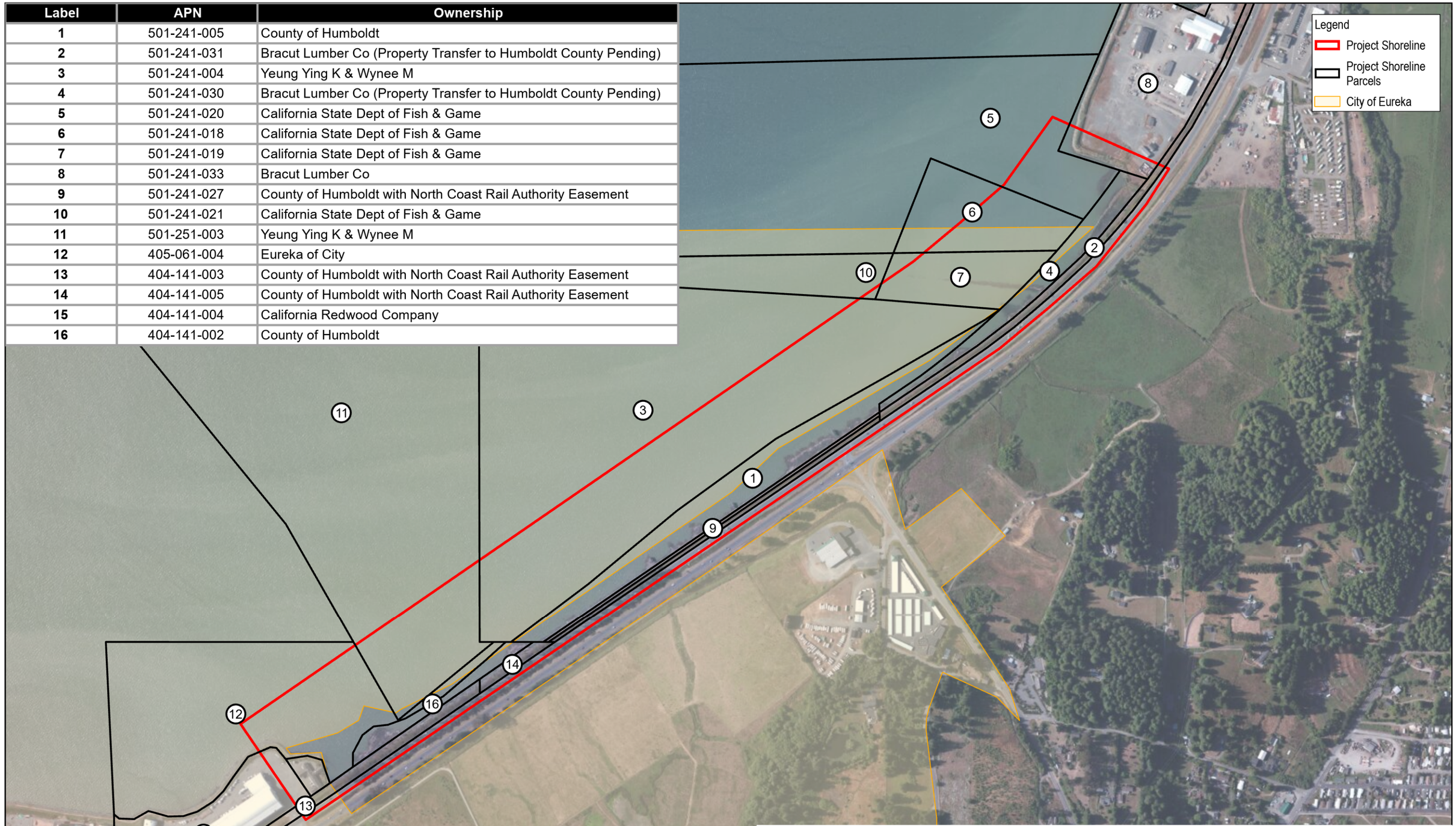
Label	APN	Ownership
1	501-241-005	County of Humboldt
2	501-241-031	Bracut Lumber Co (Property Transfer to Humboldt County Pending)
3	501-241-004	Yeung Ying K & Wynee M
4	501-241-030	Bracut Lumber Co (Property Transfer to Humboldt County Pending)
5	501-241-020	California State Dept of Fish & Game
6	501-241-018	California State Dept of Fish & Game
7	501-241-019	California State Dept of Fish & Game
8	501-241-033	Bracut Lumber Co
9	501-241-027	County of Humboldt with North Coast Rail Authority Easement
10	501-241-021	California State Dept of Fish & Game
11	501-251-003	Yeung Ying K & Wynee M
12	405-061-004	Eureka of City
13	404-141-003	County of Humboldt with North Coast Rail Authority Easement
14	404-141-005	County of Humboldt with North Coast Rail Authority Easement
15	404-141-004	California Redwood Company
16	404-141-002	County of Humboldt



