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MEMORANDUM

FROM: John Dixon, Ph.D.
Ecologist

TO: Dan Carl

SUBJECT: Recommended Boundaries of CCC Wetlands at Terrace Point

DATE: August 10, 2007

Documents reviewed:

Huffman-Broadway Group. 2007a. A map entitled "Attachment 1. Areas subject to Corps jurisdiction under Section 404 of the Clean Water Act, Terrace Point, Santa Cruz, CA. March 30, 2007

Huffman-Broadway Group. 2007b. A map entitled "Attachment 2. March 2007 Corps delineation with additional areas identified for CCC staff consideration regarding CMA Status, Terrace Point, Santa Cruz, CA." April 16, 2007

Leidy, R. (EPA). 2007. April 24, 2007 letter to D. Carl (CCC) regarding "Terrace Point wetland delineation, Santa Cruz County, California," including Attachments 1 & 2 (Huffman-Broadway Group 2007a & 2007b). This letter includes field notes made by Dr. Leidy on February 14, 2007 and an edited version of Mr. Martel's April 16, 2007 email.

Martel, D. (ACOE). 2007. April 16, 2007 email to J. Dixon (CCC) summarizing the field observations made on March 27 and 28, 2007 by Mr. Martel and Dr. Leidy (EPA) and stating their joint conclusions regarding federal jurisdictional wetlands at Terrace Point and other areas of potential wetlands under the California Coastal Act. The email references a map created for Mr. Martel by Huffman-Broadway Group (2007b).

Martel, D. and R. Leidy. March 27, 2007. Routine Wetland Determination data sheets for 16 sample points examined at Terrace Point for the federal jurisdictional determination.

In my April 25, 2007 memorandum addressed to you, I described the independent wetland assessment that was provided to the Coastal Commission by Mr. Dan Martel of the Army Corps of Engineers and Dr. Robert Leidy of the U.S. Environmental Protection Agency. Attachment 1 to Dr. Leidy's report dated April 24, 2007 shows the March 2007 federal delineation and Attachment 2 shows both the federal wetland boundary and 8 areas (6 patches of *Bacharis douglasii* (OBL) and 2 patches of *Lolium perenne* (FAC)

and other indicator species) that Mr. Martel and Dr. Leidy thought had soil and landscape characteristics that might result in sufficient subsurface wetness to be considered "wetland" under the definition in the Commission's Regulations. These independent experts considered all other areas, including those with a preponderance of wetland indicator species such as *B. douglasii* and *L. perenne*, to be "upland."

On March 27 and 28, 2007, Mr. Martel and Dr. Leidy conducted the field work for their jurisdictional determination and sketched the wetland boundaries on a map with an aerial photograph base that also showed *B. douglasii* patches and Huffman-Broadway Group's labeled sample points for reference and orientation. In translating the field sketch to electronic format, Dr. Huffman was instructed to draw the boundary to include the whole patch where the sketched wetland line intersected a *B. douglasii* patch. The maps that he created in March (Leidy Attachments 1 & 2) were based on *B. douglasii* patches as they were mapped in 2004. However, by 2007 some *B. douglasii* patches had died out and others had expanded. Dr. Huffman and Mr. Martel field-checked the map on July 19, 2007 and documented the wetland boundary using a global positioning system. The attached Maps 1 and 2 are equivalent to the earlier Attachments 1 and 2, but with some errors corrected and with the boundary line adjusted to reflect the existing size and location of *B. douglasii* patches.

Area D1 (which encompasses *B. douglasii* patch C6[1]) and *B. douglasii* patch C3 are both immediately adjacent to delineated wetlands and fall along a clear moisture gradient from obvious wetland to obvious upland. The *B. douglasii* at C3 occur along the remains of a channel that was dug by a farmer to drain wetland CCC W5 (ACOE CW3). I recommend that both these areas be included as CCC wetlands. The remaining areas that Mr. Martel and Dr. Leidy identified as potential CCC wetlands were thought to be more-or-less isolated, being surrounded by uplands. There are no data for areas D2, C4, or C5 and we did not visit them on July 19, 2007 when I accompanied Mr. Martel and Dr. Huffman in the field. I recommend that these areas simply be identified as "potential CCC wetlands," since their wetland status has no practical consequences due to their location in an area already designated as "open space." We visited the remaining two potential wetland areas (C1 and C2) on July 19 and, at my request, Mr. Martel dug a series of test pits and described the soil and vegetation at each point. The resultant data are attached as Table 1 and the sample points are shown on Map 3.

