Section 6.0
Results: Impact Evaluations

6.0 Results: Level 2 Impact Evaluation

This section describes the impacts of the Fresno to Bakersfield Section on aquatic resources, the existing conditions of those resources, the findings of the relative condition assessment of these resources, the post-project condition of those resources, and the compensatory mitigation required to offset negative effects to those resources. The impact evaluation is conducted for each of the Fresno to Bakersfield Section alternatives. The impact profile has three components: direct-permanent impacts, direct-temporary impacts (in areas where the impact would occur only during construction), and the indirect-bisected and indirect impacts within the construction and project footprints (250-foot buffer). This section uses tables and figures to describe, illustrate, and summarize the results of the data analysis methodology described in Section 3.2, Methodology: Existing Conditions, Section 3.3, Methodology: Impact Calculations, and Section 3.4, Methodology: Post-Project Condition.

Using the Level 1 Watershed Profiles developed in Chapter 5 and Level 2 condition assessment and impact evaluation, a comparison was made to determine whether the impacted aquatic resources along each alternative alignment are "typical" of the watershed or whether the impacts would result in significant adverse impacts on sensitive aquatic resources that are rare or unique to the watershed.

The Level 2 Impact Evaluation was largely developed through GIS-based modeled outputs, which established a set of projections, along with a select set of modifications (where features don't follow the projections based on best professional judgment). The projections and modifications are described in detail in Chapter 3. The development of the model allows for relatively quick recalculation of impacts, existing conditions, and post-project conditions as the alternative alignments and the engineer's design evolves. The data used—and included in this report—are based on the footprints associated with the June 2012 engineering design in the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (Authority and FRA 2012a).

Additional information and details regarding existing conditions (i.e., the results of CRAM) can be found in Appendix A. This report summarizes the methods used, the field work, and the overall CRAM scores and attribute scores for the aquatic resources in the study area.

The Compensatory Mitigation Plan provides a summary of the compensatory mitigation requirements and identifies potential compensatory mitigation properties and options. The Compensatory Mitigation Plan also identifies the mechanism, long-term management, and instruments the Authority will use to offset the loss of aquatic resources such that no net loss of aquatic functions or values will be incurred as a result of the Fresno to Bakersfield Section.

6.1 Impacts on Aquatic Resources

Impacts to special aquatic resources are described in a number of technical reports and planning documents including the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (FRA and Authority 2012a), *Fresno to Bakersfield Biological Resources and Wetlands Technical Report* (Authority and FRA 2012b), and the Checkpoint C Summary Report (Authority and FRA 2012e). Central to all discussion regarding impacts to the aquatic resources is the step wise process to first take steps to avoid impacts to aquatic resources, minimize those impacts that cannot be avoided, document the extent of aquatic resource encroachment and mitigate to the extent that there is no net loss of aquatic functions or services. The step wise process to avoid and minimize impacts to aquatic resources is well documented in Chapter 2 of the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (Authority and FRA 2012a), the *Fresno to Bakersfield Section: Checkpoint C Summary Report* (Authority and FRA 2012e), and the *Fresno to Bakersfield Section: Section 404 Individual Permit Application* (Authority and FRA 2012f).

6.1.1 Watershed Evaluation

As discussed in Section 5.3, Watershed Profile Discussion, the watersheds present in the Fresno to Bakersfield Section of the HST have similar types of features and environmental conditions. The watershed boundaries have largely been blurred through high-intensity land conversion and development, leaving few aquatic features in natural landscapes within the Great Valley. It is difficult to present a meaningful comparison of watershed-level impacts because of the north-south orientation and linear nature of the HST project, and the numerous (9) HST alternatives under consideration. Because the watersheds are similar, the presentation and analysis of impacts by watershed does not provide for a meaningful comparison of information that would be used to make project decisions. Where differences in watershed profile arise, those impacts are presented and discussed separately throughout this subsection. This is the case primarily for the concentrations and impacts to vernal pool features in the Upper Deer–Upper White Watershed.

However, understanding project impacts by watershed may be useful in mitigation planning and understanding where impacts to sensitive aquatic resources (or those in good condition) occur. While a comparison by alternative is not possible, Table 6-1 provides the range of potential project impacts that could occur to given type of aquatic resource by watershed. A range is presented because there are several HST alternatives that occur in each watershed, and depending on which alternative is ultimately selected as the least environmental damaging practicable alternative, the impacts to a given watershed would vary. This table should only be used for a coarse understanding of the watersheds and the distribution and types of features that are present and the understanding of the range of potential direct and indirect impacts.

In general, the range and of potential impacts to manipulated or man-made aquatic resources are similar across all watersheds. Of important note, vernal pool and swale impacts primarily occur in the Upper Deer–Upper White Watershed, where there are concentrations and extensive vernal pool landscapes, as described in Section 5.2.5, Upper Deer–Upper White Watershed, and Section 5.3, Watershed Profile Discussion. Other watersheds may experience loss of vernal pools but these losses are small and less significant when compared against those in the Upper Deer–Upper White Watershed. Because all watersheds contain a dominant seasonal riverine feature that runs east-west and the Fresno to Bakersfield Section runs north-south, impacts to seasonal riverine feature are similar across the watersheds.

Table 6-1
Range of Direct and Indirect Impacts to Aquatic Resources by Watershed

Watershed	Impact Type	Range of Impact Acreage by Aquatic Resource (acres)							
		Emergent Wetland	Vernal Pools and Swales	Seasonal Wetland	Canals/ Ditches	Lacustrine	Seasonal Riverine	Riparian[A]	Total
Upper Dry	Direct	—	—	0.67	4.05–4.13	1.15–1.15	0.00–0.39	0.00–0.95	5.87–7.29
	Indirect	—	0.05	—	4.94–5.29	12.14	0.00–0.79	0.00–2.64	17.13–20.91
Tulare–Buena Vista Lakes	Direct	—	0.60	0.66–0.67	20.85–28.21	10.09–11.67	0.41–1.50	0.73–2.54	33.34–45.19
	Indirect	0.00–0.92	4.13–4.58	6.63	41.47–50.77	13.90–28.96	2.77–12.85	6.41–17.66	75.31–122.37
Upper Kaweah	Direct	—	0.00–1.09	—	5.89–11.38	0.00–0.72	0.22–2.52	—	6.11–15.72
	Indirect	—	0.00–1.32	1.55–5.48	7.74–17.61	0.79–5.20	1.17–1.28	—	11.25–30.89
Upper Tule	Direct	—	0.00–1.19	0.00–0.43	1.04–1.27	0.65–3.67	0.24–0.28	0.38–0.71	2.31–7.55
	Indirect	—	0.00–0.74	0.01–1.20	0.20–0.44	<0.01–2.57	0.80–2.72	1.02–1.84	2.03–9.51
Upper Deer–Upper White	Direct	—	1.07–9.44	0.12–0.70	4.92–6.20	18.38–21.25	0.14–0.14	0.12–0.31	24.75–38.04
	Indirect	—	11.08–33.77	13.52–49.79	6.66–7.45	89.98–104.15	0.70–0.79	0.65–0.72	122.59–196.67

Table 6-1
Range of Direct and Indirect Impacts to Aquatic Resources by Watershed

Watershed	Impact Type	Range of Impact Acreage by Aquatic Resource (acres)							
		Emergent Wetland	Vernal Pools and Swales	Seasonal Wetland	Canals/ Ditches	Lacustrine	Seasonal Riverine	Riparian[A]	Total
Upper Poso	Direct	—	—	—	0.11–2.18	1.31–3.48	0.10–0.16	0.33–0.83	1.85–6.65
	Indirect	—	—	—	0.85–3.33	2.40–6.15	0.49–0.85	1.87–3.34	5.61–13.67
Middle Kern–Upper Tehachapi–Grapevine	Direct	—	—	0.00–0.11	2.39–3.92	0.90–2.10	1.48–2.24	0.25–0.82	5.01–9.19
	Indirect	0.00–<0.01	0.05–0.13	—	9.63–11.88	3.72–7.96	12.40–19.98	3.66–8.16	29.46–48.11

Notes:
— = No impact or not applicable
[A] Riparian areas are not jurisdictional waters of the U.S.

6.1.2 Alternative Evaluation

To assist in determining the least environmentally damaging practicable alternative, that is, the LEDPA, impacts to aquatic features must be described in terms of the Fresno to Bakersfield Section alternatives. Impacts are presented in a manner that allows for a comparison of the alternatives. Under the BNSF Alternative, the acreage reflects the total impact that would occur along the only end-to-end alternative. The BNSF Alternative is made up of eight segments (BNSF–Fresno, BNSF–Hanford East, BNSF–Through Corcoran, BNSF–Pixley, BNSF–Through Allensworth, BNSF–Through Wasco-Shafter, BNSF–Monmouth, and BNSF–Bakersfield North), five of which have alternatives (BNSF–Hanford East, BNSF–Through Corcoran, BNSF–Through Allensworth, BNSF–Through Wasco-Shafter, and BNSF–Bakersfield North) and three of which do not have alternatives (BNSF–Fresno, BNSF–Pixley, and BNSF–Monmouth). The three segments that do not have alternatives are referred to as "common components" and would be part of the project regardless of which alternatives are selected. The segments of the BNSF Alternative and their corresponding alternatives are listed in Table 6-2.

Table 6-2
Segments of the BNSF Alternative and Their Corresponding Alternatives

BNSF Alternative–Segment	Corresponding Alternative
BNSF–Fresno	No alternative
BNSF–Hanford East	Hanford West Bypass 1 (at-grade and below-grade options) Hanford West Bypass 2 (at-grade and below-grade options)
BNSF–Through Corcoran	Corcoran Elevated Corcoran Bypass
BNSF–Pixley	No alternative
BNSF–Through Allensworth	Allensworth Bypass
BNSF–Through Wasco-Shafter	Wasco-Shafter Bypass
BNSF–Monmouth	No alternative
BNSF–Bakersfield North	Bakersfield South Bakersfield Hybrid

The amount of encroachments on aquatic resources varies among the alternatives (Table 6-3). This table only lists the potential impacts to aquatic resources from a given alternative; the table does not include or consider the associated watershed. To compare the other project alternatives and design options for each of the other alternatives, the table contains two numbers: the first number is the amount of impact anticipated for the given alternative, and the second number is the change (or delta) when this number is compared against the corresponding segment of the BNSF Alternative. Comparison tables differentiate impact acreages between an alternative alignment and its corresponding segment of the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in a greater number of impact acres than its corresponding segment of the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in a smaller number of impact acres than its corresponding segment of the BNSF Alternative.

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Table 6-3
Comparison of Impacts on Aquatic Resources by Alternative

Aquatic Resource Type	Impact Type [a]	Alternative										
		BNSF Alternative Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
			Impact Acreage / Difference Compared with Corresponding BNSF Area [b]									
Emergent wetland	Direct-Permanent	—	—	—	—	—	—	—	—	—	—	—
	Direct-Temporary	—	—	—	—	—	—	—	—	—	—	—
	Indirect	<0.01	0.59 / +0.59	0.59 / +0.59	0.92 / +0.92	0.92 / +0.92	—	—	—	—	— / -<0.01	<0.01 / 0.00
Seasonal wetland	Direct-Permanent	1.32	0.01 / +0.01	0.01 / +0.01	—	—	0.05 / +0.05	0.43 / +0.43	0.12 / -0.43	—	0.01 / -0.11	0.01 / -0.12
	Direct-Temporary	*0.82*	—	—	—	—	—	—	*— / -0.16*	—	—	—
	Indirect	40.13	0.45 / +0.45	0.45 / +0.45	0.45 / +0.45	0.45 / +0.45	2.14 / -0.05	0.13 / -2.06	10.75 / -22.69	—	0.55 / -0.08	0.55 / -0.08
Vernal pools and swales	Direct-Permanent	11.59	—	—	—	—	1.09 / -0.46	1.19 / -0.36	1.05 / -8.37	—	—	—
	Direct-Temporary	—	—	—	—	—	—	—	—	—	—	—
	Indirect Bisected	23.88	—	—	—	—	4.76 / -0.73	— / -5.49	1.73 / -15.52	—	—	—
	Indirect	38.61	—	—	—	—	1.78 / +1.19	1.56 / +0.97	11.58 / -20.75	—	—	—
Canals/Ditches	Direct-Permanent	44.81	14.35 / +7.45	13.21 / +6.31	10.54 / +3.64	9.40 / +2.50	9.29 / -4.93	8.37 / -5.85	5.84 / -1.28	1.98 / -1.86	2.27 / +0.43	2.96 / +1.12
	Direct-Temporary	*3.50*	*0.11 / -0.39*	*0.11 / -0.39*	*0.21 / -0.29*	*0.21 / -0.29*	*0.90 / +0.02*	*1.02 / +0.14*	—	*0.06 / +0.04*	*1.03 / +0.46*	*0.98 / +0.41*
	Indirect	75.18	21.61 / +8.75	20.86 / +8.00	21.53 / +8.68	20.78 / +7.92	19.16 / +8.24	14.13 / +3.20	24.12 / -0.72	5.82 / -1.99	11.89 / +2.26	11.63 / +1.99
Lacustrine (Retention/Detention Basins and Reservoirs)	Direct-Permanent	33.27	0.53 / -0.35	0.35 / -0.54	0.51 / -0.37	0.32 / -0.56	4.00 / -0.78	3.64 / -1.14	16.28 / -3.97	2.80 / -1.41	1.82 / -0.32	1.82 / -0.32
	Direct-Temporary	*7.53*	—	—	—	—	—	*3.55 / +3.55*	*2.45 / +1.14*	*1.10 / -1.50*	*1.91 / -0.64*	*1.91 / -0.64*
	Indirect	139.66	6.34 / +1.91	0.79 / -3.64	17.61 / +13.18	12.05 / +7.62	11.37 / +0.11	8.09 / -3.16	104.37 / +14.06	6.52 / -5.23	4.35 / -4.16	4.04 / -4.47
Seasonal riverine	Direct-Permanent	5.88	0.71 / -3.31	0.52 / -3.50	1.12 / -2.91	0.93 / -3.09	0.24 / 0.00	0.14 / -0.10	0.14 / -0.14	—	0.83 / -0.50	0.83 / -0.50
	Direct-Temporary	*0.92*	*0.50 / +0.50*	*0.50 / +0.50*	*0.50 / +0.50*	*0.50 / +0.50*	—	*0.14 / +0.14*	*0.10 / +0.08*	—	*0.65 / -0.26*	*0.64 / -0.26*
	Indirect	36.63	5.32 / -8.81	4.74 / -9.40	5.40 / -8.73	4.81 / -9.32	0.80 / -0.17	2.72 / +1.75	1.27 / -0.28	—	12.40 / -7.58	12.40 / -7.58
Riparian (not USACE jurisdictional)	Direct-Permanent	4.08	0.86 / -1.60	0.92 / -1.54	0.86 / -1.60	0.92 / -1.54	0.38 / -0.01	0.24 / -0.15	0.28 / -0.83	—	0.46 / +0.34	0.46 / +0.34
	Direct-Temporary	*0.24*	*0.82 / +0.74*	*0.82 / +0.74*	*0.82 / +0.74*	*0.82 / +0.74*	—	*0.47 / +0.47*	*0.17 / +0.14*	—	*0.34 / +0.22*	*0.36 / +0.24*
	Indirect	30.94	9.09 / -8.56	9.04 / -8.61	9.09 / -8.56	9.04 / -8.61	1.02 / -0.11	1.84 / +0.70	2.59 / -1.40	—	3.67 / -4.49	3.66 / -4.50

Table 6-3
Comparison of Impacts on Aquatic Resources by Alternative

Aquatic Resource Type	Impact Type [a]	Alternative										
		BNSF Alternative Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
			Impact Acreage / Difference Compared with Corresponding BNSF Area [b]									
TOTAL AQUATIC RESOURCE IMPACTS	**Direct-Permanent**	**100.95**	**16.47 / +2.20**	**15.02 / +0.75**	**13.03 / -1.24**	**11.57 / -2.70**	**15.04 / -6.13**	**14.00 / -7.17**	**23.70 / -15.01**	**4.78 / -3.28**	**5.39 / -0.18**	**6.08 / +0.52**
	Direct-Temporary	***13.01***	***1.44 / +0.85***	***1.44 / +0.85***	***1.54 / +0.96***	***1.54 / +0.96***	***0.90 / +0.02***	***5.18 / +4.31***	***2.72 / +1.20***	***1.16 / -1.46***	***3.92 / -0.22***	***3.89 / -0.25***
	Indirect-Bisected	**23.88**	**—**	**—**	**—**	**—**	**4.76 / -0.73**	**— / -5.49**	**1.73 / -15.52**	**—**	**—**	**—**
	Indirect	**361.16**	**43.41 / -5.66**	**36.47 / -12.61**	**55.01 / +5.93**	**48.06 / -1.01**	**36.27 / +9.21**	**28.47 / +1.41**	**154.68 / -31.78**	**12.34 / -7.21**	**32.87 / -14.05**	**32.28 / -14.64**

Notes:
— = No impact or not applicable
[a] Indirect impacts are calculated within a 250-foot buffer of the project footprint, which includes areas of permanent and temporary impacts.
[b] The "Difference Compared with Corresponding BNSF Area" represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in greater impact acres than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impact acres than its corresponding segment in the BNSF Alternative.
Impact calculations in this table include alignment alternatives and station alternatives, but do not include the HMF site alternatives.
All impacts were calculated based on 15% engineering design construction footprint.

For example, under the BNSF Alternative in Table 6-3, 11.59 acres of vernal pools would be affected by direct-permanent impacts, and the use of the Allensworth Bypass Alternative would result in 1.05 acres of direct-permanent impacts, a net decrease of 8.37 acres (i.e., -8.37 acres) when compared with the corresponding segment of the BNSF Alternative (BNSF–Through Allensworth).

The impact acreages presented in Table 6-4 represent the impacts of various construction elements (e.g., the HST track, the HST stations, roadway work). Table 6-4 shows the types of aquatic resources that would be directly affected by specific construction elements. Canals/ditches and lacustrine features would be affected by nearly all types of construction elements because they are common in the areas affected by the project. Seasonal wetlands, seasonal riverine/riparian, and vernal pools and vernal swales would be affected by fewer types of construction elements because they are less common in the areas affected by the project and because efforts were made as a part of project design to avoid these features where possible. Three construction elements would have no direct impact on aquatic resources: BNSF yard relocation, pedestrian bridge, and stations.

Table 6-4
Summary of Aquatic Resource Impacts by Construction Element

Construction Element	Vernal Pools/Vernal Swales	Seasonal Riverine/ Riparian	Seasonal Wetlands	Canals/ Ditches	Lacustrine
BNSF yard relocation	—	—	—	—	—
Canal relocation	—	X		X	X
Construction area	—	X	X	X	X
Drainage basin	—	—	—	X	—
Freight rail relocation	—	—	X	X	X
Heavy maintenance facility	—	—	X	X	X
HST track	X	X	X	X	X
Interlocking site	—	—	—	X	X
Natural gas relocation	—	—	X	X	X
Petroleum line relocation	—	—	—	X	X
Pedestrian bridge	—	—	—	—	—
Radio site	X	—	—	X	X
Remove base and surfacing	—	—	—	X	X
Roadway work (closures, overpass and underpass)	X	X	X	X	X
Stations	—	—	—	—	—
Temporary construction easements	—	X	—	X	X
Traction power sub-station	X	X	X	X	X
Transmission line relocation	X	X	—	X	X
Total elements affected	**5**	**7**	**7**	**15**	**14**

6.1.2.1 Direct Impacts

Direct impacts include the permanent or temporary conversion of aquatic resources. Direct impacts on aquatic resources would result from the construction activities, including the construction of the various permanent project components (e.g., embankments, rail bed, road overcrossings, aerial structure footings) and the temporary project areas required to accommodate construction operations (i.e., access and laydown areas). Most aquatic features in temporary project areas would be restored after the construction activities are completed.

Direct-permanent impacts are the impacts that would result from the use of heavy machinery to re-contour the landscape and place permanent fill materials (e.g., culverts, dirt, engineering structures) in both man-made aquatic resources (e.g., lacustrine features, canals/ditches) and natural features (e.g., season wetlands, vernal pools, vernal swales, seasonal riverine). The contouring and placement of fill in these aquatic resources would result in the permanent loss of jurisdictional waters; potentially irreversible impacts on the physical, chemical, and biological characteristics of aquatic substrates and food webs; and a potential increase in erosion and sediment transport into adjacent aquatic areas.

Direct-permanent impacts on jurisdictional waters would occur during construction of bridges and elevated structures over seasonal riverine features and wetlands as well as canals/ditches and retention/detention basins. These direct impacts would not result in the fill of aquatic features. Instead, they would result in the potential degradation of aquatic features. Table 6-5 lists the major seasonal riverine features that would be affected by the project, the alternatives in which the impacts would occur, the approximate crossing widths, and the crossing methods. All the seasonal riverine features that the project would affect run generally east to west; therefore, impacts on these features would occur under the BNSF Alternative and the other corresponding alternatives. The No Project Alternative would avoid impacts on these features, but would affect other aquatic resources. The approximate crossing widths vary by feature and by alternative, ranging from 140 feet for Deer Creek and Poso Creek to 1,625 feet for the Kings River. The crossing method for all seasonal riverine features is either by bridge or aerial structure. Direct-permanent impacts would result from the shading of aquatic resources by elevated structures (where the aerial structure is near the ground), from the placement of piles to support the aerial structures and bridges, and from the removal of vegetation during construction. These impacts would reduce the condition of affected aquatic features but would not result in the fill or removal of these features.

Direct-temporary impacts on jurisdictional waters refer to the temporary placement of fill during construction on either man-made or natural aquatic resources. Construction staging areas are required to be adjacent to or in seasonal riverine features to facilitate construction of elevated structures. Construction staging areas are also planned where bridges are proposed at at-grade crossings. Temporary fill would be placed during the construction of access roads and staging/equipment storage areas, where required. This fill would result in a temporary loss of jurisdictional waters; potential impacts on the physical, chemical, and biological characteristics of aquatic substrates and food webs; and a potential increase in erosion and sediment transport into adjacent aquatic areas.

Table 6-5
Summary of Seasonal Riverine Impacts

Water Body	Alternative(s)	Approximate Crossing Width (feet)	Crossing Method
Kings River	BNSF Alternative, Hanford West Bypass 1, Hanford West Bypass 2	300 to 1,625	Bridge or aerial structure
Cross Creek	BNSF Alternative, Hanford West Bypass 1, Hanford West Bypass 2	150 to 200	Aerial structure
Tule River	BNSF Alternative, Corcoran Elevated, Corcoran Bypass	300	Bridge or aerial structure
Deer Creek	BNSF Alternative, Allensworth Bypass	140	Aerial structure
Poso Creek	BNSF Alternative, Allensworth Bypass, and road crossing	140	Bridge or aerial structure
Kern River [1]	BNSF Alternative, Bakersfield South, Bakersfield Hybrid	1,500	Aerial structure

[1] HST alternative alignments do not cross the Kern River perpendicularly; therefore, approximate crossing width is greater than the perpendicular width of Kern River.

Direct-permanent and direct-temporary impacts on jurisdictional waters (i.e., natural and man-made features) would also include the removal or modification of local hydrology and the redirection of flow within aquatic resources. In the case of man-made features, these impacts would remove or disrupt the limited biological functions that these features provide. In natural areas, these activities would remove or disrupt the hydrology, vegetation, wildlife use, water quality conditions, and other biological functions provided by the resources. Discussion of specific impacts on major surface water features is provided in Section 3.8, Hydrology and Water Resources, in the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (Authority and FRA 2012a).

Construction material that may be placed on aquatic resources includes imported well-graded soils, sub-ballast (coarse-grained material), ballast (crushed stone), and slab (concrete). Culverts placed in aquatic resources would be constructed of pre-cast, reinforced-concrete pipe or concrete box culverts. At the locations of bridges and elevated structures, cast-in-place or precast reinforced-concrete girders or piles may be placed in aquatic resources. Other materials would be used as part of construction and operation of the HST System but are not expected to be placed in jurisdictional waters. The origin of these materials has yet to be determined, but they would be supplied by local sources from existing permitted quarries to the extent practicable. Fill material would be suitable for construction purposes and free from toxic pollutants in toxic amounts in accordance with Section 307 of the Clean Water Act.

Many of the jurisdictional waters (e.g., canals/ditches and seasonal riverine) are heavily managed by local irrigation districts to serve public water needs and agricultural production. As a result, these jurisdictional waters support few natural biological functions and values. The biological functions of these man-made features include limited habitat for wildlife and a capacity for water storage and/or release. A number of these jurisdictional waters have been previously degraded or affected by various existing roads and the existing BNSF Railway infrastructure. The construction of the HST alternatives would eliminate or further degrade these man-made jurisdictional waters.

6.1.2.2 Indirect Impacts

Indirect impacts on aquatic resources could occur outside of the construction and project footprints and could be separated from the direct impacts in time and space. Potential indirect impacts on jurisdictional waters include a number of water-quality-related impacts: erosion, siltation, and runoff into natural and man-made or manipulated water features downstream of the footprint. Indirect impacts could occur on aquatic features as a result of both construction and operation of the HST System. The acreages of indirect impacts on jurisdictional waters reported in this document represent the combined sum of indirect impact acreages for both construction and operation impacts. The long-term indirect impacts on jurisdictional waters are more extensive than—and tend to encompass—the short-term construction impacts.

Construction of an at-grade embankment could result in changes in hydrology that have long-term indirect impacts on the surrounding aquatic resources. For many of the man-made or manipulated features, indirect impacts would be minor, and hydrologic changes would be minimal. However, for natural features such as seasonal wetlands and vernal pools and swales, the impacts may result in significant changes in the natural hydrological regime. In some areas, the hydroperiod may be either reduced or extended where sheet flow is limited.

Because vernal pools and vernal swales are sensitive to disturbance, where they straddle the project footprints, they could be permanently, albeit indirectly, disturbed, if the underlying layer is disturbed or hydrological sheet flow or rain collection is altered significantly. As described in Section 3.3, Methodology: Impact Calculations, these indirect impacts are categorized and calculated separately to account for these significant and potentially more substantive indirect impacts.

Seasonal riverine features would be spanned on an elevated structure or bridged, so the indirect impacts on seasonal riverine and riparian areas would include the removal of the riparian trees and reduced contribution to and ability to recycle nutrients. Although changes in shading and water temperature may occur, because a bridge or elevated structure would provide more shade than currently provided by the riparian trees, the water temperature would likely be lower. These indirect impacts would affect adjacent aquatic resources up to 250 feet from the project-related disturbances.

6.2 Existing Conditions

The existing conditions of the aquatic resources in the study area were determined through the use of the CRAM and relative condition extrapolation based on feature type and aerial photographic interpretation. This section presents the CRAM scores from the condition assessment as well as an assessment of the direct and indirect impacts to aquatic resources based on relative condition across HST alternatives.

6.2.1 CRAM Results

A total of 42 assessment areas (AAs) were assessed within the Fresno to Bakersfield Section using CRAM. A summary of the CRAM scores for each CRAM wetland type is presented in Table 6-6. Figure 6-1 shows the locations of the CRAM AAs in the Fresno to Bakersfield Section. A complete summary of the CRAM results is provided in Appendix A. The CRAM scores of AAs within the Fresno to Bakersfield Section ranged from 27.8 to 82.7.

Table 6-6
Range of Index and Attribute Scores by CRAM Type and Wetland Type

CRAM Type	Number of AAs	Range of Index Score	Range in Attribute Scores			
			Buffer and Landscape Context	Hydrology	Physical Structure	Biotic Structure
Depressional Wetland	8	31.5–66.2	33–66.7	28.8–45.4	25–75	25–77.8
Retention/Detention Basin and Agriculture Reservoirs	6	31.5–51.6	33–58.3	28.8–37.5	25–62.5	25–69.4
Seasonal Wetland	2	55.1–66.2	66.7–66.7	45.4–45.4	50–75	58.3–77.8
Riverine Wetland	17	27.8–72.9	25–83	25–93	25–75	30.6–72.2
Canal/Ditch	10	27.8–68.3	25–83	25–93	25–62.5	30.6–67
Seasonal Riverine	7	60.5–72.9	50–75	59–77.5	50–75	53–72.2
Individual Vernal Pool	11	56.7–80.9	75–100	55.8–93.3	37.5–75	25–83.3
Vernal Pool System	6	76.7–82.7	75–100	77.8–93.3	66.7–83.3	58.3–70.8

AA assessment area
CRAM California Rapid Assessment Method

6.2.1.1 Depressional Sites

Depressional sites identified in the study area were fundamentally of two types. The first type was agricultural irrigation reservoirs (retention/detention basins). These features yielded very low CRAM scores, reflecting that these sites are created features that function in conjunction with canals and ditches in rather unnatural "watersheds." These reservoirs are largely temporary groundwater storage facilities that function hydrologically as the sources of water (and often as the sources of hydrostatic pressure) for the agricultural irrigation systems of which they are elements. They are highly dynamic, with evidence in some reservoirs of significant fluctuations in water surface elevation over short periods, and have little vegetation. Fundamentally, they are not part of the remnant watersheds in the study area except to the extent that they provide water that may flow in the canal/ditch systems that still retain remnant "watershed" characteristics (e.g., drainage networks that convey rainfall to a watershed low point, generally the Tulare Lake bed) in the study area. Little variation in condition was observed among these features anywhere in the Fresno to Bakersfield Section.

The second type of depressional wetland area identified in the project region was detention/retention basins that function as part of local storm-water management systems. Such features were largely restricted to developed parts of the project alignment. These depressions are typically better vegetated but less hydrologically connected than are the agricultural reservoirs (that is, the primary goal of such features is *not* to release water to regional drainage systems), but they also had low CRAM scores that reflect their low importance to study area watersheds.

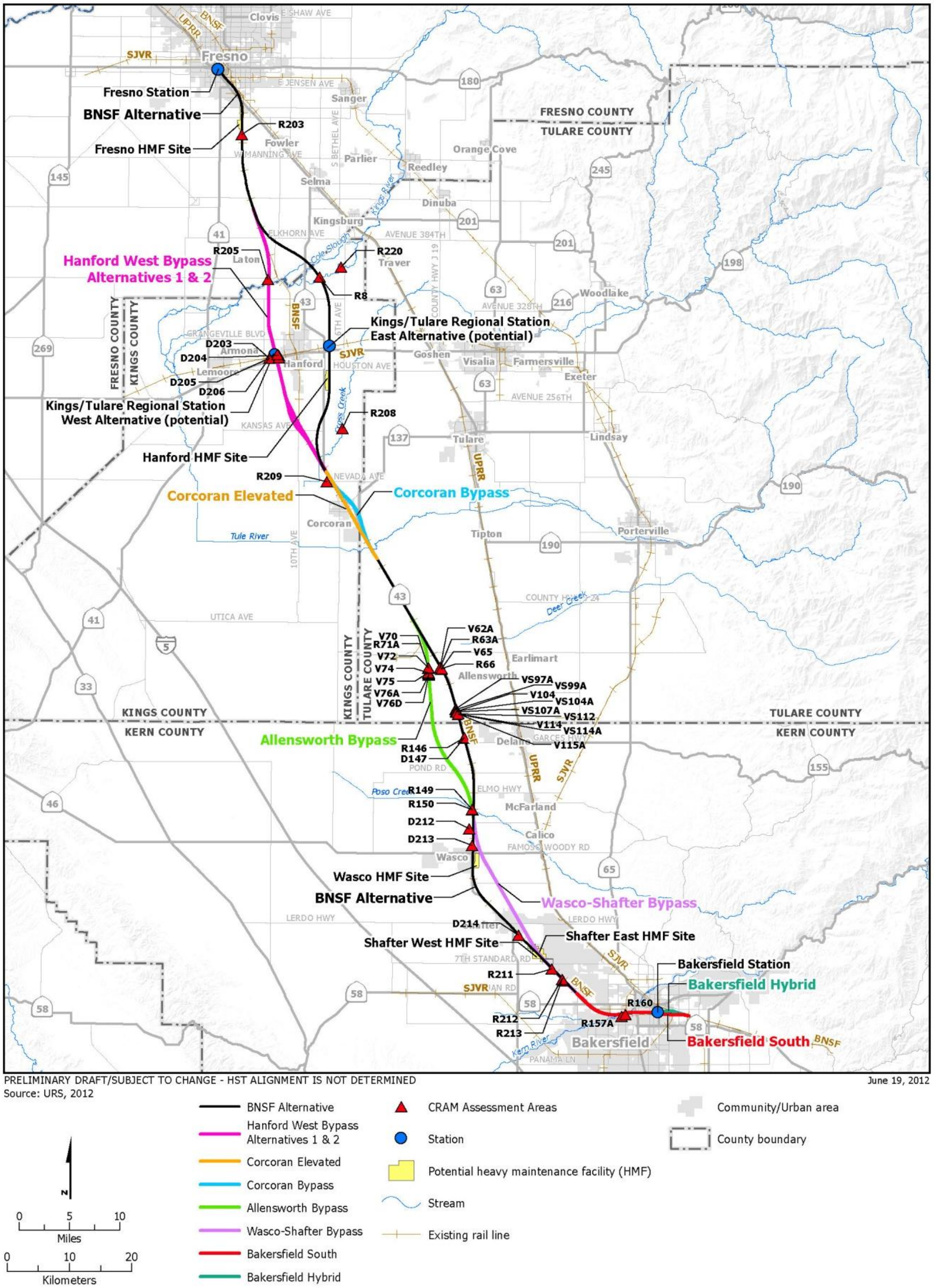


Figure 6-1
CRAM Evaluation along the Fresno to Bakersfield alternatives

These two types of depressional wetlands are indicative of study area watersheds that have substantially altered land uses and hydrology. The low CRAM scores indicate that these watershed elements do not have a high condition status and provide few of the functions that would be expected from depressional wetlands in less-altered watersheds.

Natural depressional wetlands in the Fresno to Bakersfield Section are rare, apparently occurring primarily as a consequence of past fragmentation and the isolation of more natural aquatic features, though some of the shallow natural wetlands in the Allensworth region may be depressional wetlands and are not uncommon in that context. As indicated by the CRAM scores of two "natural" depressional wetlands near Hanford (apparently relicts of a former riverine feature, probably a distributary of the Kings River), such remnants tend to provide better condition indicators, as exhibited by CRAM scores that are significantly higher than those of the created features.

6.2.1.2 Riverine Sites

The conditions presented by canals and ditches are assessed in CRAM using the riverine module, which allows a comparison of the conditions in such features with respect to remnant natural riverine features in the study area. The canals and ditches assessed throughout the Fresno to Bakersfield Section (with two exceptions; see below) yielded scores that were substantially (approximately 20 CRAM points) lower than the scores for remnant natural riverine systems in the project vicinity (the channels of the Kern River, Poso Creek, Cross Creek, and the Kings River). The CRAM scores for the canals and ditches assessed in the study area indicate that these surface water features also do not provide many of the desired conditions found in natural riverine systems for the study area watersheds.

Functionally, the canals and ditches form an alternative hydrological network in lieu of the more natural drainage system that existed before the commitment of virtually all of the study area to agriculture. In a large sense, the conversion has included even the remnant natural water features. All of the natural channels assessed in this study were clearly used as conveyances for artificial (mostly irrigation) water flow in addition to their more natural functions, such as conveying runoff. At the same time, many of the larger canals in the study area showed indications that they function to convey storm water and to deliver irrigation flows.

The low condition scores for canals and ditches arise largely because of the artificiality of the constructed features in a context of highly modified watersheds. Two canals/ditches in Colonel Allensworth State Historic Park exhibited substantially higher CRAM scores than did the majority of artificial features in the Fresno to Bakersfield Section because of the less-altered hydrological conditions in the state historic park. These sites indicate that canals/ditches elsewhere in the study area provide low condition scores because of the regional alteration of watershed patterns, not simply because they are canals and ditches.

Although the condition scores for the remnant natural features in the project alignment are higher than those of most canals and ditches, even the scores of the natural riverine features are not high in comparison with scores from riverine features in less-altered parts of California (based on CRAM scores reviewed at www.cramwetlands.org; see Section 6.4 of Appendix A for a description of the internal standard in CRAM modules that enables inter-regional comparisons among wetlands in each type). The scores indicate that even the least-altered riverine features in the study area provide fewer benefits to aquatic systems than do riverine features in less-disturbed parts of California.

6.2.1.3 Vernal Pool Sites

The CRAM scores for vernal pool wetlands are the highest scores for aquatic features within the Fresno to Bakersfield Section. This result is fully consistent with the occurrence of these wetlands in the least-fragmented remnant watersheds in the study area. The scores suggest that the watersheds in the Allensworth region continue to provide higher levels of various functions than do most of the altered watersheds elsewhere in the study area. The CRAM assessment did not locate aquatic features identifiable as vernal pools in parts of the project alignments that were not in the Allensworth region (nevertheless, vernal pool features that were not identified as vernal pools may exist elsewhere). The CRAM assessment generally concluded that it is unreasonable to assume that vernal pools were not historically widespread in the Tulare Lake Basin and that the scarcity of such features today is a consequence of their elimination as part of the conversion of the regional landscape to agriculture.

The identified condition scores for vernal pool systems are uniformly higher than comparable scores for individual vernal pools. Those who conducted the CRAM assessment are uncertain why this pattern exists, given that individual pools were intermixed with vernal pool systems where vernal pools occurred.

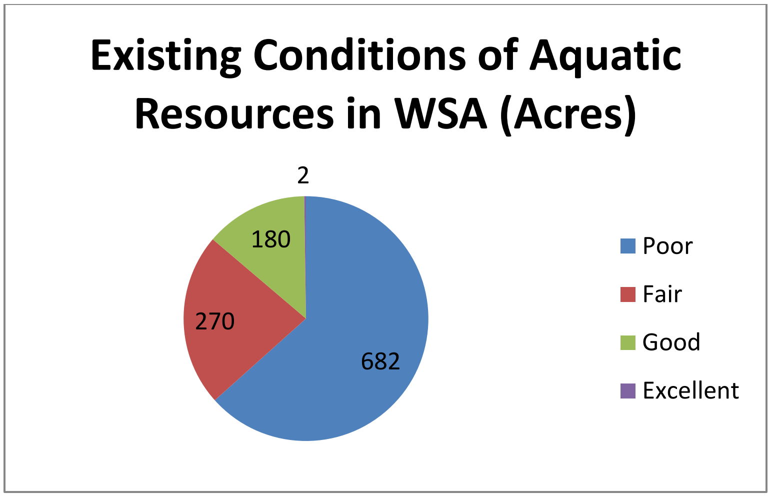
The vernal pools in the Fresno to Bakersfield Section study area are largely lacking in structural patch richness and vernal pool endemic plant species, two metrics that play large roles in calculating the attribute scores for physical structure and biotic structure. Although these metrics capture the conditions of vernal pools in California, they do not seem to account for the unique functions of vernal pools in the study area, which are representative of vernal pools in this region of the Central Valley. Low scores for physical and biotic structure may be indicative of the limitations of CRAM for assessing unique wetland communities.

6.2.2 Relative Condition Impact Assessment

To provide a side-by-side comparison of the direct and indirect impacts on aquatic resources, the relative condition assessment was used to estimate the condition of the aquatic resources that may be affected by the proposed project.

Through the CRAM results and the methods described in Section 3.2, Methodology: Existing Conditions, a relative condition was assigned to all aquatic resources in the study area. The condition of aquatic resources was established using a two-step process. First, the conditions of a representative sample of aquatic features were assessed using the CRAM. Second, the results from the CRAM assessment were extrapolated to provide relative condition values for all aquatic resources in the study area. Aerial photographic interpretation and other factors, including feature type, watershed, and proximity to stressors, were also considered in extrapolating condition scores.

Relative conditions are largely determined by CRAM score, landscape position, and whether the feature has been manipulated (man-made) or occurs in a remnant, un-fragmented landscape. The relative condition of all aquatic resources in the study area (250-foot buffer from footprint) indicated that nearly two-thirds of the aquatic resources in the study are in poor condition, with the remaining third largely split between fair and good conditions, and less than <1% of the aquatic features in excellent condition.



The extrapolation of aquatic resource conditions indicated that wetland feature types do not directly correspond to a single relative condition. As one would expect, based on CRAM results, wetland types exhibit a range of conditions. However, in general, the relative conditions of aquatic resources largely match the anticipated relative condition scores. More clearly, the manipulated or constructed aquatic features are typically in poor condition, with a few features that score higher as fair (or in some rare instances, good). Similarly, the majority of the vernal pool features are in good condition, with relatively few features in fair or excellent condition. Table 6-7 provides a summary of the aquatic resource types, without consideration of watershed or alternative, and the number of features associated with a given relative condition.