Paper Size ANSI B

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Feet

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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GHD

Humboldt County Department of Public Works
Humboldt Bay Natural Shoreline Infrastructure

Project No. **11214987**
Revision No. -
Date **6/24/2021**

Parcel Ownership

Exhibit 1-1

N:\US\Eureka\Projects\561\11214987\GIS\Maps\Deliverables\Parcel Ownership\11214987_Parcel_Ownership\11214987_Parcel_Ownership.aprx
Print date: 24 Jun 2021 - 08:35

Arcata Bay, 1865, with wetlands intact (Doolittle 1865).

Legend
- Railroads
- Project Shoreline
- 1870 Coast Survey Map

Time	Map Keynote	Activity
Holocene Epoch		Drastically lower sea levels relative to current and Mad River may have discharged into Humboldt Bay
January 1700		Major Cascadia subduction zone earthquake followed by a tsunami that flooded inland waters
1806		Western settlement of Humboldt Bay
1850's		Logging in Humboldt Bay tributaries commence, and logs transported via sloughs in log rafts to mills in Eureka
1855	A	Union (Arcata) Wharf and Plank Walk Company construct 11,000ft wharf with railroad into North Bay (see Doolittle Map inlay). This provided daily ferry services between Eureka and Arcata
1855-1862	B	Road constructed between Eureka and Arcata (Current Myrtle Ave./ Old Arcata Road)
1870-1875	C	Dolbeer & Carson Lumber Company construct tramway to transport logs from Washington Gulch drainage to shingle mill and Brainard Slough Wharf. Steamers transported shingles/logs across the bay to Eureka
1880	D	Humboldt Logging Railroad Company (later Pacific Lumber Company) construct railroad from Freshwater Creek drainage to log dump landing in Freshwater Slough and extended in 1906 connected to Northwestern Pacific Railroad along Bay shore
1881		Dredging of Eureka and Arcata navigation channels begins
1882	E	Flanigan, Brosnan & Company Railroad construct railroad from Jacoby Creek drainage to log dump in Gannon Slough and extended a wharf into the Bay in 1891 for rock transport by ferry/steamer to the Humboldt Bay jetties
1883	F	McKay & Company construct railroad to transport logs from Ryan Creek drainage to a log dump landing in Ryan Slough near Myrtle Avenue and was extended in 1887 to a log dump in Freshwater Slough
Approx. 1854-1890		Canal channeling connecting Mad River through Mad River Slough into the bay
1889	G	Haw Quarry Railroad construct railroad to transport rock from quarry to Fay Slough wharf for Humboldt Bay jetties and City of Eureka uses. Modifications to the Humboldt Bay entrance were initiated.

Paper Size ANSI B

0 500 1,000 1,500 2,000

Feet

Data source: Humboldt Historic Atlas and Rohde 2020.
Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 10N

\\ACV-SVR-001\Projects$\56\11\11214987\GIS\Maps\Deliverables\Timeline_Maps\11214987_TimeLineMaps_V2.aprx
Print date: 13 Jul 2021 - 09:47

