1 resulting from design actions. AOI F experienced the largest area of reduced inundation duration and the second largest reduction in median time of inundation relative to existing conditions. Additionally, many areas within AOI F – especially towards the central portions demonstrated reductions in inundation time of 50 to over 70 hours.

Such large decreases in the time of inundation during relatively frequent events could have significant agricultural, ecological and flood hazard benefits. For example, landowners in AOI F have noted poor soil conditions that limit agricultural productivity (e.g., low yields and sub-optimal nutritional quality of forage crops). They attribute such poor soil health to frequent, long duration flooding from the Elk River which alters soil structure and promotes anoxic conditions that are detrimental to soil microbial and earthworm communities that are important ecosystem engineers. Indeed, one landowner emphasized that lower-lying soils on his property (subject to more frequent flooding) were oddly devoid of earthworms which he suggested was an indication of poor soil health.

Although it occurred over a much smaller area, AOI H experienced the largest average decrease in inundation duration (> 26 hrs). Restoration of Orton Creek, disconnection of derelict drainage infrastructure (Orton Creek culvert), as well as vegetation management in the Elk main channel all contribute to the large decline in inundation duration in AOI H. Declines in inundation period in AOIs E are generally related to: i) levee modification, ii) repair of damaged and undersized drainage infrastructure (e.g., tide gate in the northern parcel of AOI E), and iii) placement of floodplain fill to reduce overbank flooding from the Elk River. For AOI G, the ~16 hour reduction in median period of inundation is mostly related to the redistribution of floodplain flows in AOI F along the design channel network away from AOI G and directly to Swain Slough.

In contrast, the downstream-most AOIs in PA-1 (AOIs A, B & C) all demonstrated a minor to moderate increase in average inundation period (Figure F-29 and Table F-29). This suggests that the proposed design actions (e.g., levee modifications and tidal channel excavation), which focus on enhancing lateral connectivity, are functioning as intended in these AOIs. Elevated inundation times in AOI C, which were not an explicit restoration goal, are due mostly to: i) the connection of Orton Creek and Swain Slough and ii) the redirection flows along the central floodplain corridor to Swain Slough under design conditions.

Table F-29. Difference in median time of inundation for all Areas of Interest in PA-1 for design vs. existing conditions during the 2015 Calibration-Decay event. Negative values represent a decrease in inundation duration in the design scenario.

Area of Interest	Median (hrs)
A	1.74
B	0.50
C	2.25
D	0.25
E	-12.50
F	-23.01
G	-15.75
H	-26.76
PA-1	**-16.26**