We sampled several points in the vicinity of C1 along a west to east transect that followed the apparent moisture gradient. The data show that *B. douglasii* patch C1 is at the upper end of the moisture gradient. Based on our field observations, I intended to recommend that the CCC wetland boundary be adjusted to include C1. However, this analysis was rendered moot because the adjusted federal boundary encompassed this patch. Since 2004 the *B. douglasii* patch C1 had expanded to the west into the area that is frequently inundated or saturated.

[1] In the earlier maps, C6 was mislabeled C7. There were only 6 patches of *B. douglasii* identified for CCC consideration.

C2 is an isolated *B. douglasii* patch surrounded by upland. However, it occupies a shallow depression that suggests that the area may be wetter than the surrounding land. In March, sandy clay loam, which would tend to restrict water movement, and evidence of previous soil saturation was observed at a depth of 24 inches and the herbaceous vegetation[2] was dominated by *B. douglasii* (OBL) and the grasses *L. perenne* (FAC) and *Vulpia bromoides* (FACW). In July, the data were similar although *V. bromoides* appeared to have been replaced by *V. myuros* (FACU) after the rainy season. The soil throughout the 20-inch pit dug in July was very sandy and a restrictive layer was not encountered, but there was evidence of previous soil saturation at a depth of 15 to 20 inches. Mr. Martel inferred from these soil samples that the water table during the rainy season is probably generally around 20 to 22 inches below the surface and higher right after rain events.

For comparison, sample points were placed in upland vegetation about 3 m south of C2 and in an upland *B. douglasii* patch about 7 m south of C2. The soil profile at these sites was very similar to that at C2 but there was no evidence of previous soil saturation in the form of iron mottles within the upper 20 to 24 inches. The difference is probably due to the fact that C2 is in a shallow depression and as a result the clay-rich restrictive layer and seasonally shallow water table is closer to the surface. The vegetation in the upland *B. douglasii* patch was essentially the same as in C2. I recommend that C2 also be considered upland because the vegetation is not distinctive, no indicators of surface inundation have been present, the seasonally shallow water table appears generally to be 15 to 24 inches below the surface[3], and it is surrounded by upland rather than being along the boundary of a clearly delineated wetland.

The recommended CCC wetland boundaries are shown in Map 4. The Corps wetland boundary and the recommended CCC wetland boundary are overlaid for comparison in Map 5. The wetland boundary recommended by staff in 2006, which was based on 2004 field work[4], and the current staff recommendation are overlaid for comparison in Map 6. Map 7 shows the recommended CCC wetland boundaries and wetland buffers (100 ft except for 150 ft around wetland W5) in relation to the university's proposed development envelope. Finally, Map 8 compares all the wetland delineations that have been conducted at Terrace Point.

Attachments

Maps 1-8 (in separate pdf files).

[2] The upland shrub *Baccharis pilularis* is also present as a dominant and should have been included in March as it was in July (D. Martel, personal communication).
[3] Wetland hydrology is characterized by frequent inundation or frequent saturation in the upper 12 inches of the soil.
[4] The 2004 and 2006 delineations are nearly identical. In 2006, the boundaries were adjusted in a few places at my request to include adjacent patches of *B. douglasii*.

Table 1. Data collected by D. Martel on July 19, 2007.