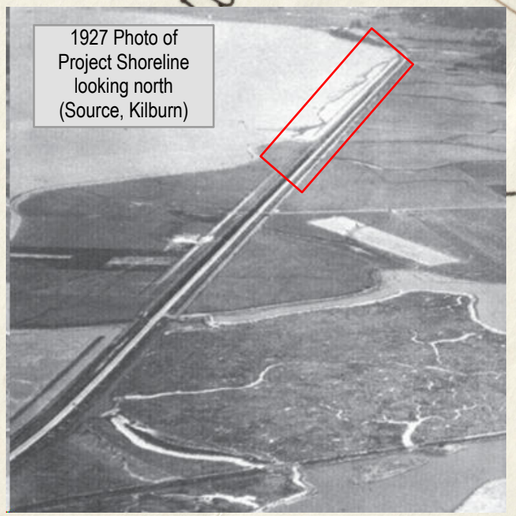
Data source: Humboldt Historic Atlas and Rohde 2020. World Imagery: Earthstar Geographics. Created by: jlopez4

Humboldt County Department of Public Works
Humboldt Bay Natural Shoreline Infrastructure

Project No. **11214987**
Revision No. **-**
Date **Feb 2021**

Landscape Alterations: Through 1890

Exhibit 2-1



Arcata-Jacoby Creek diking machine, 1893 (HSU Library).

Legend
- Railroads
- Project Shoreline
- 1933 USGS Quad

Time	Map Keynote	Activity
1892		John Harpst and O.H Spring dike Arcata Bay shoreline from Butcher Slough to mouth of Jacoby Creek
1895 - 1898		Reuben Gross purchase dredger from Harpst & Spring and dike area bound by Freshwater Slough to the south, Brainard Point (Bracut) to the north and from the County (Eureka-Arcata) road to the Bay shore
1900	A	Eureka & Klamath River Railroad (E&KRR) begin constructing rail prism from Arcata towards Eureka but do not lay tracks
1900	B	California & Northern Railway (C&N) construct Eureka Slough drawbridge and begin constructing rail prism from Eureka towards Arcata including cutting through Brainard's Point (Bracut).
1901		C&N rail complete between Eureka and Arcata and lease the use to E&KRR. E&KRR rail prism is never completed. Northwestern Pacific Railroad (NWP) starts operating C&N rail in 1907.
1918 - 1925	C	Redwood Highway (2-lane) is constructed parallel to C&N (NWP) rail prism between Eureka and Arcata using soil from Brainard Point (Bracut).

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Feet

Data source: Humboldt Historic Atlas and Rohde 2020.
Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 10N

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Print date: 13 Jul 2021 - 09:50