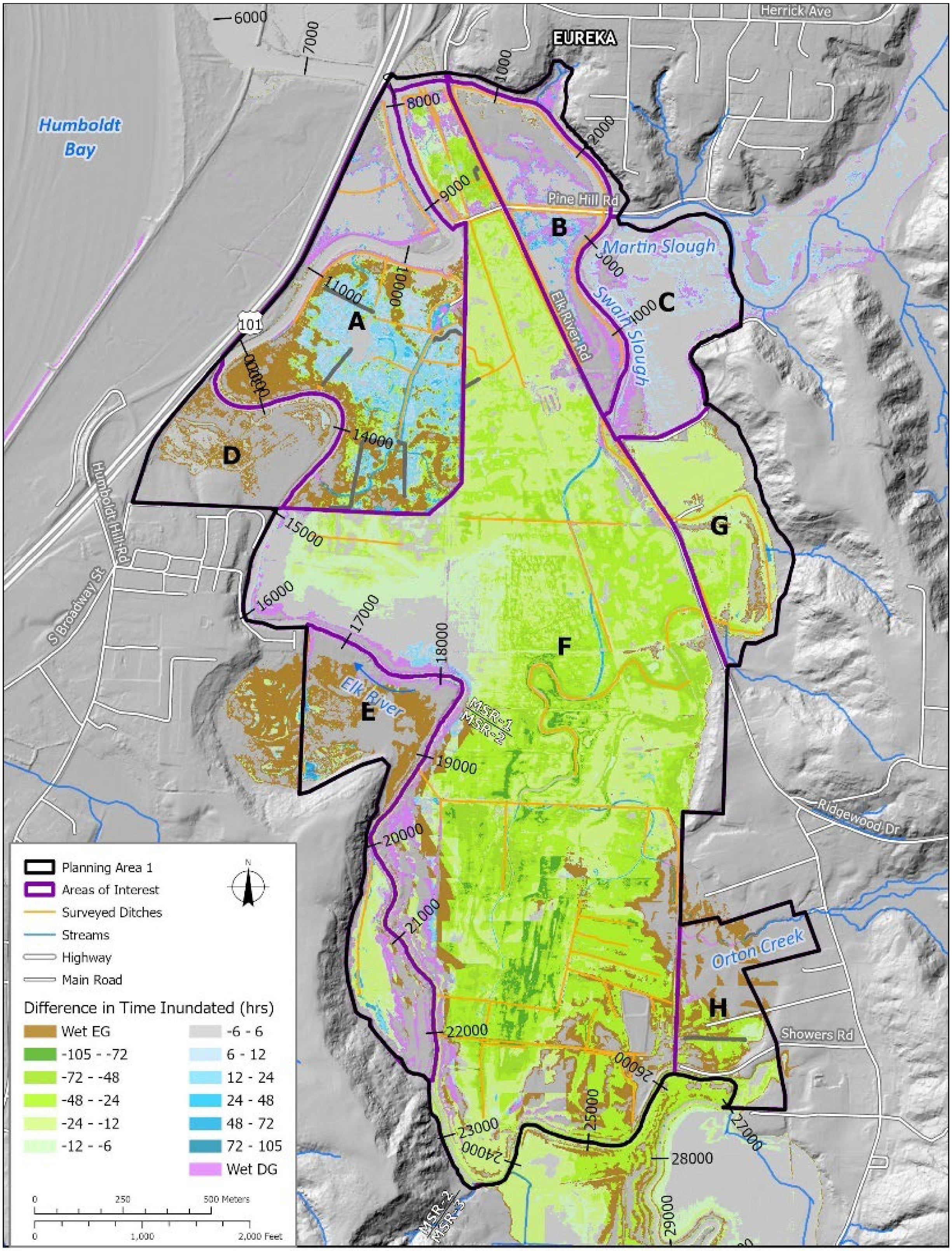


Figure F-29. Differences in design vs. existing condition time of inundation (hrs). Positive values indicate increased time of inundation for design conditions.

3 RECOMMENDED FOR FUTURE ANALYSES

The 10% design model is intended to provide preliminary, conceptual-level results that serve as a proof of concept for proposed design actions. Moving forward, results will be used by the design team to further refine the designs. The following section outlines several important recommendations for such future analyses:

- There are several known issues with the 2005, 2010 and 2019 LiDAR datasets regarding poor differentiation of vegetation and true ground returns. Future modelling efforts should be supported by the acquisition of high-resolution, rigorously post-processed LiDAR data and ground surveys.
- Similarly, future modeling efforts would benefit from the collection of new (or compilation of existing) bathymetric data for the Elk River mainstem, Martin and Swain Slough. This would serve to improve the accuracy of hydraulic results, especially at lower habitat flows.
- It would be prudent to calibrate future model runs over a larger range of observed flows (particularly low flows) with data that corresponds to the current bed conditions and to expand the calibration data to include Orton Creek, Swain Slough, and Martin Slough.
- It may also be prudent for subsequent modeling efforts to incorporate a range of sea level rise scenarios to evaluate the potential implications for PA-1 under existing and design conditions.

4 REFERENCES

Arcement, G.J., & Schneider, V.R. (1989). Guide for selecting Manning’s roughness coefficients for channels and floodplains.

Addy, S, Wilkinson, ME. Representing natural and artificial in-channel large wood in numerical hydraulic and hydrological models. WIREs Water. 2019; 6:e1389. https://doi.org/10.1002/wat2.1389

Barnes, H. (1967). Roughness characteristics of natural channels. United States Government Printing Office, 1967, 213 p. Geological Survey Water Supply, paper 1849.

California Trout, Northern Hydrology and Engineering, and Stillwater Sciences. 2021. Elk River 10% Design Report. Draft Report. Prepared by California Trout, Arcata, California; Northern Hydrology and Engineering, McKinleyville, California; and Stillwater Sciences, Arcata, California

Gotvald, A.J., Barth, N.A., Veilleux, A.G., and C. Parrett. 2012. Methods for determining magnitude and frequency of floods in California, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2012–5113, 38 p., 1 pl., available online only at http://pubs.usgs.gov/sir/2012/5113/.

Leopold, L. B., Wolman, M. G., and Miller, J. P. (1964). Fluvial processes in geomorphology. Freeman, San Francisco.

Limerinos, J.T. 1970. Determination of the Manning Coefficient from Measured Bed Roughness in Natural Channels. U.S. Geological Survey, Geological Survey Water-Supply Paper 1898-B.