Table 6-7
Summary of Aquatic Resource Impacts by Aquatic Type and Relative Condition in the Study Area

Aquatic Resource Type	Relative Condition	Number of Aquatic Features	Notes
Emergent wetland	Poor	1	-—
	Fair	1	Located in Hanford, flow from Guernsey Slough.
	Good	1	Located in Hanford, surrounded by riparian vegetation, supports waterfowl.
Seasonal wetland	Poor	11	Linear features BNSF right-of-way
	Fair	61	—
Vernal pools and swales	Poor	2	1 feature in BNSF right-of-way, 1 feature filled with dumped refuse west of Allensworth
	Fair	97	—
	Good	131	—
	Excellent	5	—

Table 6-7
Summary of Aquatic Resource Impacts by Aquatic Type and Relative Condition in the Study Area

Aquatic Resource Type	Relative Condition	Number of Aquatic Features	Notes
Canals/ditches	Poor	235	—
	Fair	3	Two ditches surrounded by seasonal wetland, one ditch adjacent to vernal pool
	Good	1	Located in Colonel Allensworth State Historic Park, not agricultural ditch
Lacustrine	Poor	179	—
	Fair	5	Four reservoirs, one retention/detention basin surrounded by riparian vegetation
Seasonal riverine[A]	Poor	2	Two sections of Cross Creek
	Fair	11	—
	Good	6	—

Notes:
— = No special note.
[A] The CRAM assessment of seasonal riverine included adjacent riparian areas as part of the AA. Riparian areas are not waters of the U.S. The condition of the riparian areas was assigned based on the condition assigned within the CRAM AA and is the same as the associated seasonal riverine area.

6.2.2.1 Watershed Evaluation

Because the HST alternatives occur in more than one watershed, a comparison of relative condition impacts across multiple watersheds and alternatives is not productive in analysis of the least environmentally damaging practicable alternative. However, a watershed-level evaluation can help identify which watersheds have good and excellent quality habitats that may be affected by the project (as discussed in Section 6.1.1, above). For the purpose of understanding the conditions of the aquatic resources that may be affected by watershed, the range of impacts to aquatic resources in poor, fair, good, and excellent condition are provided to aid in this evaluation (Table 6-8). As described in Section 5.3, Watershed Profile Discussion, watershed conditions across the Tulare Lake Basin and especially the conditions present in the Great Valley are largely similar. Table 6-8 provides the range of potential impacts to the conditions of aquatic resources in each watershed.

Implementation of the Fresno to Bakersfield Section would have no direct or indirect impacts on good quality aquatic resources in the Upper Kaweah, Upper Poso, and, for all practical purposes, the Upper Tule watersheds. Regardless of the alternative ultimately selected, few (to no) direct or indirect impacts to good quality aquatic resources in the Upper Dry Watershed would occur. Impacts to good quality aquatic features would occur in the Tulare–Buena Vista Lakes, Upper Deer–Upper White, and Middle Kern–Upper Tehachapi–Grapevine watersheds. The direct impacts in these watersheds range from a small (the Tulare–Buena Vista Lakes and the Middle Kern–Upper Tehachapi–Grapevine watersheds) to a large (the Upper Deer–Upper White Watershed) loss of good quality aquatic features.

The range of impacts to watersheds arises based on the difference in impacts associated with the HST alternatives. The biggest difference in potential direct impact occurs in the Upper Deer–Upper White Watershed: the difference is approximately 10.89 acres. The range of potential direct impacts associated with the Middle Kern–Upper Tehachapi–Grapevine Watershed is small: less than 0.18 acres difference. The range of potential impacts associated with Tulare–Buena Vista Lakes Watershed is less dramatic than that of the Upper Deer–Upper White Watershed and, depending on HST alternative, may result in a 2.78-acre difference.

The range of potential indirect impacts to good quality aquatic features is greater than 10 acres depending on HST alternative; however, the potential indirect impacts under one alternative may increase potential direct impacts for the same alternative.

More detailed condition impact analyses are provided in Section 7.1, Net Watershed Condition. By removing the watershed layer, a more meaningful comparison of the relative condition impacts by alternative is possible; the removal of this layer allows for both a quantitative comparison (see Section 6.1, Impacts on Aquatic Resources) and a qualitative comparison (Section 6.2.2.2, Alternative Evaluation, below).

Table 6-8
Range of Direct and Indirect Impacts to Relative Condition of Aquatic Resources by Watershed

Watershed	Impact Type	Aquatic Resource Relative Condition			
		Poor	Fair	Good	Excellent
		Range of Impact Acreage (Acres)			
Upper Dry	Direct	5.20–5.28	0.67–1.85	0.00–0.16	—
	Indirect	16.00–16.35	1.12–3.40	0.00–1.15	—
Tulare–Buena Vista Lakes	Direct	31.79–39.29	1.90–2.04	0.53–3.31	—
	Indirect	60.05–72.56	12.34–20.49	8.16–26.50	—
Upper Kaweah	Direct	6.31–14.45	0.00–1.09	—	—
	Indirect	10.38–20.25	1.67–10.5	—	—
Upper Tule	Direct	1.92–4.71	0.67–2.61	—	—
	Indirect	0.44–2.78	3.42–4.56	0.01–0.01	—
Upper Deer–Upper White	Direct	12.84–17.10	9.83–11.75	0.17–11.08	0.00–0.03
	Indirect	70.71–75.18	57.55–82.07	8.66–23.59	0.00–1.50
Upper Poso	Direct	1.42–5.66	0.43–0.99	—	—
	Indirect	3.25–9.47	2.36–4.19	—	—
Middle Kern–Upper Tehachapi–Grapevine	Direct	4.17–4.82	0.00–0.02	2.28–2.46	—
	Indirect	15.39–17.72	0.00–0.84	16.06–27.30	—

6.2.2.2 Alternative Evaluation

The relative condition assessment allows for a comparison between the direct and indirect effects anticipated (as presented in Section 6.1, Impacts on Aquatic Resources) and the potential impacts based on relative condition by alternative. Table 6-9 only includes the potential impact on aquatic resources by a given alternative and does not include or consider the associated watershed or separation by jurisdictional status (waters of the U.S. or CDFG Code 1600 et. seq.). Because the analysis includes riparian area, the actual impact to waters of the U.S, when considering condition alone, is in most cases less than what is presented in Table 6-9. The impacts by condition solely to riparian areas will be presented and evaluated in the *Fresno to Bakersfield Section: Checkpoint C Summary Report* (Authority and FRA 2012e).

This alternative evaluation is important to understand where a quantitatively small impact would affect an excellent or good quality resource versus an alternative that may have slightly higher quantitative impacts but affect a poor quality aquatic resource. Table 6-9 summarizes the direct and indirect impacts associated with each of the Fresno to Bakersfield Section alternatives by condition. In contrast with Table 6-3, this assessment does not include aquatic resource types or jurisdictional status; both Tables 6-8 and 6-9 (and Charts 6-1 through 6-8) only evaluate relative condition (regardless of aquatic resource type).

In general, the focus on impacts is placed on the impacts to aquatic resources that are in excellent or good condition, secondarily on features in fair condition, and lastly on features in poor condition. Similarly, impacts that are direct-permanent are more severe than those that are direct-temporary and those that are indirect-bisected or indirect.

Like Table 6-3, Table 6-9 also uses delta comparison to allow for a quick comparison of the HST alternative alignments. The delta comparison uses the BNSF Alternative, in which the acreage reflects the total impact that would occur along the only end-to-end alternative. To compare the other project alternatives and design options, the table contains two numbers for each of the subsequent alternatives: the first number is the amount of impact anticipated for the given alternative, and the second number is the change (or delta) when compared against the corresponding segment of the BNSF Alternative. Comparison tables differentiate impact acreages between an alternative alignment and its corresponding segment of the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in a larger number of impact acres than its corresponding segment of the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in a smaller number of impact acres than its corresponding segment of the BNSF Alternative.

For example, under the BNSF Alternative, 15.77 acres of good condition aquatic features (waters of the U.S. and riparian areas) would be affected by direct-permanent impacts. Use of the Allensworth Bypass would result in 0.17 acres of direct-permanent impacts, a net decrease of 10.92 acres (i.e., -10.92 acres) when compared with the corresponding area of the BNSF Alternative (BNSF–Through Allensworth).

Table 6-9
Summary of Aquatic Resource Impacts by Aquatic Feature and Relative Condition

Relative Condition	Type of Aquatic Features [a]	BNSF Impact Acreage	Impact Acreage / Difference Compared with Corresponding BNSF Area [b]									
			Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
Direct-Permanent Impacts												
Poor	Seasonal wetland, Vernal Pools and Swales, Canals/Ditches, Lacustrine, Seasonal riverine	70.38	15.11 / +4.80	13.78 / +3.47	11.68 / +1.37	10.35 / +0.04	13.29 / -5.70	12.01 / -6.99	11.64 / -5.34	4.78 / -3.28	4.10 / -0.01	4.79 / +0.68
Fair	Seasonal wetland, Vernal Pools and Swales, Lacustrine, Seasonal riverine, Riparian	14.77	0.96 / +0.23	0.83 / +0.11	0.94 / +0.22	0.81 / +0.09	1.76 / -0.43	2.00 / -0.19	11.89 / +1.27	—	—	—
Good	Vernal Pools and Swales, Canals/Ditches, Seasonal riverine, Riparian	15.77	0.41 / -2.83	0.41 / -2.83	0.41 / -2.83	0.41 / -2.83	—	—	0.17 / -10.92	—	1.29 / -0.17	1.29 / -0.17
Excellent	Vernal Pools and Swales	0.03	—	—	—	—	—	—	— / -0.03	—	—	—
Direct-Temporary Impacts												
Poor	Seasonal wetland, Canals/Ditches, Lacustrine	11.05	0.11 / -0.39	0.11 / -0.39	0.21 / -0.29	0.21 / -0.29	0.90 / +0.02	4.57 / +3.69	2.45 / +1.11	1.16 / -1.46	2.93 / -0.18	2.89 / -0.23
Fair	Seasonal wetland, Seasonal riverine, Riparian	0.87	1.05 / +1.05	1.05 / +1.05	1.05 / +1.05	1.05 / +1.05	—	0.61 / +0.61	0.27 / +0.08	—	— / -0.02	— / -0.02
Good	Seasonal riverine, Riparian	1.09	0.28 / +0.20	0.28 / +0.20	0.28 / +0.20	0.28 / +0.20	—	—	—	—	0.99 / -0.02	1.01 / -<0.01
Excellent	N/A	—	—	—	—	—	—	—	—	—	—	—
Indirect-Bisected Impacts												
Poor	N/A	—	—	—	—	—	—	—	—	—	—	—
Fair	Vernal Pools and Swales	11.24	—	—	—	—	4.76 / -0.73	— / -5.49	0.32 / -4.29	—	—	—
Good	Vernal Pools and Swales	12.35	—	—	—	—	—	—	1.41 / -10.93	—	—	—
Excellent	Vernal Pools and Swales	0.30	—	—	—	—	—	—	— / -0.30	—	—	—
Indirect Impacts [c]												
Poor	Emergent wetland, Seasonal wetland, Vernal Pools and Swales, Canals/Ditches, Lacustrine, Seasonal riverine, Riparian	193.41	28.93 / +10.36	22.81 / +4.25	29.50 / +10.93	23.38 / +4.82	30.38 / +8.22	22.07 / -0.09	88.39 / -4.52	12.34 / -7.21	16.79 / -1.98	16.22 / -2.56
Fair	Emergent wetland, Seasonal wetland, Vernal Pools and Swales, Canals/Ditches, Lacustrine, Seasonal riverine, Riparian	101.49	5.17 / +1.17	4.34 / +0.34	16.19 / +12.19	15.37 / +11.36	5.88 / +0.99	6.38 / +1.50	59.04 / -22.07	—	<0.01 / -0.84	<0.01 / -0.84

Table 6-9
Summary of Aquatic Resource Impacts by Aquatic Feature and Relative Condition

Relative Condition	Type of Aquatic Features [a]	BNSF Impact Acreage	Impact Acreage / Difference Compared with Corresponding BNSF Area [b]									
			Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
Good	Emergent wetland, Vernal Pools and Swales, Canals/Ditches, Seasonal riverine, Riparian	65.06	9.31 / -17.19	9.31 / -17.19	9.31 / -17.19	9.31 / -17.19	0.01 / 0.00	0.01 / 0.00	7.25 / -3.99	—	16.07 / -11.23	16.06 / -11.24
Excellent	Vernal Pools and Swales	1.20	—	—	—	—	—	—	— / -1.20	—	—	—
Totals												
Total poor		274.84	44.15 / +14.77	36.71 / +7.32	41.40 / +12.01	33.95 / +4.57	44.56 / +2.54	38.64 / -3.38	102.47 / -8.74	18.28 / -11.94	23.83 / -2.18	23.90 / -2.11
Total fair		128.37	7.17 / +2.45	6.22 / +1.49	18.18 / +13.46	17.23 / +12.50	12.39 / -0.17	8.99 / -3.57	71.53 / -25.01	—	— / -0.86	— / -0.86
Total good		94.26	10.00 / -19.82	10.00 / -19.82	10.00 / -19.82	10.00 / -19.82	0.01 / 0.00	0.01 / 0.00	8.83 / -25.84	—	18.35 / -11.41	18.35 / -11.41
Total excellent		1.53	—	—	—	—	—	—	— / -1.53	—	—	—

Notes:

— = No impact or not applicable

[a] Impacts include both waters of the U.S. and Riparian Areas. This leads to an overestimation of the total impacts by condition to waters of the U.S. (wetlands and other waters of the U.S).

[b] The "Difference Compared with Corresponding BNSF Area" represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in a larger number of impact acres than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in a smaller number of impact acres than its corresponding segment in the BNSF Alternative.

[c] Indirect impacts are calculated within a 250-foot buffer of the project footprint, which includes areas of permanent and temporary impacts. Impact calculations in this table include alignment alternatives and station alternatives, but do not include the HMF site alternatives.

All impacts were calculated based on the 15% engineering design construction footprint.

Another way to look at the differences in impacts between existing conditions by alternative is in graph form. Chart 6-1 shows the total acreage of direct and indirect impacts for each alternative, including the corresponding segment of the BNSF Alternative, color-coded by existing condition. The chart includes HST segments that are common to all alternatives (Fresno, Pixley, and Monmouth). The BNSF Alternative is presented through the use of segments that compose the BNSF (Fresno, Hanford, Through Corcoran, Pixley, Through Allensworth, Through Wasco-Shafter, Monmouth, and Bakersfield North).

Total impacts (including direct and indirect impacts) by acreage and existing conditions are largely similar for the alternative alignments within the same geographic area; however, differences in impact acreage and existing conditions are present. Excellent condition features only exist in small quantities, in the Allensworth area (in the Upper Deer–Upper White Watershed). The Allensworth area also has more acreage of aquatic features, including those in good condition (vernal pools and swales, Deer Creek, and Poso Creek), than any of the other geographic areas. The Bakersfield and Hanford areas also contain aquatic resources in good condition—primarily those associated with King River Complex, seasonal wetlands, and the Kern River. All of the impacted features in the Wasco-Shafter area are in poor existing condition.

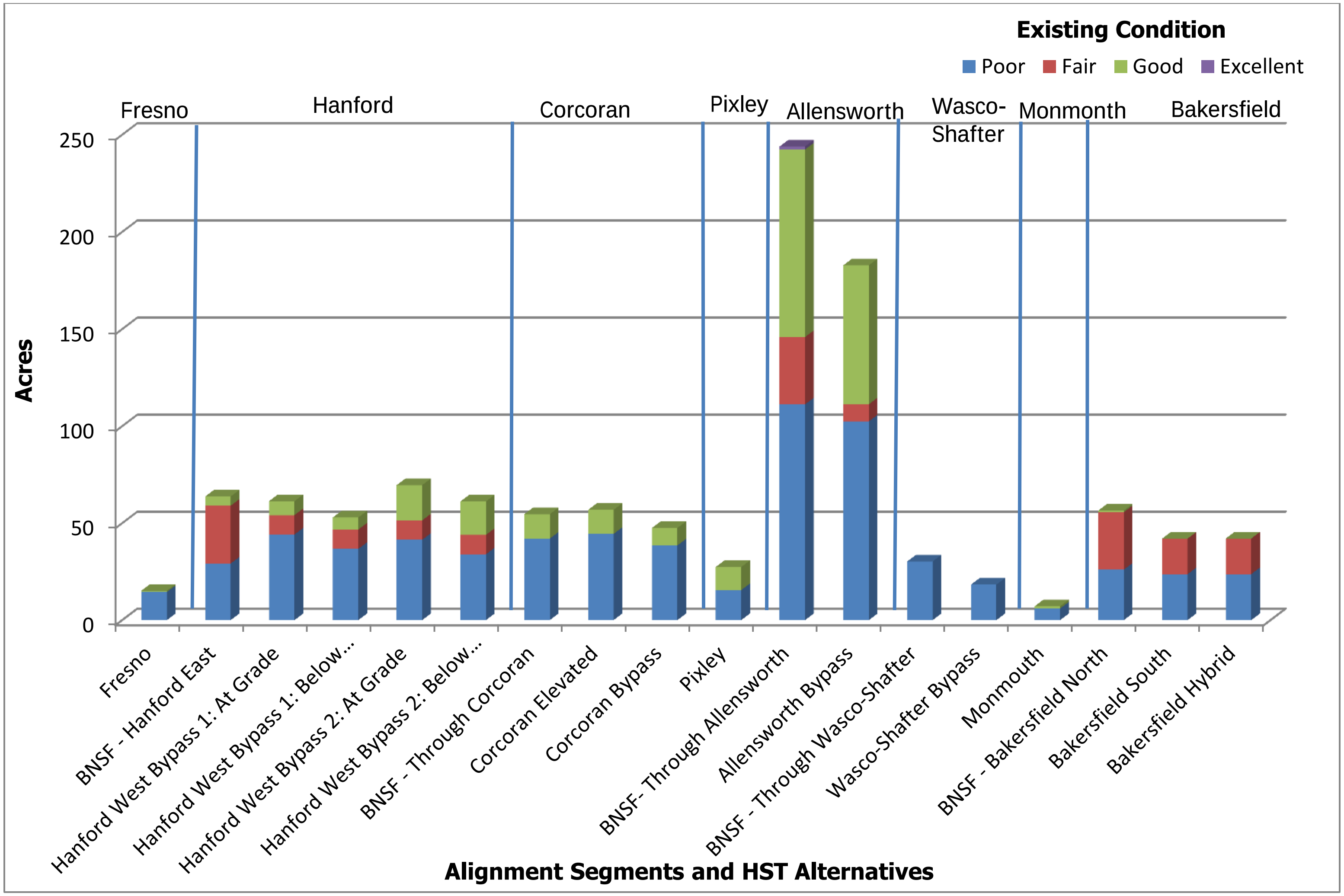


Chart 6-1
Existing Condition of Aquatic Features by Alternative

6.2.3 Stressors

In addition to calculating an overall condition score and attribute scores, CRAM includes a stressor checklist. A stressor is defined in the CRAM User's Manual as "an anthropogenic perturbation within a wetland or its setting that is likely to negatively impact the functional capacity of a CRAM Assessment Area" (CWMW 2012). The stressor checklist is used to account for low CRAM scores by identifying specific impacts on the landscape, hydrology, physical, or biotic structure of an aquatic feature. In some cases, a single stressor may be the primary cause of low-scoring conditions, though conditions are usually caused by interactions among multiple stressors (EPA 2002). The same stressors also influence and affect relative condition classification.

A number of stressors were identified during CRAM field work. Table 6-10 summarizes the stressors identified by each CRAM wetland type. No strong correlation of CRAM scores and the number of stressors was found among the aquatic features assessed in the Fresno to Bakersfield Section. A weak correlation (-0.15) supports the assumption that features with lower CRAM scores are subjected to more stressors, though many low-scoring features had few stressors.

The CRAM assessment concluded that the low-scoring man-made and manipulated features (canals/ditches, lacustrine) are a direct result of anthropogenic influences (i.e., these features are the stressors for natural watershed conditions in the project area). However, when CRAM scores and the numbers of stressors are compared for "natural" features only, the correlation remains weak. The CRAM assessment concluded that the effects of stressors throughout the project area have overwhelmed the potential relationships among stressors and natural aquatic systems, as a consequence of the regional conversion of the land use pattern to one completely dominated by agriculture, urban development, and transportation corridors with few remnants of natural hydrological/wetland systems. The most common stressors (presence of dike/levee, transportation corridor, adjacent to an orchard/nursery) are present throughout the Fresno to Bakersfield Section and affect all types of aquatic features to the extent that statistical relationships among stressors and condition scores are not observable.

Table 6-10
Most Common Stressors Affecting CRAM Wetland Types

CRAM Wetland Type	Attribute	Stressor
Depressional	Buffer and landscape context	Orchards/nurseries, row crop agriculture, industrial and commercial, and transportation corridor
	Hydrology	Actively managed hydrology
	Physical structure	Trash/refuse
	Biotic structure	Pesticide application/vector control, and human visitation
Riverine	Buffer and landscape context	Orchards/nurseries, Transportation corridor, dryland farming and row crop agriculture
	Hydrology	Dikes/levees, actively managed hydrology, and non-point source discharges
	Physical structure	Vegetation management, trash, refuse, excessive sediment from watershed, plowing discing, and grading and compaction.
	Biotic structure	Pesticide application/vector control, excessive human visitation, and treatment of non-native vegetation

Table 6-10
Most Common Stressors Affecting CRAM Wetland Types

CRAM Wetland Type	Attribute	Stressor
Vernal pools	Buffer and landscape context	Transportation corridor, dryland farming, and orchards/nurseries
	Hydrology	Dikes/levees, and flow obstructions
	Physical structure	Grading/compaction, and trash/refuse
	Biotic structure	Few stressors identified

CRAM = California Rapid Assessment Method

6.3 Post-Project Condition

A post-project condition assessment for the various aquatic features in the Fresno to Bakersfield alternatives was conducted using construction and project footprint information coupled with a set of projections made for each design feature, as described in Section 3.4, Methodology: Post-Project Conditions. This section provides a comparison of the post-project conditions by alternative. This analysis is useful to understand the potential changes that would result from the construction and operation of the Fresno to Bakersfield Section.

The post-project condition includes five potential condition categories: does not exist, fair, poor, good and excellent. The acreages associated with each classification are based on the total acreage affected by the four types of the potential project impacts: direct-permanent, direct-temporary, indirect-bisected, and indirect.

Aquatic resources assigned a post-project condition of "does not exist" are expected to experience fill and would be lost through construction and implementation of the project. These adverse and significant impacts would occur as a result of direct-permanent impacts and as a result of direct-temporary impacts associated with the loss of sensitive features, such as vernal pools and swales (as described in Section 3.3, Methodology: Impact Calculations, all direct-temporary impacts to vernal pools and swales are considered direct-permanent impacts). Some features that are associated with direct-permanent impacts would experience a reduction in relative condition as a result of construction elements that would allow the resource or feature to remain. For example, the construction of an elevated structure or bridge structure over seasonal riverine features (as is the case throughout the project area) would only cause a reduced condition.

The other post-project condition classifications (poor, fair, good, and excellent) would result from a combination of potential construction and operations impacts, including direct-temporary, indirect-bisected, and indirect. Aquatic features in areas of direct-temporary impacts would be temporarily lost during construction and may experience fill. However, following the completion of construction, these features would be restored. In some instances (i.e., for man-made and manipulated features), aquatic features would be restored to the pre-project or existing condition. In other situations (i.e., for natural features), these features would be restored but their overall condition would be reduced. Because vernal pools and swales that experience indirect-bisected impacts are expected to experience significant impacts, these features are expected to be in poor condition after construction. The post-project condition of features in areas of indirect impact would vary depending on the resource considered: for man-made or manipulated features, indirect impacts are not expected to result in a change in condition, whereas for natural features, indirect impacts may result in a reduction in condition.

The focus of the post-project evaluation in this section is the conversion of features from good or excellent condition class to lesser condition classes. In this sense, the evaluation is weighted, with the most important part of the post-project condition assessment being those features that converted to the "does not exist" condition. Secondary focus and analysis are placed on the conversion of good or excellent aquatic features to a lesser condition class.

6.3.1 Comparison by HST Alternative

This section discusses the post-project condition of aquatic resources associated with each of the potential alternatives within a given geographic area. The post-project condition is presented first for the common components and then for potential alternatives within distinct geographic areas. In each section, a chart is provided to show the acreage of aquatic features within each post-project condition category for the various alternatives. The charts also use coloring to show the existing condition, which allows one to determine whether the condition of the aquatic features has changed as a result of the project. Table 6-2 lists the various BNSF Alternative segments, the corresponding alternatives, and the common components.

6.3.1.1 BNSF Alternative

As the only end-to-end alternative from Fresno to Bakersfield, the existing relative condition scores of aquatic features within the BNSF Alternative range from poor to excellent, with most features being in poor condition and few features in good or excellent condition. As depicted in Chart 6-2, after project construction, some of the features in good condition would be lost and their post-project condition would be "does not exist." The majority of the good and excellent features would be reduced to fair or poor condition under this alternative. This chart does not provide a comparison with other HST alternatives; instead, it shows the amplitude of potential project impacts with which the least environmentally damaging practicable alternative may subsequently be compared.

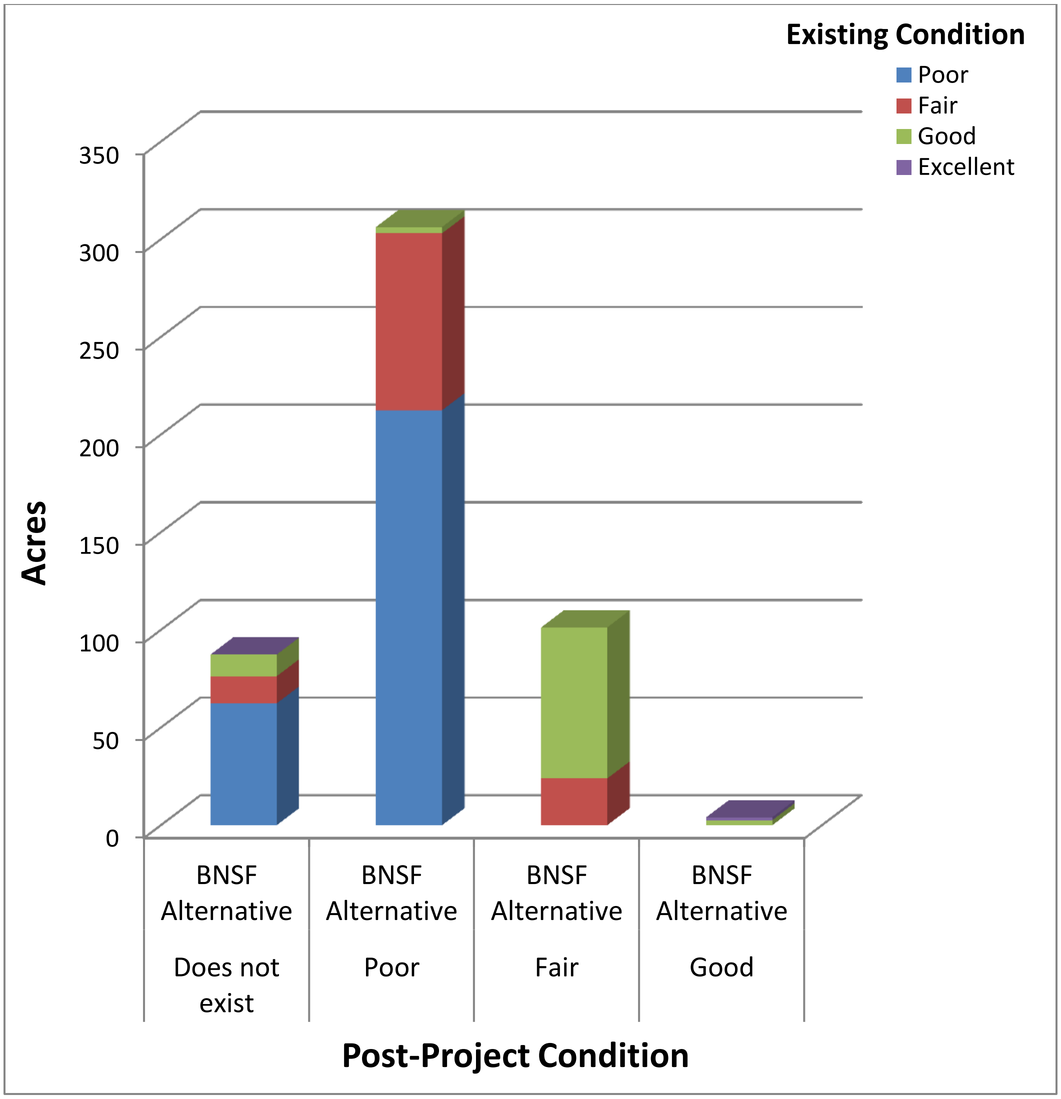


Chart 6-2
Post-Project Condition of BNSF Alternative

All aquatic resource types are represented in the BNSF Alternative; those features that are in good and excellent condition associated with the BNSF Alternative include riparian areas (not USACE jurisdictional), seasonal riverine, canals/ditches, and vernal pool and swale resources.

6.3.1.2 Common Components

Because the common components have no alternatives, the impacts associated with the construction and operation of these components will be a part of the project regardless of the alternatives ultimately selected. As depicted in Chart 6-3, all aquatic features within the common components have an existing condition of poor or fair. In the Fresno segment, features in fair condition will be reduced to poor condition. In the Pixley segment, these features will be reduced to poor condition or will no longer exist. All of the features in fair condition in the Monmouth segment are expected to remain in fair condition. In all three of these segments, most features with an existing condition of poor will remain in poor condition, but some features will no longer exist.

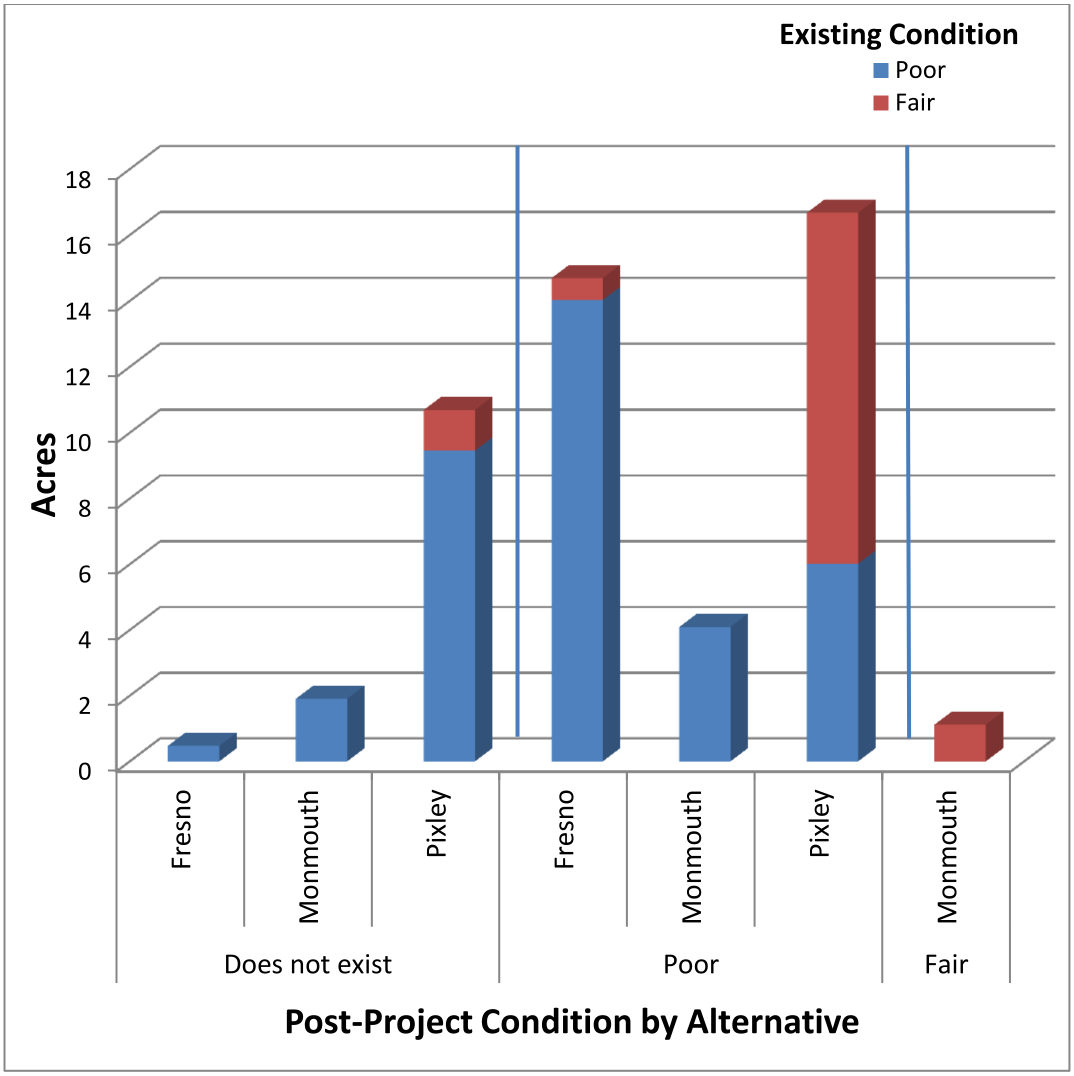


Chart 6-3
Post-Project Condition of Common Components

6.3.1.3 Hanford Alternatives

The Hanford alternatives (the Hanford West Bypass 1 and 2 alternatives) would collectively affect canals/ditches, emergent wetland, lacustrine, riparian (not USACE jurisdictional), seasonal riverine, and seasonal wetland aquatic resources (Section 6.1, Impacts on Aquatic Resources). The existing condition scores of aquatic resource features within these alternatives range from poor to good, with most features in poor condition. After the completion of project construction, riparian and seasonal riverine features in good condition would be reduced to fair condition.

Chart 6-4 provides a comparison of the post-project condition for aquatic features in the five Hanford alternatives (BNSF–Hanford East segment, Hanford West Bypass 1 Alternative at-grade option, Hanford West Bypass 1 Alternative below-grade option, Hanford West Bypass 2 Alternative at-grade option, and Hanford West Bypass 2 Alternative below-grade option). Chart 6-4 illustrates the changes from the existing conditions. The BNSF–Hanford East segment has the largest acreage of aquatic features with an existing condition of good; all of these features would be reduced to a post-project condition of either fair or poor. The reduction in condition from good to a lesser condition class would occur due to direct-permanent impacts on the various seasonal riverine features (primarily those belonging to the Kings River complex). These features would be reduced but not removed because they would be spanned by a bridge structure. In the Hanford West Bypass alternatives, some features in good condition would remain in good condition because of buffered indirect impacts to emergent wetlands, whereas others would be reduced to fair or poor condition because, as described in Table 6-5 (see Section 6.1.2, Alternative Evaluation), the Kings River complex would be crossed on an elevated structure. The acreage of features reduced from fair to poor is similar across all of the Hanford alternatives except the Hanford West Bypass 2 Alternative, where more features with an existing condition of fair remain in fair condition in the post-project condition.

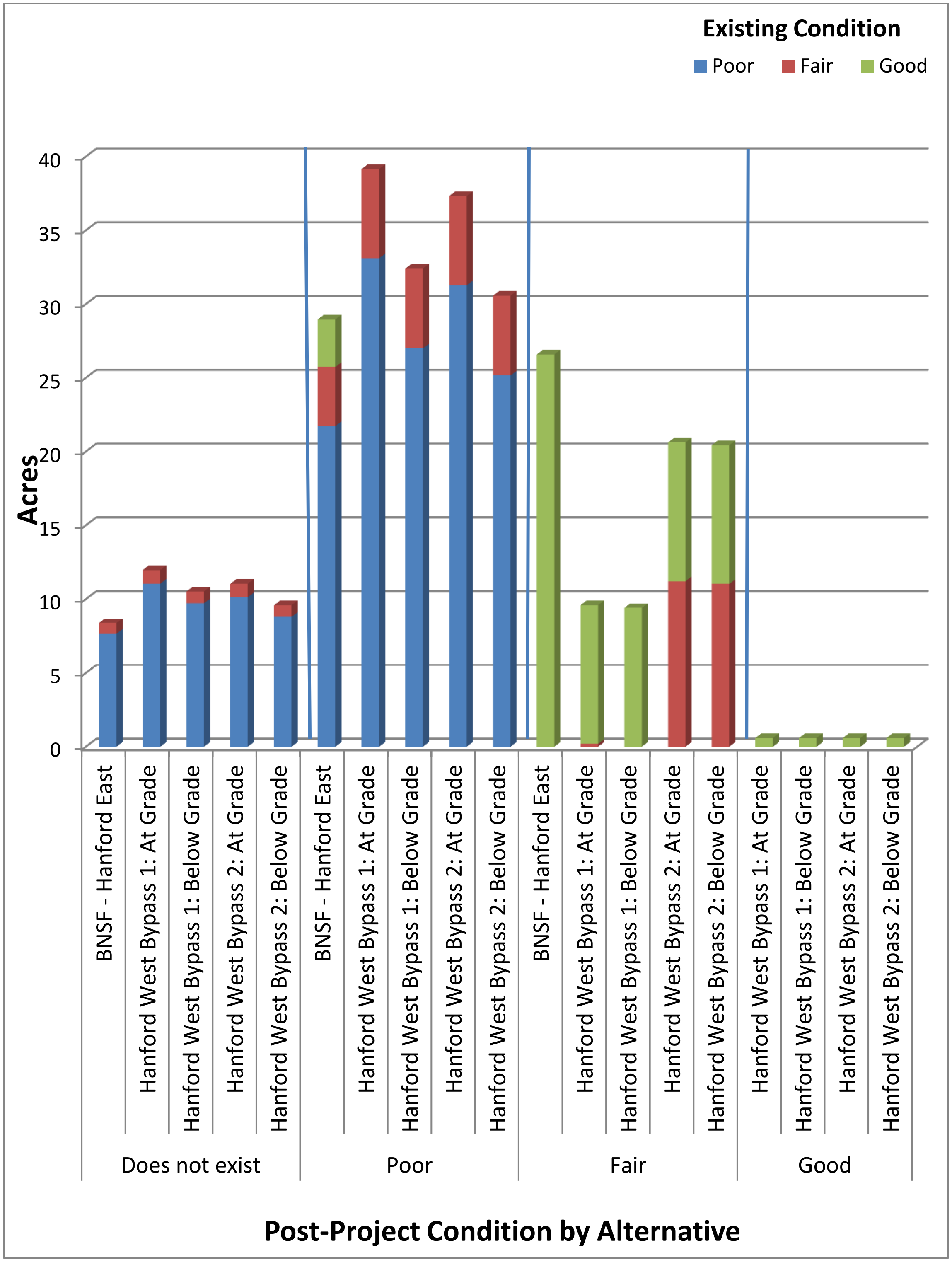


Chart 6-4.
Post-Project Condition of Hanford Alternatives

6.3.1.4 Corcoran Alternatives

The three Corcoran alternatives (BNSF–Through Corcoran segment, Corcoran Elevated Alternative, and Corcoran Bypass Alternative) collectively affect canals/ditches, lacustrine, riparian, seasonal riverine, seasonal wetland, and vernal pools and swales (Table 6-3). The existing condition of aquatic features in the Corcoran area ranges from poor to good, though the majority of aquatic features are in poor condition, and only 0.01 acres are in good condition.

The post-project conditions and the changes in condition for aquatic features are similar for all of the Corcoran alternatives (Chart 6-5). After the completion of project construction, features in good condition (totaling 0.01 acres) would be the reduced to fair condition in all Corcoran alternatives because these impacts would occur in an area where all three alternatives are in close proximity and are essentially the same. Nearly all aquatic features in fair condition, including vernal pools and swales, would be reduced to poor condition or would be removed through the placement of fill and would no longer exist (i.e., post-project condition would be "does not exist").

Although the impacts are generally similar for the Corcoran alternatives, the BNSF-Through Corcoran segment and the Corcoran Elevated Alternative have more acreage that would be lost and more features converted from fair to "does not exist" than the Corcoran Bypass Alternative. The Corcoran Bypass Alternative has the smallest amount of loss (conversion to "does not exist") of fair condition aquatic features.