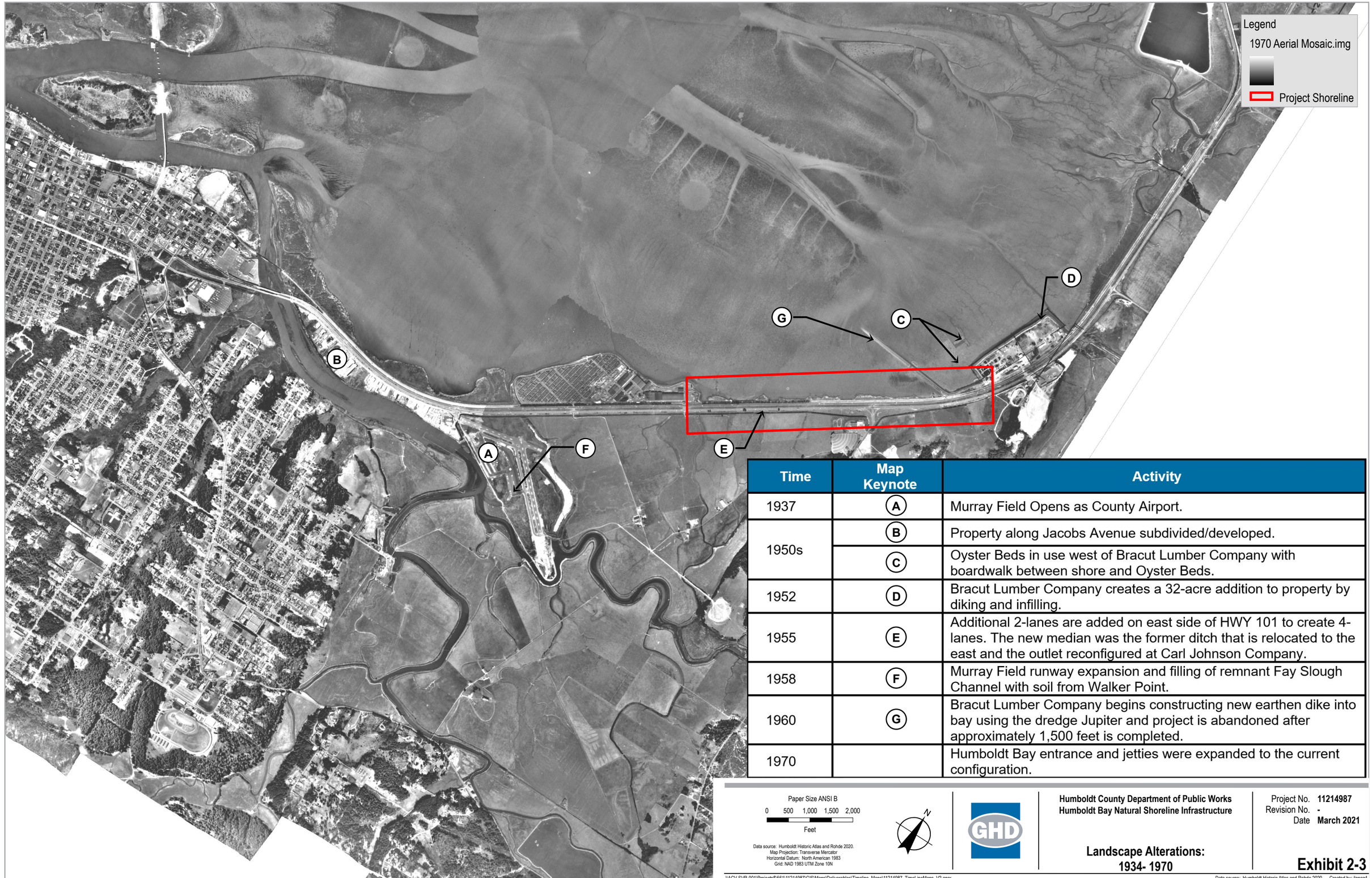
Humboldt County Department of Public Works
Humboldt Bay Natural Shoreline Infrastructure

Landscape Alterations: 1891- 1933

Project No. **11214987**
Revision No. **-**
Date **Feb 2021**

Exhibit 2-2

Data source: Humboldt Historic Atlas and Rohde 2020. . Created by: jlopez4



Time	Map Keynote	Activity
1937	A	Murray Field Opens as County Airport.
1950s	B	Property along Jacobs Avenue subdivided/developed.
	C	Oyster Beds in use west of Bracut Lumber Company with boardwalk between shore and Oyster Beds.
1952	D	Bracut Lumber Company creates a 32-acre addition to property by diking and infilling.
1955	E	Additional 2-lanes are added on east side of HWY 101 to create 4-lanes. The new median was the former ditch that is relocated to the east and the outlet reconfigured at Carl Johnson Company.
1958	F	Murray Field runway expansion and filling of remnant Fay Slough Channel with soil from Walker Point.
1960	G	Bracut Lumber Company begins constructing new earthen dike into bay using the dredge Jupiter and project is abandoned after approximately 1,500 feet is completed.
1970		Humboldt Bay entrance and jetties were expanded to the current configuration.

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0 500 1,000 1,500 2,000

Feet

Data source: Humboldt Historic Atlas and Rohde 2020.
Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 10N

GHD

Humboldt County Department of Public Works
Humboldt Bay Natural Shoreline Infrastructure

Landscape Alterations: 1934- 1970

Project No. **11214987**
Revision No. **-**
Date **March 2021**

Exhibit 2-3

\\ACV-SVR-001\Projects$\55\11214987\GIS\Maps\Deliverables\Timeline_Maps\11214987_TimeLineMaps_V2.aprx
Print date: 13 Jul 2021 - 09:51