Michael Love & Associates. 2013. Martin Slough Enhancement Project, Eureka CA Basis of Design Report. Prepared for the Redwood Community Action Agency, Eureka, CA.

Moriasi, D. N., Arnold, J. G., Van Liew, M. W., Bingner, R. L., Harmel, R. D., & Veith, T. L. (2007). Model evaluation guidelines for systematic quantification of accuracy in watershed simulations. Transactions of the ASABE, 50(3), 885-900.

Northern Hydrology & Engineering. 2009. Tidal wetland geometric relations in Humboldt Bay: Mad River Slough pilot study. For United States Fish and Wildlife Service, Arcata, CA.

Northern Hydrology & Engineering. 2020. 1% Annual Chance Flood Elevation Estimates for the Lower Elk River, Humboldt County. Prepared for North Coast Regional Water Quality Control Board, Santa Rosa, CA.

Northern Hydrology & Engineering. 2021. Elk River estuary hydraulic analysis report. Prepared for Elk River estuary intertidal wetlands enhancement and coastal access project.

OCM Partners, 2023: 2019 Lidar DEM: City of Eureka, CA, https://www.fisheries.noaa.gov/inport/item/58890.

Office for Coastal Management, 2023: 2009 - 2011 CA Coastal Conservancy Coastal Lidar Project, https://www.fisheries.noaa.gov/inport/item/48166.

Philip Williams & Associates, Ltd. 1995. Pacific Estuarine Research Lab, Louisiana Universities Marine Consortium & William Lettis and Associates, Inc. Design guidelines for tidal channels in coastal wetlands. PWA Report 934. For U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi.

Philip Williams & Associates, Ltd. and P. M. Faber. 2004. Design guidelines for tidal wetland restoration in San Francisco Bay. The Bay Institute and California State Coastal Conservancy, Oakland, CA 83pp.

Rickenmann, D., Recking, A. 2011. Evaluation of flow resistance in gravel-bed rivers through a large field data set. Water Resources Research, 47, W07538, doi:10.1029/2010WR009793.

Sanborn. 2005. Freshwater Creek Watershed and Elk River Watershed Tributaries of Humboldt Bay, California. LIDAR Campaign Final Report.

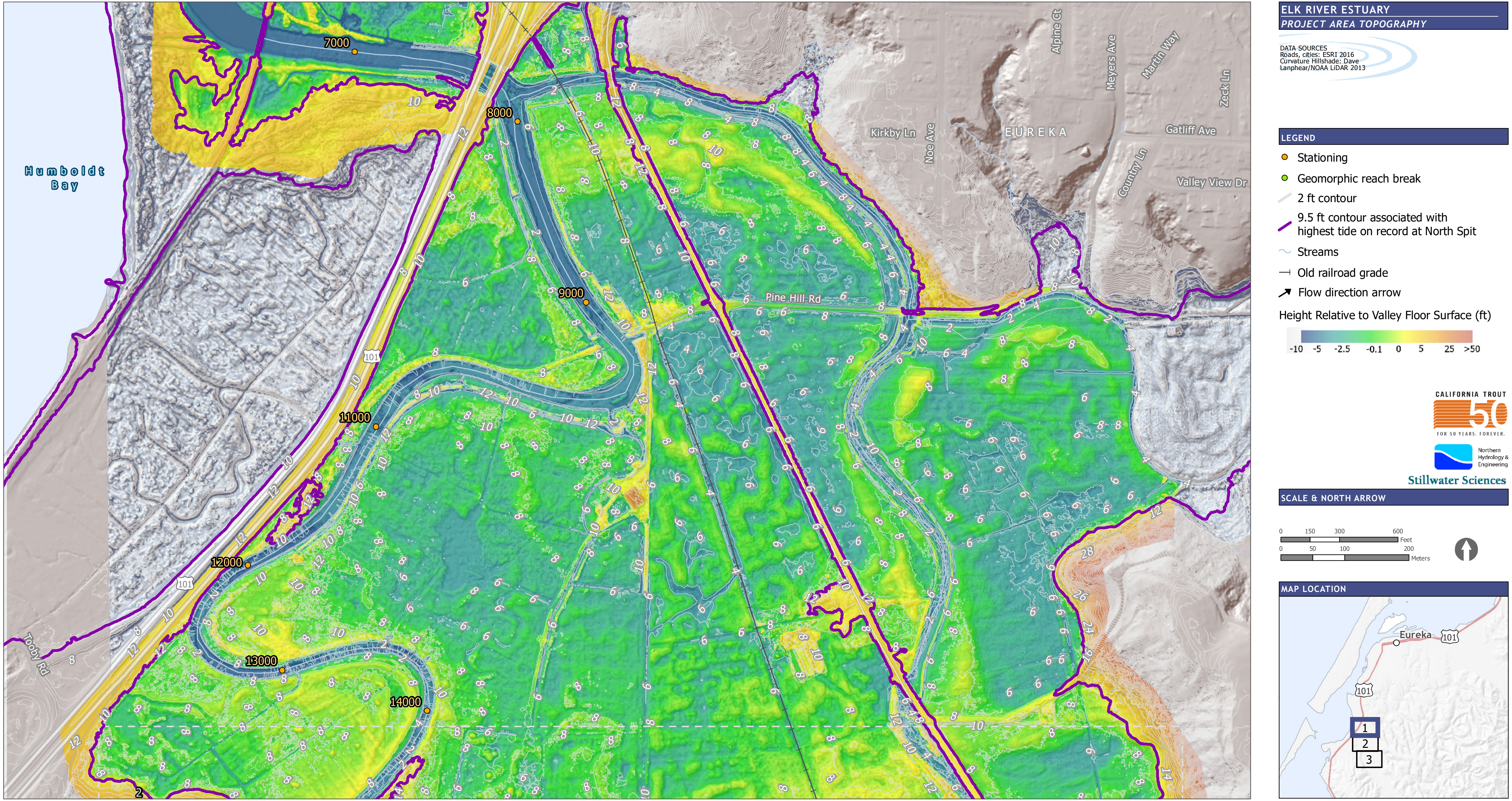
U.S. Geological Survey (USGS). 2019. 2018-2019 USGS Lidar: Northern California Wildfire-QL1. Downloaded July 7, 2020: https://coast.noaa.gov/