Location	Dominants	Sub-dominants	Hydrology Indicators	Horizon	Depth	Matrix	Redox	Texture	Notes
C1	Baccharis douglasii (OBL), B. pilularis (UPL), Lolium perenne (FAC), Vulpia myuros (FACU)	Medicago polymorpha (UPL), Hordeum brachyantherum (FACW)	None	A	1-17	10YR2/1	None	fine sandy loam	Very thick mollic epipedon
				A	17-?	10YR2/1	5% 7.5YR4/6	fine sandy loam	
Outside C1 (~2m NW)	Lolium perenne (FAC), Vulpia myuros (FACU)	Bromus diandrus (UPL)	None	A	0-20	10YR2/1	None	very fine sandy loam	Abrupt textural change at 20 inches
				B	20-?	10YR2/1	5% 7.5YR4/6	very coarse sandy or gravelly clay	
Outside C1 (W & downslope ~6 m)	Lolium perenne (FAC), Picris echioides (FAC),	Lactuca serriola (FAC), Medicago polymorpha (UPL), Epilobium ciliatum (FACW)	Sediment deposits; soil moist @ 14 inches to glistening on ped faces @ 24 inches	A	1-18	10YR2/1	None	fine sandy loam	Molic epipedon to at least 30 inches and no redox features.
				B	18-24 (described only to 24")	10YR2/1	None	fine sandy loam with much clay and some gravel	
Outside C1 (W & downslope ~9 m)	Vegetation similar to previous sample point		Algal mats, moist to surface				None		
Outside C1 (E ~11m in B. douglasii)	B. douglasii (OBL), B pilularis (UPL), Bromus diandrus (UPL), Lolium perenne (FAC)	Bromus mollis (UPL)	None	A	0-12	10YR2/1	None	find sandy loam	

Table 1 (cont). Data collected by D. Martel on July 19, 2007.

Location	Dominants	Sub-dominants	Hydrology Indicators	Horizon	Depth	Matrix	Redox	Texture	Notes
C2	Baccharis douglasii (OBL), B. pilularis (UPL), Lolium perenne (FAC), Vulpia myuros (FACU)	-	None (but shallow depression evident)	Ap	0-8	10YR2/1	None	fine sandy loam	Still very sandy at 20 inches. Water table during rainy season is probably generally ~20-22 inches and higher right after rain events
				A	8-15	10YR2/1	None	fine sandy loam	
				AB	15-18	10YR2/1 7.5YR/3/2	2% 7.5YR4/6	fine sandy loam (with higher clay content but not clay loam)	
				B	18-20 (20" hole)	10YR5/3	5% 7.5YR4/6	fine sandy loam (with higher clay content but not clay loam)	
Outside C2 (~ 3m S)	Bromus diandrus (UPL), Vulpia myuros (FACU), Avena sp. (UPL), Lolium perenne (FAC)	-	None	Ap	0-8	10YR2/1	None	fine sandy loam	Same general soil profile as at C2 but horizon boundaries slightly deeper probably because ground surface is slightly higher
				A	8-20	10YR2/1	None	fine sandy loam	
				AB	20-24 (24" hole)	10YR2/1	few 7.5YR4/6	fine sandy loam	
Outside C2 (~7m S in B. douglasii)	Baccharis douglasii (OBL), Vulpia myuros (FACU), Lolium perenne (FAC)	Avena sp. (UPL), Medicago polymorpha (UPL)	None	Ap	0-8	10YR2/1	None	find sandy loam	
				A	8-15	10YR2/1	None	fine sandy loam	
				AB	15-20 (20"hole)	10YR2/1 10YR3/3	None	fine sandy loam	

CCC Exhibit I
(page 5 of 32 pages)

Map 1. Showing Current CORPS Clean Water Act (CWA) Wetland Boundaries For Terrace Point

Legend

Current CORPS Verified CWA Wetland Boundaries (8.43 ac.)

Map 2A. Current CORPS Verified CWA Wetland Boundaries, And Additional Areas Identified by CORPS/EPA Staff Consideration As Potential Coastal Act Wetlands, Terrace Point, Santa Cruz, CA

Legend

Current CORPS Verified CWA Wetland Boundaries (8.43 ac.)

CORPS-EPA VERIFICATION OF POTENTIAL JURISDICTIONAL AREAS SUMMARY OF CHANGES TO LEGEND TERRACE POINT/LONG MARINE LABORATORY

The Corps (Dan Martel) and EPA (Robert Leidy) visited the Terrace Point property at the request of the California Coastal Commission to inspect areas that are subject to Clean Water Act jurisdiction, as well as areas that have a prevalence of hydrophytic vegetation that may or may not be subject to California Coastal Act jurisdiction as wetlands.