Data source: Humboldt Historic Atlas and Rohde 2020. . Created by: jlopez4

Legend

Shoreline Position

1870

1958

1970

2020

Imagery includes 1870 US Coast Survey map overlaid on 2018 Ortho Imagery

Paper Size ANSI B

0 125 250 375 500

Feet

Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

Projection: Lambert Conformal Conic

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Humboldt County Department of Public Works
Humboldt Bay Natural Shoreline Infrastructure

Shoreline Position
Eureka Slough Marsh

Project No. **11214987**
Revision No. **-**
Date **July 2021**

Exhibit 2-4

\\ACV-SVR-001\Projects$
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Print date: 13 Jul 2021 - 13:26

Data source: World Imagery (Clarity): Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jlopez4

Legend

Shoreline Position

1870

1958

1970

2020

Imagery includes 1870 US Coast Survey map overlaid on 2018 Ortho Imagery

Paper Size ANSI B

0 150 300 450 600

Feet

Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

Projection: Lambert Conformal Conic

\\ACV-SVR-001\Projects$
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Data source: World Imagery (Clarity): Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jlopez4

Humboldt County Department of Public Works
Humboldt Bay Natural Shoreline Infrastructure

Shoreline Position
Project Area Shoreline

Project No. **11214987**
Revision No. **-**
Date **July 2021**

Exhibit 2-5

Legend

Shoreline Position

- 1870
- 1958
- 1970
- 2020

Imagery includes 1870 US Coast Survey map overlaid on 2018 Ortho Imagery

Paper Size ANSI B

0 150 300 450 600

Feet

Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

Projection: Lambert Conformal Conic

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Humboldt County Department of Public Works
Humboldt Bay Natural Shoreline Infrastructure

Shoreline Position
Jacoby Creek Marsh

Project No. **11214987**
Revision No. **-**
Date **July 2021**

Exhibit 2-6

\\ACV-SVR-001\Projects$
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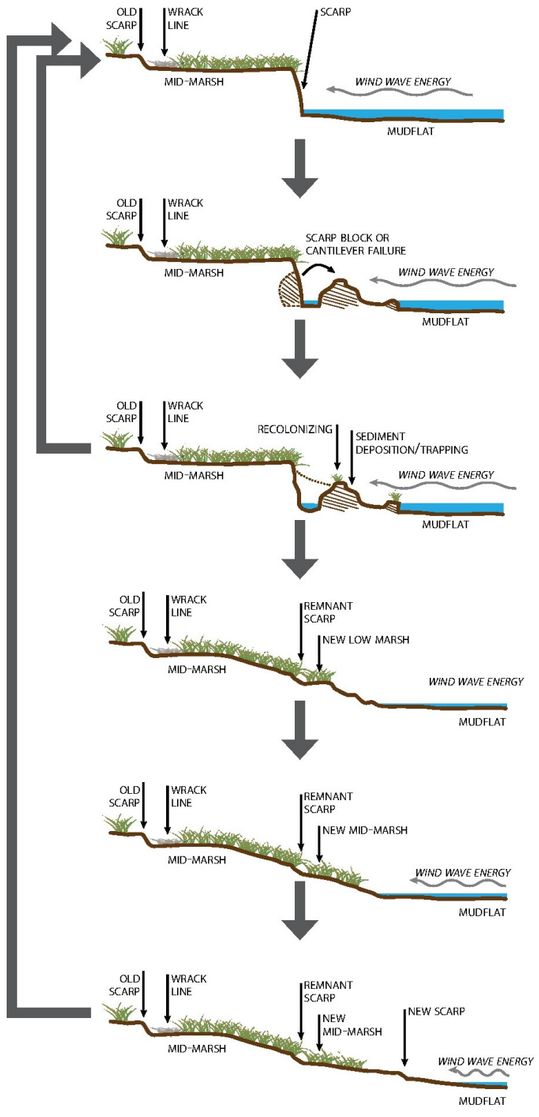
Data source: World Imagery (Clarity): Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jlopez4

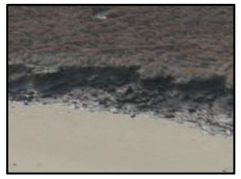
Marsh Edge Morphology (Adapted from SFEI, 2015)



Scarp without bayward vegetation (SN)
Fails under pressure from wind wave energy or wave run-up, and undercut blocks fail or cantilever, depositing sediment (with or without vegetation) in front of the scarp.