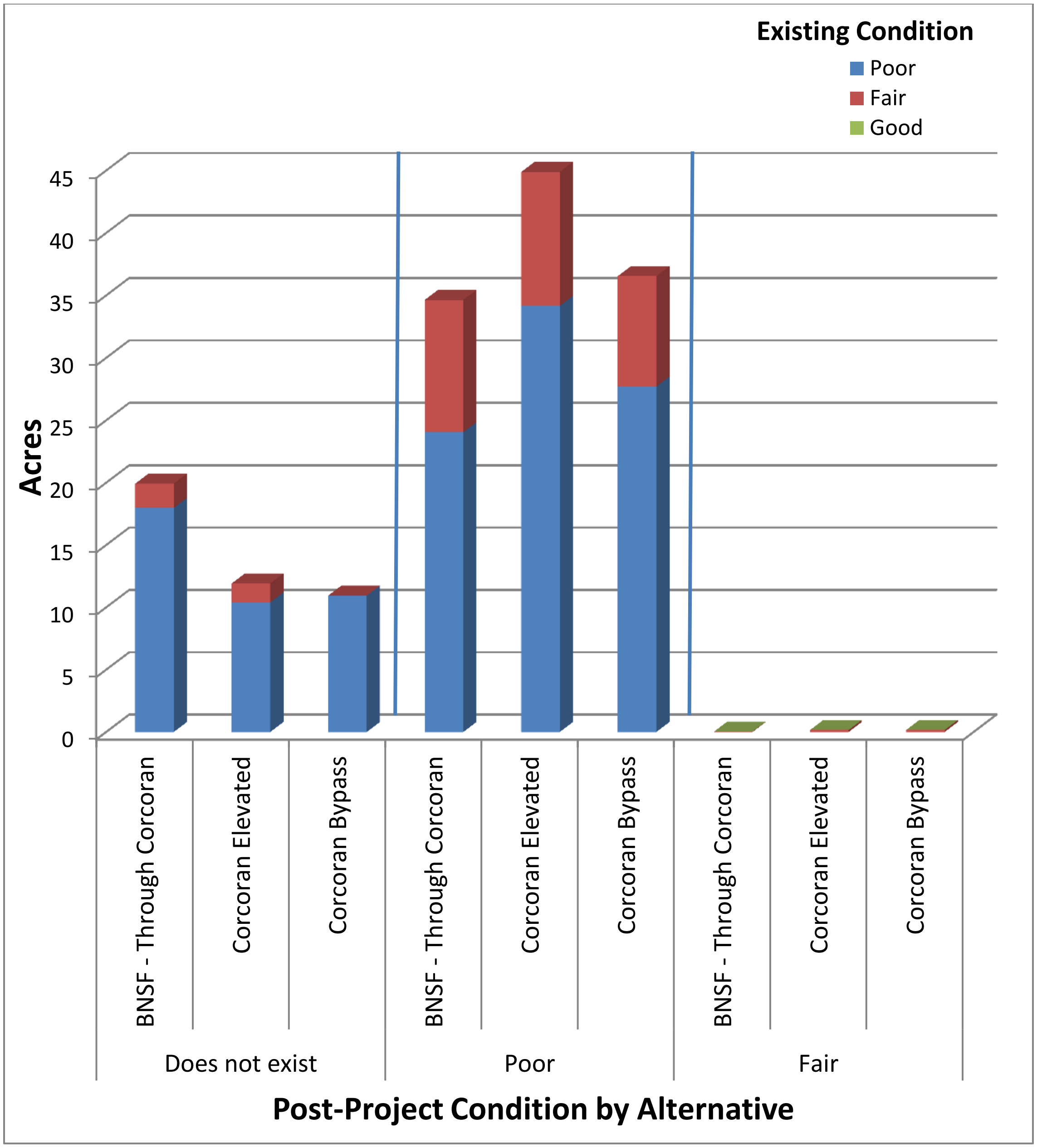


Chart 6-5.
Post-Project Condition of Corcoran Alternatives

6.3.1.5 Allensworth Alternatives

The Allensworth alternatives affect canals/ditches, lacustrine, riparian, seasonal riverine, seasonal wetland, and vernal pools and swales (Table 6-3). The existing condition of these aquatic features ranges from poor to excellent. Both the BNSF–Through Allensworth segment and the Allensworth Bypass Alternative contain more good quality features than any other groups of alternatives (Hanford, Corcoran, Wasco-Shafter, and Bakersfield). A small acreage of excellent features and a significant acreage of good features are associated with the BNSF–Through Allensworth segment. These features are associated with areas of alkali desert scrub that have not been recently disturbed and in many cases are protected as part of the Allensworth Ecological Reserve. The aquatic resources associated with these good and excellent conditions are vernal pools and swales. Although vernal pools and swales are present in the Allensworth Bypass Alternative and some of these features are in good condition, many are in fair condition—likely as a result of the stressors associated with the adjacent land uses (e.g., orchards, dry land farming).

After the completion of project construction, aquatic features in excellent and good condition would be lost (post-project condition would be "does not exist") or reduced in quality to poor or fair condition (Chart 6-6). The Allensworth Bypass Alternative would have fewer aquatic features in good condition removed or lost and consequently converted to a post-project condition of "does not exist." Therefore, fewer features in good condition would be reduced to poor condition than in the BNSF–Through Allensworth segment.

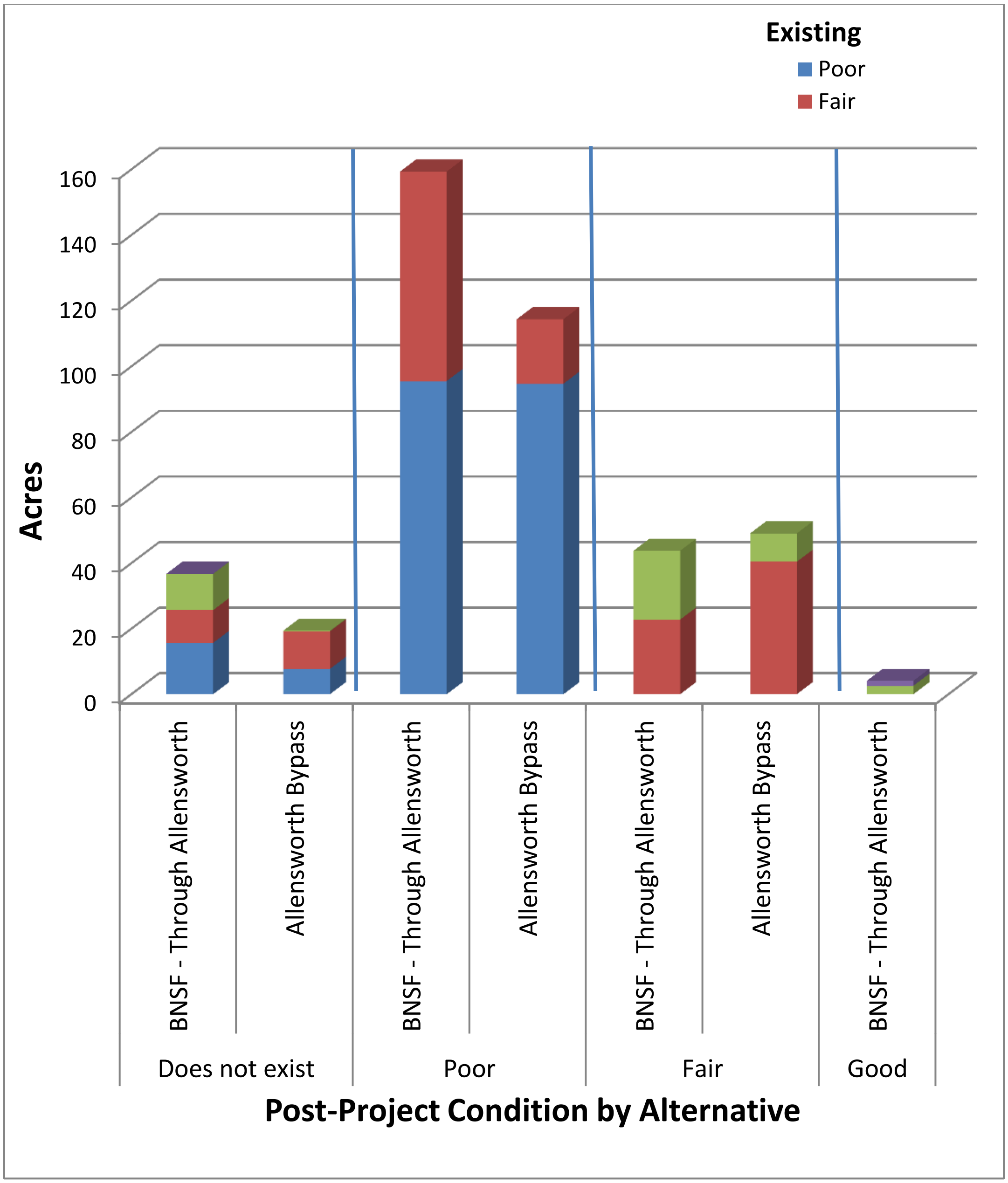


Chart 6-6
Post-Project Condition of Allensworth Alternatives

6.3.1.6 Wasco-Shafter Alternatives

A relatively small acreage of two aquatic feature types, canals/ditches and lacustrine, would be affected by the two Wasco-Shafter alternatives (BNSF–Through Wasco-Shafter segment and Wasco-Shafter Bypass Alternative) (Table 6-3). All of the aquatic features in the Wasco-Shafter area are in poor condition.

The BNSF-Through Wasco-Shafter segment would convert more features in poor condition to a "does not exist" condition as a result of construction and project fill activities than the Wasco-Shafter Bypass Alternative (Chart 6-7). Aquatic features in both alternatives would experience direct-temporary and indirect impacts that are not expected to change the existing poor condition of the resources after construction. However, the BNSF–Through Wasco-Shafter segment would subject a greater amount of poor quality aquatic features to direct-temporary and indirect impacts than the Wasco-Shafter Bypass Alternative.

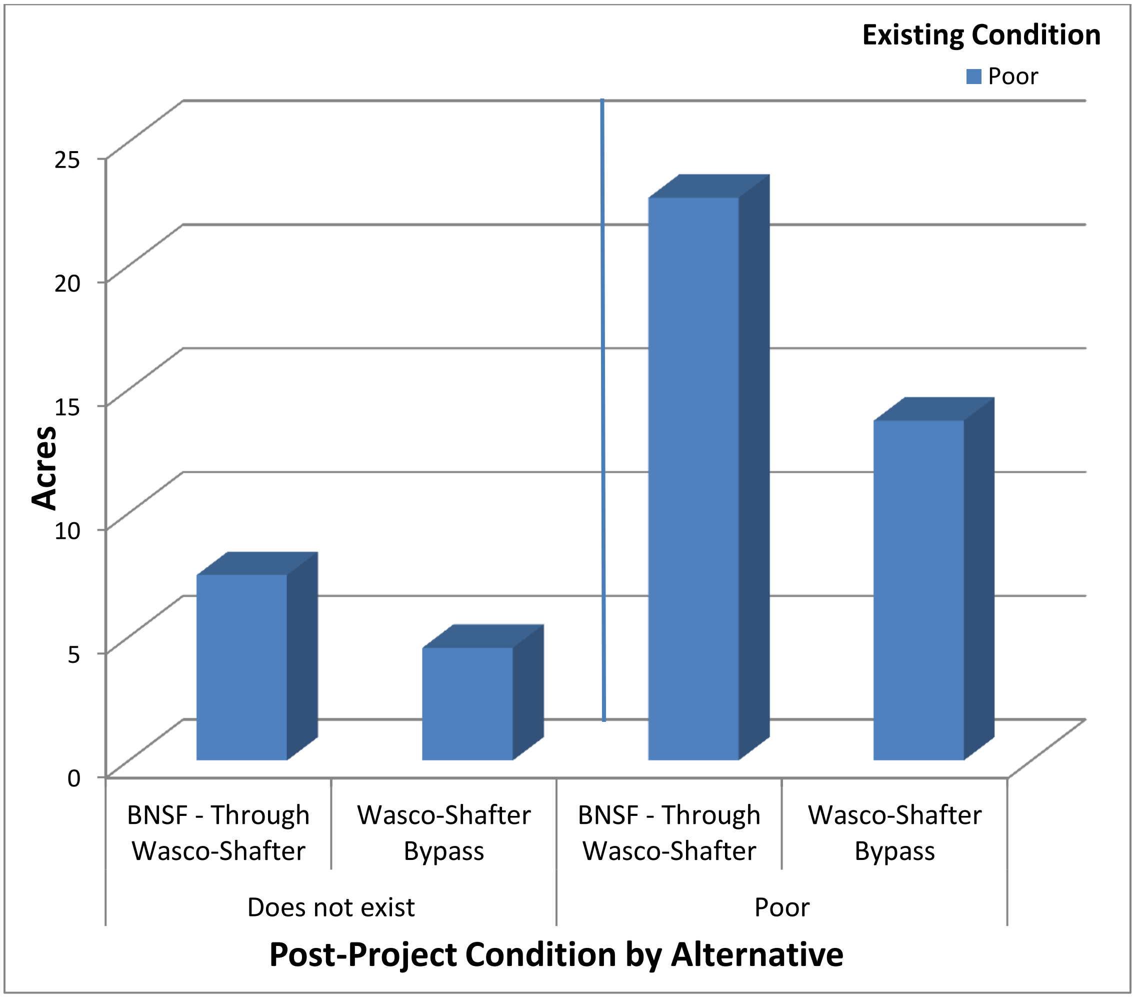


Chart 6-7
Post-Project Condition of Wasco-Shafter Alternatives

6.3.1.7 Bakersfield Alternatives

The three Bakersfield alternatives (BNSF–Bakersfield North segment, Bakersfield South Alternative, and Bakersfield Hybrid Alternative) would collectively affect canals/ditches, emergent wetland, lacustrine, riparian, seasonal riverine, and seasonal wetland features (Table 6-3). The Bakersfield alternatives contain aquatic features in poor, fair, and good condition. The acreages of poor and good features are almost equal; however, few aquatic features are in fair condition (Chart 6-8). For all of the Bakersfield alternatives, the good quality aquatic resources would be reduced to fair condition, but no good quality aquatic features would be lost (i.e., post-p0roject condition of "does not exist") as the result of this project. The aquatic resources that are in good condition include both riparian and seasonal riverine, primarily associated with the Kern River. As described in Table 6-5, an elevated structure would be built to cross the Kern River and the quality or condition of the river may experience some reduction as a result of project direct-temporary or indirect impacts. The reduced conditions associated with the Kern River are the same for the Bakersfield South and Bakersfield Hybrid alternatives. Both the Bakersfield South and the Bakersfield Hybrid alternatives have fewer good condition features that would be converted to fair than the BNSF–Bakersfield North segment.

All Bakersfield area alternatives would convert a small amount of fair quality features to poor condition due direct-temporary and/or indirect impacts. However, the BNSF–Bakersfield North segment would convert slightly more than the other two alternatives (Bakersfield South and Bakersfield Hybrid alternatives). Similarly, all of the Bakersfield area alternatives would change the poor condition features to a condition of "does not exist." Generally, all three Bakersfield area alternatives are similar, but the BNSF–Bakersfield North segment would have higher acreages with a post-project condition of poor and fair due to its overall greater number of impacts (Chart 6-8).

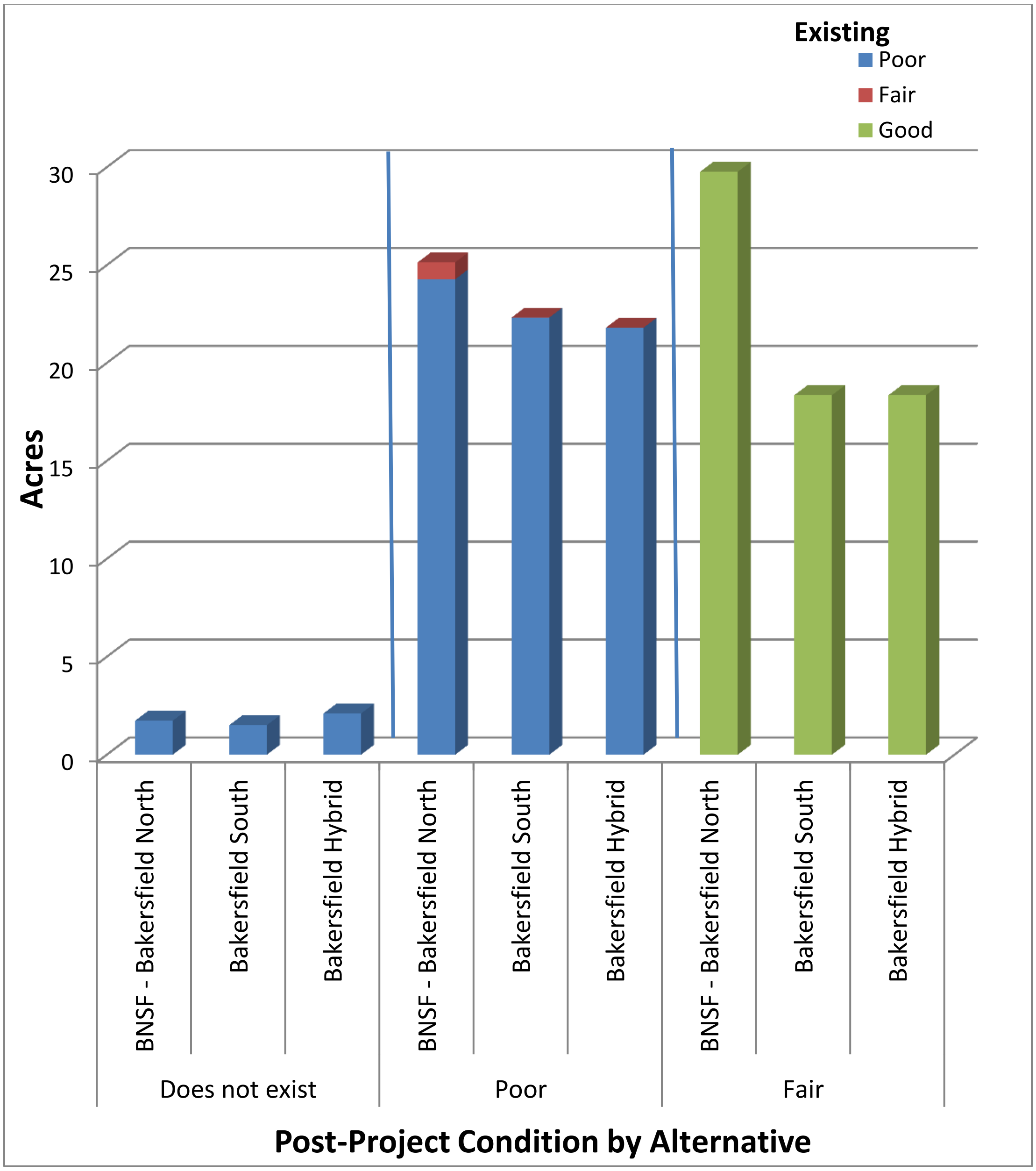


Chart 6-8
Post-Project Condition of Bakersfield Alternatives

6.4 Compensatory Mitigation

Compensatory mitigation for adverse impacts to aquatic resources will be determined in consultation with the USACE and in part through the assessment of the aquatic resource conditions (including functions and values) that would be lost or impaired through construction and operation of the Fresno to Bakersfield Section of the HST System. Compensatory mitigation will preserve, create, and/or enhance aquatic resource conditions, functions, values, and services.

The USACE requires compensatory mitigation of impacts to aquatic resources using a watershed approach in accordance with the 2008 Mitigation Rule. Where watersheds have been highly modified and highly fragmented, as many are in the San Joaquin Valley, the function and value of wetlands may better be restored if sites are chosen on the basis of quality, location, size, and connectivity—even if this site selection means mitigating outside of a given watershed. The preamble to the 2008 Mitigation Rule recognizes the challenges of mitigating impacts in the same watershed for linear projects. District engineers have the flexibility to allow compensation for linear projects to be conducted on one or multiple sites, based on environmentally preferable and practicable compensatory mitigation options. For linear projects, such as the Fresno to Bakersfield Section, district engineers may determine that consolidated compensatory mitigation projects provide appropriate compensation for the authorized impacts and are environmentally preferable to requiring numerous small permittee-responsible compensatory mitigation projects in a number of watersheds along the linear project corridor.

The USACE recently released guidance on the method used to determine mitigation ratios for different mitigation scenarios. This guidance is published in the *Standard Operating Procedure for Determination of Mitigation Ratios* (USACE 2012). Under these guidelines, mitigation ratios are determined through a standardized procedure that compares project impacts to proposed mitigation sites both quantitatively and qualitatively. Under this guidance, impacts to aquatic resources are evaluated based on their size, location, and type (or type conversion). Furthermore, proposed mitigation sites are also evaluated based on their size, location, and type (or type conversion) as well as their certainty of success and any temporal losses. Impact areas and mitigation sites are compared using CRAM evaluations or other more qualitative methods. Numerical or categorical values are assigned to the results of these evaluations and are used to calculate the required mitigation ratio. The guidelines establish a preference for onsite and in-kind mitigation; however, if this is not practicable or compatible with the proposed project, offsite and/or out-of-kind mitigation may be used. District engineers have the flexibility to allow for out-of-kind mitigation based on environmentally preferable and practicable mitigation options (33 C.F.R. Parts 325 and 332 and 40 C.F.R. Part 230).

6.4.1 Watershed Perspective

Based on the results of the Level 1 Watershed Profile and the Level 2 Impact Evaluation, the compensatory mitigation should focus on improving conditions within the watersheds where the linear project has the most significant detriment to the overall watershed and should focus on improving conditions where aquatic resources have been reduced and opportunities for improvement are present.

Because the Level 1 Watershed Profile and Level 2 Impact Evaluation identified significant vernal pools and swales in the Upper Deer–Upper White Watershed, compensatory mitigation should focus on maintaining and/or improving these features and overall watershed conditions in this watershed. Other watersheds that have significant areas of vernal pools and swales in good condition, and therefore provide an opportunity for improvement which should be considered for vernal pool compensatory mitigation, include Upper Dry, Tulare–Buena Vista Lakes, Upper Kaweah, and Upper Tule watersheds. Because of the sensitivity of vernal pool landscapes, a recent increase in their conversion, and the continued threat of loss, vernal pool compensatory mitigation should include a significant amount of preservation. Creation, reestablishment, and enhancement activities of vernal pool and swale features are seldom successful and carry significant risk in terms of not meeting performance standards. As a lower-risk alternative, the creation, enhancement, or re-establishment of out-of-kind aquatic resources (seasonal or emergent wetland features) may be used to achieve an overall improvement in watershed condition.

Compensatory mitigation for impacts to seasonal riverine features could occur in any of the identified watersheds because these features are present in all watersheds. Selection of compensatory mitigation sites should focus on areas where there is connectivity to protected lands, up-stream stressors are absent or reduced, and opportunities for stream and riparian habitat enhancement or restoration are available. Given the significant degradation of the watershed landscape, creation, re-establishment, and enhancement opportunities are likely limited and would include significant risk that mitigation may be difficult given the linear nature of these features. Therefore, compensatory mitigation sites for riverine and riparian impacts should be carefully selected to increase the likelihood of success.

Additionally, compensatory mitigation focused on restoring historically valuable aquatic resources such as Tulare Lake would greatly benefit overall watershed condition. The restoration of Tulare Lake and associated historical emergent wetlands could provide both in-kind and out-of-kind mitigation opportunities.

6.4.2 Compensatory Mitigation Options

Mitigation banks, in-lieu fee programs, and permittee-responsible mitigation options may be used to satisfy the 2008 Mitigation Rule requirements. However, there are currently no USACE-approved in-lieu fee programs or wetland mitigation banks in the vicinity of the project. Three special-status species conservation banks have been identified that provide mitigation for aquatic special-status species (e.g., vernal pool branchiopods); however, USACE has not approved any of these conservation banks to sell aquatic resource credits. Therefore, the mitigation options for aquatic resources are limited to permittee-responsible activities.

To date, several permittee-responsible mitigation options have been identified that may be suitable to partially or fully mitigate potential impacts to aquatic resources. As described in more detail in the Compensatory Mitigation Plan, five potential mitigation sites containing aquatic features have been identified and are currently under consideration. These five properties include lands adjacent to or in the immediate vicinity of public lands, including the Kern NWR, the Allensworth ER, the Kern Water Bank Authority Conservation Bank, the Semitropic Ecological Reserve, Center for Natural Lands Management lands, vernal pool fairy shrimp critical habitat, Poso Creek, and the Tule River. These properties have been surveyed for the presence of aquatic resources (wetland delineation) and CRAM assessments have been conducted to determine the baseline extent, condition, and suitability for mitigation (preservation, enhancement, re-establishment, or creation) consistent with the 2008 Mitigation Rule. Aquatic resources identified on these properties include vernal pool, depressional wetland, riverine, and riparian resource types.

The CRAM evaluation included evaluating wetland conditions identified on each site based on buffer and landscape context, hydrology, physical structure, and biotic structure using various metrics (and sub-metrics) to address wetland class-specific relationships. CRAM data can be utilized to determine which assessment areas could benefit from restoration or enhancement and which are suitable for preservation. In general, potential mitigation sites with CRAM scores >70 are suitable for preservation, sites with CRAM scores of between 25 and 70 are suitable for enhancement and or re-establishment, and sites with no aquatic resources may be suitable for creation.

CRAM data will also be key in determining the appropriate amounts of compensatory mitigation required to replace or compensate for the loss of wetlands (e.g., an impact to a wetland feature with a high CRAM score would require a higher mitigation ratio to compensate for unavoidable impacts to the wetland feature).

The wetland delineations and CRAM assessments conducted on five properties (i.e., the Buena Vista Dairy, Davis, Staffel Family Trust, Valadez, and Yang properties) identified that these properties, taken together, have a significant area of vernal pools that is suitable for preservation (Figure 6-2). These features are ideal candidates for preservation because they are in good condition. In addition to vernal pools, the Buena Vista Dairy property also has depressional wetlands in good condition that are, therefore, suitable for preservation. Also, the Staffel Family

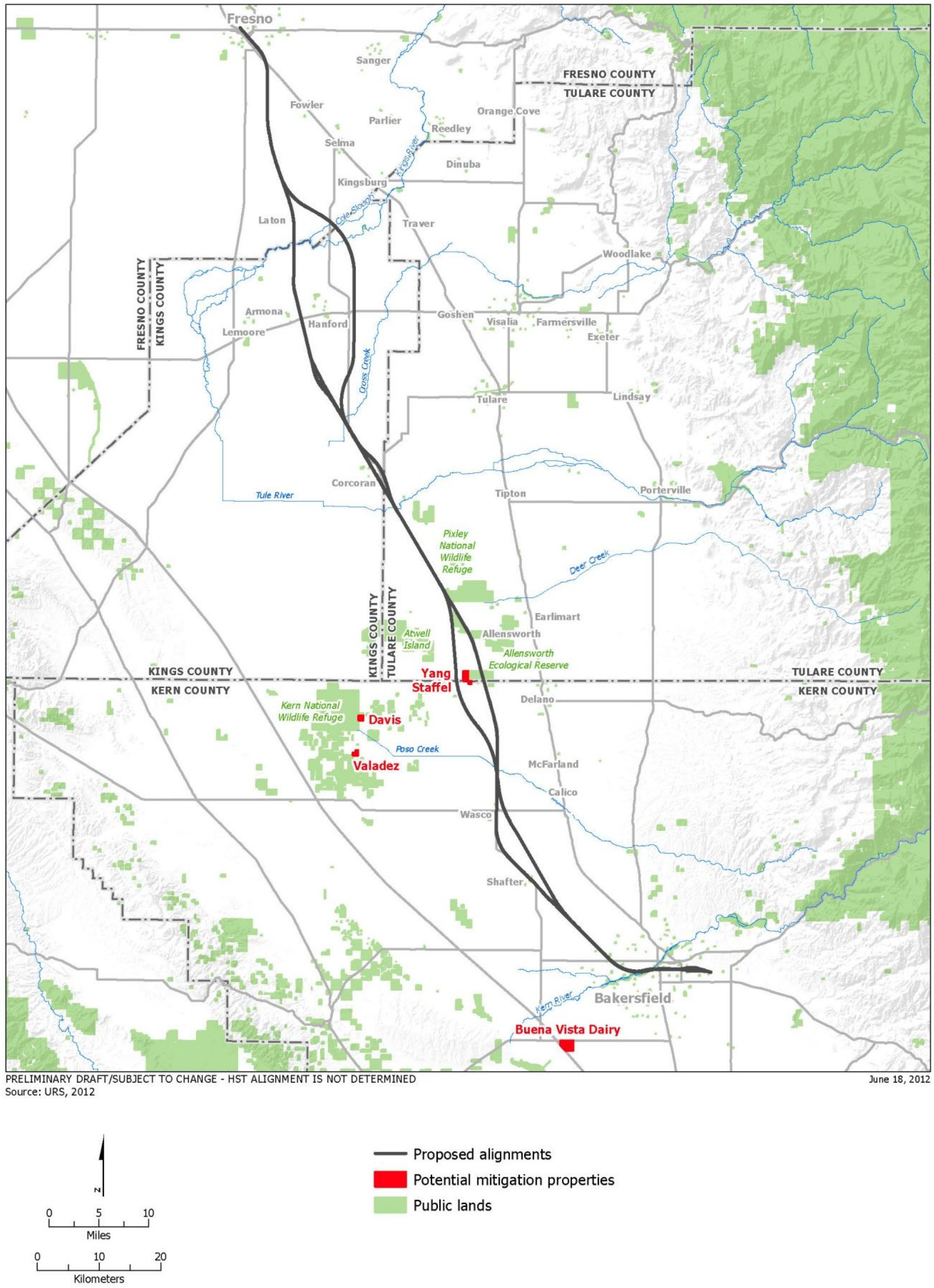


Figure 6-2
Location overview of potential mitigation properties

Trust, Davis, and Valadez properties have depressional wetlands that have potential for enhancement because they have lower CRAM scores.

Re-establishment and creation may be possible on some of the properties identified. Specifically, a historic riverine system is present on the Buena Vista Dairy property that is currently being evaluated to determine its suitability for re-establishment. At several locations, the presence of vegetation (facultative plants) and seasonal wetland depressions suggests that creation of depressional wetlands would provide "ecological lift" to the overall ecosystem of the sites. Both creation and re-establishment would require additional consideration of the potential impacts of land conversion on the special-status wildlife species that are believed to occur on these parcels. Creation and re-establishment may be more appropriate on other properties that are yet to be identified where aquatic resources have been removed through the conversion to agriculture land uses and impacts to special-status wildlife would not occur. Although these resources may be created out-of-kind, they would provide ecological benefits to the landscape and watershed.

The estimated aquatic resource acreage is preliminary and the mitigation proposal will require review and approval by the USACE. Other properties are currently being considered and will be evaluated when the potential for mitigation has been analyzed in more detail. Specifically, further investigations are focusing on properties with potential for riverine and riparian enhancement and properties adjacent to the five properties identified in Table 6-11 that may be suitable for creation or enhancement of aquatic resources The total acreage of compensatory mitigation utilizing preservation, enhancement, and re-establishment has not been finalized. However, suitable opportunities exist in the potential permittee-responsible mitigation properties and in unidentified areas within the project watersheds.

Table 6-11

Potential Mitigation Properties: Acreage, CRAM Scores, and Mitigation Suitability

Mitigation Property	Resource Type	Acres	Average CRAM Score [a]	Mitigation Category
Middle Kern-Upper Tehachapi-Grapevine Watershed				
Buena Vista Dairy properties (715.0 acres)	Vernal pool	243.5	79.2	Preservation
	Depressional wetland	13.3	70.7	Preservation
Upper Deer–Upper White Watershed				
Yang properties (316.4 acres)	Vernal pool	170.0	81.0	Preservation
Staffel Family Trust property (61.2 acres)	Vernal pool	2.8	73.9	Preservation
	Depressional wetland	0.1	N/A	Enhancement
Tulare-Buena Vista Lakes Watershed				
Davis property (158.0 acres)	Vernal pool/swale	28.3	N/A	Enhancement
	Depressional wetland	4.1	69.7	Enhancement
Valadez property (120.0 acres)	Vernal pool	0.2	57.7	Enhancement
	Depressional wetland	0.8	58.5	Enhancement

N/A = not available

[a] Features without a CRAM score are the result of CRAM and wetland protocols classifying features differently. For example, the wetland delineation listed acreage for riverine features, but these features were historical; CRAM classified these same features as depressional wetlands.

CRAM = California Rapid Assessment Method

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Section 7.0

Net Watershed Condition and Recommendations

7.0 Net Watershed Condition and Recommendations

This section provides a high-level discussion regarding the potential post-project condition of the watersheds after implementation of the project, regardless of project alternative, with potential compensatory mitigation (the net watershed condition). At this time, a detailed evaluation is not possible because the project alternatives have not been selected, compensatory mitigation is in the planning phase, and no parcels are currently under contract or approved by the various regulatory agencies.

7.1 Net Watershed Condition

After the implementation of the compensatory mitigation, the HST project is anticipated to result in no net change or in a net increase in condition for the watersheds that would be affected by the project. No change in condition is expected because of the nature of the watersheds and aquatic features in the impact area, as described below, and because the implementation of compensatory mitigation would replace any potential loss through the creation, enhancement, or preservation of aquatic resources.

In general, the Level 1 Watershed Profile identified a number of common themes in each of the affected watersheds, especially in the Great Valley Ecological Section:

1. The conditions of aquatic features in the watersheds are similar, with significant quantities of aquatic features in poor condition and limited numbers of features in good condition.
2. The relative abundance and condition of habitats within watersheds depend on the level of disturbances or stressors on the watersheds.
3. Most of the aquatic features are man-made or manipulated; of the limited natural features that are present, most are affected by some form of disturbance or stressors.
4. Similar aquatic features are present in all watersheds (except in the Upper Deer–Upper White Watershed, where a significantly larger area of vernal pool landscape is present than in the other watersheds).
5. Watershed boundaries have been blurred through extensive water diversion.

Both in terms of the conditions in the watershed and the land uses identified in the watersheds, the Level 2 Impact Evaluation for the project affirms the findings of the watershed profile. As described below, the themes identified in the watershed profile are consistent with the conditions observed within the study area:

1. The vast majority of the aquatic resources in the Great Valley have been significantly degraded through extensive conversion to agricultural, urban, and transportation land uses. As a result, aquatic features are generally in poor condition, though some features, including seasonal riverine and vernal pools and swales, are generally in excellent or good condition. The condition of features in the study area is generally tied to the type of feature (i.e., man-made or manipulated features are typically in poor or fair condition and natural features are generally in good or excellent condition). These conditions were anticipated by the watershed profile and supported in the study area by the CRAM results. However, some vernal pools and swales near the Corcoran alternatives are in fair condition because they are near major stressors (SR 43 and the existing BNSF Railway tracks).

2. The relative abundance and condition of aquatic resources in the study area reflect the relative condition of habitats within their watersheds. For example, aquatic resources within the study area identified through CRAM as being in relatively "poor" condition generally correspond to habitats in the greater watershed most impacted by altered hydrology and land conversion. Likewise, aquatic resources within the study area identified through CRAM as being in relatively "good" condition generally correspond to relatively natural habitats in the watershed.

3. As described in Section 6.1, Impacts on Aquatic Resources, and Section 6.2, Existing Conditions, most aquatic features in the study area are man-made or manipulated. Natural aquatic features are present in the study area; however, their acreage and distribution are limited. The natural aquatic features present (vernal pools and swales and seasonal riverine) are generally in better condition, but many of these features have been subject to disturbance associated with conversation of adjacent areas and in the case of seasonal riverine, the reduction of the flood channel and riparian areas.

4. Similar aquatic features (canals/ditches, lacustrine, emergent wetlands, seasonal wetlands, seasonal riverine, riparian, and vernal pools and swales) are present throughout the study area. Many of the aquatic resources have been manipulated or are man-made to support agricultural land use practices, including canals/ditches, lacustrine, and emergent wetlands. However, as seen in the watershed profile, a higher density of vernal pool features is present in the Upper Deer–Upper White Watershed, which is associated with the Allensworth alternatives.

5. Due to extensive networks of canals and water diversions, clear watershed boundaries were not observed.

The above themes, which were observed in both the Level 1 Watershed Profile and the Level 2 Impact Evaluation, reduce the potential for the project to result in a net negative impact on the project watersheds.

Because most aquatic features that would be affected by the project are already in poor condition, it is not likely that project impacts (especially indirect impacts) would further reduce the condition of the features significantly. Many features in poor condition are currently exposed to stressors such as transportation corridors, agricultural land uses, and urban development; therefore, construction of the HST project would not significantly change the existing condition or significantly modify the watershed profile. The features that are in good or excellent condition are much more likely to experience a reduction in condition due to construction of the HST project. The aquatic conditions (including functions and services) of these features that would be lost as a result of project construction would be the focus of the compensatory mitigation efforts.

After the occurrence of direct-permanent impacts on man-made and manipulated features in the study area, these features would be considered to be completely lost. However, through project engineering design and the inclusion of culverts, hydrological connections associated with canals/ditches would be maintained and the services provided would not be lost. After the occurrence of direct-temporary impacts on man-made and manipulated features in the study area, these features would be restored to pre-project condition after construction, where possible, with no reduction in condition (and with no reduction or loss of functions and services). For example, several canals/ditches will be re-routed to accommodate construction of the HST project but this re-routing would not reduce the condition of these features or diminish their functions and services. The limited natural features that would be affected by the project (i.e., would experience direct-permanent or direct-temporary impacts) are much more susceptible to project impacts and would be reduced both in condition and in terms of functions, values, and services. The loss of the natural features would be mitigated through compensatory mitigation efforts.

Under a strict interpretation of the watershed-based mitigation, a number of small compensatory mitigation projects would need to be implemented in each of the project watersheds. The numerous small projects required under a strict interpretation would have a limited influence on the overall condition of the regional watershed. In many of the project watersheds, the mitigation would only compensate for impacts to features in poor ecological condition, because the conditions of aquatic resources have been significantly degraded across all of the project watersheds through the conversion of natural land to agricultural and urban land uses.

However, because the watershed boundaries are blurred and similar features were observed in all watersheds, the project area is more realistically considered as a single hydrologic unit. Focusing compensatory mitigation efforts in a subset of this larger watershed will result in larger projects that will improve the conditions in those watersheds and which will provide a greater degree of functional lift for the overall condition of the region. With consideration of these factors, compensatory mitigation should be designed to maintain the condition (in terms of both quantity and quality of aquatic resources) of the greater project region rather than mitigating on a watershed-by-watershed basis.

Compensatory mitigation efforts should focus on locations where mitigation efforts are likely to succeed (i.e., in locations where the risk of failure for enhancement, restoration, and preservation projects is low). Examples of such locations include areas where the aquatic features present are in good condition or are adjacent to good condition aquatic resources and/or protected areas.

In summary, watershed profiles and project impacts evaluations (both in terms of quantity and quality) and compensatory mitigation will be conducted in select areas and will focus on select watersheds (consistent with project impacts to sensitive resources). Sufficient opportunities will be available to provide significant enhancements and benefits to one or more watersheds that will, in both the short term and the long term, provide local and regional ecological benefit (or lift) to the watershed and to existing conditions of the associated aquatic features. In the end, the condition of the watersheds will be sustained or enhanced through the long-term preservation of aquatic resources and will experience no net loss of aquatic functions, values, or services (condition).

7.2 Recommendations

This report is designed to provide an analysis to the USACE of the extent and quality of the wetlands and other jurisdictional features present in the watershed in which the Fresno to Bakersfield Section of the HST System occurs. The purpose of this evaluation is to provide the USACE with information with regard to the extent and quality of the aquatic resources present in the study area and the extent to which these features would be affected by construction and operation of the Fresno to Bakersfield Section. The impacts to existing aquatic resources are organized by watershed and by project alternative so that the project proponents (Authority and FRA), along with the USACE and EPA, can use the data in this report to evaluate, identify, and compare the preferred project alternative and ultimately assist in the identification of the preliminary LEDPA.

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Section 8.0
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8.0 References Cited

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Section 9.0

List of Preparers

9.0 List of Preparers

This section lists the URS-HMM-Arup Joint Venture employees that prepared this report, and provides a summary of their qualifications, roles, and responsibilities in the preparation of this Watershed Evaluation Report.