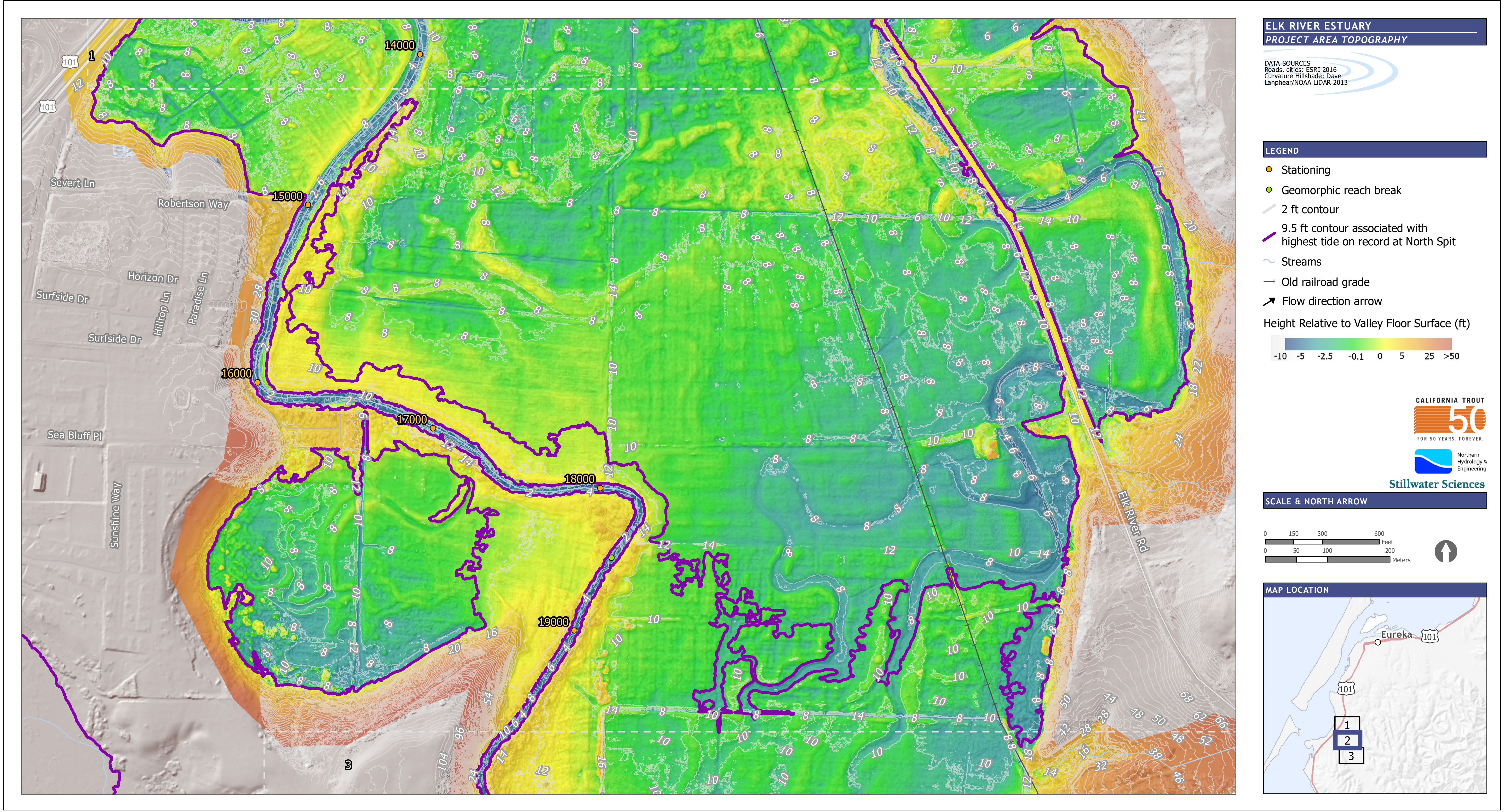
U.S. States Army Corps of Engineers (COE), 2016. HEC-RAS, River Analysis System – User's Manual and Hydraulic Reference Manual. U.S. Army Corps of Engineers, Institute of Water Resources, Hydraulic Engineering Center, Davis, California, CPD-68 and CPD-69.

