Aquatic Resources Assessment

Lower Deer Creek Flood and

Ecosystem Improvement Project

Tehama County, CA

February 2019

Aquatic Resources Assessment Lower Deer Creek Flood and Ecosystem Improvement Project

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ACRONYMS AND ABBREVIATIONS

GPS	Global Positioning System
MLRA	Major Land Resource Area
msl	mean sea level
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OHWM	ordinary high water mark
Project	Lower Deer Creek Flood and Ecosystem Improvement
USDA	U.S. Department of Agriculture
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WETS	Climate Analysis for Wetlands
WRCC	Western Regional Climate Center
°F	degrees Fahrenheit

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EXECUTIVE SUMMARY

The Lower Deer Creek Flood and Ecosystem Improvement Project (Project) is located on Deer Creek and China Slough in Tehama County. The Project is sponsored by Deer Creek Watershed Conservancy with the participation of various federal, state, and local agencies and a range of stakeholders. The Project is intended to accrue multiple benefits throughout the lower watershed.

An aquatic resources assessment was conducted for a 680-acre assessment area, which includes the proposed project construction area and adjacent areas expected be temporarily or permanently impacted by the Project.

The assessment area contains 90.810 acres of potential non-wetland waters of the U.S. and 45.642 acres of potential wetlands. Mapped aquatic resources consisted of Deer Creek and China Slough, as well as intermittent and ephemeral channels, constructed canals, culverted waters of the U.S., and a variety of wetland types.

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1.0 INTRODUCTION

This report presents the methods and results of an aquatic resources assessment conducted for the Lower Deer Creek Flood and Ecosystem Improvement Project (Project), which encompasses 680 acres in unincorporated Tehama County, California (**Figure 1**). The Project would include flood and ecosystem improvements intended to accrue multiple benefits throughout the Lower Deer Creek watershed. This assessment was conducted to identify and describe aquatic resources within the assessment area and their expected jurisdictional status. This information will support the planning and design of the Project. Methods used in this assessment were informed by the U.S. Army Corps of Engineers' (USACE's) 1987 *Wetland Delineation Manual* and the 2008 *Arid West Regional Supplement*; however, this report does not constitute an aquatic resource (preliminary jurisdictional or jurisdictional) delineation for submittal to the USACE, as the results of this assessment are informational only and intended for Project planning purposes.

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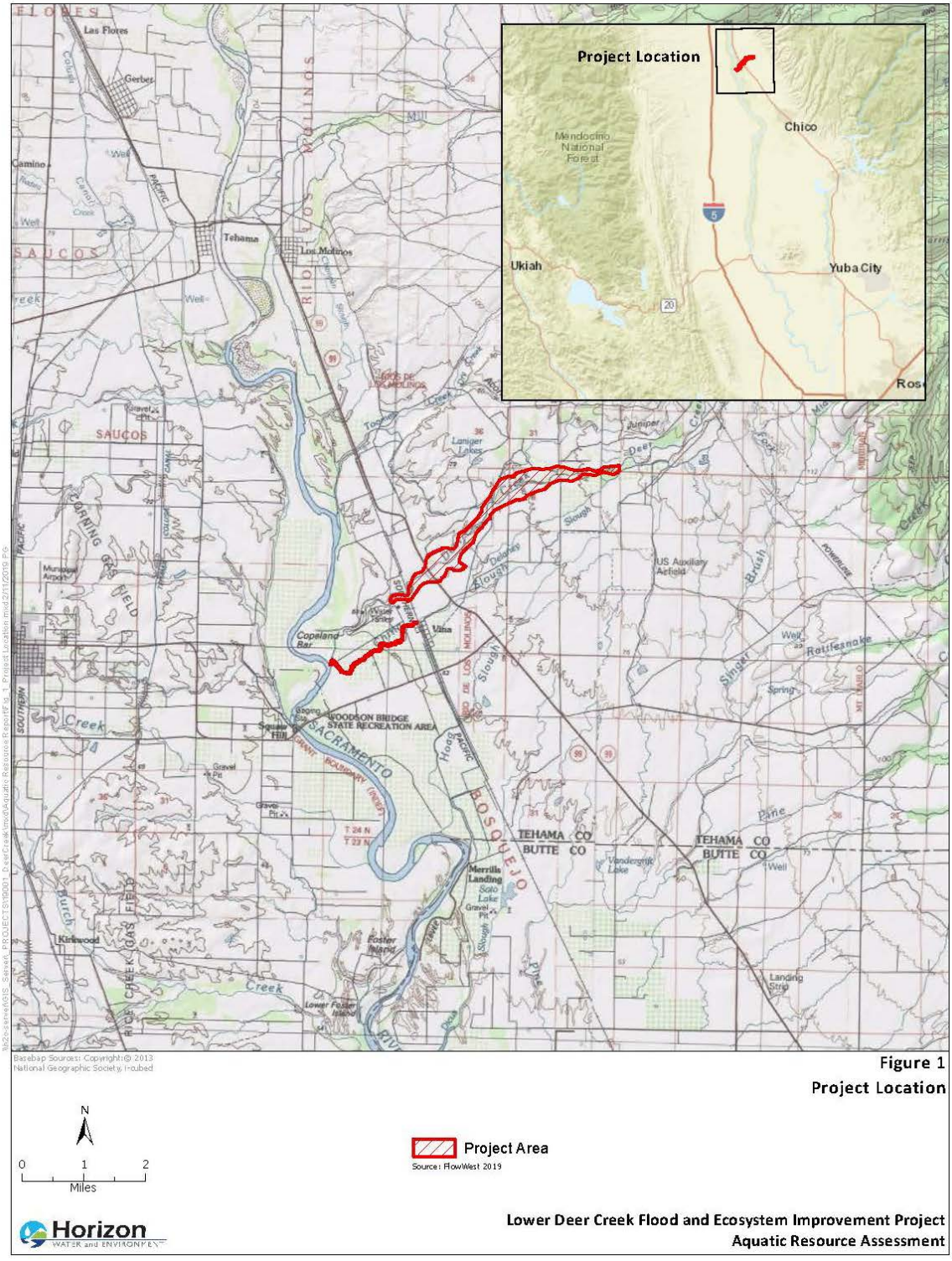
Figure 1. Project Location