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Appendix A

Evaluation of Wetland Conditions Using the California Rapid Assessment Method (CRAM)

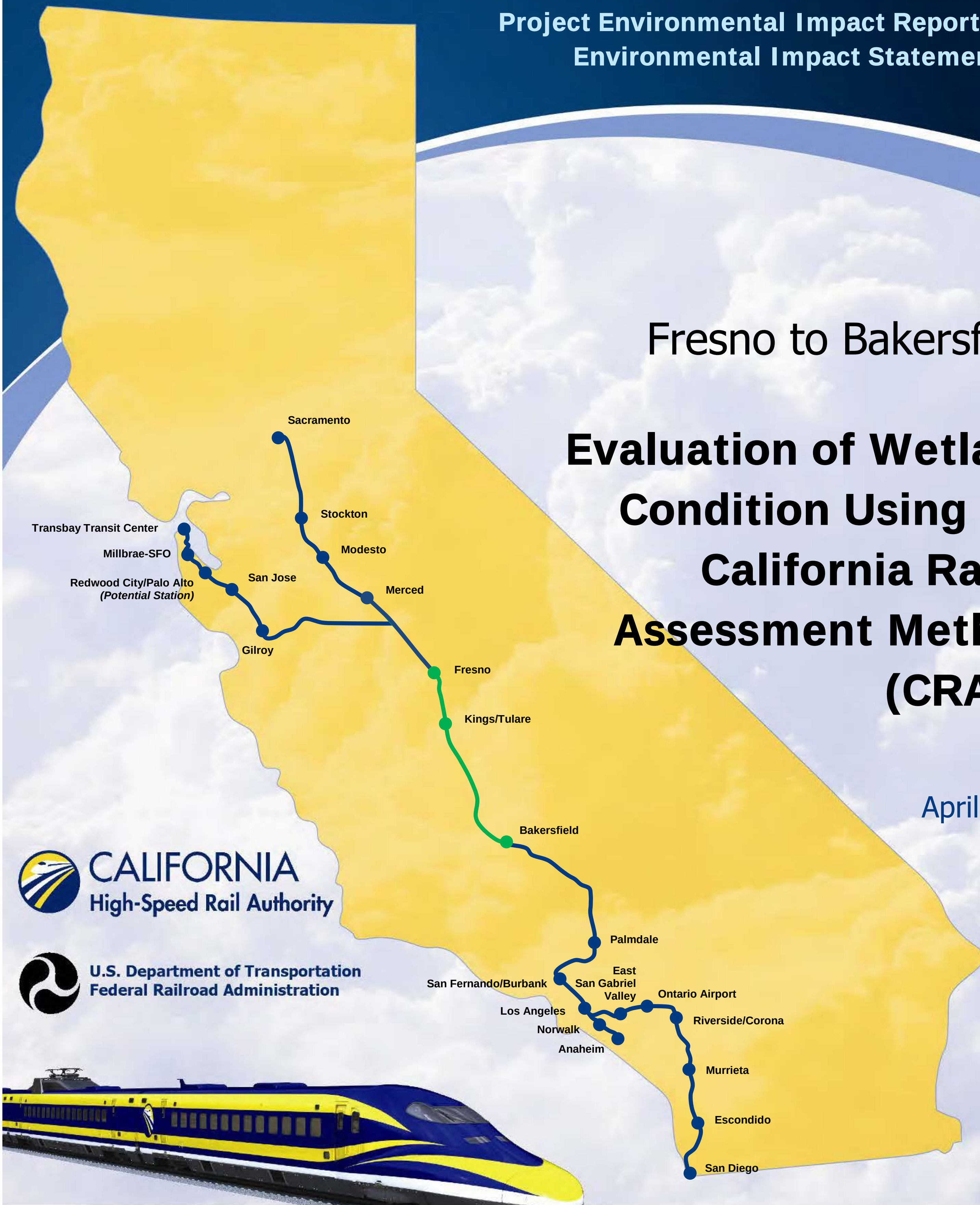
CALIFORNIA HIGH-SPEED TRAIN

Project Environmental Impact Report / Environmental Impact Statement

Fresno to Bakersfield

Evaluation of Wetland Condition Using the California Rapid Assessment Method (CRAM)

April 2013



CALIFORNIA
High-Speed Rail Authority

U.S. Department of Transportation
Federal Railroad Administration

Evaluation of Wetland Condition Using the California Rapid Assessment Method (CRAM)

Prepared by:

URS/HMM/Arup Joint Venture

April 2013

Table of Contents

Page

1.0 Introduction 1-1
2.0 Project Location 2-1
2.1 Watersheds and Waterbodies 2-1
3.0 Project Description 3-1
3.1 High-Speed Train Alternatives 3-1
4.0 Methods 4-1
4.1 Wetland Classification 4-1
4.2 CRAM Team Members 4-2
4.3 Procedures for Using CRAM 4-3
4.3.1 Assessment Areas (AA) 4-4
4.3.2 Field Assessment 4-4
4.3.3 Field Conditions and Limitations 4-4
4.3.4 Post-Field Data Evaluation 4-5
5.0 Results: Fresno to Bakersfield CRAM Scores 5-1
5.1 Depressional 5-1
5.2 Riverine Wetlands 5-2
5.3 Individual Vernal Pools 5-3
5.4 Vernal Pool Systems 5-4
5.5 Fresno to Bakersfield CRAM Stressors 5-5
5.6 Potential Mitigation Sites 5-5
5.6.1 Buena Vista Dairy 5-6
5.6.2 Davis 5-7
5.6.3 Staffel 5-8
5.6.4 Te Velde 5-9
5.6.5 Valadez 5-10
5.6.6 Yang 5-11
5.6.7 Clark River Ranch 5-12
6.0 Discussion 6-1
6.1 Consistency with CRAM Requirements and Implementation Guidelines 6-1
6.1.1 Sample Frame and Sample Size 6-1
6.1.2 Methodological Considerations 6-2
6.2 Watershed Condition 6-3
6.2.1 Depressional Sites 6-3
6.2.2 Riverine Sites 6-4
6.2.3 Vernal Pool Sites 6-5
6.2.4 Watershed Condition Summary from CRAM Results 6-5
6.3 Effect of Stressors on CRAM Scores 6-6
6.4 Existing Condition Extrapolation 6-6
6.5 Using CRAM for Evaluating Existing Conditions at Potential Mitigation Sites 6-7
7.0 References 7-1

Appendices

A Maps of Assessment Areas
B Summary Table of CRAM Data
C Assessment Area of Data Forms
D Photographs of Representative Assessment Areas
E Summary Table of Stressors

Tables

Table 2-1 Watersheds and Major Waterbodies within the Fresno to Bakersfield Section 2-1
Table 4-1 Crosswalk of Standard Terms Used for Wetland Condition Assessment 4-1
Table 4-2 Fresno to Bakersfield CRAM: Key Staff Members 4-2
Table 5-1 Average Index and Attribute Scores by CRAM Type, by Wetland Type 5-1
Table 5-2 CRAM Results for Mitigation Sites 5-6
Table B-1 Summary Table of CRAM Data B-1
Table E-1 Summary Table of Stressors for Project AAs..E-1
Table E-2 Summary Table of Stressors for Potential Mitigation Sites E-4

Figures

Figure 3-1 Fresno to Bakersfield HST alternatives 3-3
Figure 4-1 Index map of CRAM AAs in the study area 4-6
Figure 4-2 Index map of CRAM AAs at mitigation sites 4-7
Figure 5-1 Average CRAM index scores and attribute scores for depressional wetland AAs 5-2
Figure 5-2 Average CRAM index scores and attribute scores for riverine wetland AAs............5-3
Figure 5-3 Average CRAM index score and attribute scores for individual vernal pool AAs.......5-4
Figure 5-4 Average CRAM index score and attribute scores for vernal pool systems AAs.........5-5
Figure 5-5 Average CRAM index score and attribute scores for AAs on Buena Vista Dairy 5-7
Figure 5-6 Average CRAM index score and attribute scores for AAs on the Davis property......5-8
Figure 5-7 Average CRAM index score and attribute scores for AAs on the Staffel property 5-9
Figure 5-8 Average CRAM index score and attribute scores for AAs on the Te Velde property 5-10
Figure 5-9 Average CRAM index score and attribute scores for AAs on the Valadez property 5-11
Figure 5-10 Average CRAM index score and attribute scores for AAs on the Yang property 5-12
Figure 5-11 Average CRAM index score and attribute scores for AAs on the Clark River Ranch property 5-13

Acronyms

AA	assessment area
Authority	California High-Speed Rail Authority
BNSF	Burlington Northern & Santa Fe Railway
CRAM	California Rapid Assessment Method
EIR	environmental impact report
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FRA	Federal Railroad Administration
HMF	heavy maintenance facility
HST	high-speed train
HUC	hydrologic unit code
LEDPA	Least Environmentally Damaging Practicable Alternative
MOU	memorandum of understanding
NAVD 88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
RTP	Regional Transportation Plan
SR	State Route
USACE	U.S. Army Corps of Engineers

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Section 1.0
Introduction

1.0 Introduction

The *NEPA/404/408 Integration Process Memorandum of Understanding* between the U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), Federal Railroad Administration (FRA), and California High-Speed Rail Authority (Authority), dated November 2010 (referred to as the MOU), outlines the requirements for Checkpoint C: Preliminary LEDPA Determination for the California High-Speed Trail (HST) project. One of the steps in identifying the Least Environmentally Damaging Practicable Alternative (LEDPA) is to determine the functions and services of the aquatic resources within the different project alternatives. In accordance with the MOU and discussions with the project's technical work group—composed of members from the regulatory agencies, FRA, Authority, and the regional consultants—these determinations will be made by conducting a "detailed (rapid assessment or better) assessment of the functions and services of special aquatic sites and other waters of the U.S" (EPA et al. 2010).

The California Rapid Assessment Method (CRAM) provides the tool for assessing the condition of aquatic resources (CWMW 2012). CRAM is the methodology that is being used across all HST sections to provide a uniform approach for assessing the functions and services (health) of wetlands and other aquatic features, and it is consistent with the USACE and EPA Mitigation Rule (EPA and USACE 2008). A detailed description of CRAM is not included in this report. This information is available on the CRAM web site (www.cramwetlands.org) and in the *California Rapid Assessment Method for Wetlands and Riparian Areas: User's Manual,* Version 6.0 (CWMW 2012), including background information on the development, application, and implementation of CRAM. Additionally, the *Condition Assessment Technical Work Plan* (Authority and FRA 2011a) describes the methods used to conduct CRAM for the Fresno to Bakersfield Section of the HST and is supplemental to the *DRAFT Checkpoint C: LEDPA Determination: Methodology for Wetland Condition Assessment Using CRAM* that was prepared for the entire statewide HST system (Authority and FRA 2011b).

This report summarizes the results of CRAM conducted for the Fresno to Bakersfield Section of the HST during fall 2011 (September 19-29), spring 2012 (March 5-9, May 14-18), and winter 2013. The first two rounds assessed aquatic features within the Fresno to Bakersfield Section study area. The third and fourth rounds assessed aquatic features within potential mitigation sites for the project.

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Section 2.0
Project Location

2.0 Project Location

The Fresno to Bakersfield Section of the HST system lies entirely within the Great Valley Ecological biogeographic area and is surrounded by the Sierra Nevada Foothills and Sierra Nevada sections to the east, the Southern California Mountain and Valley sections to the south, and the Central California Coastal Ranges sections to the west. The study area is located in the central part of the San Joaquin Valley within the Tulare Lake Basin. The Tulare Lake Basin is approximately 16,400 square miles and spans mostly across Fresno, Kings, Tulare, and Kern counties. The topography in this part of the Central Valley is flat-lying, with elevations across the project alternatives and HMFs ranging between +395 feet (North American Vertical Datum of 1988 [NAVD 88]) to +205 feet (NAVD 88). A general downward gradient occurs in the study area to the west-southwest, determined principally by the gentle slope of the vast alluvial fans extending from the Sierra Nevada in the east to the center of the San Joaquin Valley.

2.1 Watersheds and Waterbodies

The Fresno to Bakersfield Section occurs within seven Hydrologic Unit Code (HUC)-8 watersheds in the Tulare Lake Basin. Significant natural waters that intersect with the Fresno to Bakersfield alternative alignments include Kings River, Cross Creek, Tule River, Deer Creek, Poso Creek, and Kern River. The names of the HUC-8 watersheds, the major surface water features, and the area of each watershed are summarized in Table 2.1-1.

Table 2-1
Watersheds and Major Waterbodies within the Fresno to Bakersfield Section

Subbasin (HUC-8 No.)	Major Water Features	Watershed Area (Acres)
Upper Dry (18030009)	Kings River	1,360,539
Tulare-Buena Vista Lakes (18030012)	Kings River, Cross Creek, Tule River	2,423,853
Upper Kaweah (18030007)	Cross Creek	974,462
Upper Tule (18030006)	Tule River	604,506
Upper Deer-Upper White (18030005)	Deer Creek, Friant-Kern Canal	782,998
Upper Poso (18030004)	Poso Creek, Friant-Kern Canal	368,178
Middle Kern-Upper Tehachapi-Grapevine (18030003)	Kern River	1,675,939
Total	—	8,190,475
Acronym: HUC = Hydrologic Unit Code		

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Section 3.0
Project Description

3.0 Project Description

The proposed action is to construct and operate an HST rail line from Fresno to Bakersfield (Figure 3-1). The Fresno to Bakersfield Section is one of nine sections that were identified in the Program EIR/EISs (Authority and FRA 2005, 2008, 2010). The nine HST sections comprise a system that would connect the major population centers of the San Francisco Bay Area with the Los Angeles metropolitan region. The California HST System is planned to be implemented in two phases. Phase 1 would connect San Francisco to Los Angeles and Anaheim via the Pacheco Pass and the Central Valley. Phase 2 would connect from the Central Valley (Merced Station) to the state's capital, Sacramento, and another extension is planned from Los Angeles to San Diego. The HST system is envisioned as a state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, which would employ the latest technology, safety, signaling, and automated train control systems. The trains would be capable of operating at speeds of up to 220 miles per hour over fully grade-separated, dedicated track.

The Fresno to Bakersfield Section of the HST project would be approximately 114 miles long, varying in length by only a few miles based on the route alternatives selected. To comply with the Authority's guidance to use existing transportation corridors, when feasible, the Fresno to Bakersfield HST Section would primarily be located adjacent to the existing BNSF Railway right-of-way. Alternative alignments are being considered where engineering constraints require deviation from the existing railroad corridor, and to avoid environmental impacts.

The Fresno to Bakersfield HST Section would cross both urban and rural lands and include a station in both Fresno and Bakersfield, a potential Kings/Tulare Regional Station in the vicinity of Hanford, a potential heavy maintenance facility (HMF), and power substations along the alignment. The HST alignment would be entirely grade-separated, meaning that crossings with roads, railroads, and other transport facilities would be located at different heights (overpasses or underpasses) so that the HST would not interrupt or interface with other modes of transport. The HST right-of-way would also be fenced to prohibit public or automobile access. The project footprint would primarily consist of the train right-of-way, which would include both a northbound and southbound track in an area typically 120 feet wide. Additional right-of-way would be required to accommodate stations, multiple track at stations, maintenance facilities, and power substations.

The Fresno to Bakersfield Section would include at-grade, below-grade, and elevated track segments. The at-grade track would be laid on an earthen rail bed topped with rock ballast approximately 6 feet off the ground; fill and ballast for the rail bed would be obtained from permitted borrow sites and quarries. Below-grade track would be laid in an open or covered trench at a depth that would allow roadway and other grade-level uses above the track. Elevated track segments would span long sections of urban development or aerial roadway structures and consist of steel truss aerial structures with cast-in-place, reinforced-concrete columns supporting the box girders and platforms. The height of elevated track sections would depend on the height of existing structures below, and would range from 40 to 80 feet. Columns would be spaced 60 feet to 120 feet apart.

3.1 High-Speed Train Alternatives

The project EIR/EIS for the Fresno to Bakersfield HST Section examines alternative alignments, stations, and HMF sites within the general BNSF Railway corridor. Discussion of the HST project alternatives begins with a single continuous alignment (the BNSF Alternative) from Fresno to Bakersfield. This alternative most closely aligns with the preferred alignment identified in the Record of Decision (ROD) for the Statewide Program EIR/EIS. Descriptions of the additional eight alternative alignments that deviate from the BNSF Alternative for portions of the route then follow. The alternative alignments that deviate from the BNSF Alternative were selected to avoid environmental, land use, or community issues identified for portions of the BNSF Alternative (Figure 3-1). The Authority and FRA, in coordination with USACE and EPA, will identify the least environmentally damaging alternative to comply with Section 404 of the Clean Water Act.

The Fresno to Bakersfield Revised Draft EIR/Supplemental Draft EIS (Authority and FRA 2012) evaluates 10 alignment alternatives including the No Project Alternative, BNSF, Hanford West Bypass 1, Hanford West Bypass 2, Corcoran Elevated, Corcoran Bypass, Allensworth Bypass, Wasco-Shafter Bypass, Bakersfield South, and Bakersfield Hybrid (Figure 3-1). In addition to the alternative alignments, two station alternatives in Fresno, two potential station locations in the Hanford area, three station alternatives in Bakersfield, and five potential heavy-maintenance facility alternatives are considered.

The Fresno to Bakersfield Section would connect to Merced to the north and to Palmdale to the south. A HST rail heavy vehicle maintenance and layover facility would be sited in either the Merced to Fresno Section or Fresno to Bakersfield Section. Additional details on project features and construction are presented in the Fresno to Bakersfield Revised Draft EIR/Supplemental Draft EIS (Authority and FRA 2012).

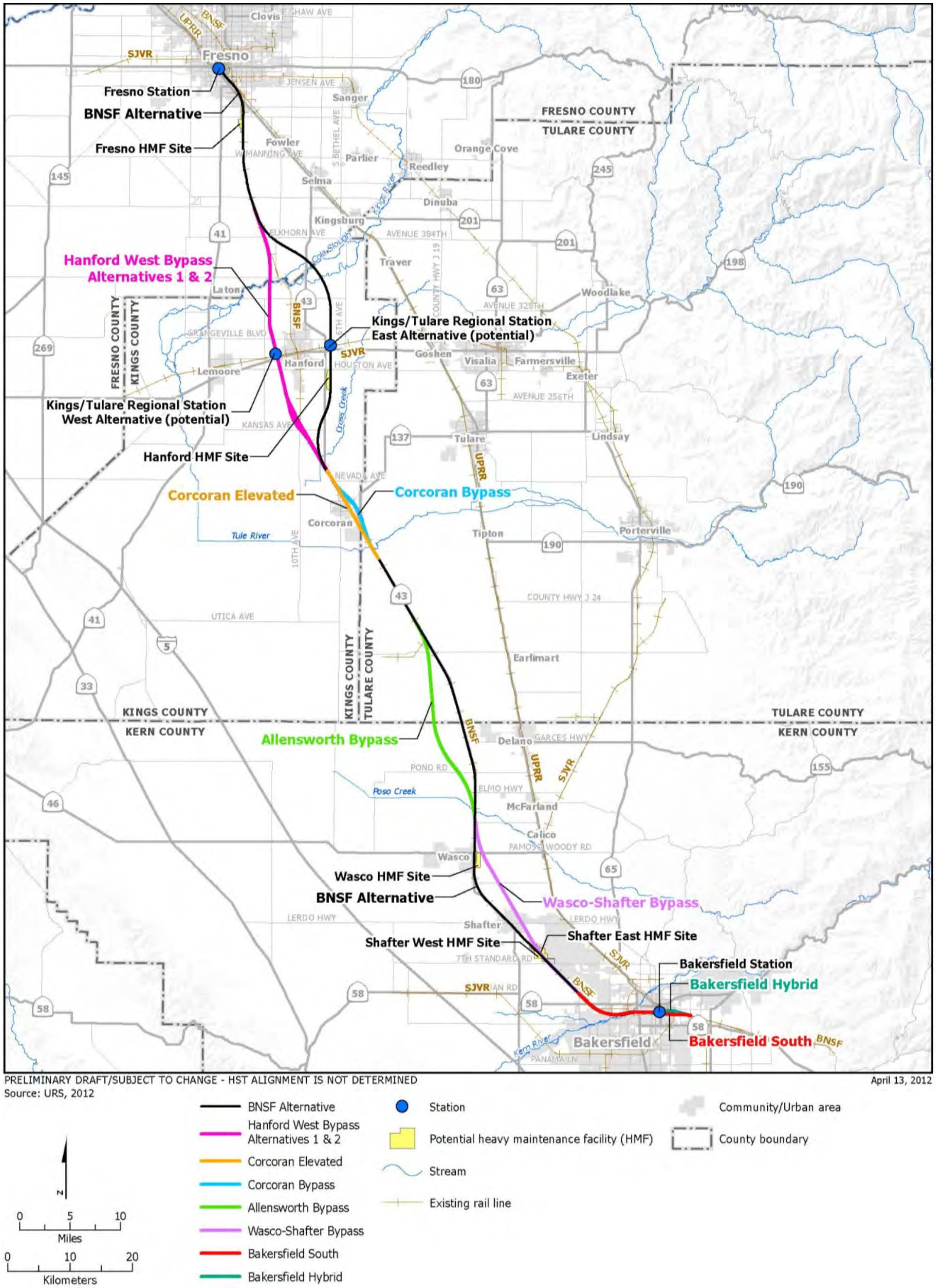

Figure 3-1
Fresno to Bakersfield HST alternatives

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Section 4.0
Methods

4.0 Methods

The methodology for conducting CRAM is described in the *California Rapid Assessment Method for Wetlands and Riparian Areas: User's Manual,* Version 6.0 (CWMW 2012). This section provides details on pre-field preparations, the CRAM team for the Fresno to Bakersfield Section, and field methods and limitations particular to this section of the HST.

4.1 Wetland Classification

CRAM uses a wetland classification derived primarily from the functional classification described in the Hydrogeomorphic Method (Brinson 1993). The CRAM typology includes five wetland types: riverine wetlands, depressional wetlands, estuarine wetlands, lacustrine wetlands, and slope wetlands. All but lacustrine wetlands have been divided into sub-types. Riverine wetlands and depressional wetlands and their sub-types were used in the CRAM assessment for the Fresno to Bakersfield Section.

The *Preliminary Jurisdictional Waters and Wetlands Delineation Report* (Authority and FRA 2011c) submitted for the Fresno to Bakersfield Section described Special Aquatic Resource (SAR) types that were identified in the study area using the Cowardin system. This system is similar but not equivalent to the standard CRAM typology. A "crosswalk" was used to standardize the aquatic feature terms to standard wetland classification in accordance with CRAM (Table 4.1).

Table 4-1
Crosswalk of Standard Terms Used for Wetland Condition Assessment

Preliminary Jurisdictional Waters and Wetland Delineation Report		
SAR Type	**Cowardin Type**	**CRAM Type**
Canal[a]	Riverine unconsolidated bottom	Riverine wetlands (streams and rivers-channel)
Ditch[a]	None assigned	Riverine wetlands (streams and rivers-channel)
Reservoir[a]	Lacustrine unconsolidated bottom	Lacustrine
Emergent wetland	Palustrine emergent nonpersistent	Depressional wetlands (except vernal pools and swales, marsh, and unvegetated flats)
Retention/detention basin[a]	Lacustrine unconsolidated bottom	Depressional wetlands (except vernal pools and swales, marsh, and unvegetated flats)
Riparian	Riverine forested wetland	Riverine wetlands (sub-types confined and non-confined streams and rivers-channel)
Seasonal riverine	Riverine unconsolidated bottom	Riverine wetlands (sub-types confined and non-confined streams and rivers-channel)
Seasonal wetland[b]	Palustrine emergent nonpersistent	Depressional wetlands (except vernal pools and swales, marsh, and unvegetated flats)

Table 4-1
Crosswalk of Standard Terms Used for Wetland Condition Assessment

Preliminary Jurisdictional Waters and Wetland Delineation Report		
SAR Type	**Cowardin Type**	**CRAM Type**
Vernal pool	Palustrine emergent nonpersistent	Individual vernal pools and vernal pool systems (subtypes of Depressional)
Vernal swale	Palustrine emergent nonpersistent	Individual vernal pools and vernal pool systems (subtypes of Depressional)

[a] Man-made environment; it should be noted that the riverine module is acknowledged in CRAM to be applicable to "flowing-water" man-made features such as ditches and canals.

[b] This habitat type can contain seasonal (ephemeral) wetlands.

Acronym:
CRAM California Rapid Assessment Method
SAR Special Aquatic Feature

4.2 CRAM Team Members

The individuals involved in the field aspects of this study are listed in Table 4.2-1.

Table 4-2
Fresno to Bakersfield CRAM: Key Staff Members

Staff	Education	Experience	Project Role
Chad Roberts/Roberts Environmental and Conservation Planning	PhD, Ecology, University of California-Davis	CRAM Principal Investigator Group	CRAM Coordinator
Justin Whitfield/Joint Venture	BS, Biology, Florida State University	10 years' experience in preparing biological assessments, environmental documents, and wetland delineations	Biology Task Manager
Amy Langston/Joint Venture	MS, Biology, San Francisco State University	7 years' experience conducting wetland delineations and botanical surveys	CRAM field and office support
Chris Julian/Joint Venture	BS, Biology, University of California-Santa Barbara	9 years' experience in wetland permitting, and conducting wetland delineations and wetland functional assessments	CRAM field and office support

Table 4-2
Fresno to Bakersfield CRAM: Key Staff Members

Staff	Education	Experience	Project Role
Julie Love/Joint Venture	MS, Environmental Science and Management, University of California-Santa Barbara	9 years' experience conducting wetland delineations, habitat restoration and monitoring, and stream monitoring	CRAM field and office support
Galen Peracca/Joint Venture	MF, Forestry, University of California-Berkeley	8 years' experience conducting wetland delineations, botanical surveys, and biological impact analysis	CRAM field and office support
Erin Maroni/Joint Venture	BS, Environmental Science, University of New Hampshire	3 years' experience participating in wetland delineations and habitat assessments.	CRAM field support
Tammy Lim/Joint Venture	MA, Ecology, San Francisco State University	12 years' experience as a field biologist conducting protocol-level surveys and habitat assessments	CRAM field support
Acronym: CRAM California Rapid Assessment Method			

The individuals identified above comprised the CRAM assessment team that carried out the fieldwork and/or provided technical guidance. The team was led by Chad Roberts. Dr. Roberts was selected as the CRAM coordinator/team leader because of his involvement in the development of CRAM as a member of the CRAM North Coast Regional Team. The other team members were not previously CRAM-trained; however, Amy Langston, Galen Peracca, and Justin Whitfield gained sufficient CRAM experience in the process of completing the work to be designated as competent in the CRAM methodology, and Julie Love and Chris Julian completed a formal CRAM training course. Erin Maroni and Tammy Lim, not formally CRAM-trained, assisted CRAM-trained team members in the field for CRAM conducted at potential mitigation sites. The team members led by Dr. Roberts were included in the team because of their experience and knowledge of aquatic features and wetland vegetation.

4.3 Procedures for Using CRAM

CRAM works by scoring four key attributes: Buffer and Landscape Context, Hydrology, Physical Structure, and Biotic Structure. All CRAM modules assess these four attributes, using various metrics (and submetrics) to address wetland class-specific relationships. In all modules, the CRAM "Index Score," or overall score, is calculated as the average of the four attribute scores. The condition assessment of wetlands for the Fresno to Bakersfield Section and potential mitigation sites used CRAM according to the most recent field books for the four modules: riverine, depressional, individual vernal pool, and vernal pool systems (Table 4.1-1).

4.3.1 Assessment Areas

In CRAM, the conditions attributed to wetland areas in a site or region are based on the conditions sampled in "assessment areas" (AAs), which are chosen to represent the wetlands within the site or region. The AAs in the Fresno to Bakersfield Section were identified by the CRAM team and GIS staff, accommodating site access constraints (see Section 4.3.3), and were reviewed by Chad Roberts, the CRAM coordinator. Some potential AAs were rejected as not consistent with CRAM guidance (e.g., an area substantially smaller than suggested guidance was rejected as too small), and other AAs were modified or redesignated (e.g., reclassified as depressional instead of riverine because of a lack of connection to a linear water feature) to be consistent with CRAM assessment practices. All draft AAs scheduled for field evaluation were classified according to standard CRAM assessment categories regardless of other classification categories. Before conducting CRAM fieldwork, a field packet was created for each prospective AA, including maps at necessary scales, showing a preliminary boundary for each AA, as well as a field book with necessary text and work tables for conducting CRAM.

AAs are identified in this report according to CRAM module type. Each AA has a unique identifier code that begins with a letter identifying the type of CRAM module applied (D=depressional, V=vernal pool, VS=vernal pool system, R=riverine). AAs within the study area include a number within the 1–299 range (e.g., R8, D105, VS212). AAs within the potential mitigation sites include a number in the 300–399 range (e.g., VS304).

Figures 4-1 and 4-2 show index maps of all the AA locations within the study area and potential mitigation areas. Appendix A provides maps of all the AAs evaluated for this report.

4.3.2 Field Assessment

Field assessments were conducted in four rounds: September 19–29, 2011, March 5–9, 2012, May 14–18, 2012, and January 3-4, 2013. The first two rounds assessed aquatic features within the Fresno to Bakersfield Section study area. The third and fourth rounds assessed aquatic features within potential mitigation sites for the project. The first round of CRAM fieldwork was conducted outside the vernal pool wetlands assessment window at the request of the EPA and USACE staff, in order to meet the project timeline goals. Though it occurred outside the assessment window, the results are considered valid. Any deviations from standard CRAM methodology are described in Section 4.3.3.

As required by CRAM, the field team modified AA boundaries during fieldwork to better capture the conditions present in the AAs at the time of the assessment. Additionally, some AAs were shifted to more appropriate locations that better represented the wetlands present. The revisions to AA boundaries made in the field were used by the GIS staff to update the CRAM maps. The results and maps provided in this report reflect the AAs and field conditions identified by the field team at the times that CRAM fieldwork was conducted.

4.3.3 Field Conditions and Limitations

The first round of CRAM fieldwork occurred outside the appropriate assessment window for vernal pool wetlands, which corresponds with the growing season and which extends from March to July (CWMW 2009). Much of the vegetation associated with vernal pools was desiccated and reduced in cover, and identification of dominance was based on the familiarity of project team members with the dry-season appearances of species that grow in the study area. In addition, direct evidence of hydrology in natural seasonal wetlands was limited, although hydrology indicators used in CRAM are typically present throughout the year. Another exception, due to deep water levels, occurred in assessing the Kern River, where the AA had to be positioned along only one bank, and the data extrapolated for the entire width of the river. The details for this situation are described in Section 6.1.2. All exceptions to standard CRAM assessment methodology (e.g., the identification of vernal pool-endemic plants, assessment windows) were executed with consultation from the CRAM coordinator, EPA, and USACE.

The first two rounds of CRAM fieldwork were conducted within the Fresno to Bakersfield Section study area, which includes the project footprint and a 250-foot buffer surrounding the footprint. The footprint includes all areas where aquatic features will be directly impacted by the project. The 250-foot buffer accounts for aquatic features that may be indirectly affected by the project. Because permission to enter was not available for all aquatic features in the study area, the Fresno to Bakersfield regional consultants requested permission to enter from the various private and public landowners. That is, CRAM assessments were only conducted where permission had been granted to the consultant team to enter private land. Therefore, a condition assessment of all aquatic features or all feature types present within the study area was not possible. Instead, a representative sample of accessible aquatic features was selected for CRAM fieldwork. The sample included canals, ditches, retention/detention basins, seasonal riverine, seasonal wetlands, vernal pools, and vernal swale and pool complexes. Access to emergent wetland and reservoirs was not granted. Vernal swales were represented in AAs of vernal pool systems. Best professional judgment, along with direction from the CRAM coordinator regarding an appropriate CRAM sample frame and consultation with the EPA and USACE, were followed in selecting the sample of AAs.

The third and fourth rounds of CRAM fieldwork were conducted on seven private properties being considered for compensatory mitigation. Permission to enter was granted for all seven. The following six properties were evaluated during the third round of CRAM: Buena Vista Dairy, and the Davis, Staffel, Te Velde, Valadez, and Yang properties. Clark River Ranch was evaluated during the fourth round of CRAM.

4.3.4 Post-Field Data Evaluation

After completion of each round of fieldwork, the scoring results were entered into an Excel spreadsheet by the CRAM team and reviewed by Chad Roberts. The spreadsheet was compared with the field data forms for quality-assurance purposes, particularly for data entry and computational errors. The Excel spreadsheet is the basis for this summary report. Both the spreadsheet and the original field data forms are available to agency staff for review purposes. Additionally, AA boundary maps, data forms, stressor checklists, and site photographs are provided in the attached appendices.

Following the field surveys for the Fresno to Bakersfield study area, CRAM data collected using the individual vernal pools and vernal pool systems field books (Version 5.0.3) were revised according to the new vernal pool field books (Version 6.0), which were released after the fieldwork for the Fresno to Bakersfield Section study area was completed. Scores for these AAs were updated based on the new field books at the recommendation of the CRAM coordinator. These scores are presented in this report. The AAs for vernal pools, vernal pool systems and riverine wetlands at potential mitigation sites were assessed in the field using Version 6.0 of the field books.

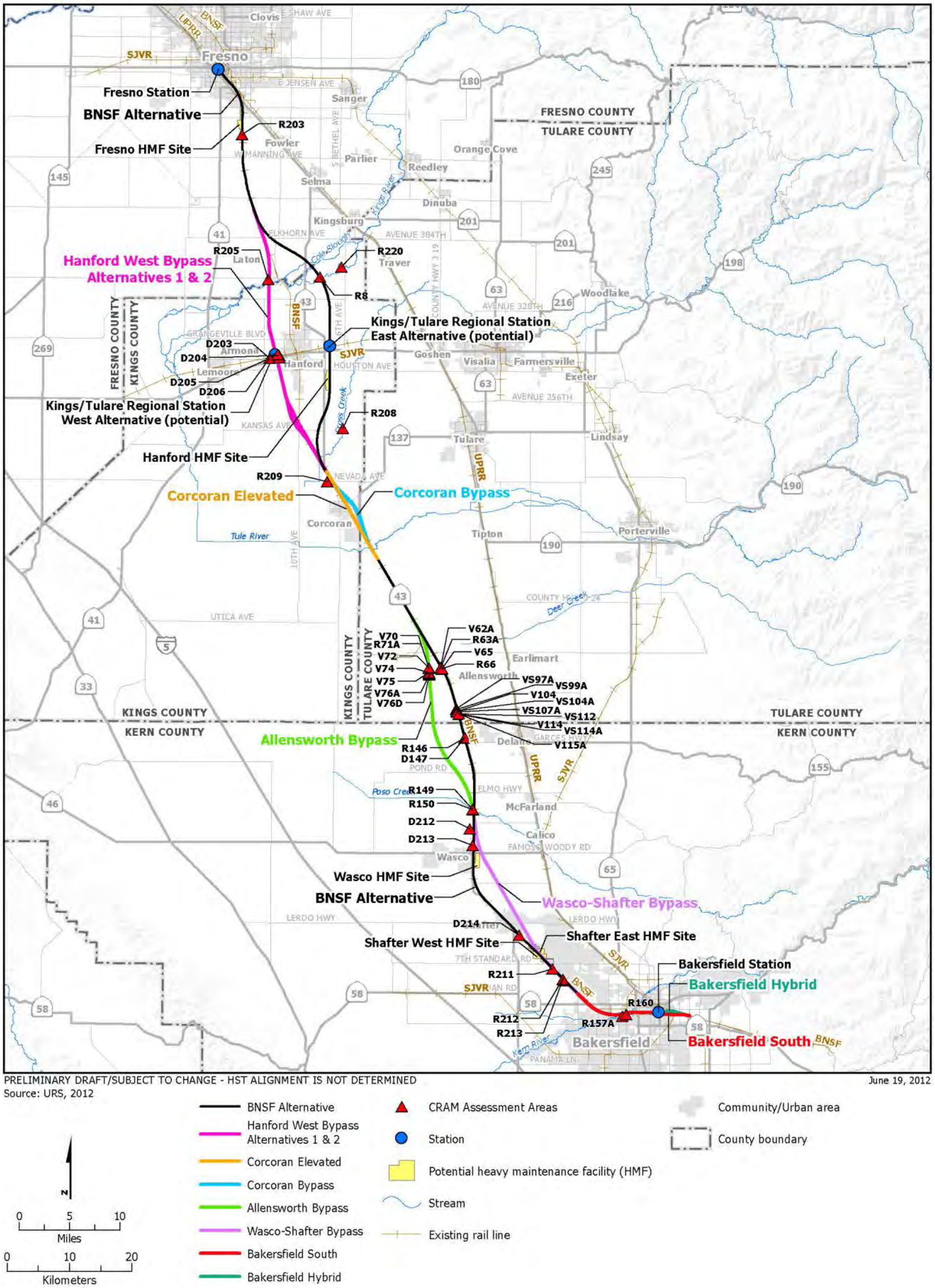

Figure 4-1
Index map of CRAM AAs in the study area

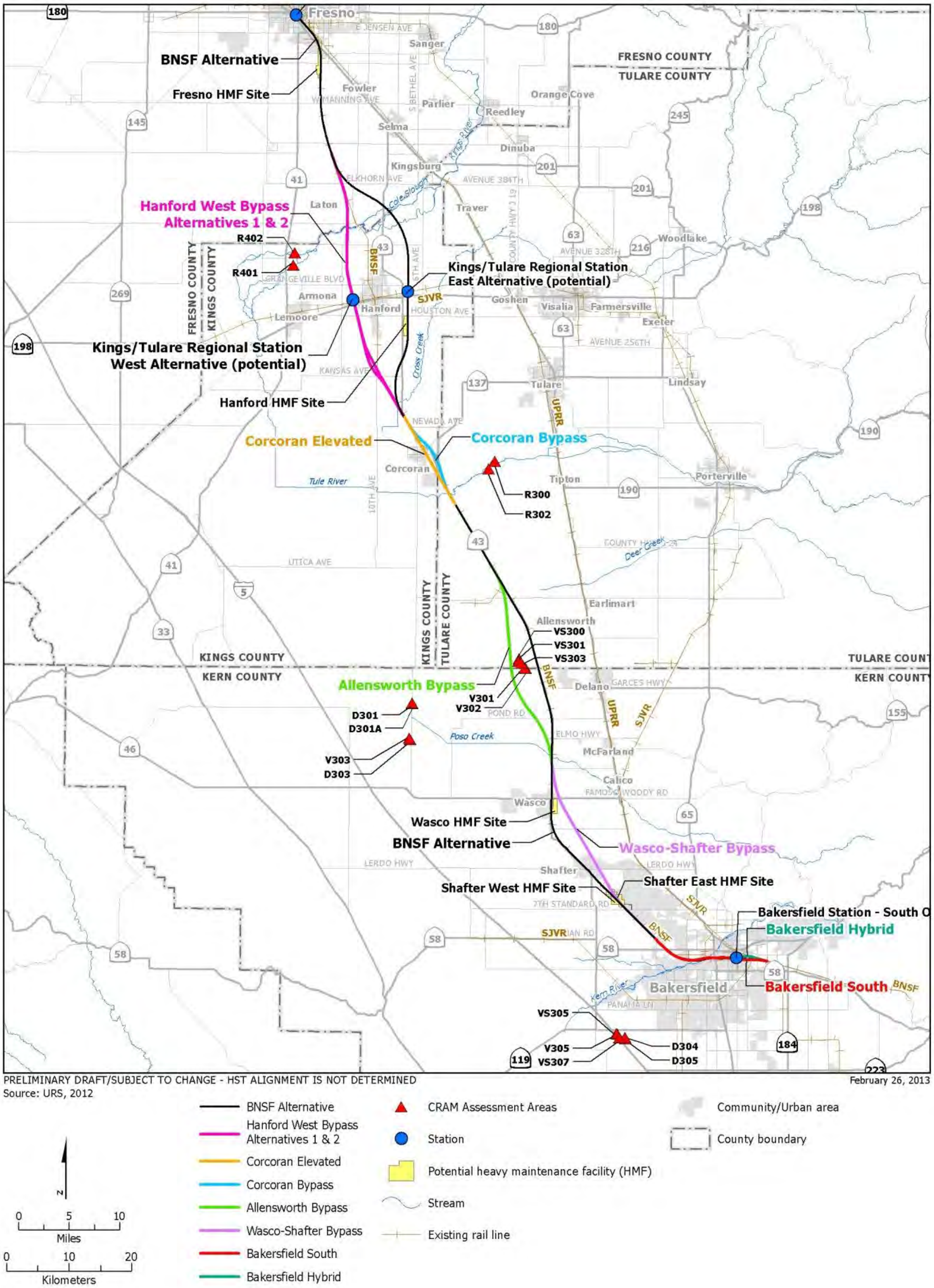

Figure 4-2
Index map of CRAM AAs at mitigation sites

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Section 5.0
Results

5.0 Results: Fresno to Bakersfield CRAM Scores

This section presents the CRAM scores from the condition assessment conducted in the study area of the Fresno to Bakersfield Section (Sections 5.1-5.5), as well as CRAM scores from AAs within the potential mitigation sites (Section 5.6). Forty-two AAs were assessed within the Fresno to Bakersfield Section and 16 AAs were assessed within potential mitigation sites. A table summarizing the results for all of the AAs is provided in Appendix B and data forms are provided in Appendix C. Representative photos of the AAs are provided in Appendix D.

Assessment areas were set up using four CRAM wetland types within the Fresno to Bakersfield section of HST: (1) depressional wetlands, (2) riverine wetlands, (3) individual vernal pools, and (4) vernal pool systems. These wetland types correspond to CRAM field books, which were used to assess the AAs. A summary of the CRAM scores for each CRAM wetland type is presented in Table 5-1. Possible CRAM scores range from 25 to 100. CRAM scores of AAs within the Fresno to Bakersfield Section ranged from 27.8 to 82.7.