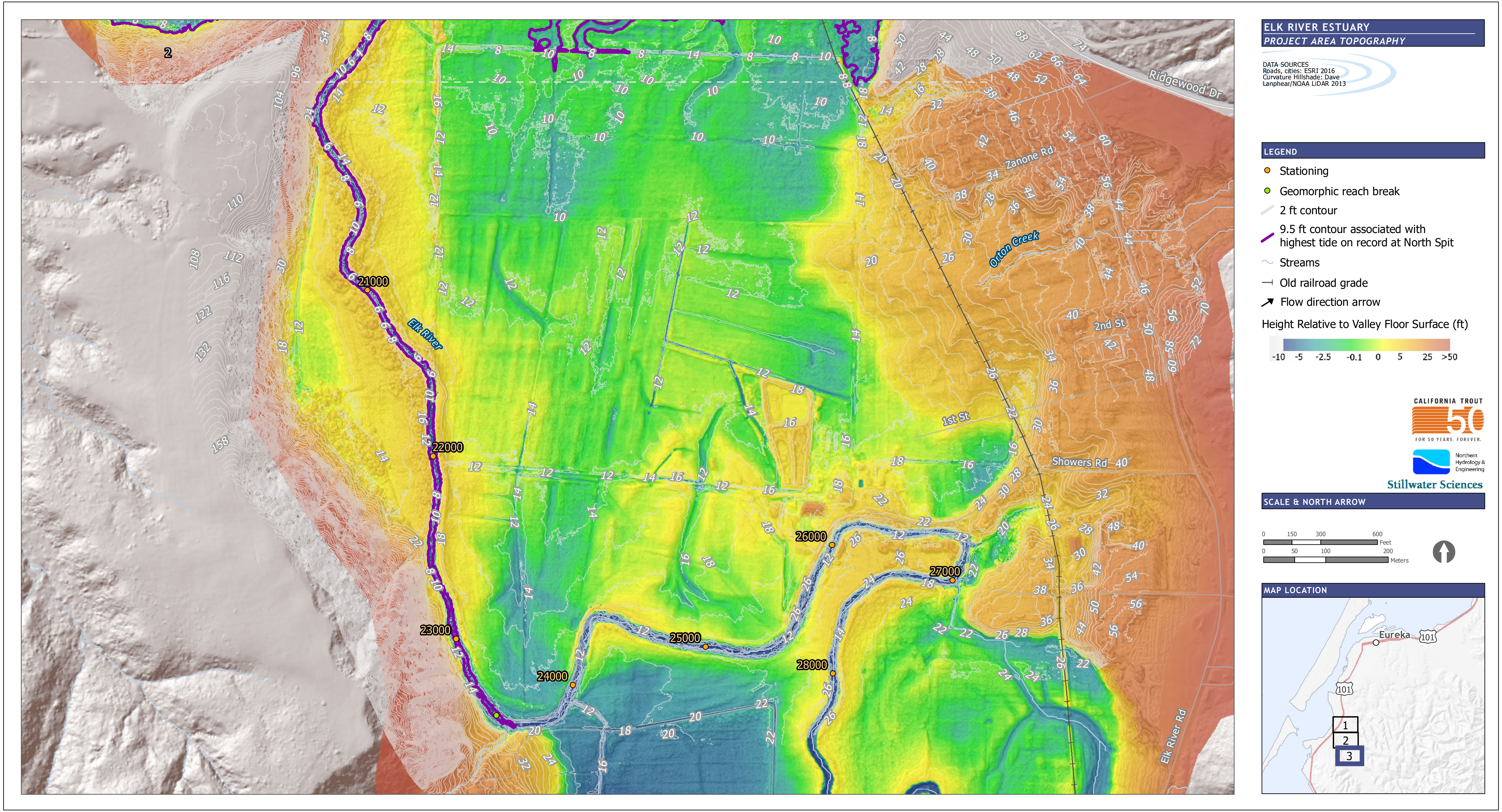
Williams, P. B., M. K. Orr, and N. J. Garrity. 2002. Hydraulic geometry: a geomorphic design tool for tidal marsh channel evolution in wetland restoration projects. Restoration Ecology 10:577-590.