The areas that the Corps and EPA inspected can be put into 4 general categories. The legend on the map/aerial photograph should read as follows:

A. *Baccharis douglasii* patch growing with FAC, FACW, or OBL plant-dominated community with soil conditions that meet Corps hydric soil and wetland hydrology criteria

Current Location of *Baccharis douglasii* patch

B. *Baccharis douglasii* patch not meeting Corps' hydric soil and/or wetland hydrology criteria, and in a landscape position and with soil characteristics unlikely to promote wetland conditions

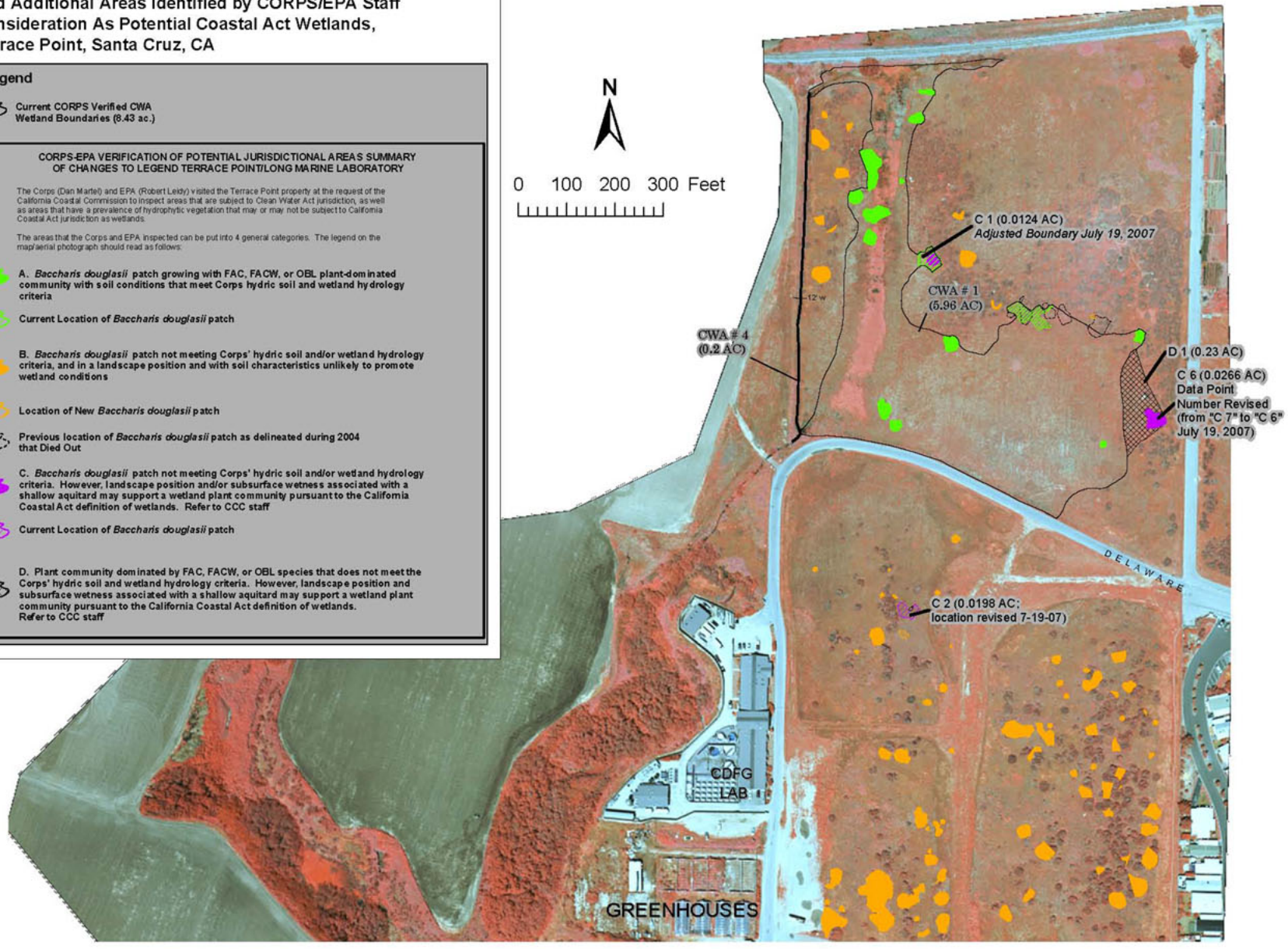
Location of New *Baccharis douglasii* patch

Previous location of *Baccharis douglasii* patch as delineated during 2004 that Died Out