Scarp without bayward vegetation (SN)
The failed block dissipates wave energy until deposit is secured away and redistributed on the mudflat or marsh plain, thus creating an erosional environment as the wave energy is then directed back to the scarp.

1

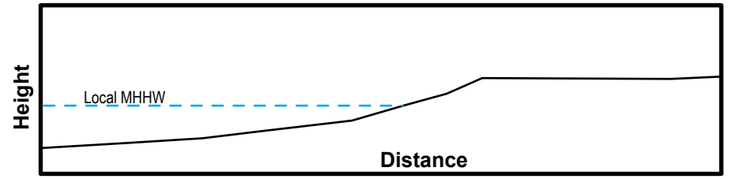


Scarp with bayward vegetation (SV)
If the failure is large enough to redirect wave energy for longer periods of time, the failed blocks may create an environment for sediment deposition and trapping between the old scarp and the failed block.

2

Ramp with inflection point (RI)
A ramped profile begins to form as sediment fills in behind the failed block, building elevation, creating new low marsh and leaving behind a remnant scarp.

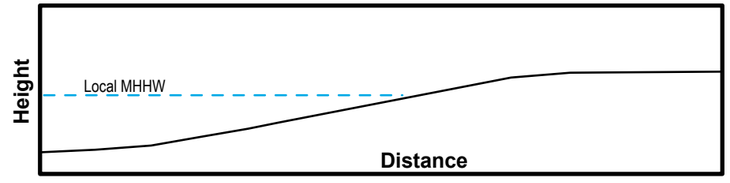
3



Ramp without inflection point (RN)
As the ramping continues, wave energy is dissipated such that the low marsh vegetation traps sediment, building up to mid marsh habitat.

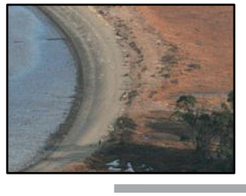
Ramp with new bluff forming (RI)
When the new mid marsh levels, the ramped profile steepens and wind wave energy begins to erode the new mid marsh, creating a new scarp. And the cycle continues....

4



Beaches or Rocky Shoreline (B)

5



Data Disclaimer
Beagle JR, Salomon M. 2015. Shifting Shores: Marsh Expansion and retreat in San Pablo Bay. Pages: 25, 49

Paper Size ANSI B

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

Humboldt County
Humboldt Bay Natural Shoreline Infrastructure

Marsh Edge Morphology

Project No. **11214987**
Revision No. **-**
Date **July 2021**

Exhibit 2-7

\\ACV-SVR-001\Projects$
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Print date: 13 Jul 2021 - 10:47

Data source: Beagle JR, Salomon M. 2015. Shifting Shores: Marsh Expansion and retreat in San Pablo Bay. . Created by: jlopez4

1. Scarp without bayward vegetation
2. Scarp with bayward vegetation
3. Ramp with inflection point
4. Ramp without inflection point
5. Beaches or rocky shoreline

Legend

Shoreline Position
- 1870
- 1958
- 1970
- 2020

Marsh Edge Morphology

Roads

JACOBS

US HWY 101

UNNI

COLE

Paper Size ANSI B

0 125 250 375 500

Feet

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Humboldt County
Humboldt Bay Natural Shoreline Infrastructure

Eureka Slough Marsh

Marsh Edge Morphology

Project No. **11214987**
Revision No. **-**
Date **July 2021**

Exhibit 2-8

\\ACV-SVR-001\Projects$\561\11214987\GIS\Maps\Deliverables\Marsh_Edge_Morphology\11214987_Shorline_types_revC.aprx
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Data source: World Imagery (Clarity): Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
World Topographic Map: Esri, FAO, NOAA
AirPhoto_2019_:
World Topographic Map: Esri Community Maps Contributors, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA
World Hillshade: Esri, USGS
World Hillshade: Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community. Created by: jlopez4