Table 5-1
Average Index and Attribute Scores by CRAM Type, by Wetland Type

CRAM Type	Number of AAs	Average Index Score	Average Attribute Scores			
			Buffer and Landscape Context	Hydrology	Physical Structure	Biotic Structure
Depressional Wetland	8	46.0	35.1	54.1	40.7	54.1
Agricultural Reservoir	4	40.5	30.8	45.8	37.6	47.9
Detention Basin	2	42.3	33.2	58.3	25	52.7
Seasonal Basin	2	60.7	45.4	66.7	62.5	68.1
Riverine Wetland	17	55.2	66.3	57.4	45.7	51.4
Canal/Ditch	10	48.1	63.5	50.8	36.4	41.7
Seasonal Riverine	7	65.4	70.3	66.8	59.1	65.2
Individual Vernal Pool	11	70.0	73.6	87.1	54.5	64.8
Vernal Pool System	6	79.2	83	91.7	75	67.4

Acronyms:
AA assessment area
CRAM California Rapid Assessment Method

5.1 Depressional

Eight AAs were assessed using the depressional wetlands module. The scores are based on the assessment of six retention/detention basins and two isolated seasonal wetlands (basins) that appear to be remnants of a former riverine feature. The six retention/detention basins are located throughout the Fresno to Bakersfield study area and are composed of four agricultural basins and two urban basins. The retention/detention basins all received similar scores. Because they are immediately surrounded by agricultural land or urban development, the retention/detention basins scored particularly low on the Buffer and Landscape Context Attribute.

A manipulated hydrologic regime accounted for the low scores on the Hydrology Attribute and the general lack of physical and biotic structural complexity resulted in low scores on the Physical Structure and Biotic Structure Attributes.

Two isolated seasonal wetland basins in Hanford were assessed as depressional wetlands. These features are remnant segments of a natural channel and are now hydrologically closed off from a flow-through system. These features scored higher than the retention/detention basins as a result of being surrounded by larger buffers and having a predominantly natural water source (groundwater). Because these two features, unlike the retention/detention basins, were vegetated and had some degree of topographic complexity, they scored higher, in general, on the Physical and Biotic Structure Attributes.

Figure 5-1 shows the average CRAM index scores and attribute scores for retention/detention basins and seasonal wetlands evaluated using the depressional wetland module.

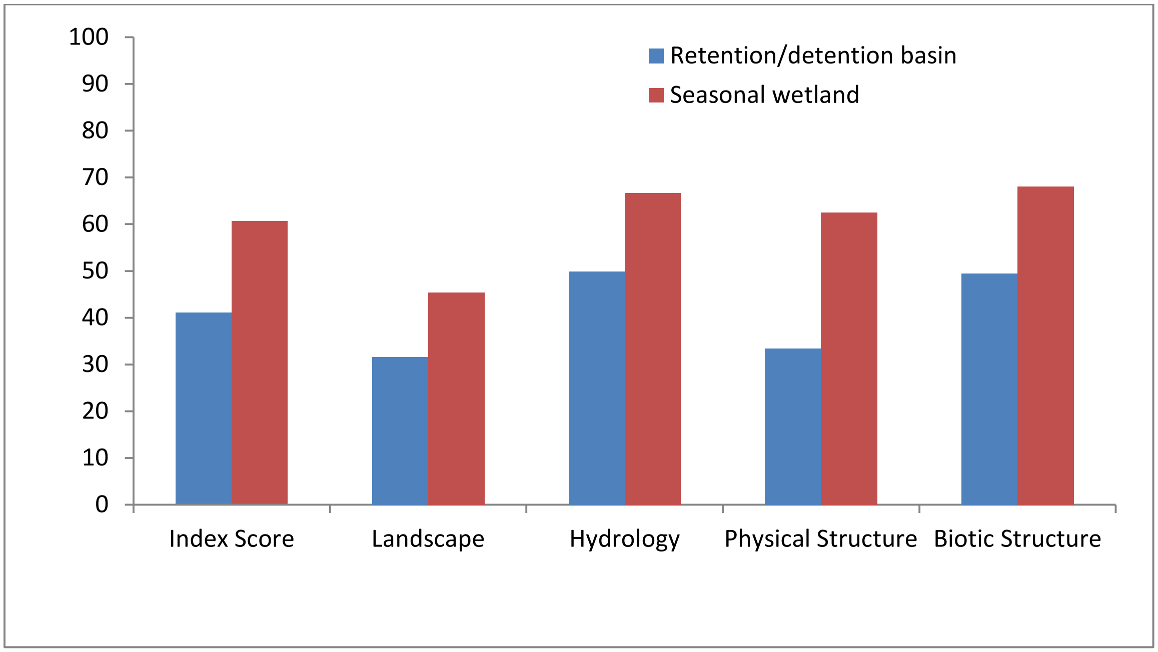

Figure 5-1
Average CRAM index scores and attribute scores for depressional wetland AAs

5.2 Riverine Wetlands

Seventeen AAs were assessed using the riverine module. These scores are based on the assessment of three canals, seven ditches, and seven seasonal riverine features. The ditches and canals were generally the lowest-scoring features assessed using the riverine module. The ditches and canals are located throughout the Fresno to Bakersfield study area. The majority are adjacent to agricultural fields and have hydrologic regimes controlled by weirs, gates, and pumping systems. Because of their landscape position, highly manipulated hydrologic regime, and lack physical and structural complexity, AAs of ditches and canals generally received relatively low Index scores and attribute scores. Three exceptions are ditches in the Allensworth area that are surrounded by a relatively natural vernal pool landscape and are not used for agricultural purposes.

AAs along the Kings River, Poso Creek, Cross Creek, and Kern River were selected to assess seasonal riverine features within the Fresno to Bakersfield study area. Overall, the Index scores for these AAs were similar though attribute scores for the AAs along the Kings River were generally higher than those of the other AAs, and attribute scores for Poso Creek were generally lower than those of the other AAs. The AA along Cross Creek scored relatively high overall, though individual attribute scores were within the ranges of those of the other riverine AAs. The lowest Index score for a seasonal riverine AA was along the Kern River where evidence of severe aggradation and little structural patch richness resulted in low Hydrology and Physical Structure Attribute scores.

Figure 5-2 shows the average CRAM index scores for SAR wetland types evaluated using the riverine module.

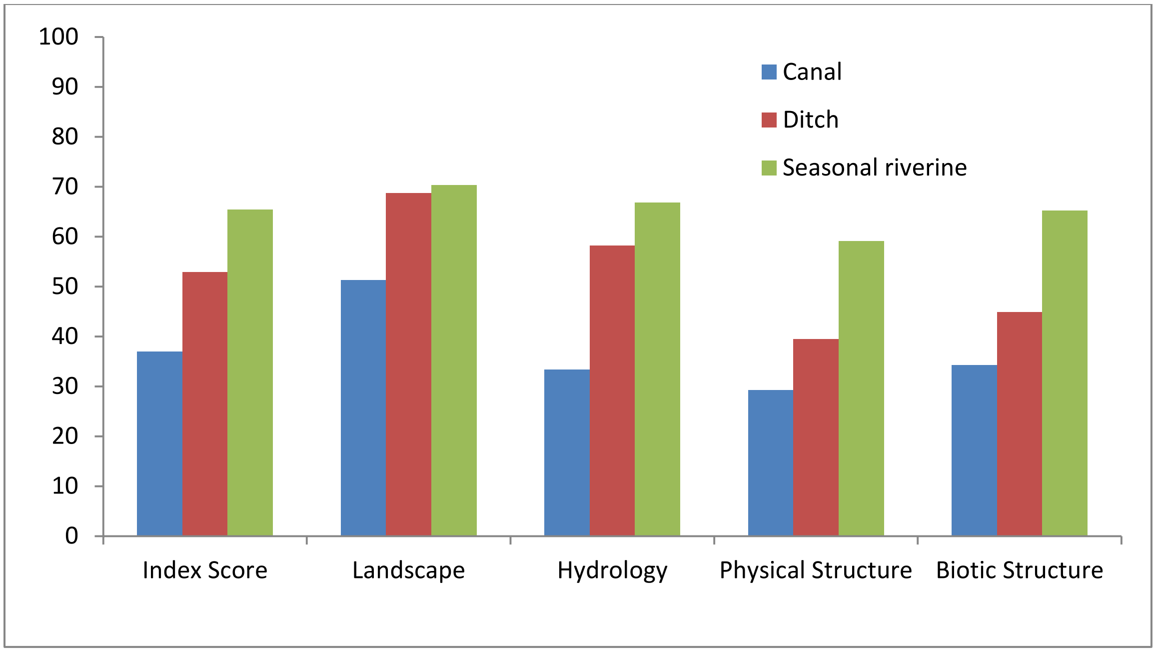

Figure 5-2
Average CRAM index scores and attribute scores for riverine wetland AAs

5.3 Individual Vernal Pools

Eleven AAs in vernal pools were assessed using the individual vernal pool module. All of these AAs occurred in the Allensworth area, either west of the town of Allensworth or near the Allensworth Ecological Reserve and BNSF railway. The AAs west of Allensworth (Appendix B, V70-V76D) scored lower than those near the Allensworth Ecological Reserve (Appendix B, V62A, V65, and V104-V115A) due to the proximity to habitat disturbed by surrounding dry land farming, compacted soils, and the dumping of refuse. Comparatively, vernal pools near the Allensworth Ecological Reserve are surrounded by relatively undisturbed natural lands and are dominated by native vegetation. All AAs in vernal pools received relatively high scores for the Hydrology Attribute, because the majority of the vernal pools assessed were away from berms, groundwater pumping systems, and agricultural canals and ditches. Scores for Physical Structure tended to be lower than other attribute scores, as a result of a lack of structural patch richness and a lack of topographic complexity.

Figure 5-3 shows the average CRAM index scores for individual vernal pool AAs.

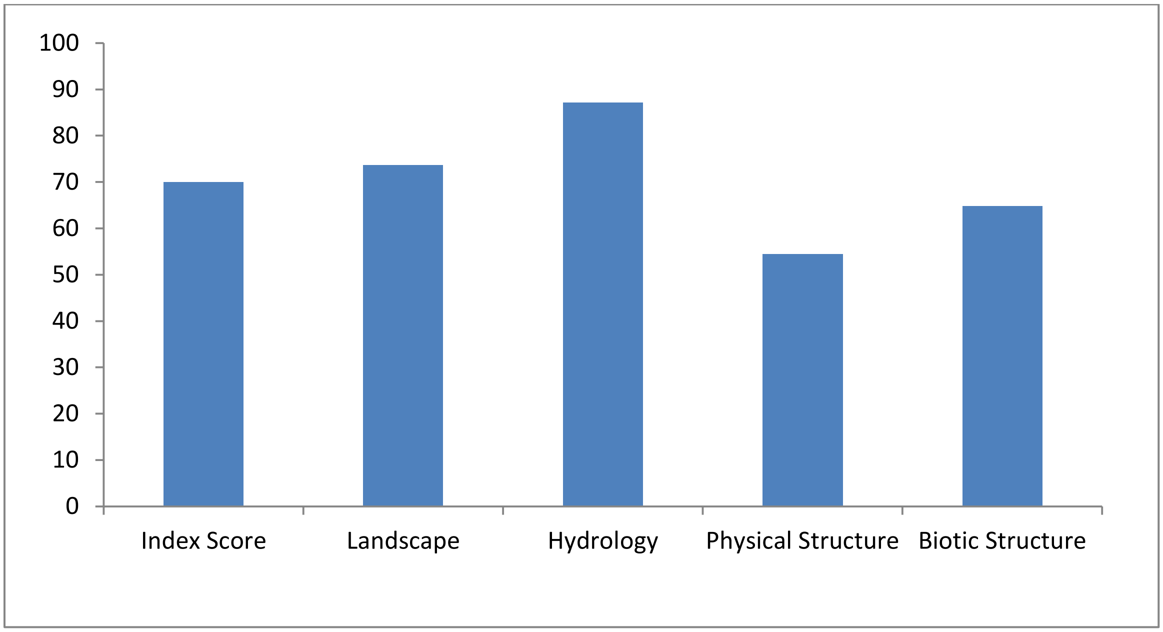

Figure 5-3
Average CRAM index score and attribute scores for individual vernal pool AAs

5.4 Vernal Pool Systems

Six AAs were assessed using the vernal pool systems module. All of these AAs occurred in the Allensworth area. These AAs consistently scored relatively high, with the highest-scoring AA receiving an overall score of 82.7. The high scores are indicative of the fact that the surrounding natural landscape is composed of a network of wetlands that is less disturbed than the rest of the Fresno to Bakersfield study area. All of the AAs scored high on the Buffer and Landscape Context and Hydrology Attributes. Scores for the Physical Structure Attribute varied, which was due to the varied degree of topographic complexity observed in each vernal pool system. Scores were typically lowest for the Biotic Structure Attribute because of a general lack of dominant endemic vernal pool vegetation.

Figure 5-4 shows the average CRAM index scores for vernal pool systems AAs.

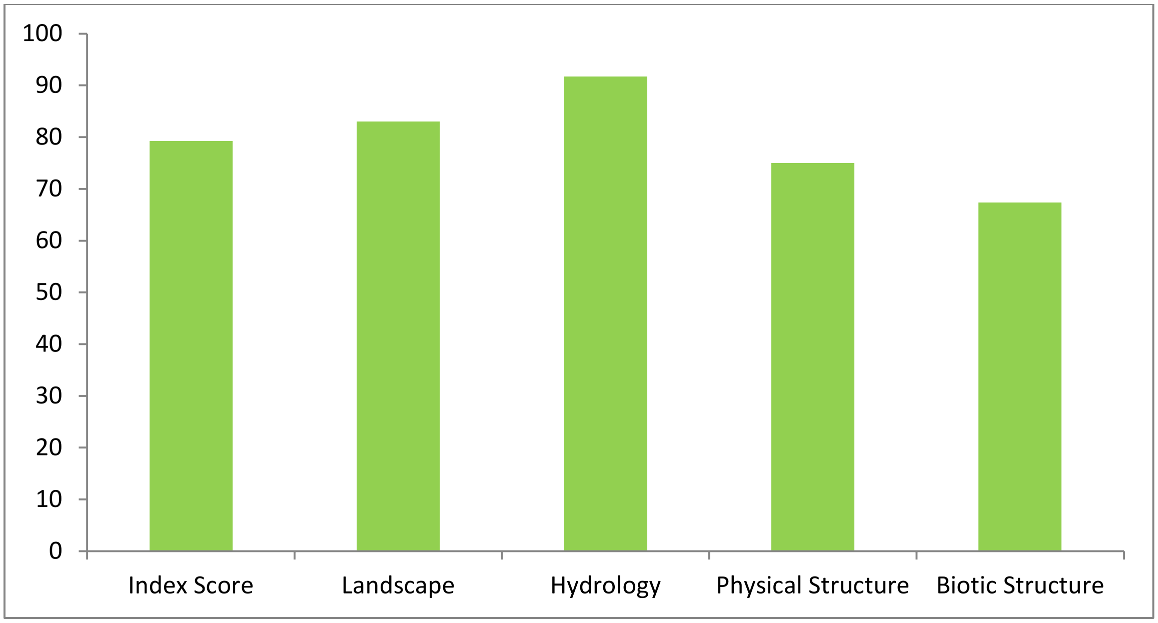

Figure 5-4
Average CRAM index score and attribute scores for vernal pool systems AAs

5.5 Fresno to Bakersfield CRAM Stressors

Appendix E lists the stressors influencing the AAs evaluated for Fresno to Bakersfield. The most common stressor within the Buffer and Landscape Attribute was the negative effect of a transportation corridor within 500 meters of AAs. Generally, the transportation corridor closest to the AAs was the BNSF railroad and SR 43 corridor. The most common stressor for the Hydrology Attribute was the negative influence of a dike/levee within 50 meters, which was typically the berm associated with BNSF and SR 43. Grading/compaction was the most common stressor within the Physical Structure Attribute and can generally be attributed to grading for agricultural purposes. Pesticide application or vector control was the most common stressor within the Biotic Structure Attribute, resulting from the proximity of AAs to row crops and orchards to which pesticides are applied.

The stressors can also be compared by CRAM wetland type. For depressional wetlands, the most common stressor was pesticide application/vector control, due to the hydrologic connection between agricultural fields and retention/detention basins and the opportunity for chemicals to flow into the basins. The presence of dikes/levees, orchards/nurseries, and a transportation corridor were most common for all riverine AAs (including canals, ditches and seasonal riverine). No difference was found in the stressors on canals and ditches versus seasonal riverine features. For vernal pools and vernal pool systems, the most common stressors were the presence of dikes/levees and a transportation corridor. Grading/compaction was also common for individual vernal pools.

5.6 Potential Mitigation Sites

A summary of the CRAM scores for each potential mitigation site is presented in Table 5.6-1. Eighteen AAs were evaluated across the seven properties. The CRAM scores of AAs within these sites ranged from 57.7 to 81.2. The CRAM results for each site are detailed in this section along with descriptions of the stressors influencing the AAs.

Table 5-2
CRAM Results for Mitigation Sites

Location	CRAM Type	Number of AAs	Average Index Score	Average Attribute Scores			
				Buffer and Landscape Context	Hydrology	Physical Structure	Biotic Structure
Buena Vista Dairy	Depressional Wetland	2	70.7	87.1	83.3	50	62.5
	Individual Vernal Pool	1	75.4	93.3	91.7	62.5	54.2
	Vernal Pool System	2	81.2	93.3	91.7	75	64.6
Davis	Seasonal Depressional Wetland	2	69.7	84.0	83.3	37.5	73.6
Staffel	Individual Vernal Pool	2	73.9	93.3	91.7	43.8	66.7
Te Velde	Riverine	2	57.9	67.7	66.7	37.5	60.3
Valadez	Depressional Wetlands	1	58.5	47.9	66.7	50	69.4
	Individual Vernal Pool	1	57.7	55.8	100	37.5	37.5
Yang	Vernal Pool System	3	81.0	93.3	91.7	75	63.9
Clark River Ranch	Riverine	2	59.8	68.8	62.5	43.8	63.9

Acronyms:
AA assessment area
CRAM California Rapid Assessment Method

5.6.1 Buena Vista Dairy

Buena Vista Dairy is a 715-acre property in Kern County, predominantly composed of undisturbed land supporting vernal pools, swales, and remnant riverine wetlands. Five AAs were evaluated on the Buena Vista Dairy property: two depressional wetlands, one individual vernal pool, and two vernal pool systems. All five of these AAs are representative of the wetland features present on the property. The depressional wetlands are part of a remnant channel that no longer functions as a flow-through system because of a restrictive berm downstream of the AAs. These two AAs received nearly identical scores. Due to lack of physical and biotic diversity and the presence of a non-native invasive plant species, both AAs scored relatively low on the Physical Structure and Biotic Structure Attributes, compared to their scores for the Buffer and Landscape and Hydrology Attributes. The individual vernal pool AA scored relatively high on Buffer and Landscape, and Hydrology Attributes due to a continuous, wide buffer and natural hydrology. It scored lower on the Physical Structure Attribute as a result of moderate structural patch richness. It scored lowest on Biotic Structure due to a lack of endemic vernal pool species in the AA. Of the AAs evaluated on the property, the two vernal pool system AAs scored the highest, scoring relatively high for all attributes except Biotic Structure. Like the individual vernal pool AA, no endemic vernal pool species were identified in these AAs lowering the Biotic Structure score.

Appendix E lists the stressors influencing the AAs evaluated at the Buena Vista Dairy as well as the rest of the potential mitigation sites. The stressor influencing the depressional wetland AAs on the Buena Vista Dairy within the Buffer and Landscape Attribute was intensive row crop activities on the adjacent property. The Interstate 5 and Route 119 transportation corridors were the stressors that had the greatest influence on the individual vernal pool and vernal pool system AAs. All of the AAs were negatively influenced by the dike/levee within 50 meters (under the Hydrology Attribute), which blocked the flow of the historic channel through the property. No stressors within the Physical or Biotic Structure Attributes were identified for any of the AAs on the Buena Vista Dairy property.

Figure 5-5 shows the average CRAM index scores and attribute scores for the five AAs evaluated on the Buena Vista Dairy property, broken down by CRAM wetland type.

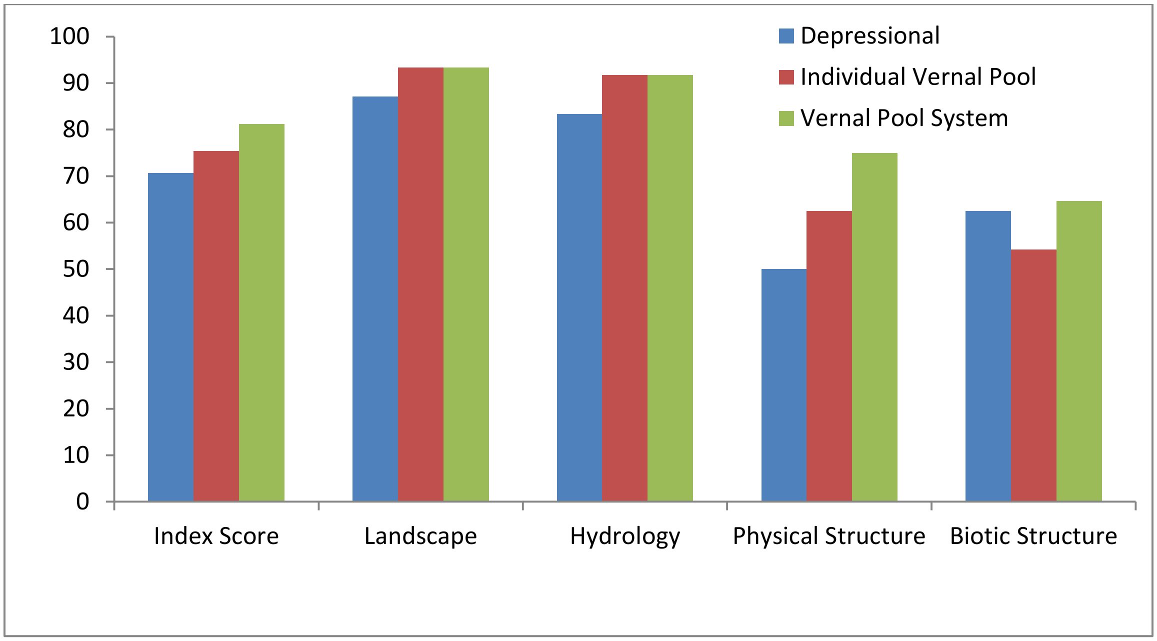

Figure 5-5
Average CRAM index score and attribute scores for AAs on Buena Vista Dairy

5.6.2 Davis

The Davis property is a 158-acre parcel containing predominantly undisturbed land in Kern County. A large vernal swale extends from the northeast region of the property to the southwest corner and seasonal depressional wetlands are present along the western edge of the parcel. Two of these seasonal wetlands were assessed using the CRAM depressional module. Both AAs occur in the northwestern portion of the property. The AAs received similar CRAM index scores and received identical scores for the Buffer and Landscape Context, Hydrology, and Physical Structure Attributes. The site is relatively undisturbed and the presence of a wide buffer in good condition and the natural hydrology resulted in high scores for the Buffer and Landscape Context and Hydrology Attributes. Among the attributes, the AAs scored lowest on Physical Structure. Both structural patch richness and topographic complexity were lacking in these wetlands. This was characteristic of other wetlands identified on the property. Differing degrees of horizontal interspersion and zonation in the two AAs provided variation in the scores for the Biotic Structure Attribute.

The stressors influencing the AAs on the Davis property were within the Buffer and Landscape Context and Hydrology Attributes. The transportation corridor (Corcoran Road) supports enough traffic to negatively affect the AAs. Additionally, evidence of passive recreation (foot trails) indicates potential for a negative effect from human use. Within the Hydrology Attribute, the AAs were negatively influenced by flow obstructions from the presence of a culvert directing flows beneath Corcoran Road. No stressors were identified within the Physical and Biotic Structure Attributes.

Figure 5-6 shows the average CRAM index score and attribute scores for the two seasonal depressional wetland AAs evaluated on the Davis property.

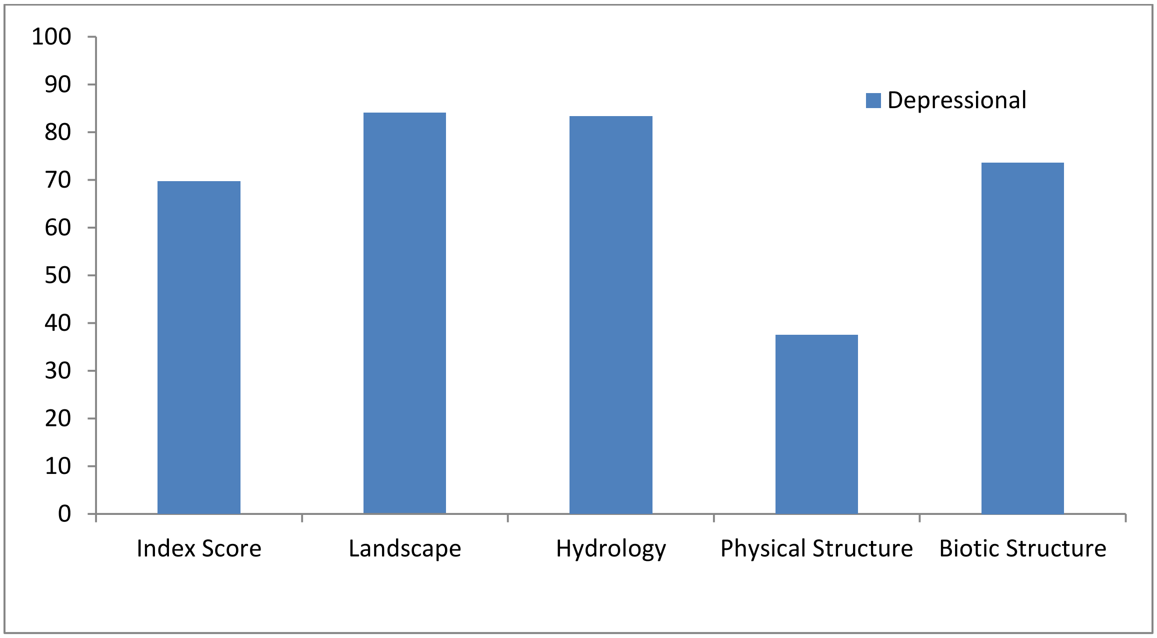

Figure 5-6
Average CRAM index score and attribute scores for AAs on the Davis property

5.6.3 Staffel

The Staffel property is a 61-acre parcel in Kings County, immediately south of the Allensworth Ecological Reserve. The land is predominantly undisturbed and supports vernal pools in the northern portion of the property and as well as small scattered depressional seasonal wetlands. The vernal pools are part of a larger vernal pool network that extends offsite, receiving surface flow from the Allensworth Ecological Reserve that enters at the northern boundary of the Staffel property. Two large individual vernal pool AAs were evaluated at the Staffel property. These AAs are representative of vernal pools present throughout the property. The site is relatively undisturbed and both AAs scored high on Buffer and Landscape Context and Hydrology Attributes because of the continuous, wide buffers and natural hydrology. Both AAs scored lowest on the Physical Structure Attribute. Both structural patch richness and topographic complexity were lacking in these vernal pools. This was characteristic of other vernal pools identified on the property. One vernal pool AA scored relatively low on the Biotic Structure Attribute due to little horizontal interspersion and zonation. The other AA received a moderately high Biotic Structure Attribute score because it had a large number of co-dominant plant species. Neither AA contained endemic vernal pool species.

The stressors influencing the AAs on the Staffel property were within the Buffer and Landscape Context and Physical Structure Attributes. The presence of orchards/nurseries on parcels south of the Staffel property potentially has a negative effect on the AAs. Additionally, the presence of trash/refuse, including plastic buckets, oil drums, and discarded appliances and furniture may negatively affect the physical structure of the vernal pools. No stressors were identified within the Hydrology and Biotic Structure Attributes.

Figure 5-7 shows the average CRAM index score and attribute scores for the two individual vernal pool AAs evaluated on the Staffel property.

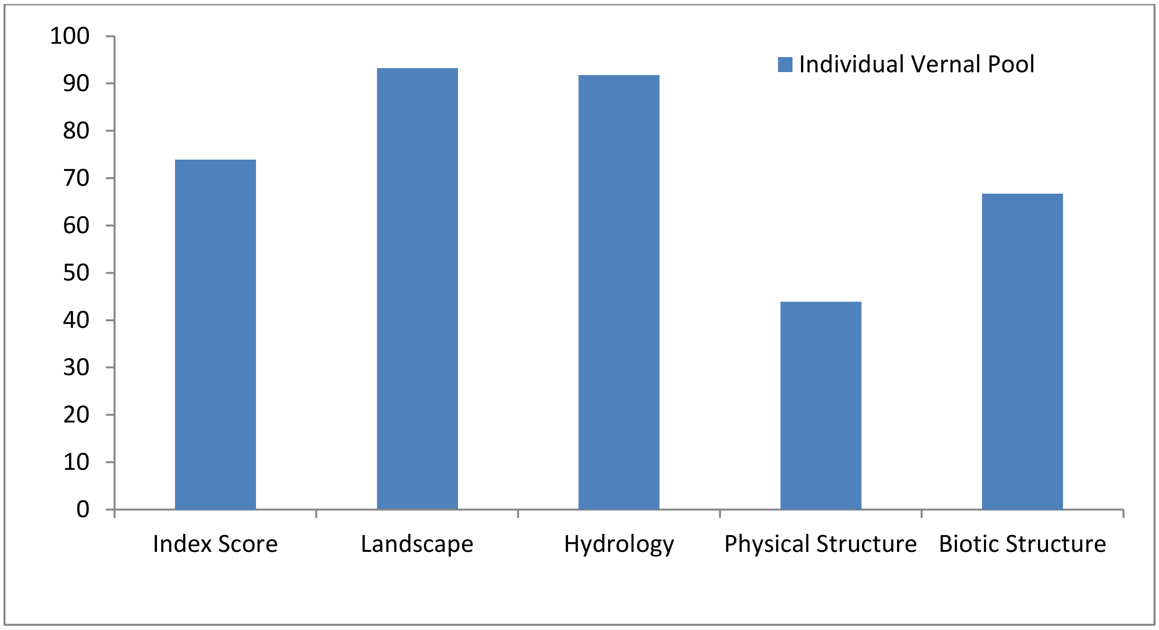

Figure 5-7
Average CRAM index score and attribute scores for AAs on the Staffel property

5.6.4 Te Velde

The Te Velde property consists of eight parcels on 1,356 acres in Tulare County. The parcels are in active agricultural use. The Tule River flows across the property from the east, bisecting the site, and forks before reaching the southwest corner. Two riverine AAs were evaluated along the Tule River on the Te Velde Property. Because this portion of the Tule River is bounded on both sides by roads atop berms and is surrounded by agricultural fields, both AAs received moderate scores for the Buffer and Landscape Context Attribute. Hydrologic connectivity was the metric that most influenced scores for the Hydrology Attribute, with one AA scoring relatively high and the other relatively low. Both AAs scored relatively low on the Physical Structure Attribute. Structural patch richness and topographic complexity were lacking within this portion of the Tule River. The presence of non-native invasive plant species and low vertical biotic structure resulted in relatively low Biotic Structure Attribute scores for both AAs. These AAs are representative of the segment of the Tule River that runs through the Te Velde property.

The stressor influencing the AAs on the Te Velde property within the Buffer and Landscape Context was ranching, from the onsite ranch south of the river. Within the Hydrology Attribute, non-point source discharges from agricultural activities immediately adjacent to the AAs and flow diversions from culverts were identified as stressors negatively influencing the AAs. Within the Physical Structure Attribute, grading/compaction and plowing/discing were also identified. Additionally, the AAs were identified as bacteria- and pathogen- impaired based on visible watering of livestock waste piles adjacent to the Tule River. No stressors were identified within the Biotic Structure Attribute.

Figure 5-8 shows the average CRAM index score and attribute scores for the two seasonal riverine AAs evaluated on the Te Velde property.

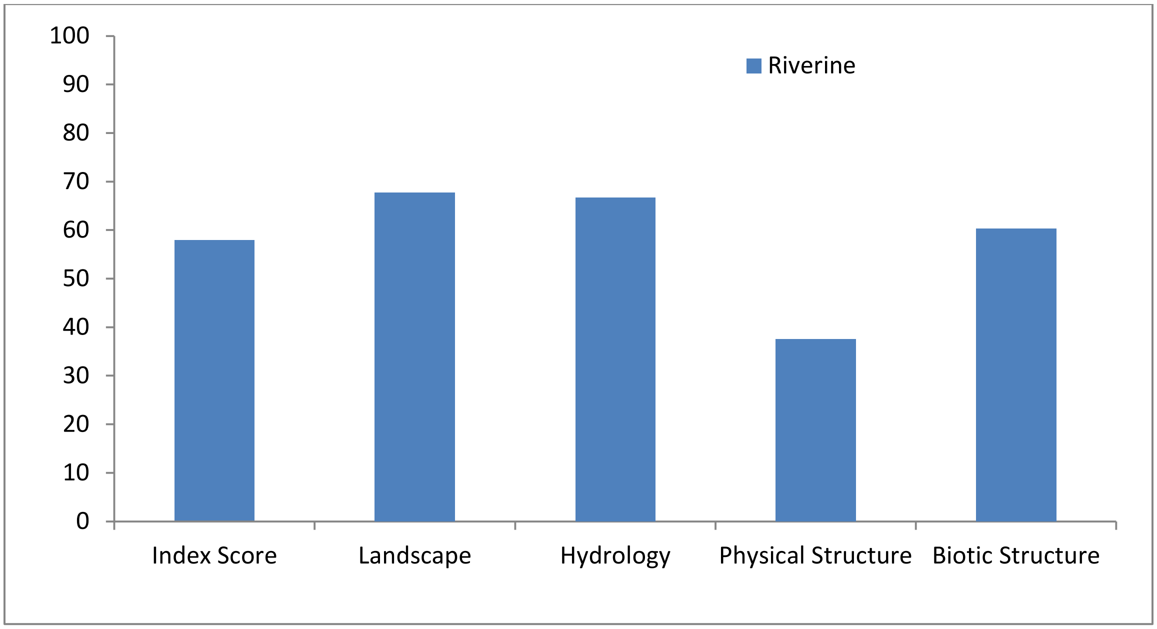

Figure 5-8
Average CRAM index score and attribute scores for AAs on the Te Velde property

5.6.5 Valadez

The Valadez property is a 120-acre parcel of moderately disturbed land featuring a man-made wetland basin, and vernal pools that are located in the northern portion of the site. Two AAs were evaluated on the Valadez property: one depressional wetland and one individual vernal pool. The depressional wetland AA was in the large, deep, man-made basin that appears to no longer be used for any water-holding/infiltration purposes. The basin now functions as a vegetated wetland with upland islands. This AA received a relatively low index score and low attribute scores because of disturbed site conditions, the man-made nature of the feature, and little physical and biotic diversity. The individual vernal pool AA also received a relatively low index score and low attribute scores, resulting from a disturbed landscape and little physical and biotic diversity. The exception was the Hydrology Attribute, for which the AA received a score of 100. Despite disturbed site conditions, the AA showed evidence of a natural hydrology regime.

The stressors influencing the AAs on the Valadez property differed somewhat between the two AAs. The stressors influencing the depressional wetland were urban/residential (from the onsite residential and operational facilities) and grading/compaction of the land adjacent to the wetland. These stressors are within the Buffer and Landscape Context and Physical Structure Attributes, respectively. The transportation corridor of Corcoran Road was identified as negatively affecting both AAs. No other stressors were observed for the individual vernal pool AA and no stressors within the Biotic Structure Attribute were identified.

Figure 5-9 shows the average CRAM index scores and attribute scores for the depressional wetland and the individual vernal pool AAs evaluated on the Valadez property.

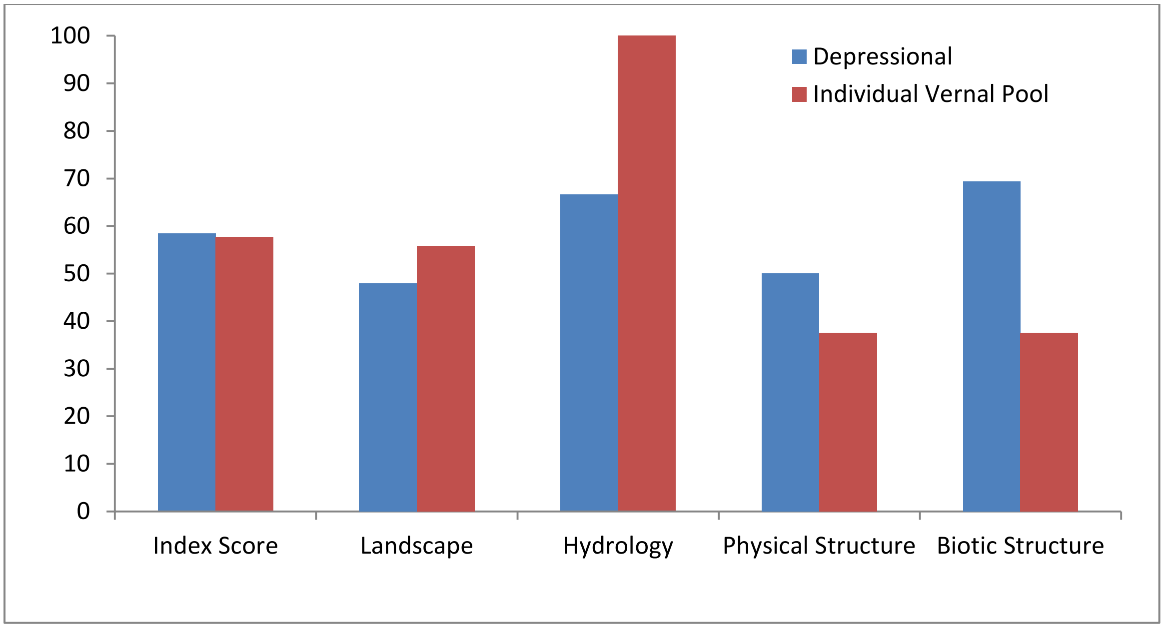

Figure 5-9
Average CRAM index score and attribute scores for AAs on the Valadez property

5.6.6 Yang

The Yang property is composed of 316 acres on eight parcels in Kings County and is bordered by the Allensworth Ecological Reserve to the east. The land is predominantly undisturbed and a large, continuous network of vernal pools and swales extends from the Allensworth Ecological Reserve west onto the Yang property. Three vernal pool system AAs were evaluated on the Yang property. All three received relatively high index scores and are representative of vernal pool systems on the property. The natural conditions of the site and surrounding landscape resulted in relatively high scores for the Buffer and Landscape Context and Hydrology Attributes for all three AAs. Although pool and swale density were high, a lack of abundant structural patch richness and topography complexity resulted in lower scores for the Physical Structure Attribute in all three AAs. The Biotic Structure Attribute received the lowest scores. This was primarily due to a high percentage of non-native species present in the vernal pools and a lack of endemic vernal pool species.

Only one stressor was identified as negatively affecting the three AAs on the Yang property: the presence of orchards/nurseries within 500 meters of the property north of Yang. No CRAM stressors within the Hydrology, Biotic, or Physical Structure Attributes were observed.

Figure 5-10 shows the average CRAM index score and attribute scores for the three vernal pool system AAs evaluated on the Yang property.

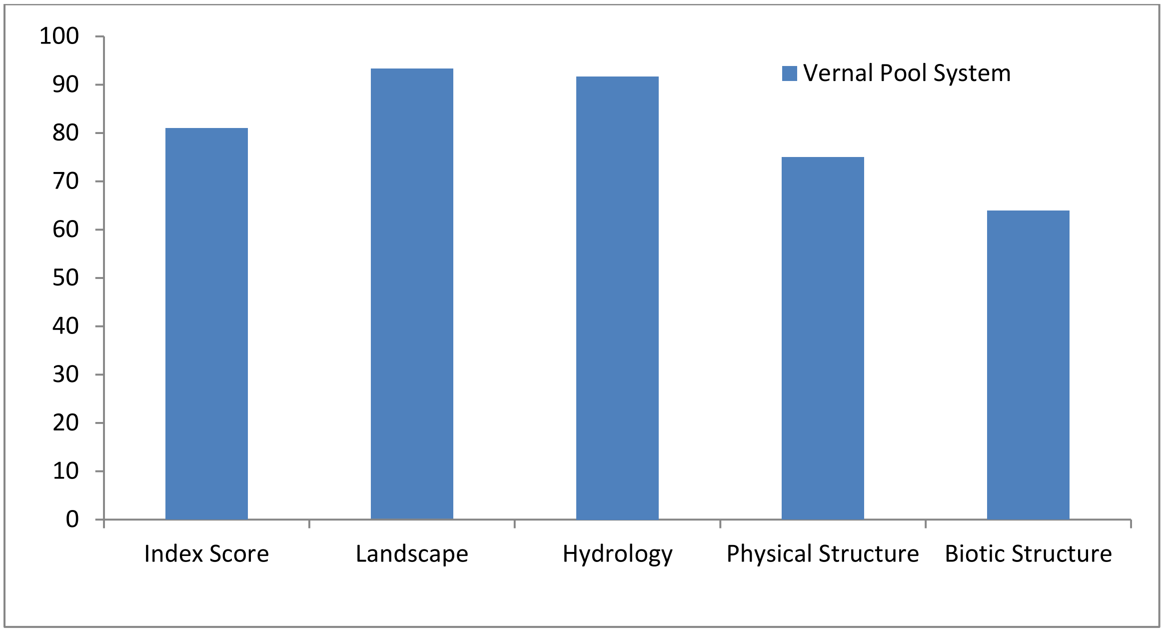

Figure 5-10
Average CRAM index score and attribute scores for AAs on the Yang property

5.6.7 Clark River Ranch

Clark River Ranch is composed of approximately 290 acres on 110 parcels at the divergence of the northern and southern forks of the Kings River in Kings County. The parcels include a combination of active irrigated and fallow agricultural fields surrounded by intact and degraded riparian and woodland habitats. Two riverine AAs were evaluated along branches of the Kings River. One of the AAs (R401) is along the Clarks Fork of the Kings River at the southern end of Clark River Ranch. The other AA (R402) is along the northern fork of the Kings River at the northern end of Clark River Ranch.