C. *Baccharis douglasii* patch not meeting Corps' hydric soil and/or wetland hydrology criteria. However, landscape position and/or subsurface wetness associated with a shallow aquitard may support a wetland plant community pursuant to the California Coastal Act definition of wetlands. Refer to CCC staff

Current Location of *Baccharis douglasii* patch

D. Plant community dominated by FAC, FACW, or OBL species that does not meet the Corps' hydric soil and wetland hydrology criteria. However, landscape position and subsurface wetness associated with a shallow aquitard may support a wetland plant community pursuant to the California Coastal Act definition of wetlands. Refer to CCC staff



Map 2B. Current CORPS Verified CWA Wetland Boundaries, And Additional Areas Identified by CORPS/EPA Staff Consideration As Potential Coastal Act Wetlands, Terrace Point, Santa Cruz, CA

Legend

Current CORPS Verified CWA Wetland Boundaries (8.43 ac.)

CORPS-EPA VERIFICATION OF POTENTIAL JURISDICTIONAL AREAS SUMMARY OF CHANGES TO LEGEND TERRACE POINT/LONG MARINE LABORATORY

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Current Location of *Baccharis douglasii* patch

B. *Baccharis douglasii* patch not meeting Corps' hydric soil and/or wetland hydrology criteria, and in a landscape position and with soil characteristics unlikely to promote wetland conditions

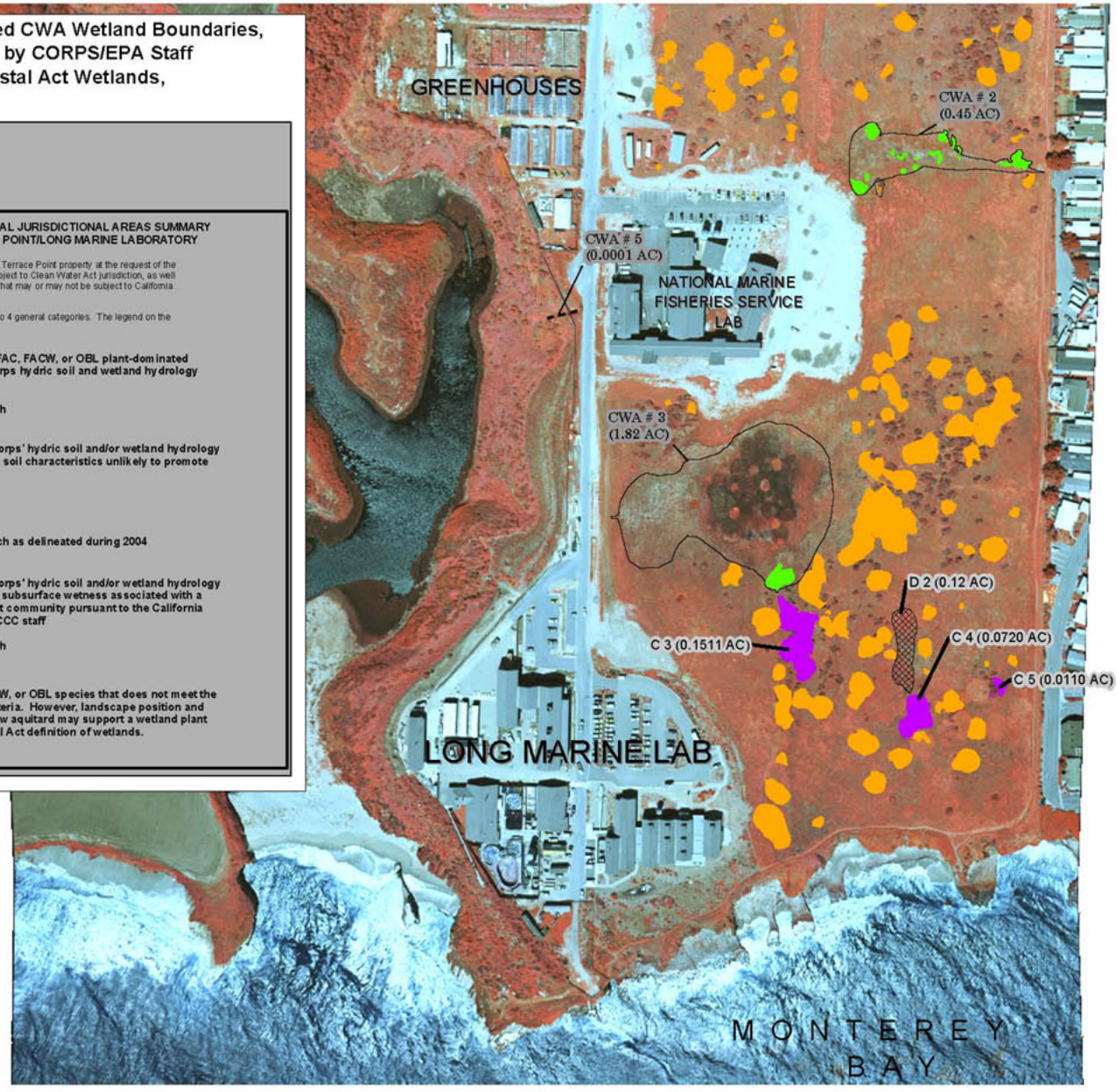
Location of New *Baccharis douglasii* patch