Appendix G

Topographic Map Tiles


ELK RIVER ESTUARY
PROJECT AREA TOPOGRAPHY
DATA SOURCES
Roads, cities: ESRI 2016
Curvature Hillshade: Dave Lanphear/NOAA LiDAR 2013
LEGEND
Stationing
Geomorphic reach break
2 ft contour
9.5 ft contour associated with highest tide on record at North Spit
Streams
Old railroad grade
Flow direction arrow
Height Relative to Valley Floor Surface (ft)
-10 -5 -2.5 -0.1 0 5 25 >50
CALIFORNIA TROUT
50
FOR 50 YEARS. FOREVER.
Northern Hydrology & Engineering
Stillwater Sciences
SCALE & NORTH ARROW
0 150 300 600 Feet
0 50 100 200 Meters
MAP LOCATION
Eureka
101
1
2
3
Humboldt Bay
EUREKA
Kirkby Ln
Noe Ave
Alpine Ct
Meyers Ave
Martin Way
Zeck Ln
Gatliff Ave
Country Ln
Valley View Dr
Pine Hill Rd
Tooby Rd
7000
8000
9000
11000
12000
13000
14000


ELK RIVER ESTUARY
PROJECT AREA TOPOGRAPHY
DATA SOURCES
Roads, cities: ESRI 2016
Curvature Hillshade: Dave Lanphear/NOAA LiDAR 2013
LEGEND
Stationing
Geomorphic reach break
2 ft contour
9.5 ft contour associated with highest tide on record at North Spit
Streams
Old railroad grade
Flow direction arrow
Height Relative to Valley Floor Surface (ft)
-10 -5 -2.5 -0.1 0 5 25 >50
CALIFORNIA TROUT
FOR 50 YEARS. FOREVER.
Northern Hydrology & Engineering
Stillwater Sciences
SCALE & NORTH ARROW
0 150 300 600 Feet
0 50 100 200 Meters
MAP LOCATION
Eureka
101
1
2
3
Severt Ln
Robertson Way
Horizon Dr
Surfside Dr
Hilltop Ln
Paradise Ln
Surfside Dr
Sea Bluff Pl
Sunshine Way
Elk River Rd
14000
15000
16000
17000
18000
19000


ELK RIVER ESTUARY
PROJECT AREA TOPOGRAPHY
DATA SOURCES
Roads, cities: ESRI 2016
Curvature Hillshade: Dave Lanphear/NOAA LiDAR 2013
LEGEND
Stationing
Geomorphic reach break
2 ft contour
9.5 ft contour associated with highest tide on record at North Spit
Streams
Old railroad grade
Flow direction arrow
Height Relative to Valley Floor Surface (ft)
-10 -5 -2.5 -0.1 0 5 25 >50
CALIFORNIA TROUT
50
FOR 50 YEARS. FOREVER.
Northern Hydrology & Engineering
Stillwater Sciences
SCALE & NORTH ARROW
0 150 300 600 Feet
0 50 100 200 Meters
MAP LOCATION
Eureka
101
1
2
3
2
Ridgewood Dr
Zanone Rd
Orton Creek
2nd St
1st St
Showers Rd
Elk River
Elk River Rd
21000
22000
23000
24000
25000
26000
27000
28000