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2.0 LOCATION AND SETTING

The assessment area is located along Deer Creek and a portion of China Slough and the adjacent Sacramento River, in the vicinity of Vina (a census-designated place) in southern Tehama County (Figure 1). The majority of the assessment area is located on privately owned land. The Lower Deer Creek watershed, which drains through the assessment area, is predominantly categorized as rural, with large portions used for agricultural or livestock production. The watershed in which the assessment area is located is approximately 1.5 percent urbanized (U.S. Geological Survey [USGS] 2019). The assessment area includes portions of Deer Creek, China Slough, potential wetlands, ditches, canals, culverts, and other features potentially subject to USACE jurisdiction.

Site photographs are provided in **Appendix A** (photograph locations are shown on Figure 5).

2.1 Location & Driving Directions

Waterbodies	Deer Creek, China Slough
Tributary to and downstream waterbody	Sacramento River, San Francisco Bay, Pacific Ocean
Watershed Hydrologic Unit Code and Name	180201570206, Delaney Slough–Deer Creek 180201570703, Hoag Slough–Sacramento River (includes China Slough)
Latitude & Longitude (decimal degrees)	39.948429°, -122.046700° (assessment area center)
Section, Township, Range	Vina quadrangle: (S1, S11, S12, S14, S15, S22), T24N, R2W S6, T24N, R1W S31, T25N, R1W Richardson Springs NW quadrangle: S5, T24, R1W S32, T25, R1W
USGS Quadrangle(s)	Vina, Richardson Springs NW
Street Address	Varies

Assessment Area	680 acres (Figure 1)

2.2 Land Forms and Topography

The assessment area gradually slopes downward to the southwest away from the Sierra Nevada Mountain Range. Elevations in the assessment area range from approximately 190 to 310 feet above mean sea level (msl). Within the assessment area, Deer Creek meanders across its alluvial fan. China Slough, which has an elevation of approximately 168 feet above msl at the outlet of the watershed (USGS 2019), is relatively confined to its channel.

2.3 Climate

The assessment area has a Mediterranean climate characterized by cool, wet winters and hot, dry summers. Average temperatures range from a low of 36 degrees Fahrenheit (°F) in January to a high of 96°F in July (Western Regional Climate Center [WRCC] 2019). Average annual precipitation is approximately 26 inches, with most precipitation occurring from October through May (WRCC 2019).

2.4 Hydrology

The assessment area is located along portions of Deer Creek and China Slough. China Slough flows into Deer Creek immediately upstream of the confluence of Deer Creek and the Sacramento River. The Sacramento River is defined by USACE as a traditional navigable water (USACE 2019).

2.4.1 Growing Season and Precipitation Analysis

To establish baseline hydrologic conditions within the assessment area, precipitation and growing season analyses were conducted. Current conditions were compared with long-term climate data maintained by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service's (NRCS's) National Water and Climate Center. The Climate Analysis for Wetlands (WETS) Tables present monthly summaries and probability analyses of temperature and precipitation, as well as growing season information. **Tables 1 and 2** summarize this information for the assessment area from the nearest WETS station, located in Chico (**Appendix B**). Approximate growing season dates are represented by the median dates (50 percent probability of occurrence) of 28°F air temperatures, as described in the WETS tables (USACE 2005).