Previous location of *Baccharis douglasii* patch as delineated during 2004 that Died Out

C. *Baccharis douglasii* patch not meeting Corps' hydric soil and/or wetland hydrology criteria. However, landscape position and/or subsurface wetness associated with a shallow aquitard may support a wetland plant community pursuant to the California Coastal Act definition of wetlands. Refer to CCC staff

Current Location of *Baccharis douglasii* patch

D. Plant community dominated by FAC, FACW, or OBL species that does not meet the Corps' hydric soil and wetland hydrology criteria. However, landscape position and subsurface wetness associated with a shallow aquitard may support a wetland plant community pursuant to the California Coastal Act definition of wetlands. Refer to CCC staff



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Map 3A. CORPS/EPA Data Points

Legend

- Current CORPS Verified CWA Wetland Boundaries (8.43 ac.)
- RL Observation Point 2-14-07
- RL Transect 2-14-07
- DM/RL Observation Point 3-27-07 and 3-28-07
- DM Observation Point 7-19-07
- HBG Observation Point

CORPS-EPA VERIFICATION OF POTENTIAL JURISDICTIONAL AREAS SUMMARY OF CHANGES TO LEGEND TERRACE POINT/LONG MARINE LABORATORY

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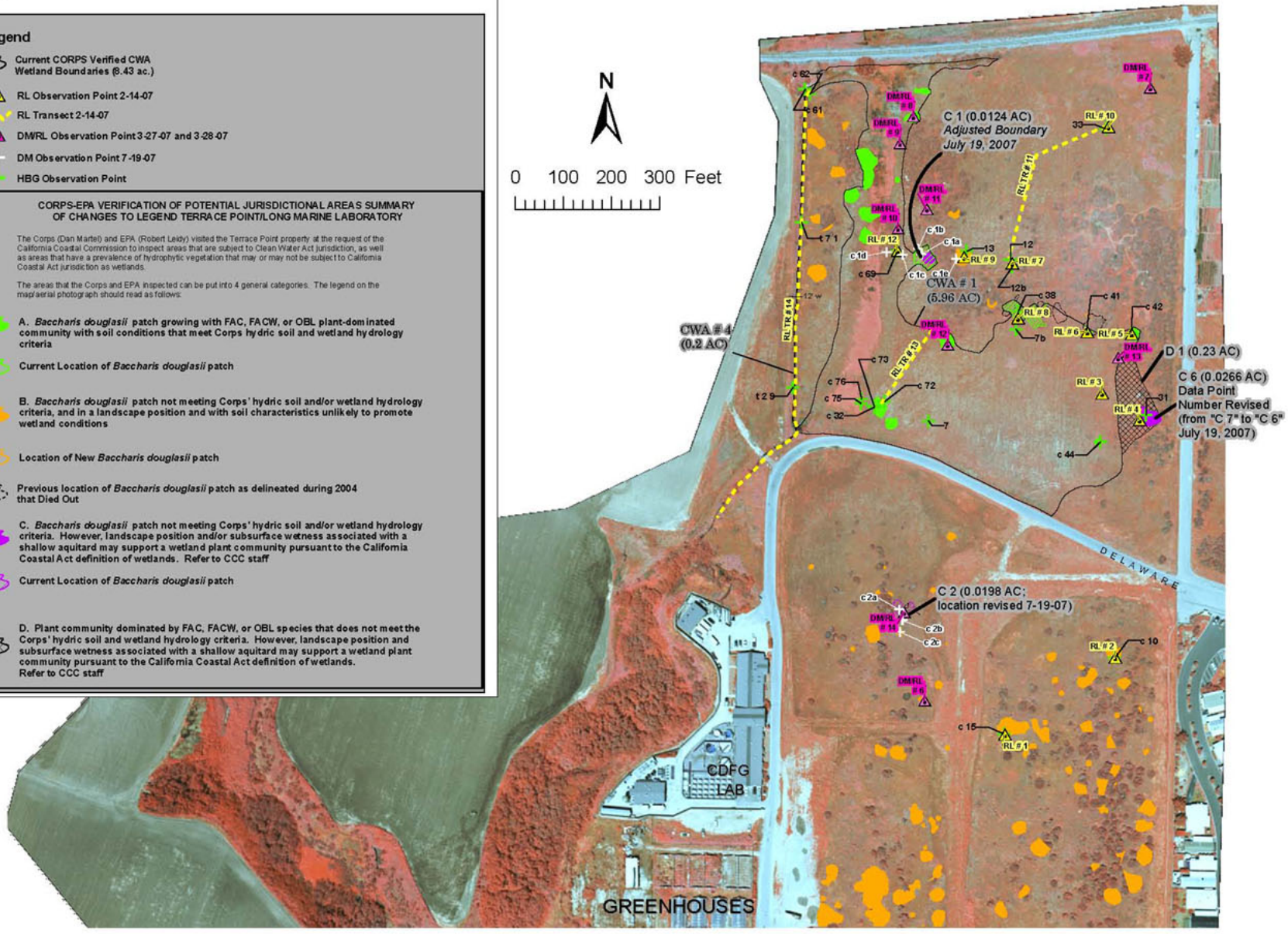
- A. *Baccharis douglasii* patch growing with FAC, FACW, or OBL plant-dominated community with soil conditions that meet Corps hydric soil and wetland hydrology criteria