1. Scarp without bayward vegetation
2. Scarp with bayward vegetation
3. Ramp with inflection point
4. Ramp without inflection point
5. Beaches or rocky shoreline

HIGHWAY 101 ON
INDIANOLA CUTOFF
HIGHWAY 101 OFF
US HWY 101

Legend
Shoreline Position
1870
1958
1970
2020
Marsh Edge Morphology
Roads





Paper Size ANSI B
0 125 250 375 500
Feet

GHD

Humboldt County
Humboldt Bay Natural Shoreline Infrastructure

Project Area Marsh

Marsh Edge Morphology

Project No. **11214987**
Revision No. **-**
Date **July 2021**

Exhibit 2-9

\\ACV-SVR-001\Projects$
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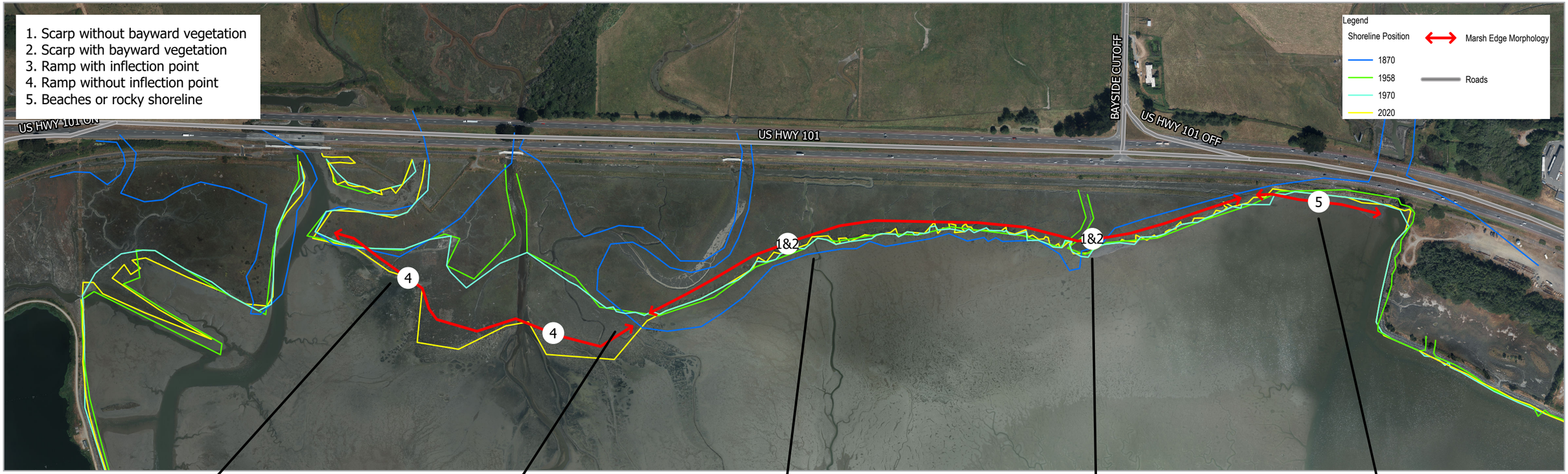
1. Scarp without bayward vegetation
2. Scarp with bayward vegetation
3. Ramp with inflection point
4. Ramp without inflection point
5. Beaches or rocky shoreline



Paper Size ANSI B
0 125 250 375 500
Feet

N

GHD

Humboldt County
Humboldt Bay Natural Shoreline Infrastructure

Jacoby Creek Marsh

Marsh Edge Morphology

Project No. **11214987**
Revision No. **-**
Date **July 2021**

Exhibit 2-10

\\ACV-SVR-001\Projects$\561\11214987\GIS\Maps\Deliverables\Marsh_Edge_Morphology\11214987_Shorline_types_revC.aprx
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Data source: World Imagery (Clarity): Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
World Topographic Map: Esri, FAO, NOAA
AirPhoto_2019_:
World Topographic Map: Esri Community Maps Contributors, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA
World Hillshade: Esri, USGS
World Hillshade: Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community. Created by: jlopez4