The two riverine AAs received similar overall scores. Because both forks of the Kings River are bounded by road berms and surrounded by agriculture, which has created narrow buffers, both AAs received moderate scores for the Buffer and Landscape Context Attribute. AA R402 received a lower score than R401 for this attribute because it has a wide gap in the riparian corridor upstream of the AA. Both AAs scored lower on the Hydrology Attribute due to regulated releases of water through dams upstream of the AAs and low entrenchment ratios. Both AAs scored relatively low in Physical Structure because they lacked structural patch richness and topographic complexity. R401 scored relatively low on Biotic Structure due to low horizontal interspersion and vertical biotic structure. R402 received a moderate score due to greater horizontal interspersion and vertical biotic structure.

The stressors influencing the AAs at Clark River Ranch within the Buffer and Landscape Context were the dams upstream within 500 meters and intensive row-crop agriculture and orchards on Clark River Ranch and surrounding properties. Within the Hydrology Attribute, dike/levees and actively managed hydrology were identified as stressors on both AAs. Within the Physical Structure Attribute, plowing/discing and excessive sediment from the watershed were identified as stressors on both AAs. No stressors within the Biotic Structure Attribute were identified for either AA.

Figure 5-11 shows the average CRAM index score and attribute scores for the two riverine AAs evaluated on the Clark River Ranch property.

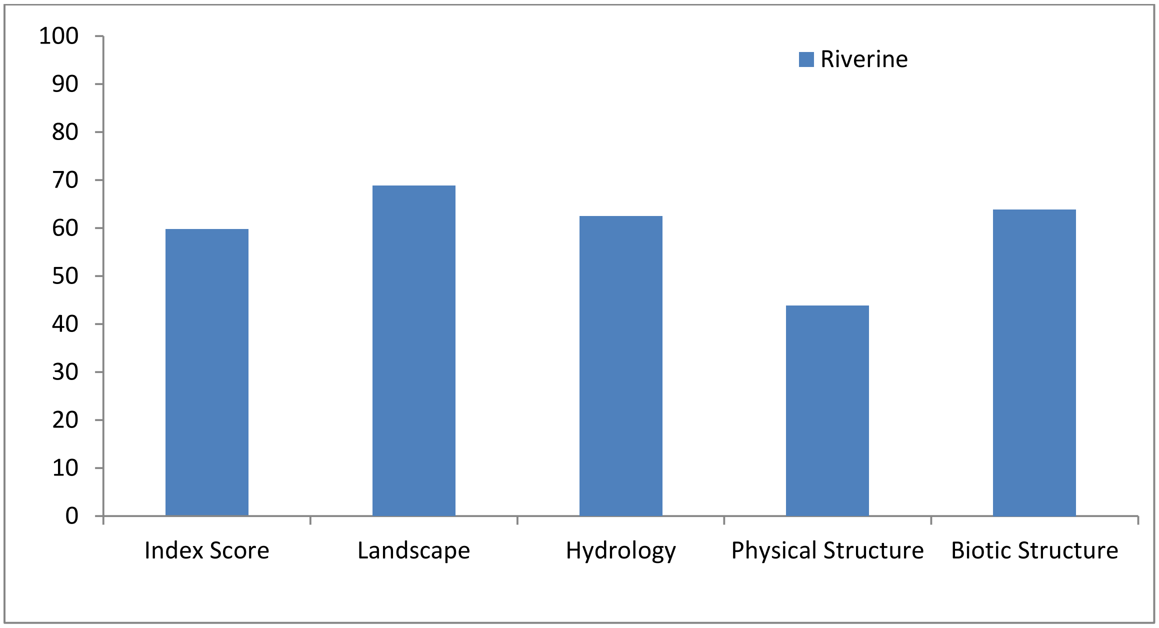

Figure 5-11
Average CRAM index score and attribute scores for AAs on the Clark River Ranch property

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Section 6.0
Discussion

6.0 Discussion

This section discusses the sampling and methodological considerations in using CRAM for the Fresno to Bakersfield Section of HST and in using CRAM to evaluate watershed condition. This section also provides some discussion on the effects of stressors on CRAM scores and using CRAM to extrapolate existing conditions for all the aquatic features in the study area. A brief summary is also included on how CRAM was used to evaluate the potential mitigation sites.

6.1 Consistency with CRAM Requirements and Implementation Guidelines

A concern that arises in conducting CRAM studies is deviation from the specified technical approaches identified in the CRAM guidance. With the guidance of the CRAM coordinator, Chad Roberts, the field portion of this study was conducted in accordance with published CRAM technical requirements except as indicated below. The results reported in this document stem from a valid application of CRAM.

6.1.1 Sample Frame and Sample Size

A primary concern for this CRAM application arises as a consequence of the distributed nature of wetlands and aquatic areas within the project alignment and the need to ensure an adequate sample frame for the AAs in each module. A second, related concern stems from the size of the CRAM sample (i.e., the numbers of AAs) for each module.

The CRAM manual recommends a process for establishing a project-based sampling protocol to: (1) establish a separate map of the study area showing all of the aquatic features of each wetland type (the *sample frame* for that type); (2) identify possible AAs within each sample frame for the study area; and (3) sample AAs and consider the scores, with sampling continuing until the ranges in Index and Attribute scores are small enough to conclude that the results accurately describe the real variation in condition in each sample frame.

For the Fresno to Bakersfield Section, the sample frames (the set of wetlands of each type from which the sample of AAs is drawn) were determined jointly by (1) the locations of aquatic features of each type within a given distance of the project alignment and (2) the team's permission to access the features. It is an unavoidable consequence of the arrangement of aquatic features that the combination of proximity and permission resulted in a limitation in the locations and numbers of AAs that could be sampled.

The sample frames for aquatic features (Table 5-1) were 8 (combined) for depressional features, 17 (combined) for riverine features, 11 for individual vernal pools, and 6 for vernal pool systems. The project team made an effort to distribute the AAs in each module throughout the project alignment between Fresno and Bakersfield according to the sample frame; that is, to sample the aquatic features where they occurred throughout the study area to ensure that the range of variability in these features was captured in the results.

In general, the locations for depressional sites and riverine sites indicate a broad sample frame within the study area. The CRAM coordinator determined that a relatively small sample size was required for depressional features because the vast majority of depressional features in the project alignment were either (1) irrigation reservoirs related to agricultural operations that exhibited limited variation in site conditions everywhere in the study area, or (2) stormwater retention/detention basins in developed areas. Similarly, many "riverine" sites were ditches and canals associated with agricultural operations and/or flood conveyance, features that exhibit limited variability throughout the project alignment. These agricultural- and urbanization-related features did not exhibit sufficient variation in condition to warrant large sample sizes, even if the opportunity were presented to sample large numbers of such features. This result is fully consistent with CRAM implementation guidance.

The sample frame for "natural" riverine features in the project alignment was, however, limited by the combination of limited presence in the alignment and lack of access permission. Additional assessments of "natural" riverine features would have been desirable, but opportunities for such assessments did not exist given the exigencies of the project. Nonetheless, the team was able to secure assessment scores for seven natural riverine features from the entire alignment. In the end, the CRAM coordinator judged that the sample size for these features reflected the average condition of such features within the alignment.

The sample frame for vernal pool features (both individual pools and vernal pool systems) in the project alignment was highly constrained geographically; generally these features have been obliterated through much of the alignment by agricultural conversions. Paradoxically, where the features can still be found (e.g., in the Allensworth area) they are relatively common, and an adequate sample size was obtained within the project vicinity.

In general summary, the application of the CRAM methodology to the project was consistent with the recommendations in the CRAM manual for sample frame and sample size.

6.1.2 Methodological Considerations

A minor deviation from then-existing CRAM methodology occurred in conducting two riverine assessments on the Kern River. AAs were established along the southern bank of the Kern River. At the time of the assessments, the depth of water flowing in the river was too deep to be wadable and the riverbed was unstable. Under the direction of the CRAM coordinator, the AA was positioned along one bank and an electronic distance-measuring device was used to measure the bankful width and flood-prone width, the two variables required to assess the "entrenchment ratio" in the riverine module's Hydrological Connectivity metric. This approach was subsequently incorporated into the riverine module, and the approach adopted for this project is now accepted in similar CRAM contexts. No other substantial methodological variations occurred for riverine module applications covered by this report.

The season of applicability for the depressional wetland module is the "growing season" for wetland vegetation, generally considered in CRAM to be March to September in areas not subject to snowmelt. However, even though the Fresno to Bakersfield Section was assessed in September and in March (both within the nominal "growing season"), at the time of the assessments the area already showed signs of severely dry conditions, and "natural" depressional areas (as opposed to irrigation ponds) exhibited reduced vegetative growth that likely affected Biotic Structure Attribute scores. However, this factor (drought during the growing season) is considered to be an element of natural variation within the study area, rather than a variation from CRAM methodology, and no substantial methodological variations occurred for the depressional wetland module applications covered by this report.

The vernal pool assessments reported in this document were conducted in September, which was (and remains) outside the period recommended for vernal pool module assessments (essentially the spring, approximately March to June). While many of the metrics in the vernal pool modules can be assessed outside of the spring season, the presence and dominance of vernal pool-endemic plant species is constrained seasonally. In addition, seasonal drought reduces the percent cover for all vegetation. Both results affect the Biotic Structure Attribute scores in both vernal pool modules. The vegetation conditions in September required that team botanists identify the dried remnants of vernal pool-endemic plants based on prior familiarity with these pools in wetter seasons. Early vernal pool assessments were used to train other members in the field team in recognizing the remains of endemic species.

This identification of vernal pool endemics on the basis of dried remnants is loosely termed "forensic vernal pool botany" in CRAM contexts, and while it is appropriate to identify the applicability of vernal pool modules, it is not recommended for standard use because evidence exists that this variant in the methodology does not fully identify a complete complement of vernal pool species that would be identified at the appropriate season. This is expected to have occurred within the study area even though the abundance of vernal pool-endemic plant species is lower in the Tulare Lake region than in other parts of the Central Valley.

Therefore, the conclusion should be reached that the application of CRAM to the vernal pools in the study area most likely resulted in identifying fewer vernal pool-endemic plant species than would have been identified with assessments during the spring. Out-of-season assessments may also have resulted in underscoring vegetation mosaic complexity (now termed "Horizontal Interspersion"). Such results would likely be reflected by lower Biotic Structure Attribute scores for vernal pools than would occur with springtime assessments. However, the other aspects of the application of the vernal pool modules were executed according to CRAM guidance, and scores in general are expected to reflect appropriate ranking among the pools assessed. (In addition, it should be noted that the drought conditions in the study area during the winter and spring of 2011–2012 did not result in the development of "normal" vernal pool vegetation in the spring of 2012, and the assessment of vernal pool conditions in the study area would have been affected in any event.)

6.2 Watershed Condition

The arrays of CRAM scores reported in Section 5.0 provide a snapshot of watershed condition in the vicinity of the HST alignment between Fresno and Bakersfield. Table 5-1 presents the relevant CRAM index and attribute scores for features assessed, by feature subtype.

6.2.1 Depressional Sites

Depressional sites identified in the study area were fundamentally of two types. The first type was agricultural irrigation reservoirs. These features yielded very low CRAM scores, which reflects the fact that these are created features that function in conjunction with canals and ditches in rather unnatural "watersheds." These reservoirs are largely temporary groundwater storage facilities, which function hydrologically as the sources of water (and often as the sources of hydrostatic pressure) for the agricultural irrigation systems of which they are elements; they are highly dynamic, with evidence in some reservoirs of significant fluctuations in water surface elevation over short time periods, and have little vegetation. Fundamentally, they are not part of the remnant watersheds in the study area except to the extent that they provide water that may flow in the canal/ditch systems that still retain remnant "watershed" characteristics (e.g., drainage networks that convey rainfall to a watershed low point, generally the Tulare Lake bed) in the study area. Little condition variation was observed among these features anywhere in the Fresno to Bakersfield Section.

The second type of depressional wetland area identified in the project region was detention/retention basins that function as part of local stormwater management systems. Such features were largely restricted to developed parts of the project alignment. These depressions are typically better vegetated but less hydrologically connected than are the agricultural reservoirs (that is, the primary goal of such features is *not* to release water to regional drainage systems), but they also had low CRAM scores that reflect low importance to study area watersheds.

These two types of depressional wetlands are indicative of study area watersheds that have substantially altered land uses and hydrology. The low CRAM scores indicate that these watershed elements do not have a high condition status and provide few of the functions that would be expected from depressional wetlands in less-altered watersheds.

Natural depressional wetlands in the Fresno to Bakersfield Section are rare, apparently occurring primarily as a consequence of past fragmentation and isolation of more natural aquatic features, although some of the shallow natural wetlands in the Allensworth region may be depressional wetlands and are not uncommon in that context. As indicated by the CRAM scores of two "natural" depressional wetlands near Hanford (apparently relicts of a former riverine feature, probably a distributary of the Kings River), such remnants tend to provide better condition indicators, exhibited by CRAM scores that are significantly higher than those of the created features.

6.2.2 Riverine Sites

The conditions presented by canals and ditches are assessed in CRAM using the riverine module, which allows a comparison of conditions in such features with respect to remnant natural riverine features in the study area. The canals and ditches assessed throughout the Fresno to Bakersfield Section (with two exceptions; see below) yielded scores that were substantially (approximately 20 CRAM points) lower than the scores for remnant natural riverine systems in the project vicinity (which included the channels of the Kern River, Poso Creek, Cross Creek, and the Kings River). The CRAM scores for the canals and ditches assessed in the study area indicate that these surface water features also do not provide many of the desired conditions found in natural riverine systems for study area watersheds.

Functionally, the canals and ditches form an alternative hydrological network in lieu of the more natural drainage system that existed before the commitment of virtually all of the study area to agriculture. In a large sense the conversion has included even the remnant natural water features. All of the natural channels assessed in this study were clearly used as conveyances for artificial (mostly irrigation) water flow, as well as having more natural functions such as conveying runoff. At the same time, many of the larger canals in the study area showed indications that they function for conveying stormwater as well as for delivering irrigation flows.

The low condition scores for canals and ditches arise largely because of the artificiality of the constructed features in a context of highly modified watersheds. Two canals in Colonel Allensworth State Historic Park exhibited substantially higher CRAM scores than did the majority of artificial features in the Fresno to Bakersfield Section as a consequence of less-altered hydrological conditions in the State Historic Park. That is, these sites indicate that canals and ditches elsewhere in the study area provide low condition scores because of the regional alteration of watershed patterns, not simply because they are canals and ditches.

While the condition scores for the remnant natural features in the project alignment are higher than those of most canals and ditches, it is noteworthy that even the scores of the natural riverine features are not high in comparison with scores from riverine features in less-altered parts of California (based on CRAM scores reviewed at www.cramwetlands.org; see Section 6.4 for a description of the internal standard in CRAM modules that enables inter-regional comparisons among wetlands in each type). The scores indicate that even the least-altered riverine features in the study area provide fewer benefits to aquatic systems than riverine features in less-disturbed parts of California.

6.2.3 Vernal Pool Sites

The CRAM scores for vernal pool wetlands are the highest scores for aquatic features within the Fresno to Bakersfield Section. This result is fully consistent with the occurrence of these wetlands in the least-fragmented remnant watersheds in the study area. The scores suggest that the watersheds in the Allensworth region continue to provide higher levels of various functions than do most of the altered watersheds elsewhere in the study area. The CRAM team did not locate aquatic features identifiable as vernal pools in parts of the project alignments that were not in the Allensworth region (vernal pool features nevertheless may exist elsewhere which were not identified as vernal pools). The team generally concluded that it was unreasonable to conclude that vernal pools were not historically widespread in the Tulare Lake basin, and that the scarcity of such features today can only be identified as a consequence of their elimination as part of the conversion of the regional landscape to agriculture.

The identified condition scores for vernal pool systems are uniformly higher than comparable scores for individual vernal pools. The CRAM team is uncertain why this pattern exists, given that individual pools were intermixed with vernal pool systems where vernal pools occurred.

The vernal pools in the Fresno to Bakersfield study area are largely lacking in structural patch richness and vernal pool endemic plant species, two metrics that play large roles in calculating the attribute scores for Physical Structure and Biotic Structure, respectively. While these metrics capture conditions of vernal pools in California, they do not seem to account for the unique functions of vernal pools in the study area, which are representative of vernal pools in this region of the Central Valley. Low scores for Physical and Biotic Structure may be indicative of the limitations of CRAM for assessing unique wetland communities.

6.2.4 Watershed Condition Summary from CRAM Results

While the CRAM assessments were confined to the vicinities of the HST project elements in the Fresno to Bakersfield Section, the resulting condition scores are sufficient to support the following general conclusions about the watersheds in which these elements occur.

- Prior land use changes in the study area (largely the conversion of the regional landscape for agricultural purposes) have altered virtually all of the aquatic area conditions that are assessed by CRAM. The altered conditions are evident in the low study area scores for depressional and riverine features in general, and are particularly evident for the constructed features (ditches, canals, and reservoirs) that currently represent dominant hydrological elements in the project vicinity.
- Remnant "natural" features in the study area (a number of riverine features, a small number of altered depressional features, and a geographically limited sample of relatively intact vernal pools) generally received higher condition scores than did the constructed features. The remnant features provide a set of core elements that may be used for enhancing wetland conditions in the project vicinity, even though there is clear evidence that many of the remnant features have been co-opted to serve as elements in the altered watershed hydrology.
- The absence of vernal pool features in most of the project alignment is incompatible with expected conditions in unaltered watersheds in the Central Valley, including the Tulare Lake basin, supporting the conclusion that the extent of watershed alteration in the project vicinity has been extensive.

- Given the extent of the prior watershed alterations and the associated reductions in condition scores, it is not clear whether the pre-agricultural configuration and aquatic conditions provided by study area watersheds can be characterized at the present time.

6.3 Effect of Stressors on CRAM Scores

In addition to calculating an overall condition score and attribute scores, CRAM includes a stressor checklist. A stressor is defined in the CRAM User's Manual as "an anthropogenic perturbation within a wetland or its setting that is likely to negatively impact the functional capacity of a CRAM Assessment Area" (CWMW 2012). The stressor checklist is used to account for low CRAM scores by identifying specific impacts on the landscape, hydrology, physical, or biotic structure of an AA. In some cases, a single stressor may be the primary cause of low-scoring conditions, though conditions are usually caused by interactions among multiple stressors (EPA 2002).

No strong correlation of CRAM scores and the number of stressors was found among the AAs assessed in the Fresno to Bakersfield Section. A weak correlation (-0.15) supports the assumption that AAs with lower CRAM scores are subjected to more stressors, although many low-scoring AAs had few stressors.

The CRAM team concluded that the low-scoring AAs in man-made features (canals, ditches, agricultural reservoirs, and detention basins) are a direct result of anthropogenic influences (i.e., these man-made features are the stressors for natural watershed conditions in the project area). However, when CRAM scores and the numbers of stressors for each AA are compared for natural features only, the correlation remains weak. The CRAM team concluded that the effects of stressors throughout the project area have overwhelmed the potential relationships among stressors and natural aquatic systems, as a consequence of the regional conversion of the land use pattern to one completely dominated by agriculture with few remnants of natural hydrological/wetland systems. The most common stressors (presence of dike/levee, transportation corridor, adjacent orchard/nursery) are present throughout the Fresno to Bakersfield Section and affect all types of aquatic features to the extent that statistical relationships among stressors and AA condition scores are not observable.

6.4 Existing Condition Extrapolation

CRAM data reflect instantaneous condition snapshots of the assessed aquatic features, although the condition data identified in CRAM assessments represent an integration of the landscape, hydrological, physical, and biological factors affecting these features over time. To the extent that the underlying physical, hydrological, biotic, and land use conditions for the assessed features are represented elsewhere in the watersheds that contain the project elements, the CRAM scores may be used to infer condition (and functions provided) in other parts of those watersheds. However, making such extrapolations is not included within the CRAM methodology per se, and care is warranted in verifying the reach of the factors underlying CRAM scores if the object is to extrapolate condition scores from a sampled area to a larger area.

For example, in the case of the HST project in the Fresno to Bakersfield Section, the observed modifications to regional hydrology cover an enormous area outside of the immediate project vicinity, extending throughout the Tulare Lake basin from near Fresno to the area south of Bakersfield, and from the lower Sierra Nevada foothills to the Tulare Lake bed. Hydrological processes are the most significant of the factors determining condition scores, and it is reasonable to extrapolate condition scores within areas sharing similar hydrology. It is not unreasonable to consider that the CRAM condition data resulting from this work may apply in this region of altered hydrology.

Similarly, the regional land use pattern throughout the Tulare Lake basin very much resembles the agriculture-dominated pattern within which the CRAM data reported herein were collected. Land use patterns (through the Landscape and Buffer Attribute) are significant factors in determining condition scores, and are the primary sources of stressors that alter conditions in wetlands, and it is reasonable to extrapolate condition scores within areas exhibiting a similar, continuous land use pattern. It is not unreasonable to consider that the CRAM data from this work may be similarly applicable in agriculture-dominated landscape areas elsewhere.

Notwithstanding considerations of variations in regional conditions, the CRAM data reported in this report do reflect relative rankings among the aquatic features within each wetland type, both inside the region and across regions. As a general rule of practice, the CRAM methodology is applicable to all aquatic features within each wetland type (e.g., riverine wetlands, vernal pools, or depressional wetlands) throughout the state, and the relative rankings of sampled sites everywhere can be compared to one another. CRAM includes an "internal scale" comparing the condition of an aquatic feature at any site to the same "ideal" wetland for the type. This internal standard is intended to account for the regional and site-specific variability across each wetland type throughout the state, and CRAM scores are intended to provide relative rankings among the metrics, attributes, and index scores in proportion to the degree to which each site provides the conditions in the "ideal" model for that type. Hence riverine sites (for example) in the Fresno to Bakersfield Section that demonstrate lower condition scores than riverine features in northwestern California are considered to provide fewer riverine benefits in the same ratios as the index, attribute, and metric scores.

Because of the internal CRAM standard, the condition data for a feature of a given type (e.g., a vernal pool) near one project element can be compared directly to the condition data for another feature of the same type near a different element. This means that CRAM assessment results are directly applicable for comparing the conditions of similar elements across alternatives. The relative similarity of the important geological, ecological, and land use conditions throughout the Fresno to Bakersfield Section merely reinforce the conclusion that differences in CRAM scores among alternatives reflect actual differences among the sites. Consequently, these data are applicable in considering the relative effects of project alternative elements on these features; in other words, in identifying the Least Environmentally Damaging Practicable Alternative (LEDPA).

6.5 Using CRAM for Evaluating Existing Conditions at Potential Mitigation Sites

Compensatory mitigation for adverse impacts on aquatic resources will be determined in consultation with the USACE, in part through the assessment of aquatic resource conditions (including functions and values) that would be lost or impaired through construction and operation of the Fresno to Bakersfield Section of the HST System. Compensatory mitigation will preserve, create, and/or enhance aquatic resource conditions, functions, values, and services.

The USACE recently released guidance on the method used to determine mitigation ratios for different mitigation scenarios. This guidance is published in the *Standard Operating Procedure for Determination of Mitigation Ratios* (USACE 2012). Under the guidance, impact areas and mitigation sites are compared using CRAM evaluations/or other qualitative methods. Numerical or categorical values are assigned to the results of these evaluations and are used to calculate the required mitigation ratio. CRAM data will be key in determining the appropriate amounts of compensatory mitigation required to replace or compensate for the loss of wetlands (e.g., an impact on a wetland feature with a high CRAM index score would require a higher mitigation ratio to compensate for unavoidable impacts on the wetland feature).

The AAs evaluated at the mitigation sites are representative of the aquatic features present on the potential mitigation properties, in terms of both wetland type and condition. CRAM can be used to infer relative differences in wetland condition among sites and in this capacity can aid decisions about how to apply mitigation requirements to the potential mitigation sites. For example, the CRAM data collected and presented in this report can be used to determine which assessment areas could benefit from restoration or enhancement and which are suitable for preservation.

In general, potential mitigation sites with AAs receiving CRAM index scores >70 are suitable for preservation, sites with AAs scoring between 25 and 70 are suitable for enhancement and or re-establishment, and sites with no aquatic resources may be suitable for creation. Based on the wetland delineation and CRAM assessments conducted on these properties, the Buena Vista Dairy, Yang, Staffel, and Davis properties, when examined together, have a significant area of vernal pools that is suitable for preservation. These features are ideal candidates for preservation because they are in good condition and face manageable stressors. In addition to vernal pools, the Buena Vista Dairy property also features depressional wetlands in good condition that are therefore suitable for preservation. The Staffel, Davis, and Valadez properties feature depressional wetlands that have potential for enhancement because they have lower CRAM scores. Likewise, the riverine features on the Te Velde and Clark River Ranch properties have potential for enhancement based upon lower index scores.

Section 7.0
References

7.0 References

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Appendix A
Maps of Assessment Areas

Assessment area: D147

0 10 20 40 Meters

1 inch equals 20 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: D203

0 15 30 45 60 75 Meters

1 inch equals 30 meters

N

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: D204

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: D205

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area
Depressional (D)
Lacustrine (L)
Riverine (R)

Assessment area centroid
Alignment alternatives
Parcel
Parcel PTE = Yes


018270017000
6TH
6TH St
D206 - 36.315692, -119.699366
018270054000
018270045000
018270053000
Assessment area: D206
0
10
20
30
40
50 Meters
1 inch equals 20 meters
N
CRAM Assessment Area
Depressional (D)
Lacustrine (L)
Riverine (R)
Assessment area centroid
Alignment alternatives
Parcel
Parcel PTE = Yes


05928033
05928031
D212 - 35.637191, -119.339365
05928027
05928026
Assessment area: D212
0 10 20 30 40 50 Meters
1 inch equals 20 meters
N
CRAM Assessment Area
Depressional (D)
Lacustrine (L)
Riverine (R)
Assessment area centroid
Alignment alternatives
Parcel PTE = Yes

Assessment area: D213

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel PTE = Yes

Assessment area: D214

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

- Depressional (D)
- Lacustrine (L)
- Riverine (R)
- Assessment area centroid
- Alignment alternatives
- Parcel PTE = Yes

Assessment area: R8

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area
- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)

- Assessment area centroid
- Alignment alternative
- Parcels

Assessment area: R63A

0 10 20 40 Meters

1 inch equals 20 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: R66

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)

- Assessment area centroid
- Alignment alternative
- Parcels

Assessment area: R71A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

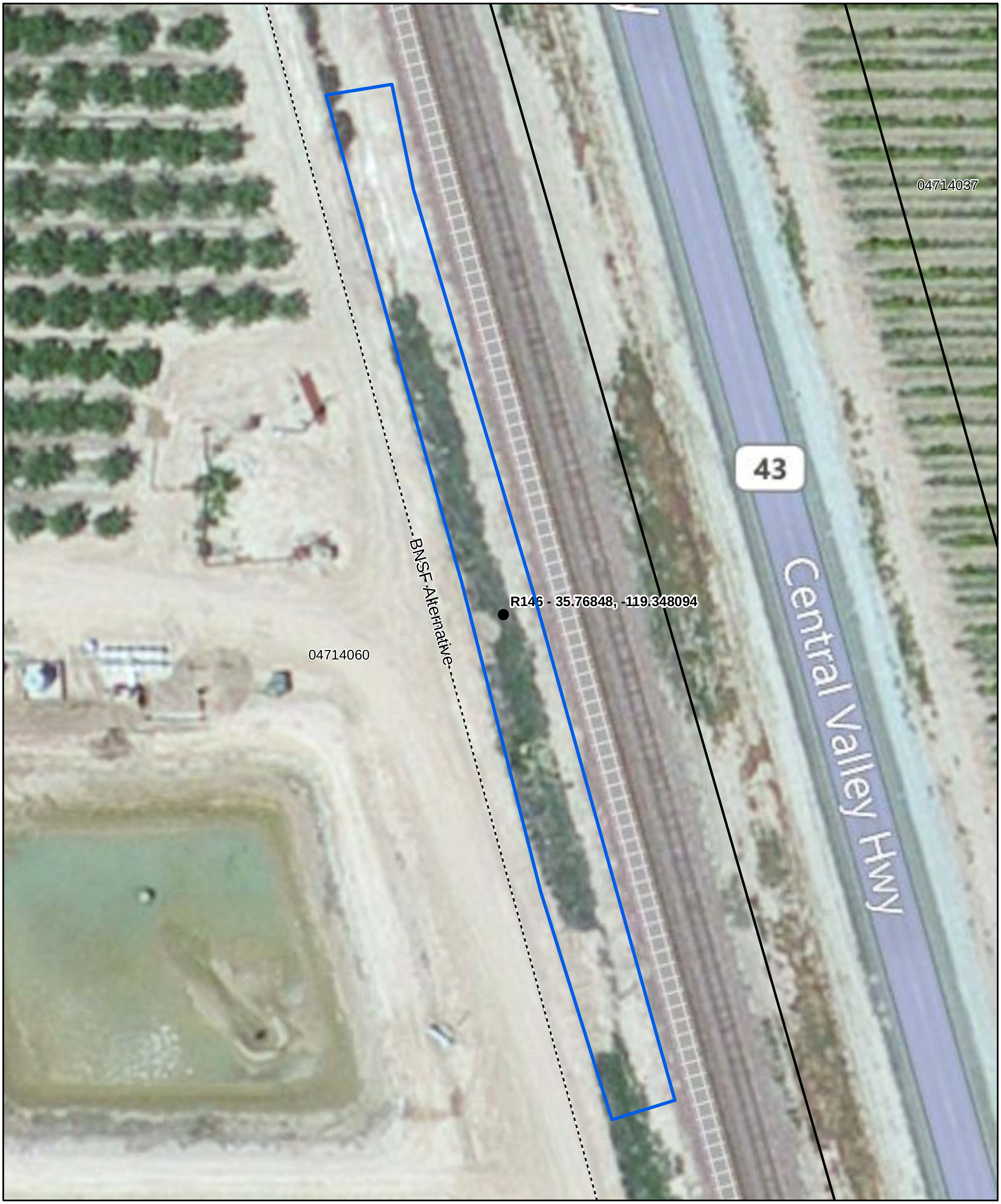
Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels



Assessment area: R146

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: R149

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: R150

0 9 18 36 Meters

1 inch equals 18 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

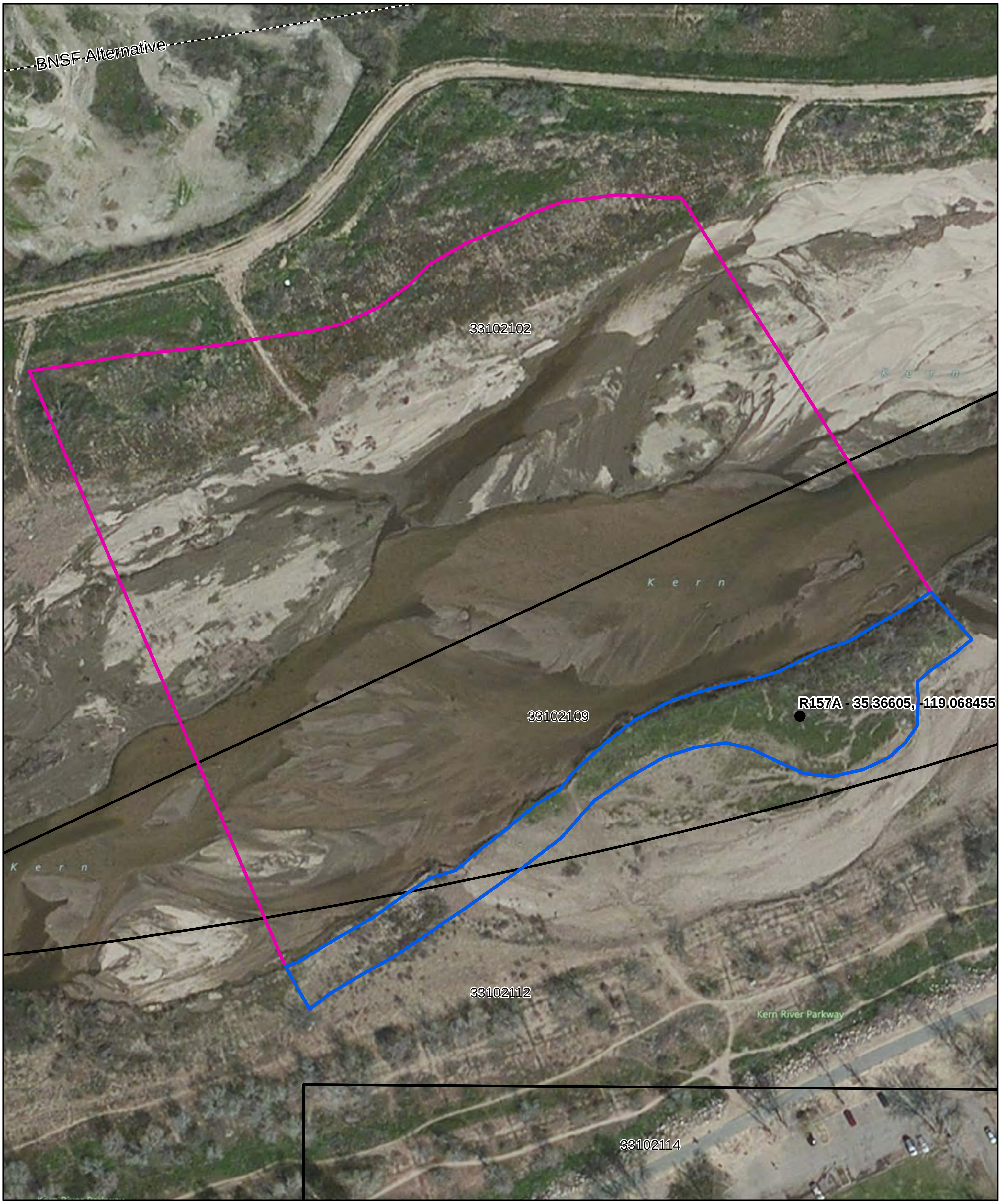
Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels



Assessment area: R157A

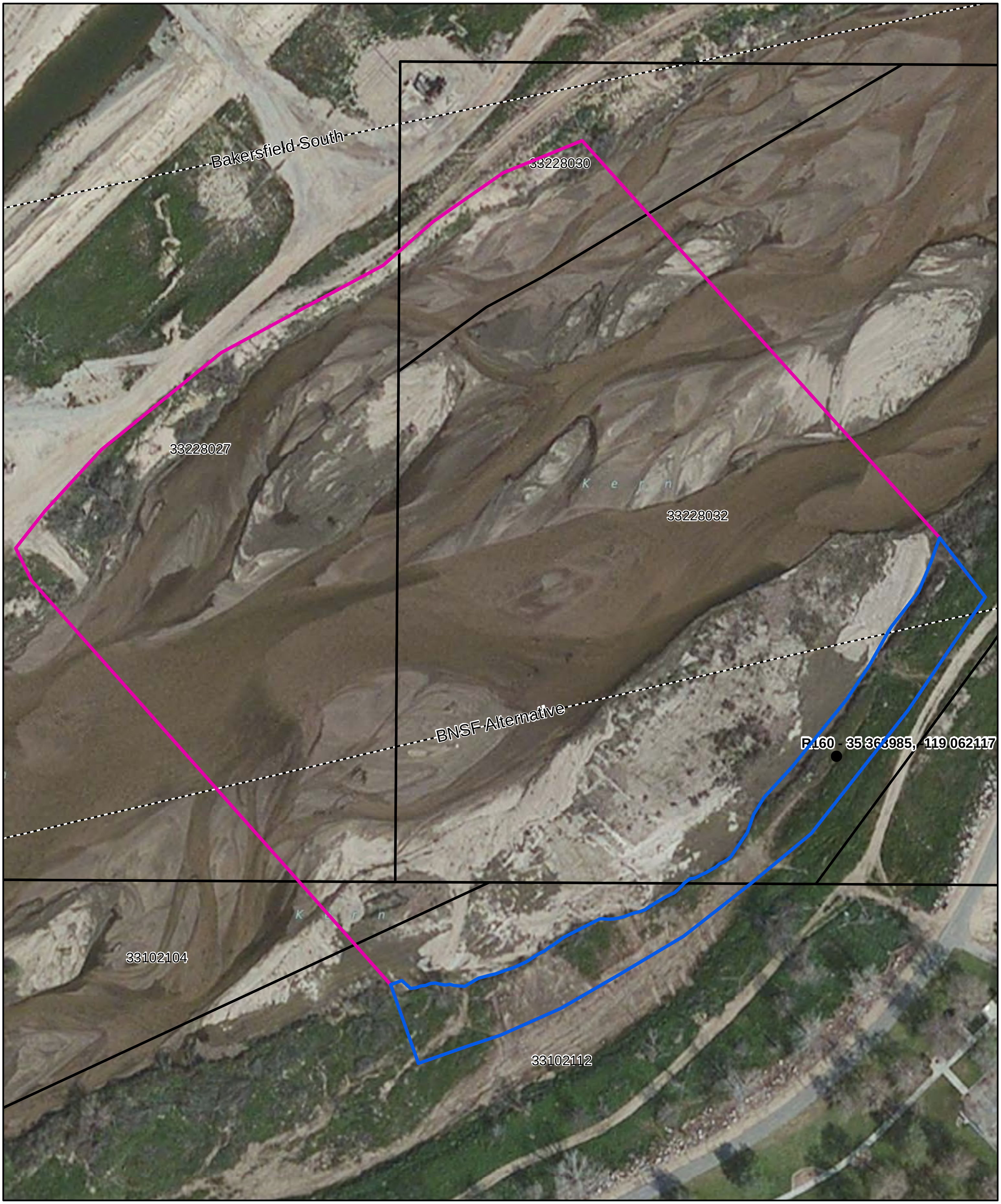
0 18 36 72 Meters

1 inch equals 36 meters

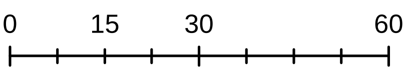
N

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)
- Assessment area centroid
- Alignment alternative
- CRAM Associated Area
- Parcels



Assessment area: R160

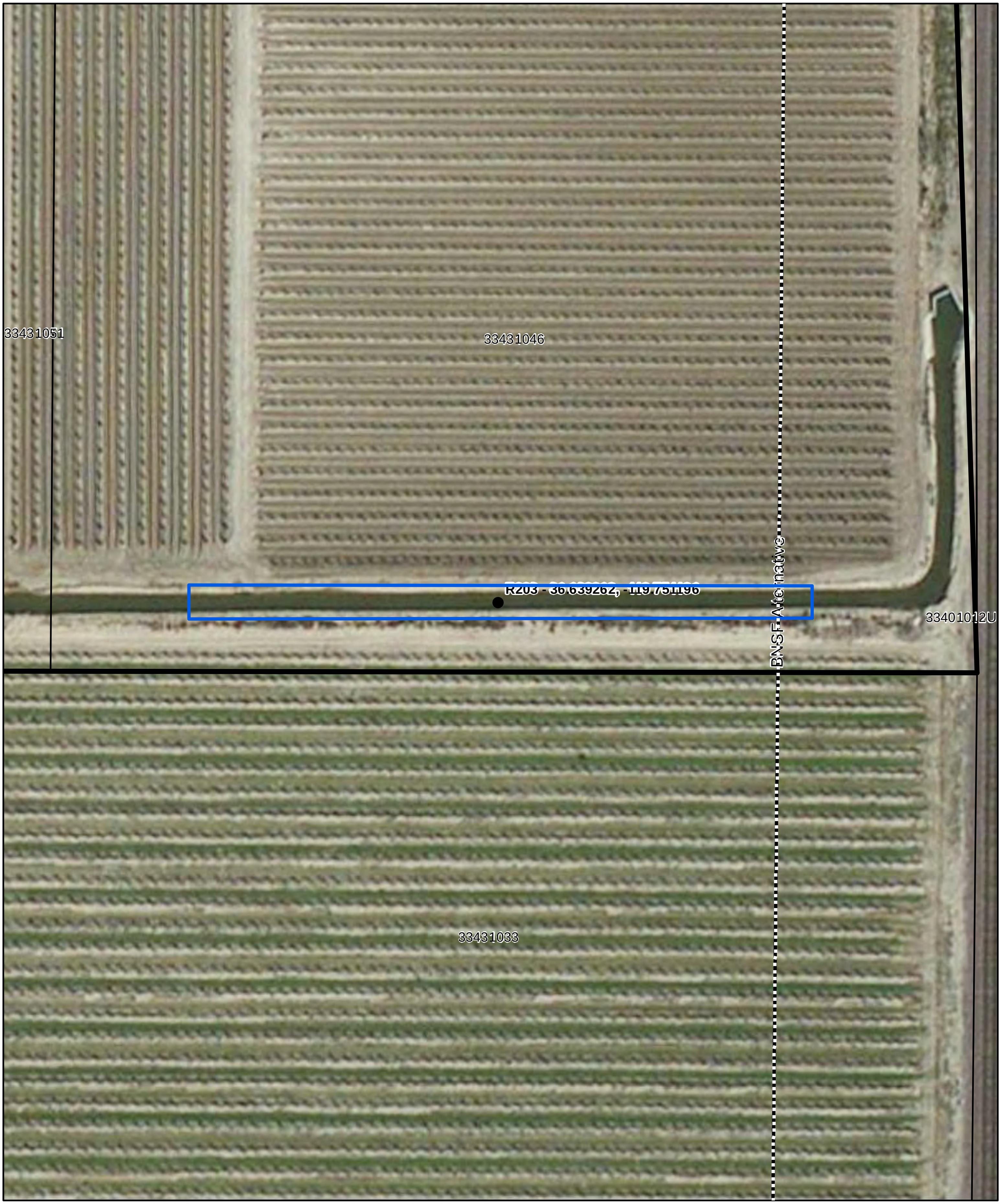


1 inch equals 30 meters

N

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)
- Assessment area centroid
- Alignment alternative
- CRAM Associated Area
- Parcels