Table 1. Growing Season Analysis

Station and Period of Record	Relative Location to Project	Elevation (Feet)	Average Annual Rainfall (Inches)	Rainfall November through April	>28°F Growing Season (50% probability)	Number of Days
Chico University Farm 1906-2019	20 miles southeast of the Project area	185	25.61	87%	February 21 to December 4	286

Source: NRCS 2019a

Table 2. NRCS Precipitation Analysis for the Chico University Farm Station (2018)*

Month	Observed Total	Precip-itation Average	30th Percentile	70th Percentile	Condition[1]	Condition Weight Factor[2]	Month Weight Factor[3]	Product
Oct	0.52	1.34	0.53	1.51	Dry	1	1	1
Nov	3.40	2.89	1.34	3.41	Normal	2	2	4
Dec	2.31	4.52	2.30	5.53	Normal	2	3	6
Sum[4]								**11**

Notes:

* Data presented in inches.

[1] If Total (Observed) is between 30th percentile and 70th percentile values, Condition = Normal; if Total (Observed) is less than 30th percentile, Condition = Dry; if Total (Observed) is more than 70th percentile, Condition = Wet.

[2] Dry = 1; Normal = 2; Wet = 3.

[3] Month weight factor provides greater value to the most recent month's precipitation conditions.

[4] A sum of 6 to 9 is drier than normal; 10 to 14 is normal; 15 to 18 is wetter than normal.

Source: NRCS 2019a

2.5 Soils

Sixteen soil types are present within the assessment area. These soil mapping units are listed in **Table 3. Figure 2** shows soils mapped in the assessment area (NRCS 2019b). Eleven soil types mapped within the assessment area are included on the USDA, NRCS list of hydric soils (NRCS 2019c).

Table 3. NRCS Soil Types Mapped in the Assessment Area

Map Unit Symbol	Map Unit Name	Map Unit Details	Hydric Soil
Ad	Anita clay	---	Yes
Af	Anita clay	moderately deep	Yes
CsA	Columbia silt loam	0 to 3 percent slopes	Yes
Kf	Keefers loam	0 to 3 percent slopes	Yes
Km	Keefers loam	moderately deep, 0 to 3 percent slopes	Yes
My	Molinos fine sandy loam	0 to 3 percent slopes, Major Land Resource Area (MLRA) 17	Yes
Mzd	Molinos fine sandy loam	deep over gravel	No
Mzm	Molinos fine sandy loam	moderately deep over gravel	No
Mzr	Molinos fine sandy loam	deep over rock	No
Mzt	Molinos complex	channeled	Yes
Rr	Riverwash	---	Yes
TsB	Tuscan loam	1 to 5 percent slopes	Yes
TtB	Tuscan clay loam	1 to 8 percent slopes	Yes
TuB	Tuscan cobbly loam	1 to 5 percent slopes	Yes
VnA	Vina loam	0 to 2 percent slopes, MLRA 17	No
W	Water	---	No

Source: NRCS 2019b, 2019c

2.6 National Wetlands Inventory

Classifications of features mapped in the assessment area by the National Wetlands Inventory (NWI) are provided in **Figure 3** (U.S. Fish and Wildlife Service [USFWS] 2018). Potential waters mapped in the assessment area by the NWI include Riverine (lower perennial and intermittent) and Freshwater Pond, and include named features such as Deer Creek, China Slough, and Delaney Slough. Potential wetlands mapped in the assessment area by NWI are classified as Freshwater Emergent Wetland and Freshwater Forested/Shrub Wetland.

2.7 Land Use

The assessment area is predominantly rural and includes orchards, vineyards, irrigated pastures, rangelands, and riparian vegetation surrounding much of Deer Creek.

2.8 Aquatic Features and Terrestrial Vegetation

This section describes aquatic features and terrestrial vegetation communities present within the assessment area. Vegetation within the assessment area was noted during field surveys.

Vegetation was categorized based on the classifications included in the *Lower Deer Creek Biological Resources Assessment* (WRA, Inc. 2018), which are generally based on the classification system defined in *A Manual of California Vegetation, Online Edition* (California Native Plant Society 2019). Botanical nomenclature follows the second edition of *The Jepson Manual* (Baldwin et al. 2012), except where synonyms are used by Lichvar et al. (2016). A list of all plants observed in the assessment area is included in **Appendix C**.

2.8.1 Open Water

Open water in the assessment area includes streams, canals, and unvegetated ponded areas. These include Deer Creek, China Slough, the Stanford Vina Ranch Irrigation Company's North Main Canal, and smaller streams, ditches, and ponds.