- Current Location of *Baccharis douglasii* patch
- B. *Baccharis douglasii* patch not meeting Corps' hydric soil and/or wetland hydrology criteria, and in a landscape position and with soil characteristics unlikely to promote wetland conditions
- Location of New *Baccharis douglasii* patch
- Previous location of *Baccharis douglasii* patch as delineated during 2004 that Died Out
- C. *Baccharis douglasii* patch not meeting Corps' hydric soil and/or wetland hydrology criteria. However, landscape position and/or subsurface wetness associated with a shallow aquitard may support a wetland plant community pursuant to the California Coastal Act definition of wetlands. Refer to CCC staff
- Current Location of *Baccharis douglasii* patch
- D. Plant community dominated by FAC, FACW, or OBL species that does not meet the Corps' hydric soil and wetland hydrology criteria. However, landscape position and subsurface wetness associated with a shallow aquitard may support a wetland plant community pursuant to the California Coastal Act definition of wetlands. Refer to CCC staff



Map 3B. CORPS/EPA Data Points

Legend

- Current CORPS Verified CWA Wetland Boundaries (8.43 ac.)
- RL Observation Point 2-14-07
- RL Transect 2-14-07
- DM/RL Observation Point 3-27-07 and 3-28-07
- DM Observation Point 7-19-07
- HBG Observation Point

CORPS-EPA VERIFICATION OF POTENTIAL JURISDICTIONAL AREAS SUMMARY OF CHANGES TO LEGEND TERRACE POINT/LONG MARINE LABORATORY