Assessment area: R203

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

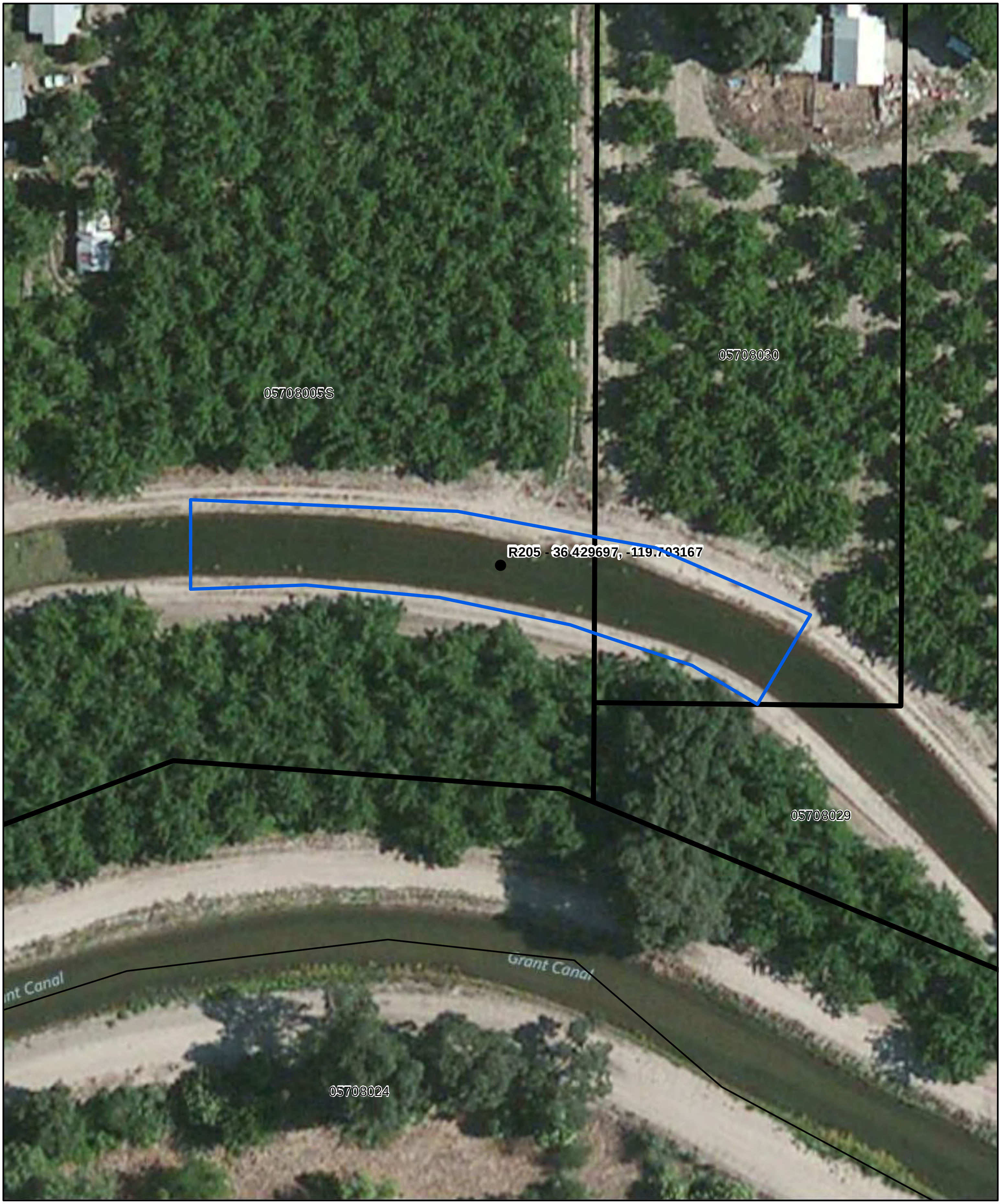
Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes



Assessment area: R205

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: R208

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel PTE = Yes

Assessment area: R209

0 10 20 30 40 50 Meters

N

1 inch equals 25 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

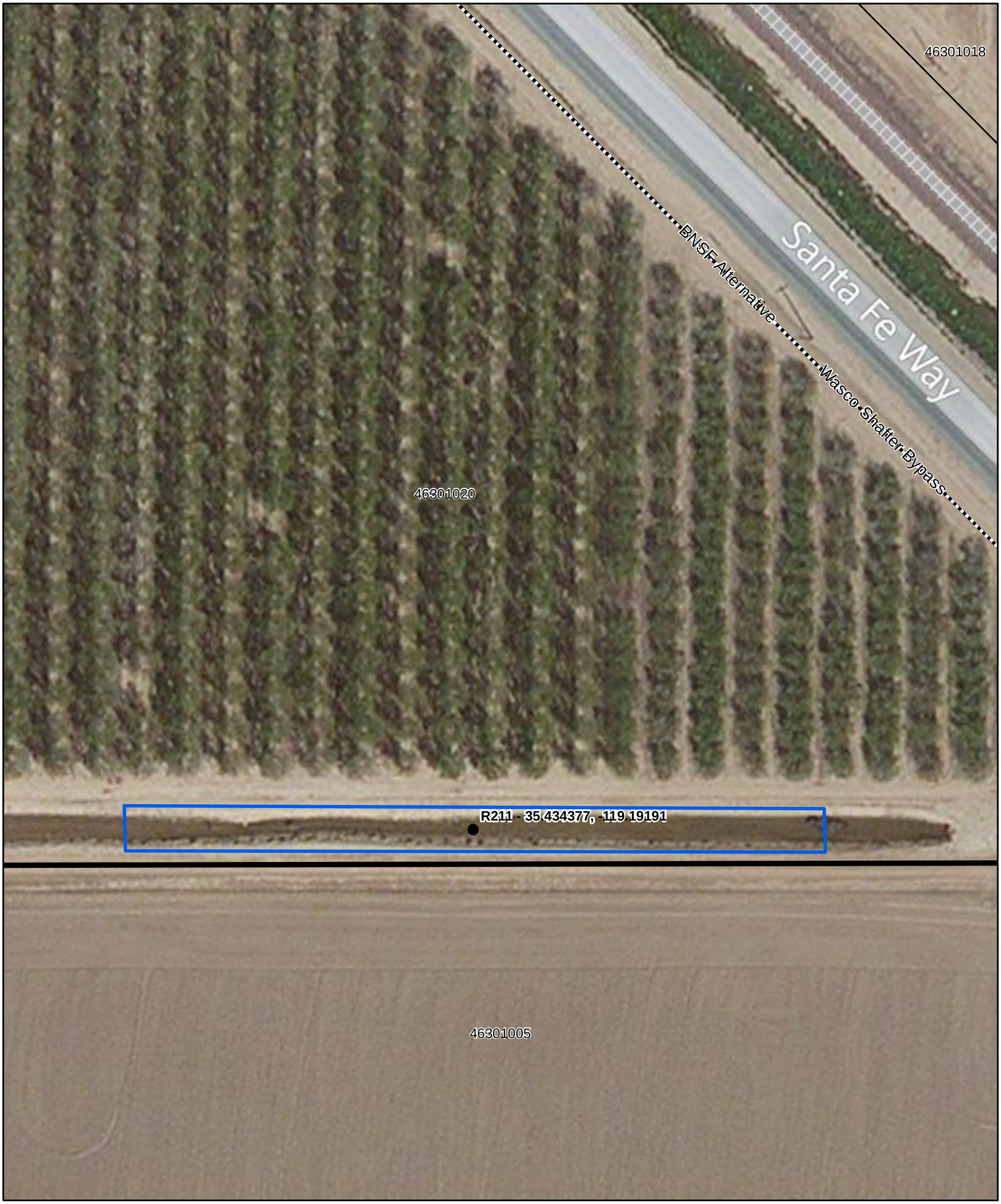
Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes



Assessment area: R211

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: R212

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

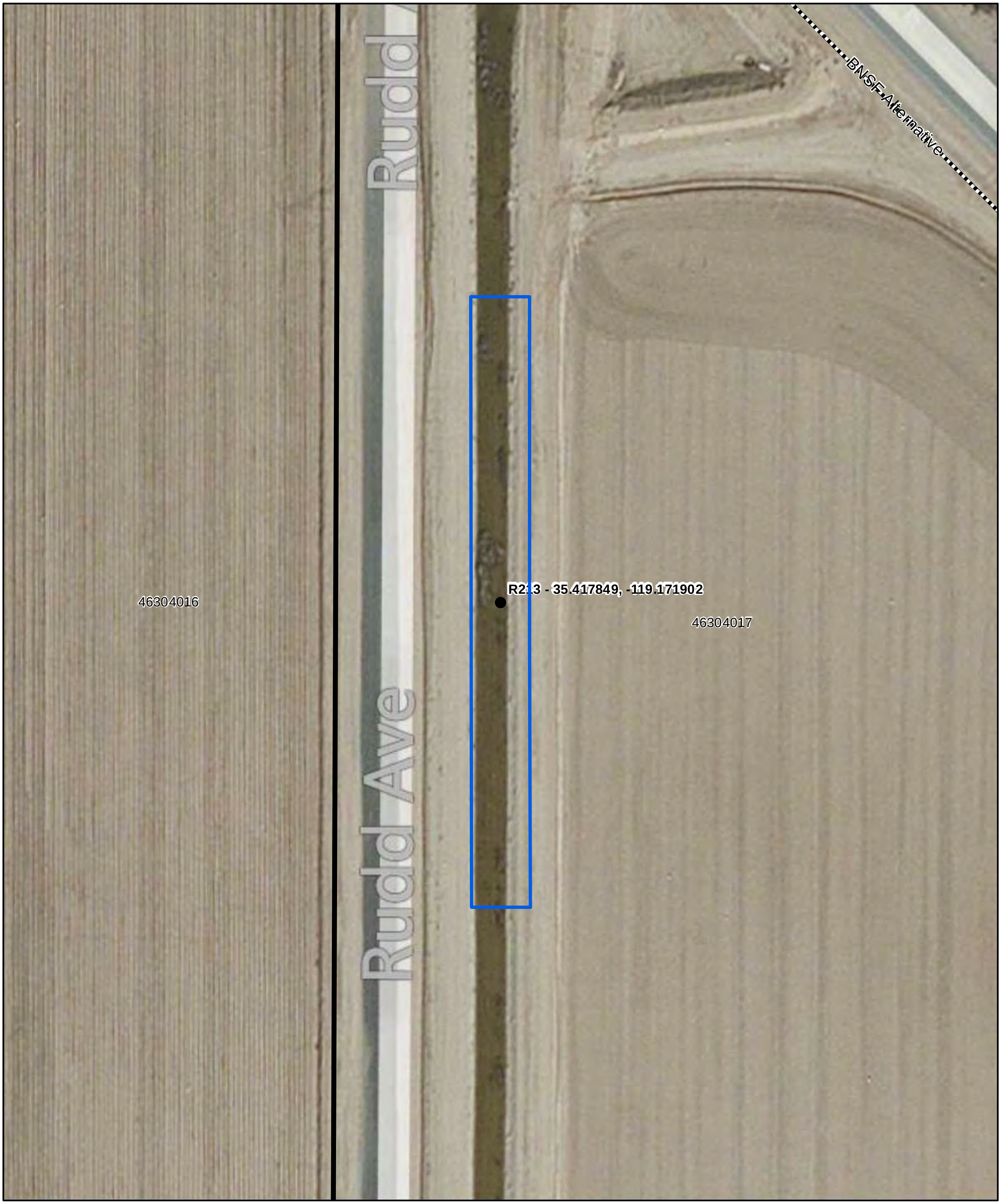
Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes



Assessment area: R213

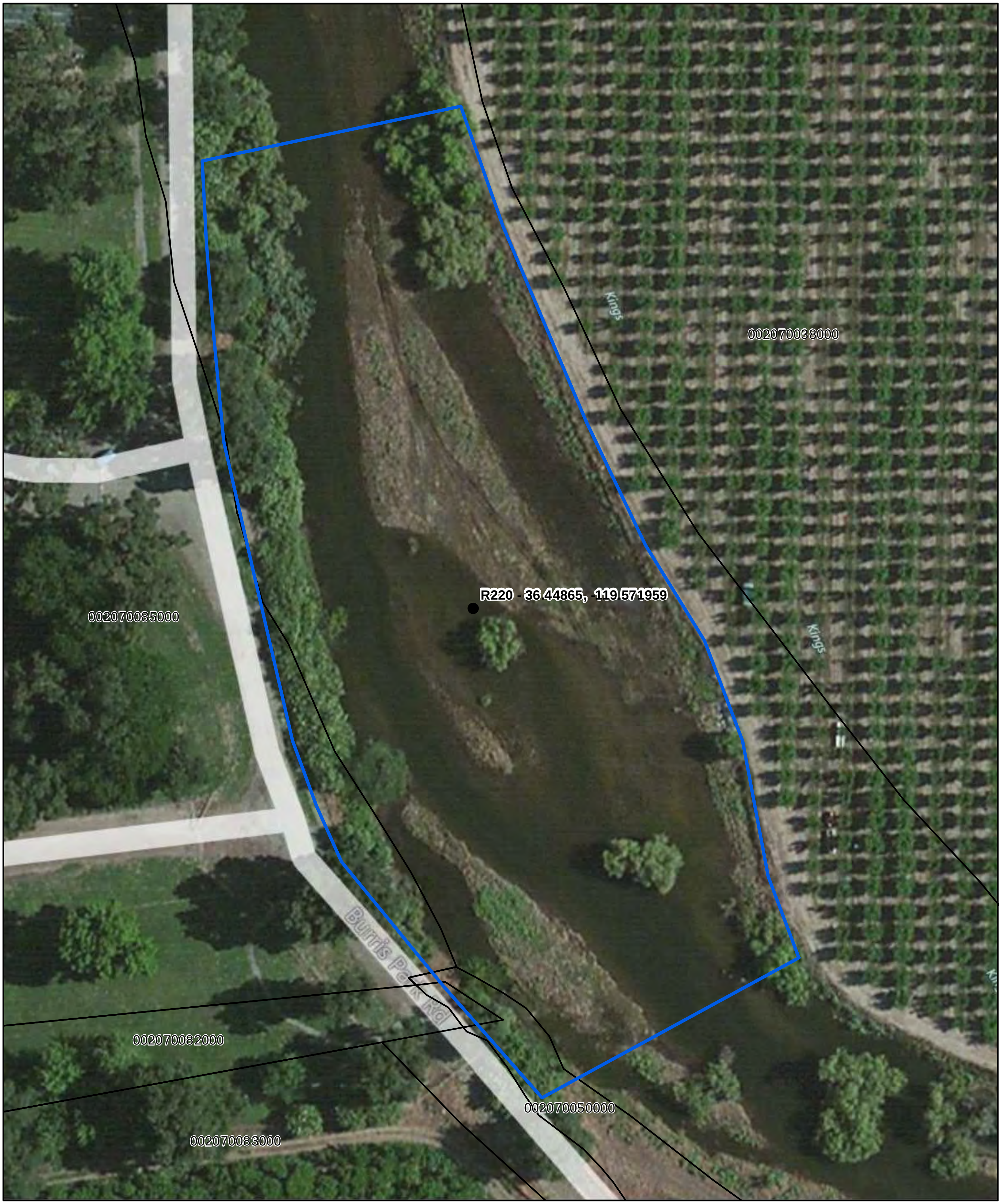
0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area
- Depressional (D)
- Lacustrine (L)
- Riverine (R)

- Assessment area centroid
- Alignment alternatives
- Parcel
- Parcel PTE = Yes



Assessment area: R220

0 10 20 30 40 50 Meters

1 inch equals 25 meters

N

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: V62A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: V65

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: V70

0 5 10 20 Meters

1 inch equals 10 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: V72

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: V74

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)

- Assessment area centroid
- Alignment alternative
- Parcels

Assessment area: V75

0 10 20 40 Meters

1 inch equals 20 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: V76A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)

- Assessment area centroid
- Alignment alternative
- Parcels

Assessment area: V76D

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

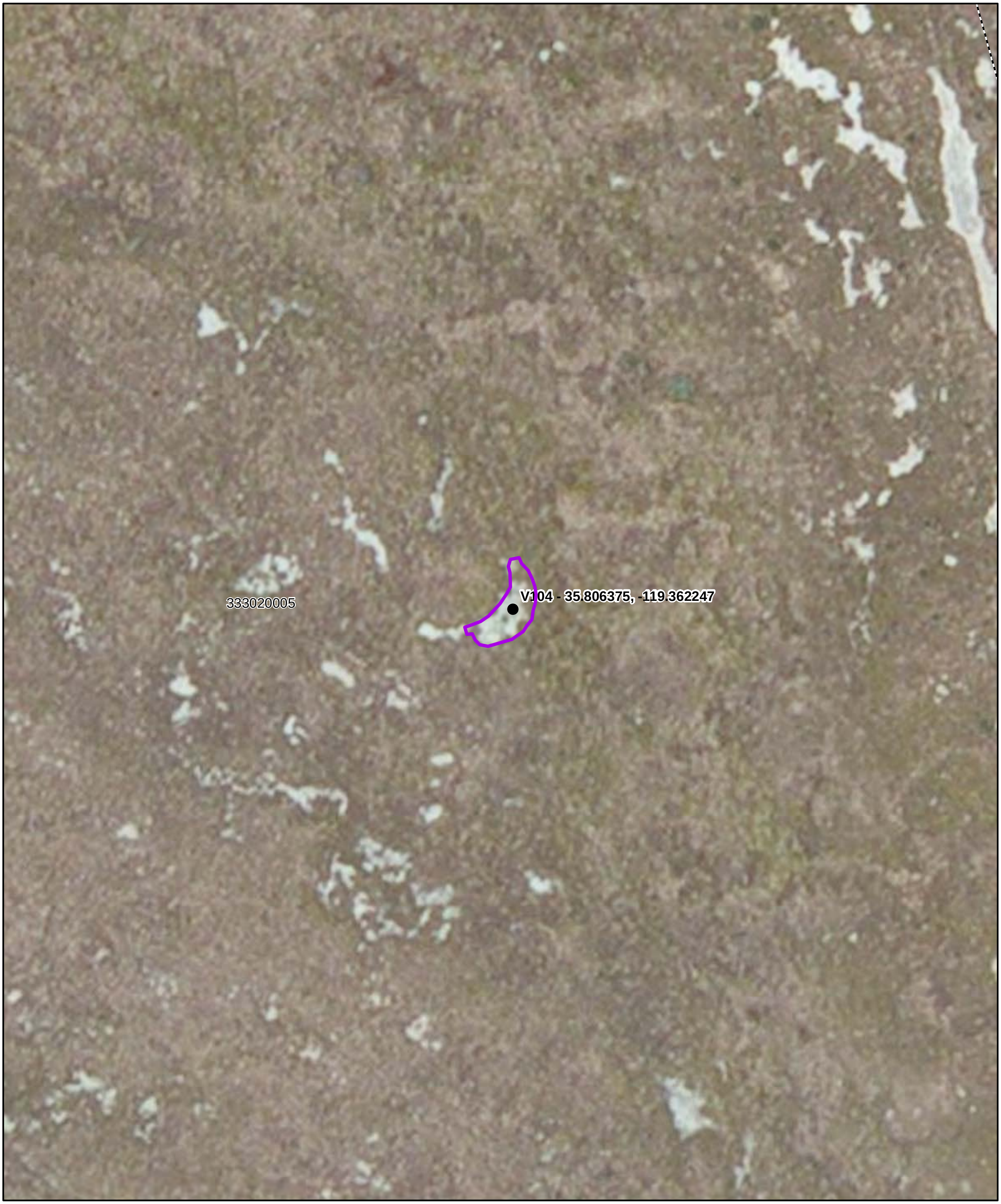
Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels



Assessment area: V104

0 9 18 36 Meters

1 inch equals 18 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

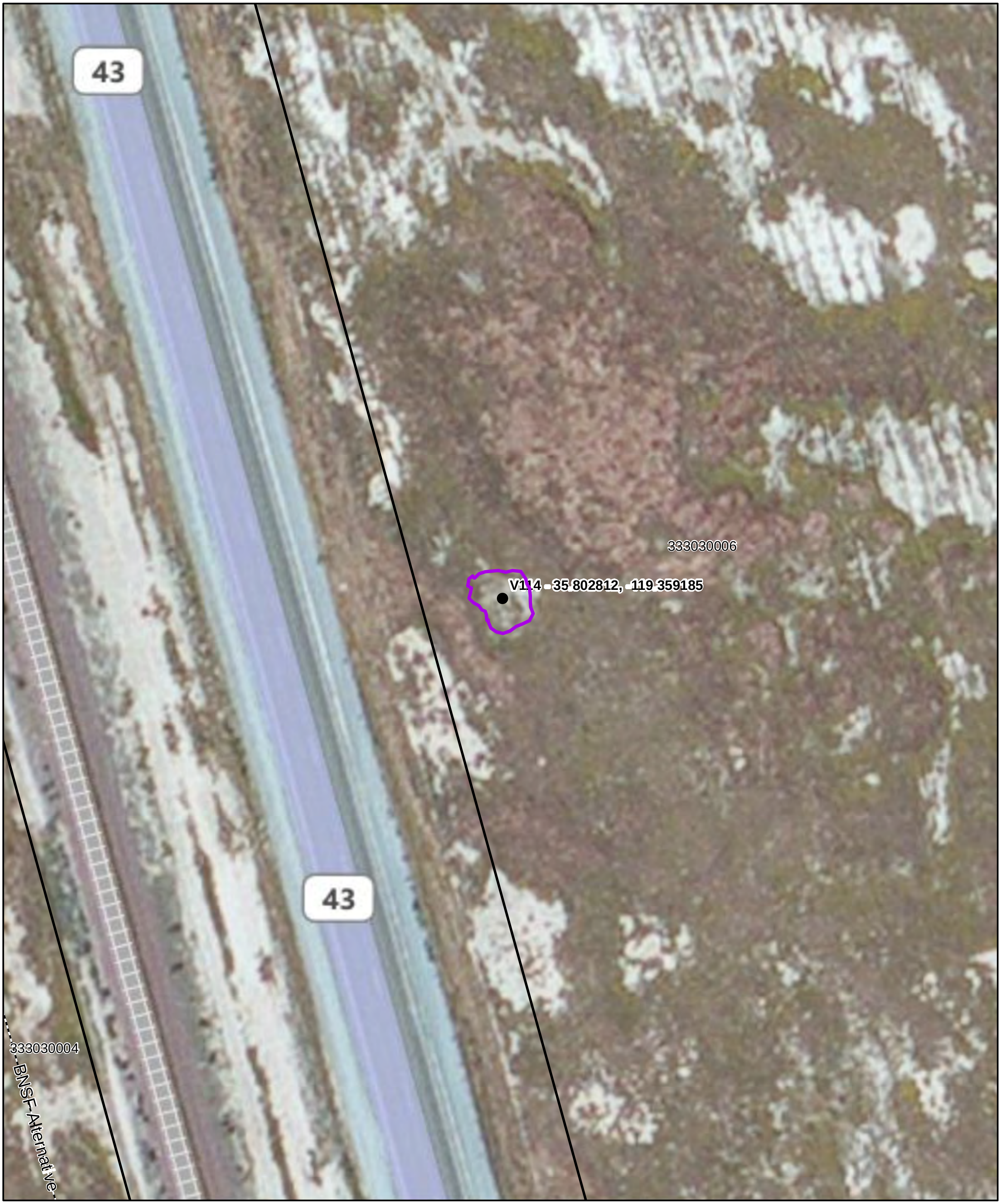
Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels



Assessment area: V114

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

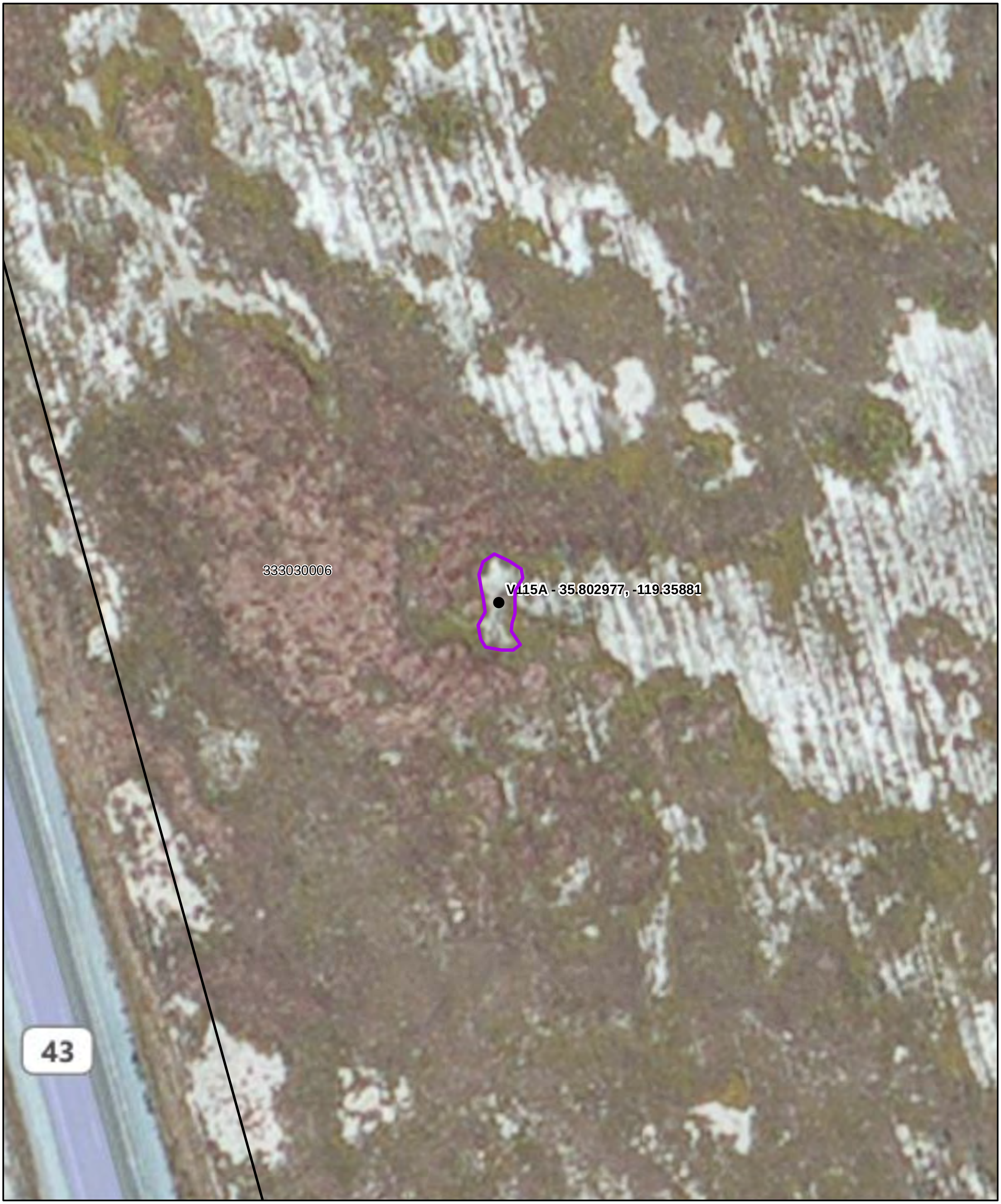
Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels



Assessment area: V115A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: VS97A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)

- Assessment area centroid
- Alignment alternative
- Parcels

Assessment area: VS99A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

BNSF Alternative
VS104A 35.807287, -119.362204
333020005
Assessment area: VS104A
0
7.5
15
30 Meters
1 inch equals 15 meters
N
CRAM Assessment Area
Depressional (D)
Riverine (R)
Vernal Pool (V)
Vernal Pool System (VS)
Assessment area centroid
Alignment alternative
Parcels

Assessment area: VS107A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels


333030005
333030006
333030004
43
VS112 - 35.803378, -119.35931
Assessment area: VS112
0
7.5
15
30 Meters
1 inch equals 15 meters
N
CRAM Assessment Area
Depressional (D)
Riverine (R)
Vernal Pool (V)
Vernal Pool System (VS)
Assessment area centroid
Alignment alternative
Parcels

Assessment area: VS114A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: D304

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

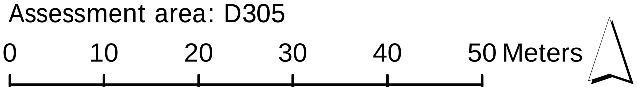
Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

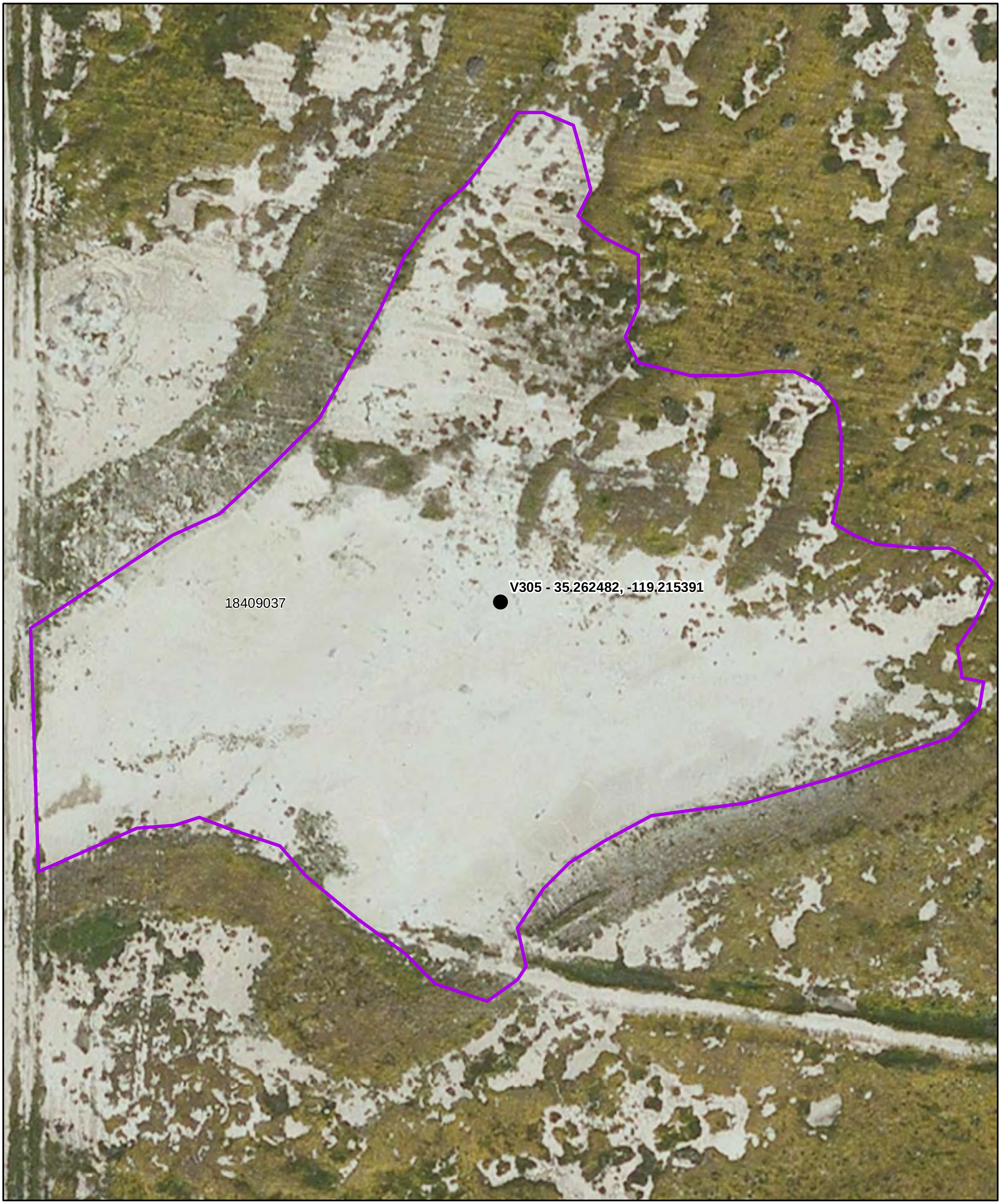
Assessment area: D305



1 inch equals 20 meters

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)
- Assessment area centroid
- Alignment alternatives
- Parcel
- Parcel PTE = Yes



Assessment area: V305

1 inch equals 30 meters

Assessment area: VS305

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

CRAM Centroid

Alignment alternatives

250 meter Buffer

Parcel

Parcel PTE = Yes


18409037
VS307 - 35.255689, -119.21021
Assessment area: VS307
0 10 20 30 40 50 Meters
N
1 inch equals 20 meters
CRAM Assessment Area
Depressional (D)
Riverine (R)
Vernal Pool (V)
Vernal Pool System (VS)
Assessment area centroid
Alignment alternatives
Parcel
Parcel PTE = Yes

Assessment area: D301

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternatives

250 meter Buffer

Parcel

Parcel PTE = Yes

Assessment area: D301A

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)
- Assessment area centroid
- Alignment alternatives
- Parcel
- Parcel PTE = Yes

Assessment area: V301

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

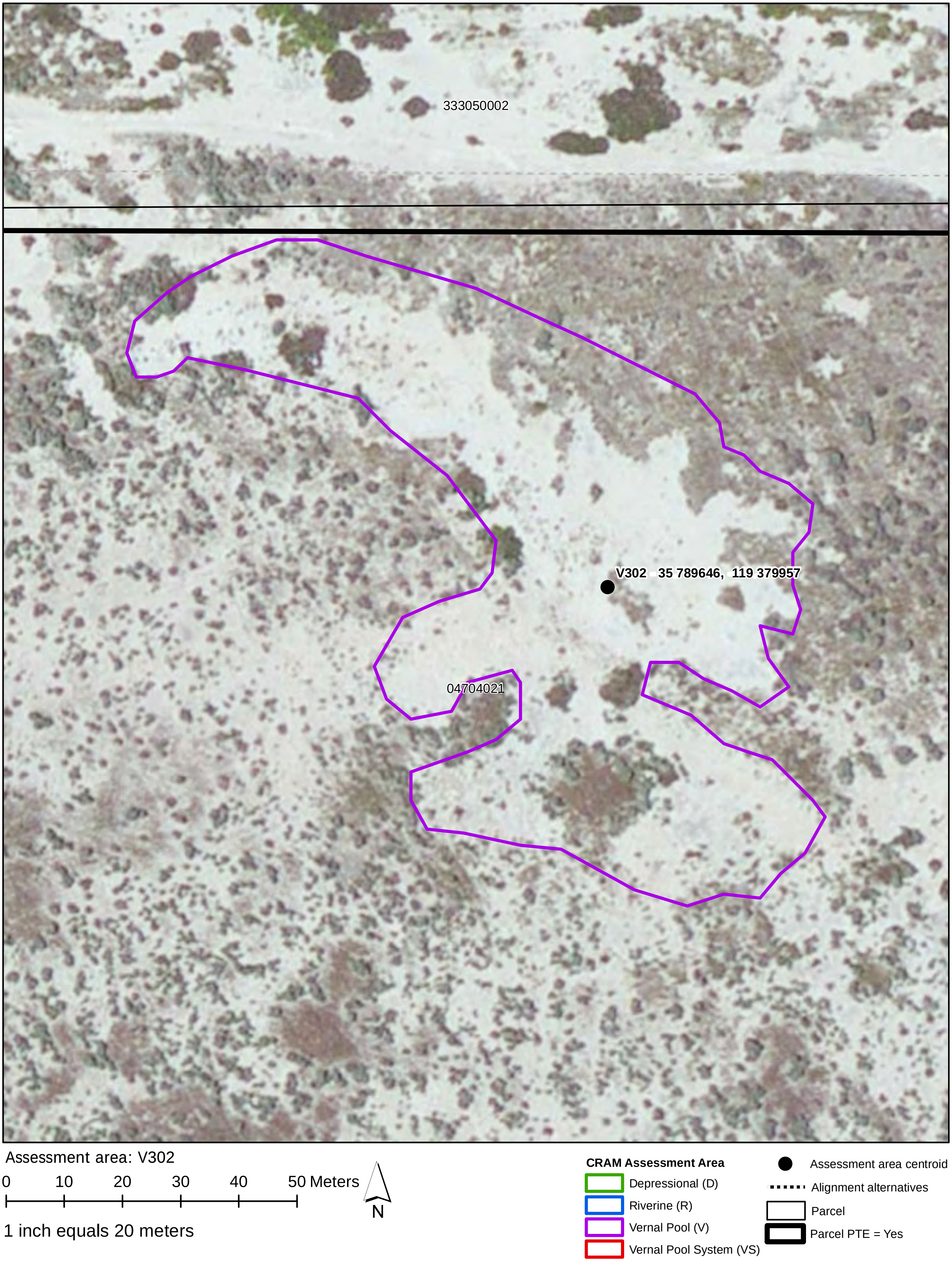
Vernal Pool System (VS)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes



333050002
V302 35 789646, 119 379957
04704021
Assessment area: V302
0 10 20 30 40 50 Meters
N
1 inch equals 20 meters
CRAM Assessment Area
Depressional (D)
Riverine (R)
Vernal Pool (V)
Vernal Pool System (VS)
Assessment area centroid
Alignment alternatives
Parcel
Parcel PTE = Yes

Assessment area: R300

0 10 20 30 40 50 Meters

N

1 inch equals 25 meters

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)

- Assessment area centroid
- Alignment alternatives
- Parcel
- Parcel PTE = Yes

Assessment area: R302

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)
- Assessment area centroid
- Alignment alternatives
- Parcel
- Parcel PTE = Yes

Assessment area: D303

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: V303

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)

- Assessment area centroid
- Alignment alternatives
- Parcel
- Parcel PTE = Yes

Assessment area: VS300

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

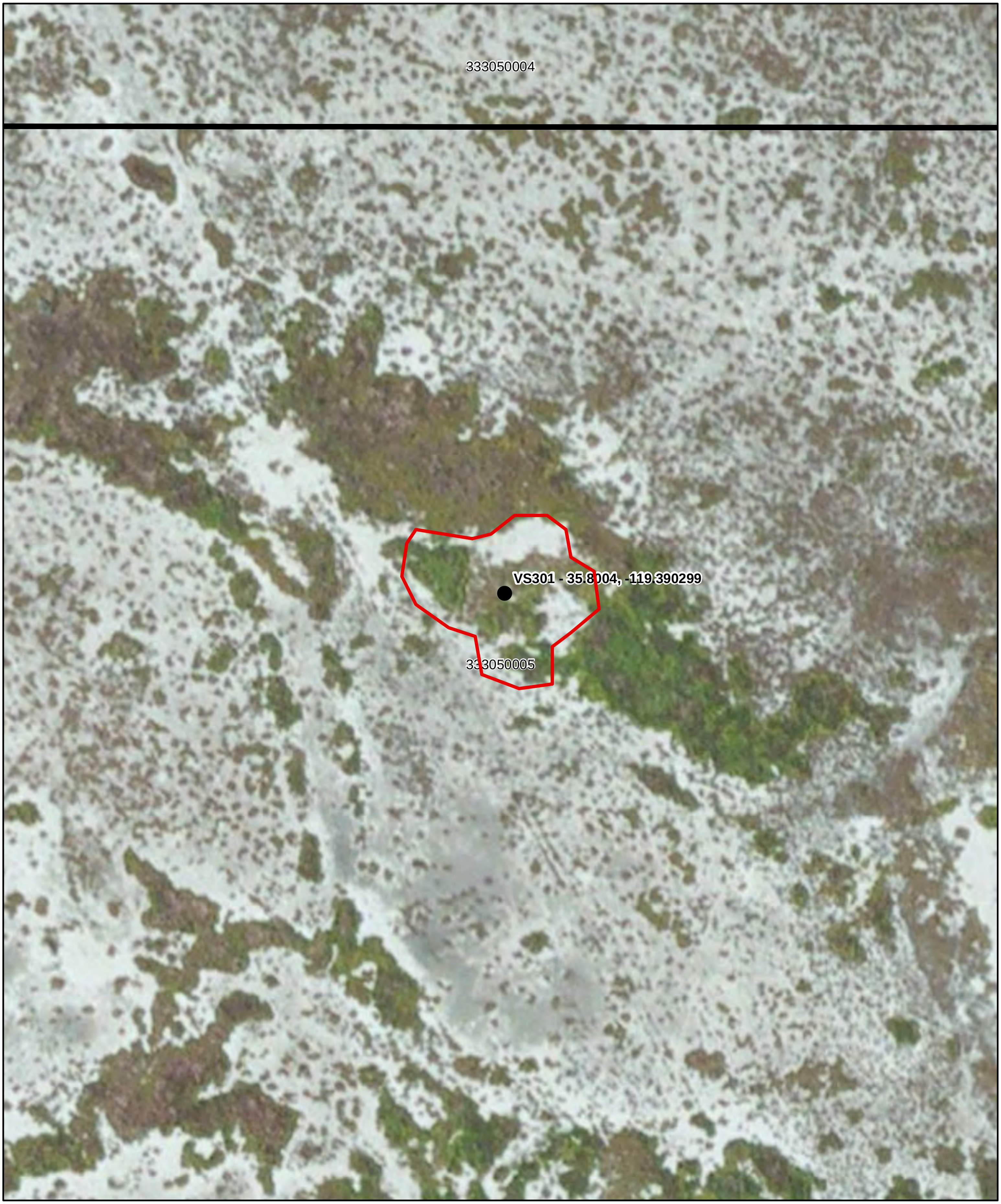
Vernal Pool System (VS)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes



Assessment area: VS301

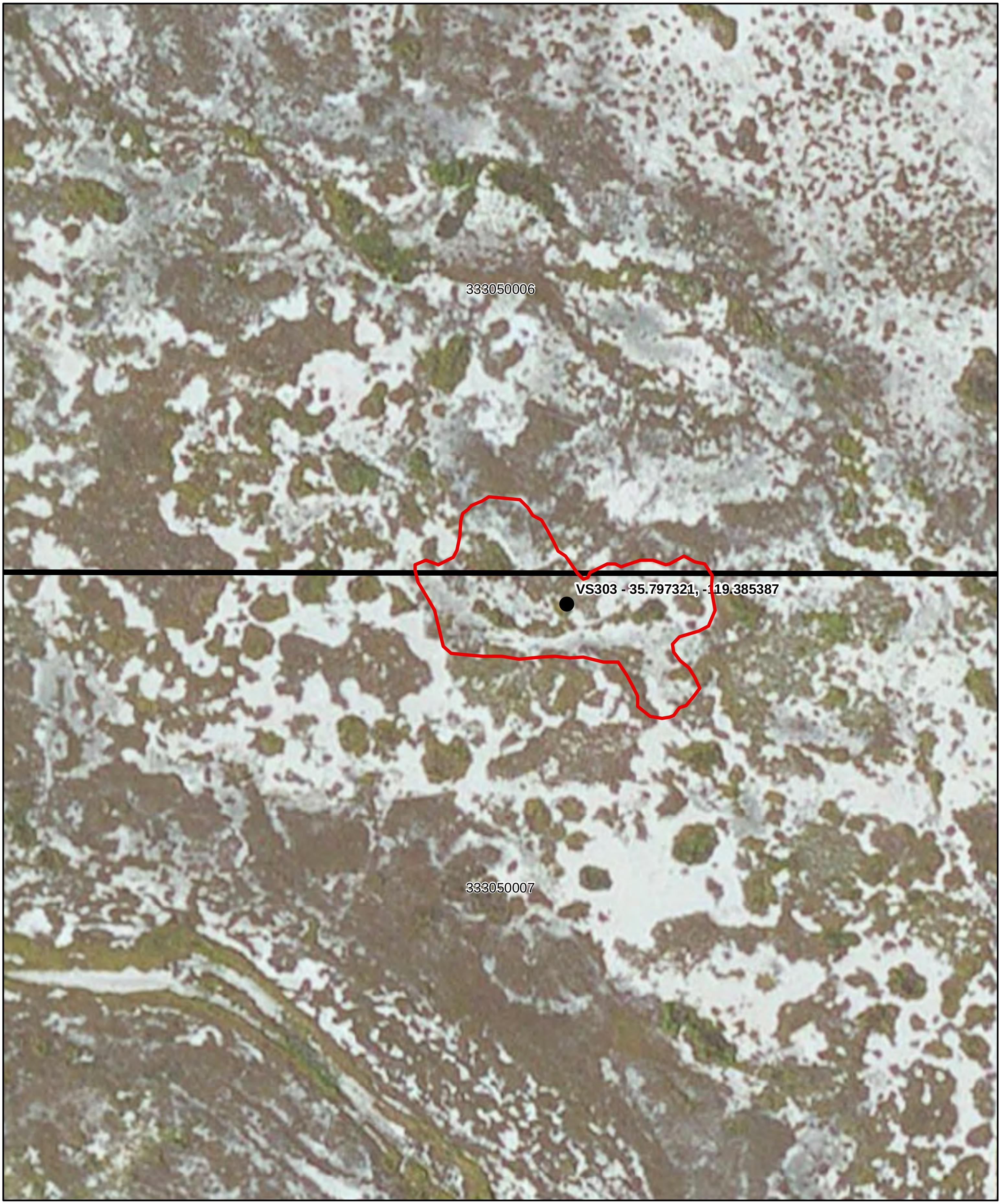
0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)
- Assessment area centroid
- Alignment alternatives
- Parcel
- Parcel PTE = Yes



Assessment area: VS303

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

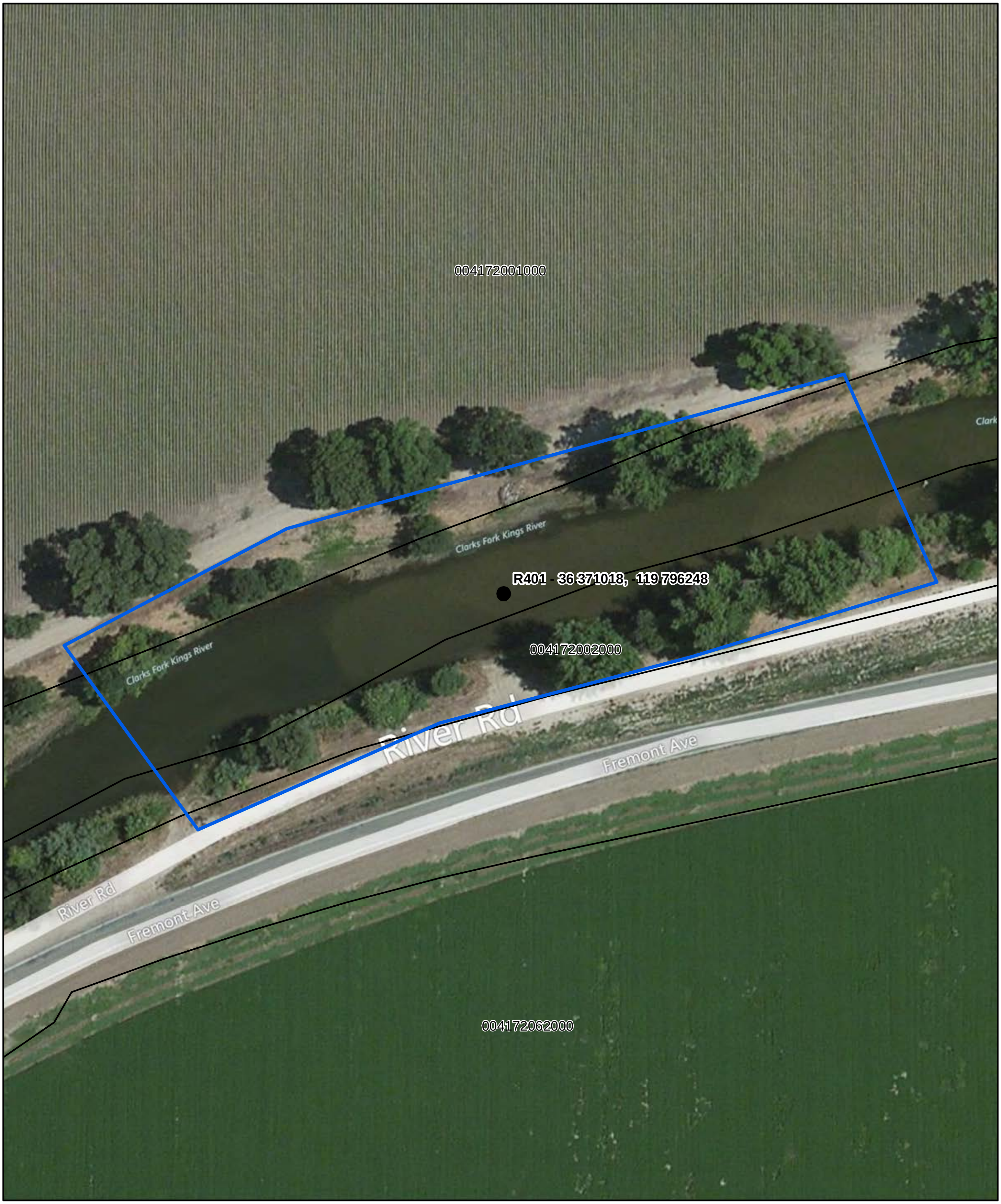
Vernal Pool System (VS)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes



Assessment area: R401

0 20 40 60 80 100 Meters

1 inch equals 35 meters

N

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)

- Assessment area centroid
- Parcel
- Parcel PTE = Yes

Assessment area: R402

0 10 20 30 40 50 Meters

N

1 inch equals 25 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Parcel

Parcel PTE = Yes

Appendix B
Summary Table of CRAM Data

Table B-1
Summary Table of CRAM Data

AA Code	CRAM Type	Wetland Type	Watershed	Index Score[a]	Attribute Scores				Number of Stressors	Attribute Stressors			
					Buffer and Landscape Context	Hydrology	Physical Structure	Biotic Structure		Buffer and Landscape Stressors	Hydrology Stressors	Physical Stressors	Biotic Stressors
D147	Depressional	Agricultural reservoir	Upper Deer-Upper White	31.5	30	33	38	25	9	2	4	2	1
D203	Depressional	Seasonal basin	Tulare-Buena Vista Lakes	55.1	45	67	50	58	5	2	1	1	1
D204	Depressional	Seasonal basin	Tulare-Buena Vista Lakes	66.2	45	67	75	78	3	1	0	1	1
D205	Depressional	Detention basin	Tulare-Buena Vista Lakes	41.2	29	58	25	53	2	1	1	0	0
D206	Depressional	Detention basin	Tulare-Buena Vista Lakes	43.4	38	58	25	53	1	1	0	0	0
D212	Depressional	Agricultural reservoir	Upper Poso	51.6	30	50	63	64	1	0	0	0	1
D213	Depressional	Agricultural reservoir	Upper Poso	44.4	33	50	25	69	1	0	0	0	1
D214	Depressional	Agricultural reservoir	Tulare-Buena Vista Lakes	34.6	30	50	25	33	4	3	0	0	1
R8	Riverine	Seasonal riverine	Tulare-Buena Vista Lakes	67.3	75	75	63	56	11	4	4	2	1
R63A	Riverine	Ditch	Upper Deer-Upper White	68.3	93	75	38	67	7	2	1	2	2
R66	Riverine	Ditch	Upper Deer-Upper White	67.0	90	67	50	61	7	2	2	2	1
R71A	Riverine	Ditch	Upper Deer-Upper White	61.3	93	83	38	31	6	1	3	2	0
R146	Riverine	Ditch	Upper Deer-Upper White	43.0	29	58	38	47	9	2	1	4	2
R149	Riverine	Seasonal riverine	Upper Poso	63.0	63	67	50	72	6	2	2	1	1
R150	Riverine	Seasonal riverine	Upper Poso	61.3	75	67	50	53	10	2	3	3	2
R157A	Riverine	Seasonal riverine	Middle Kern-Upper Tehachapi-Grapevine	65.3	59	67	63	72	8	6	0	1	1
R160	Riverine	Seasonal riverine	Middle Kern-Upper Tehachapi-Grapevine	60.5	75	50	50	67	10	6	1	3	0
R203	Riverine	Canal	Upper Dry	27.8	25	25	25	36	3	2	0	1	0
R205	Riverine	Canal	Upper Dry	37.9	63	33	25	31	5	1	2	2	0
R208	Riverine	Seasonal riverine	Upper Kaweah	67.2	68	67	63	72	2	2	0	0	0
R209	Riverine	Canal	Upper Kaweah	45.4	66	42	38	36	5	3	0	2	0
R211	Riverine	Ditch	Tulare-Buena Vista Lakes	45.7	43	42	63	36	9	3	3	2	1
R212	Riverine	Ditch	Tulare-Buena Vista Lakes	42.6	68	42	25	36	8	3	3	1	1
R213	Riverine	Ditch	Tulare-Buena Vista Lakes	42.3	66	42	25	36	7	3	2	1	1
R220	Riverine	Seasonal riverine	Tulare-Buena Vista Lakes	72.9	78	75	75	64	5	2	2	0	1
V62A	Individual Vernal Pool	Vernal swale and pool complex	Upper Deer-Upper White	72.6	78	92	50	71	7	2	1	2	2
V65	Individual Vernal Pool	Vernal swale and pool complex	Upper Deer-Upper White	76.4	93	92	50	71	4	2	1	1	0

Table B-1
Summary Table of CRAM Data

AA Code	CRAM Type	Wetland Type	Watershed	Index Score[a]	Attribute Scores				Number of Stressors	Attribute Stressors			
					Buffer and Landscape Context	Hydrology	Physical Structure	Biotic Structure		Buffer and Landscape Stressors	Hydrology Stressors	Physical Stressors	Biotic Stressors
V70	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	56.7	56	75	38	58	5	1	2	2	0
V72	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	66.0	56	83	50	75	5	1	2	2	0
V74	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	72.3	56	83	75	75	6	1	2	2	1
V75	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	66.0	56	83	63	63	5	1	2	2	0
V76A	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	62.1	61	83	50	54	4	1	2	0	1
V76D	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	59.8	81	83	50	25	3	1	2	0	0
V104	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	77.5	93	100	50	67	3	2	1	0	0
V114	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	79.9	91	83	63	83	3	1	1	1	0
V115A	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	80.9	90	100	63	71	2	1	1	0	0
VS97A	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	76.7	78	83	75	71	4	2	1	1	0
VS99A	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	82.7	93	92	75	71	2	2	0	0	0
VS104A	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	77.8	78	100	75	58	3	2	1	0	0
VS107A	Vernal Pool Systems	Vernal pool	Upper Deer-Upper White	80.6	81	100	75	67	2	2	0	0	0
VS112	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	76.7	78	75	83	71	3	1	1	1	0
VS114A	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	80.9	90	100	67	67	2	1	1	0	0
Potential Mitigation Sites													
Buena Vista Dairy													
D304	Depressional	Depressional wetland	Middle Kern-Upper Tehachapi-Grapevine	70.9	81	83	50	69	3	2	1	0	0
D305	Depressional	Depressional wetland	Middle Kern-Upper Tehachapi-Grapevine	70.5	93	83	50	56	3	2	1	0	0
V305	Individual Vernal Pool	Vernal pool	Middle Kern-Upper Tehachapi-Grapevine	75.4	93	92	63	54	2	1	1	0	0
VS305	Vernal Pool Systems	Vernal swale and pool complex	Middle Kern-Upper Tehachapi-Grapevine	80.6	93	92	75	63	2	1	1	0	0
VS307	Vernal Pool Systems	Vernal swale and pool complex	Middle Kern-Upper Tehachapi-Grapevine	81.7	93	92	75	67	2	1	1	0	0
Davis													
D301	Depressional	Seasonal wetland	Tulare-Buena Vista Lakes	70.7	84	83	38	78	3	2	1	0	0
D301A	Depressional	Seasonal wetland	Tulare-Buena Vista Lakes	68.6	84	83	38	69	3	2	1	0	0
Staffel													
V301	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	77.5	93	92	50	75	2	1	0	1	0

Table B-1
Summary Table of CRAM Data

AA Code	CRAM Type	Wetland Type	Watershed	Index Score[a]	Attribute Scores: Buffer and Landscape Context	Attribute Scores: Hydrology	Attribute Scores: Physical Structure	Attribute Scores: Biotic Structure	Number of Stressors	Attribute Stressors: Buffer and Landscape Stressors	Attribute Stressors: Hydrology Stressors	Attribute Stressors: Physical Stressors	Attribute Stressors: Biotic Stressors
V302	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	70.2	93	92	38	58	2	1	0	1	0
Te Velde													
R300	Riverine	Seasonal riverine	Upper Tule	54.1	68	58	38	53	6	1	2	3	0
R302	Riverine	Seasonal riverine	Upper Tule	61.7	68	75	38	68	6	1	2	3	0
Valadez													
D303	Depressional	Seasonal basin	Tulare-Buena Vista Lakes	58.5	48	67	50	69	3	2	0	1	0
V303	Individual Vernal Pool	Vernal pool	Tulare-Buena Vista Lakes	57.7	56	100	38	38	1	1	0	0	0
Yang													
VS300	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	77.5	93	92	68	58	1	1	0	0	0
VS301	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	84.8	93	92	83	71	1	1	0	0	0
VS303	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	80.6	93	92	75	63	0	0	0	0	0
Clark River Ranch													
R401	Riverine	Seasonal riverine	Tulare-Buena Vista Lakes	58.7	75	67	38	56	7	2	2	3	0
R402	Riverine	Seasonal riverine	Tulare-Buena Vista Lakes	60.8	63	58	50	72	9	3	3	3	0

[a] The averages of the Attribute scores may not exactly match the Index score due to rounding.

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Appendix C

Assessment Area of Data Forms

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: C. Roberts

Assessment Area Name: D147

Assessment No. | **Date (mm/dd/yyyy):** 09/21/2011

Assessment Team Members for This AA

C. Roberts

C. Julian

A. Langston

J. Love

AA Category:

□ Restoration □ Mitigation □ Impacted X Other

Which best describes the type of depressional wetland?

□ freshwater marsh □ alkaline marsh □ alkali flat X other (specify):

Retention /detention basin

Which best describes the hydrologic state of the wetland at the time of assessment?

X ponded/inundated □ saturated soil, but no surface water □ dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

X long-duration □ medium-duration □ short-duration

Does your wetland connect with the floodplain of a nearby stream? □ yes X no

Is the topographic basin of the wetland X distinct **or** □ indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1205	North			
2	1207	South			
3	1206	East			
4	1208	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D147				**Date:** 09/21/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3			
Buffer submetric A: Percent of AA with Buffer	12			Unpaved area > 5 m wide	
Buffer submetric B: Average Buffer Width	3			Avg=16	
Buffer submetric C: Buffer Condition	3				
D + [C x (A x B)^{½}] ^{½} = **Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		7	30		30
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		12	33		33
Physical Structure					
Structural Patch Richness		3		2 patch types	
Topographic Complexity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		9	38		38
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	3			Non-vegetated	
Plant Community submetric B: Number of Co-dominant species	3				
Plant Community submetric C: Percent Invasion	3				
Plant Community Metric (*average of submetrics A-C*)		3			
Horizontal Interspersion and Zonation		3			
Vertical Biotic Structure		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		9	25		25
Overall AA Score (Average of Final Attribute Scores)				**31.5**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows	X	X
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)	X	X
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	X
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	X
Comments		
Pumped retention/detention basin		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	X
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)	X	X
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
Surrounded by levee/dirt road; orchard (impairing nutrients)		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
Likely mosquito control; pesticide for trees?		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Surrounded by orchard, next to HWY 43 and BNSF		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: A. Langston	
Assessment Area Name: D203	
Assessment No.	**Date (mm/dd/yyyy):** 03/08/2012

Assessment Team Members for This AA

G. Peracca

J. Whitfield

C. Roberts

A. Langston

AA Category:

[ ] Restoration [ ] Mitigation X Impacted [ ] Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat X other (specify):

Impounded historic riverine channel.

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration X medium-duration [ ] short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

Is the topographic basin of the wetland X distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1709	North			
2	1712	South			
3	1710	East			
4	1711	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D203				**Date:** 03/08/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=2.5%	
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	9			Avg= 150.6 meters	
Buffer submetric C: Buffer Condition	6				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ **= Attribute Score**		Raw 10.9	Final 45.4	Final Attribute Score = (Raw Score/24)100	45.4
Hydrology					
Water Source		9		groundwater	
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		12			
Attribute Score		Raw 24	Final 66.7	Final Attribute Score = (Raw Score/36)100	66.7
Physical Structure					
Structural Patch Richness		6		7 Patches	
Topographic Complexity		6			
Attribute Score		Raw 12	Final 50	Final Attribute Score = (Raw Score/24)100	50
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			2 Layers	
Plant Community submetric B: Number of Co-dominant species	3			4 co-dominant spp.	
Plant Community submetric C: Percent Invasion	9			25% non-native spp.	
Plant Community Metric (*average of submetrics A-C*)		6			
Horizontal Interspersion and Zonation		12			
Vertical Biotic Structure		3			
Attribute Score		Raw 21	Final 58.3	Final Attribute Score = (Raw Score/36)100	58.3
Overall AA Score (Average of Final Attribute Scores)				**55.1**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	
Comments		
Surrounding agricultural pumping within 50m draining into ending slope of AA.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	X	
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture	X	
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: G. Peracca	
Assessment Area Name: D204	
Assessment No.	**Date (mm/dd/yyyy):** 03/08/2012

Assessment Team Members for This AA

J. Whitfield

C. Roberts

G. Peracca

A. Langston

AA Category:

[ ] Restoration [ ] Mitigation X Impacted X Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat X other (specify):

Impounded portion of river system and retention / detention basin

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration X medium-duration [ ] short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

Is the topographic basin of the wetland X distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1714	North			
2	1716	South			
3	1715	East			
4	1713	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D204				**Date:** 03/08/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=9%	
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	9			Avg=179.4 meters	
Buffer submetric C: Buffer Condition	6				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ **= Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	45.4
		10.9	45.4		
Hydrology					
Water Source		9		Ground water = dry season source	
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	66.7
		24	66.7		
Physical Structure					
Structural Patch Richness		6		6 patch types	
Topographic Complexity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	75
		18	75		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	12			4 Layers	
Plant Community submetric B: Number of Co-dominant species	6			6 co-dominant spp.	
Plant Community submetric C: Percent Invasion	3			50% invasion	
Plant Community Metric (*average of submetrics A-C*)		7			
Horizontal Interspersion and Zonation		12			
Vertical Biotic Structure		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	77.8
		28	77.8		
Overall AA Score (Average of Final Attribute Scores)				**66.2**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	X	
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial	X	
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: G. Peracca		
Assessment Area Name: D205		
Assessment No.		**Date (mm/dd/yyyy):** 03/07/2012

Assessment Team Members for This AA

G. Peracca

C. Roberts

A. Langston

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat X other (specify):

Retention / Detention Basin

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration [ ] medium-duration X short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

Is the topographic basin of the wetland X distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1707	North			
2	1705	South			
3	1708	East			
4	1706	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D205				**Date:** 03/07/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=2.5%	
Buffer submetric A: Percent of AA with Buffer	9			60% with buffer	
Buffer submetric B: Average Buffer Width	3			Avg=11.5 meters	
Buffer submetric C: Buffer Condition	3				
$D + [\, C \times (A \times B)^{1/2} \,]^{1/2}$ = **Attribute Score**		Raw: 6.9	Final: 28.8	Final Attribute Score = (Raw Score/24)100	28.8
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		12			
Attribute Score		Raw: 21	Final: 58.3	Final Attribute Score = (Raw Score/36)100	58.3
Physical Structure					
Structural Patch Richness		3		2 patch types	
Topographic Complexity		3			
Attribute Score		Raw: 6	Final: 25.0	Final Attribute Score = (Raw Score/24)100	25.0
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			1 Layer	
Plant Community submetric B: Number of Co-dominant species	3			4 Co-dominant spp.	
Plant Community submetric C: Percent Invasion	2			75% non-native spp.	
Plant Community Metric (*average of submetrics A-C*)		4			
Horizontal Interspersion and Zonation		6			
Vertical Biotic Structure		9			
Attribute Score		Raw: 19	Final: 52.7	Final Attribute Score = (Raw Score/36)100	52.7
Overall AA Score (Average of Final Attribute Scores)				**41.2**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)	X	
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
Mowing AA but effected = not negative		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial	X	X
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Poor drainage off adjacent commercial development visible sediment apron from failure in berm		
corner.		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: G. Peracca		
Assessment Area Name: D206		
Assessment No.		**Date (mm/dd/yyyy):** 03/07/2012

Assessment Team Members for This AA

A. Langston

G. Peracca

C. Roberts

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat X other (specify): Stormwater Retention/detention basin

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration [ ] medium-duration X short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

Is the topographic basin of the wetland X distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1703	North			
2	1701	South			
3	1704	East			
4	1702	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D206				**Date:** 03/07/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=3.3%	
Buffer submetric A: Percent of AA with Buffer	12			92% with buffer	
Buffer submetric B: Average Buffer Width	3			Avg=28.5 meters	
Buffer submetric C: Buffer Condition	6				
$D + [C \times (A \times B)^{½}]^{½}$ **= Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		9	37.5		37.5
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		21	58.3		58.3
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		6	25		25
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6				
Plant Community submetric B: Number of Co-dominant species	3				
Plant Community submetric C: Percent Invasion	3				
Plant Community Metric (*average of submetrics A-C*)		4			
Horizontal Interspersion and Zonation		9			
Vertical Biotic Structure		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		19	52.7		52.7
Overall AA Score (Average of Final Attribute Scores)				**43.4**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: G. Peracca	
Assessment Area Name: D212	
Assessment No.	**Date (mm/dd/yyyy):** 03/06/2012

Assessment Team Members for This AA

C. Roberts

A. Langston

G. Peracca

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat X other (specify): Retention/detention basin

Which best describes the hydrologic state of the wetland at the time of assessment?

X ponded/inundated [ ] saturated soil, but no surface water [ ] dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

X long-duration [ ] medium-duration [ ] short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no*

*but obviously hydrologically connected to the regional irrigation system

Is the topographic basin of the wetland X distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1689	North			
2	1687	South			
3	1690	East			
4	1688	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D212				**Date:** 03/06/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=2%	
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	3			Avg= 8.9 meters	
Buffer submetric C: Buffer Condition	3				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ **= Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	30
		7.2	30		
Hydrology					
Water Source		3			
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	50
		18	50		
Physical Structure					
Structural Patch Richness		6			
Topographic Complexity		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	62.5
		15	62.5		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	9			3 Layers	
Plant Community submetric B: Number of Co-dominant species	3			3 co-dominant spp.	
Plant Community submetric C: Percent Invasion	3			100% non-native spp.	
Plant Community Metric (*average of submetrics A-C*)		5			
Horizontal Interspersion and Zonation		12			
Vertical Biotic Structure		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	63.9
		23	63.9		
Overall AA Score (Average of Final Attribute Scores)				**51.6**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: G. Peracca	
Assessment Area Name: D213	
Assessment No.	**Date (mm/dd/yyyy):** 03/06/2012

Assessment Team Members for This AA

A. Langston

G. Peracca

C. Roberts

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat X other (specify): Retention/detention basin

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration [ ] medium-duration X short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

Is the topographic basin of the wetland X distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1683	North			
2	1685	South			
3	1684	East			
4	1686	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D213				**Date:** 03/06/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=1.25%	
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	6			Avg=70.6 meters	
Buffer submetric C: Buffer Condition	3				
$D + [C \times (A \times B)^{½}]^{½}$ = **Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		8	33.3		33.3
Hydrology					
Water Source		3		Receives surface water from rain	
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		18	50		50
Physical Structure					
Structural Patch Richness		3		1 patch type	
Topographic Complexity		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		6	25		25
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			2 Layers	
Plant Community submetric B: Number of Co-dominant species	3			Co-dominant spp.	
Plant Community submetric C: Percent Invasion	3			66.7% non-native spp.	
Plant Community Metric (*average of submetrics A-C*)		4			
Horizontal Interspersion and Zonation		12			
Vertical Biotic Structure		9		Little to no entrained vegetation	
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		25	69.4		69.4
Overall AA Score (Average of Final Attribute Scores)				**44.4**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: A. Langston	
Assessment Area Name: D214	
Assessment No.	**Date (mm/dd/yyyy):** 03/06/2012

Assessment Team Members for This AA

C. Roberts

A. Langston

G. Peracca

AA Category:

[ ] Restoration [ ] Mitigation X Impacted X Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat X other (specify): Retention/detention basin

Which best describes the hydrologic state of the wetland at the time of assessment?

X ponded/inundated [ ] saturated soil, but no surface water [ ] dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

X long-duration [ ] medium-duration [ ] short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

Is the topographic basin of the wetland X distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1680, 1681	North			
2	1679	South			
3	1676	East			
4	1682	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D214				**Date:** 03/06/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=0%	
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	3			Avg=34.4 meters	
Buffer submetric C: Buffer Condition	3				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ = **Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	30
		7.2	30		
Hydrology					
Water Source		3			
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	50
		18	50		
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	25
		6	25		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	3				
Plant Community submetric B: Number of Co-dominant species	3				
Plant Community submetric C: Percent Invasion	12				
Plant Community Metric (*average of submetrics A-C*)		6			
Horizontal Interspersion and Zonation		3			
Vertical Biotic Structure		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	33
		12	33.3		
Overall AA Score (Average of Final Attribute Scores)				**34.6**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture	X	
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: C. Julian	
CRAM Site ID: FB HST	
Assessment Area Name: R8	
Date (mm/dd/yyyy): 09/23/2011	

Assessment Team Members for This AA

C. Roberts, C. Julian, J. Love, A. Langston

Average Bankfull Width: 9 meters

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
100 meters

Wetland Sub-type:

[ ] Confined X Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1230	Northeast			
2	1231	Southeast			
3	1228	Southwest			
4	1229	Northwest			

Scoring Sheet: Riverine Wetlands

AA Name: R8				**Date:** 09/23/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12			
Buffer submetric A: Percent of AA with Buffer	12				
Buffer submetric B: Average Buffer Width	3				
Buffer submetric C: Buffer Condition	6			Disturbed soils, mix of native and non-native vegetation	
D + [C x (A x B)^{½}] ^{½} = **Attribute Score**		Raw	Final	Final Attribute Score = (Rawcore/24)100	75
		18	75		
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	75
		27	75		
Physical Structure					
Structural Patch Richness		6			
Topographic Complexity		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	63
		15	63		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	9			3 Layers	
Plant Community submetric B: Number of Co-dominant species	6			6 co-dominants	
Plant Community submetric C: Percent Invasion	9			17% invasion	
Plant Community Metric *(average of submetrics A-C)*		8			
Horizontal Interspersion and Zonation		6			
Vertical Biotic Structure		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	56
		20	56		
Overall AA Score (Average of Final Attribute Scores)				**67.3**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)	X	X
Flow obstructions (culverts, paved stream crossings)	X	X
Weir/drop structure, tide gates	X	X
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	X
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management	X	
Excessive sediment or organic debris from watershed	X	X
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	X	
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)	X	X
Dryland farming		
Intensive row-crop agriculture	X	X
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)	X	
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: C. Roberts

CRAM Site ID: FB HST

Assessment Area Name: R63A

Date (mm/dd/yyyy): 09/29/2011

Assessment Team Members for This AA

C. Roberts, G. Peracca

Average Bankfull Width: 6 meters

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
100 meters

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial X ephemeral [ ] intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1308	North			
2	1310	South			
3	1309	East			
4	1307	West			

Scoring Sheet: Riverine Wetlands

AA Name: R63A			**Date:** 09/29/2011	
Attributes and Metrics	**Scores**		**Comments**	
Buffer and Landscape Context				
Landscape Connectivity	12			
Buffer submetric A: Percent of AA with Buffer	12			
Buffer submetric B: Average Buffer Width	12			
Buffer submetric C: Buffer Condition	9			
D + [C x (A x B)$^{1/2}$] $^{1/2}$ = **Attribute Score**	Raw	Final	Final Attribute Score = (Rawcore/24)100	
	22	93		93
Hydrology				
Water Source	9			
Hydroperiod or Channel Stability	12			
Hydrologic Connectivity	6			
Attribute Score	Raw	Final	Final Attribute Score = (Raw Score/36)100	
	27	75		75
Physical Structure				
Structural Patch Richness	3			
Topographic Complexity	6			
Attribute Score	Raw	Final	Final Attribute Score = (Raw Score/24)100	
	9	38		38
Biotic Structure				
Plant Community submetric A: Number of Plant Layers	9		3 layers	
Plant Community submetric B: Number of Co-dominant species	6		7 co-dominants	
Plant Community submetric C: Percent Invasion	3		57% non-native spp.	
Plant Community Metric *(average of submetrics A-C)*	6			
Horizontal Interspersion and Zonation	6			
Vertical Biotic Structure	12			
Attribute Score	Raw	Final	Final Attribute Score = (Raw Score/36)100	
	27	67		67
Overall AA Score (Average of Final Attribute Scores)			**68.3**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
RR levee; probably not very significant; AA seems to get adequate water		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)	X	
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management	X	
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
BNSF manages ROW		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species	X	
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
BNSF manages veg. in ROW		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: G. Peracca

CRAM Site ID: FB HST

Assessment Area Name: R66

Date (mm/dd/yyyy): 09/29/2011

Assessment Team Members for This AA

C. Roberts, G. Peracca

Average Bankfull Width:

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
100 meters

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1316	North			
2	1315	South			
3	1317, 1318	East			
4	1319, 1320	West			

Scoring Sheet: Riverine Wetlands

AA Name: R66				**Date:** 09/29/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12			
Buffer submetric A: Percent of AA with Buffer	12			100%	
Buffer submetric B: Average Buffer Width	9			Avg =140 meters	
Buffer submetric C: Buffer Condition	9				
D + [C x (A x B)^{½}] ^{½} = **Attribute Score**		Raw	Final	Final Attribute Score = (Rawcore/24)100	90
		22	90		
Hydrology					
Water Source		9			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	67
		24	67		
Physical Structure					
Structural Patch Richness		6			
Topographic Complexity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	50
		12	50		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	B (9)			3 Layers	
Plant Community submetric B: Number of Co-dominant species	B (9)			8 co-dominants	
Plant Community submetric C: Percent Invasion	D (3)			57% invasion	
Plant Community Metric *(average of submetrics A-C)*		7			
Horizontal Interspersion and Zonation		9			
Vertical Biotic Structure		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	61
		22	67		
Overall AA Score (Average of Final Attribute Scores)				**67**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)	X	
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)	X	
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management	X	
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
RR ROW veg. management = removal of plants along rairlroad berm using herbicides.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
See physical structure attribute discussion re: herbicides in RR ROW		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: C. Roberts

CRAM Site ID: FB HST

Assessment Area Name: R71A

Date (mm/dd/yyyy): 09/20/2011

Assessment Team Members for This AA

C. Roberts, C. Julian, J. Love, A. Langston

Average Bankfull Width: 4 meters

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
100 meters

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1189	North			
2	1191	South			
3	1190	East			
4	1192	West			

Scoring Sheet: Riverine Wetlands

AA Name: R71A				**Date:** 09/20/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12		No Breaks	
Buffer submetric A: Percent of AA with Buffer	12				
Buffer submetric B: Average Buffer Width	12				
Buffer submetric C: Buffer Condition	9				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ = **Attribute Score**		Raw	Final	Final Attribute Score = (Rawcore/24)100	
		22	93		93
Hydrology					
Water Source		12			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		30	83		83
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		9	38		38
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			2 layers	
Plant Community submetric B: Number of Co-dominant species	3			3 co-dominants	
Plant Community submetric C: Percent Invasion	6			33% non-native spp.	
Plant Community Metric *(average of submetrics A-C)*		5			
Horizontal Interspersion and Zonation		3			
Vertical Biotic Structure		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		11	31		31
Overall AA Score (Average of Final Attribute Scores)				**61.3**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)	X	
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)	X	
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming	X	
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: J. Love
CRAM Site ID: FB HST
Assessment Area Name: R146
Date (mm/dd/yyyy): 09/22/2011

Assessment Team Members for This AA
C. Roberts, C. Julian, J. Love, A. Langston

Average Bankfull Width:

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
100 meters

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1213	North			
2	1215	South			
3	1214	East			
4	NO ACCESS	West			

Scoring Sheet: Riverine Wetlands

AA Name: R146			**Date:** 09/22/2011	
Attributes and Metrics		**Scores**	**Comments**	
Buffer and Landscape Context				
Landscape Connectivity		3		
Buffer submetric A: Percent of AA with Buffer	9		RR on W is a main line with w/ riprap which we didn't count as buffer. E side is dirt road	
Buffer submetric B: Average Buffer Width	3			
Buffer submetric C: Buffer Condition	3			
$D + [C \times (A \times B)^{1/2}]^{1/2}$ **= Attribute Score**	Raw: 7	Final: 29	Final Attribute Score = (Rawcore/24)100	29
Hydrology				
Water Source		9		
Hydroperiod or Channel Stability		6		
Hydrologic Connectivity		6		
Attribute Score	Raw: 21	Final: 58	Final Attribute Score = (Raw Score/36)100	58
Physical Structure				
Structural Patch Richness		3		
Topographic Complexity		6		
Attribute Score	Raw: 9	Final: 38	Final Attribute Score = (Raw Score/24)100	38
Biotic Structure				
Plant Community submetric A: Number of Plant Layers	9		3 Layers	
Plant Community submetric B: Number of Co-dominant species	3		4 co-dominants	
Plant Community submetric C: Percent Invasion	3		50% invasion	
Plant Community Metric *(average of submetrics A-C)*		5		
Horizontal Interspersion and Zonation		6		
Vertical Biotic Structure		6		
Attribute Score	Raw: 17	Final: 47	Final Attribute Score = (Raw Score/36)100	47
Overall AA Score (Average of Final Attribute Scores)			43	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	X
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
RR is built on a levee		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)	X	X
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management	X	X
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)	X	X
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		
Grading/compaction due to roads adjacent; veg removal seen on site; herbicides from orchards		
trash		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species	X	
Pesticide application or vector control	X	X
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
Herbicides from orchards; veg removal seen on-site		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Orchards; RR adjacent to AA and SR 43 nearby		

Basic Information Sheet: Riverine Wetlands

Your Name: C. Roberts	
CRAM Site ID: FB HST	
Assessment Area Name: R149	
Date (mm/dd/yyyy): 09/20/2011	

Assessment Team Members for This AA

C. Roberts, C. Julian, J. Love, A. Langston

Average Bankfull Width: 9 meters

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
100 meters

Wetland Sub-type:

[ ] Confined X Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1193	North			
2	1194	South			
3	1195	East			
4	1196	West			

Scoring Sheet: Riverine Wetlands

AA Name: R149			**Date:**09/20/2011	
Attributes and Metrics		**Scores**	**Comments**	
Buffer and Landscape Context				
Landscape Connectivity		12	70m break upstream	
Buffer submetric A: Percent of AA with Buffer	3		functionally no buffer	
Buffer submetric B: Average Buffer Width	3			
Buffer submetric C: Buffer Condition	3			
$D + [C \times (A \times B)^{1/2}]^{1/2}$ = **Attribute Score**		Raw 15 / Final 63	Final Attribute Score = (Rawcore/24)100	63
Hydrology				
Water Source		6		
Hydroperiod or Channel Stability		9		
Hydrologic Connectivity		9		
Attribute Score		Raw 24 / Final 67	Final Attribute Score = (Raw Score/36)100	67
Physical Structure				
Structural Patch Richness		3		
Topographic Complexity		9		
Attribute Score		Raw 12 / Final 50	Final Attribute Score = (Raw Score/24)100	50
Biotic Structure				
Plant Community submetric A: Number of Plant Layers	9		3 layers	
Plant Community submetric B: Number of Co-dominant species	6		6 co-dominants	
Plant Community submetric C: Percent Invasion	9		17% invasion	
Plant Community Metric *(average of submetrics A-C)*		8		
Horizontal Interspersion and Zonation		9		
Vertical Biotic Structure		9		
Attribute Score		Raw 26 / Final 72	Final Attribute Score = (Raw Score/36)100	72
Overall AA Score (Average of Final Attribute Scores)			**63**	