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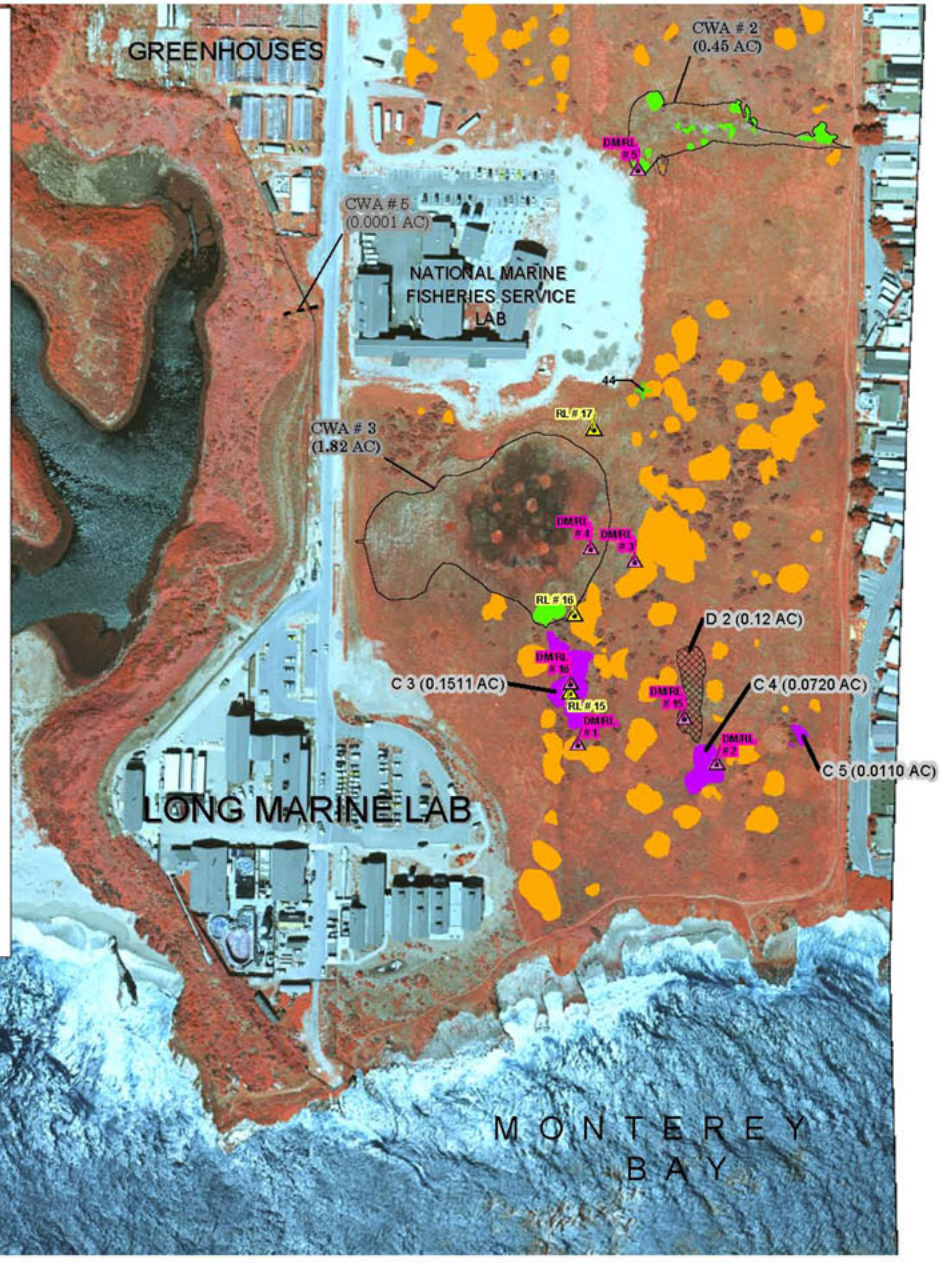
- B. *Baccharis douglasii* patch not meeting Corps' hydric soil and/or wetland hydrology criteria, and in a landscape position and with soil characteristics unlikely to promote wetland conditions
- Location of New *Baccharis douglasii* patch
- Previous location of *Baccharis douglasii* patch as delineated during 2004 that Died Out
- C. *Baccharis douglasii* patch not meeting Corps' hydric soil and/or wetland hydrology criteria. However, landscape position and/or subsurface wetness associated with a shallow aquitard may support a wetland plant community pursuant to the California Coastal Act definition of wetlands. Refer to CCC staff
- Current Location of *Baccharis douglasii* patch
- D. Plant community dominated by FAC, FACW, or OBL species that does not meet the Corps' hydric soil and wetland hydrology criteria. However, landscape position and subsurface wetness associated with a shallow aquitard may support a wetland plant community pursuant to the California Coastal Act definition of wetlands. Refer to CCC staff



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