2.8.2 Freshwater Marsh

Freshwater marshes in the assessment area are typically dominated by tule (*Schoenoplectus acutus* var. *occidentalis*), Himalayan blackberry (*Rubus armeniacus*), broadleaf cattail (*Typha latifolia*), common bog rush (*Juncus effusus*), and Santa Barbara sedge (*Carex barbarae*)**.**

2.8.3 Seasonal Wetland

Seasonal wetlands in the assessment area occur in topographic depressions where seasonal inundation and/or saturation occur during the rainy season. Vegetative composition in seasonal wetlands varied within the assessment area and is expected to be associated with their respective inundation periods. Relatively drier portions of seasonal wetlands are typically dominated by non-native species such as Italian ryegrass (*Lolium perenne*) and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*). Native species such as coyote thistle (*Eryngium vaseyi*), goldfields (*Lasthenia fremontii*), blennosperma (*Blennosperma nanum*), cocklebur (*Xanthium strumarium*), common bog rush, and Santa Barbara sedge were also observed in wetter portions of seasonal wetlands.

Figure 2. Soils Map – Sheet 1 of 3

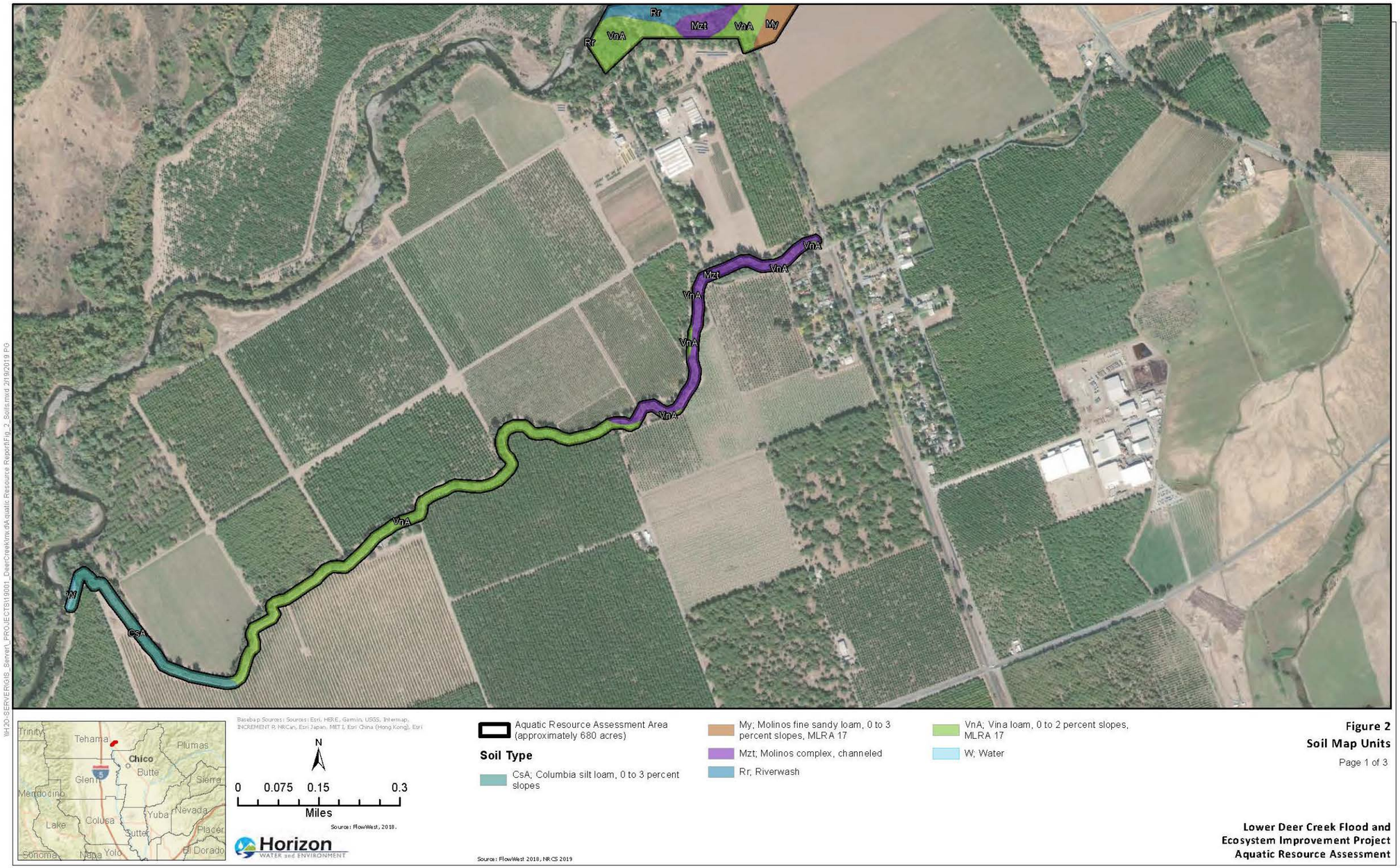

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Figure 2. Soils Map - Sheet 2 of 3

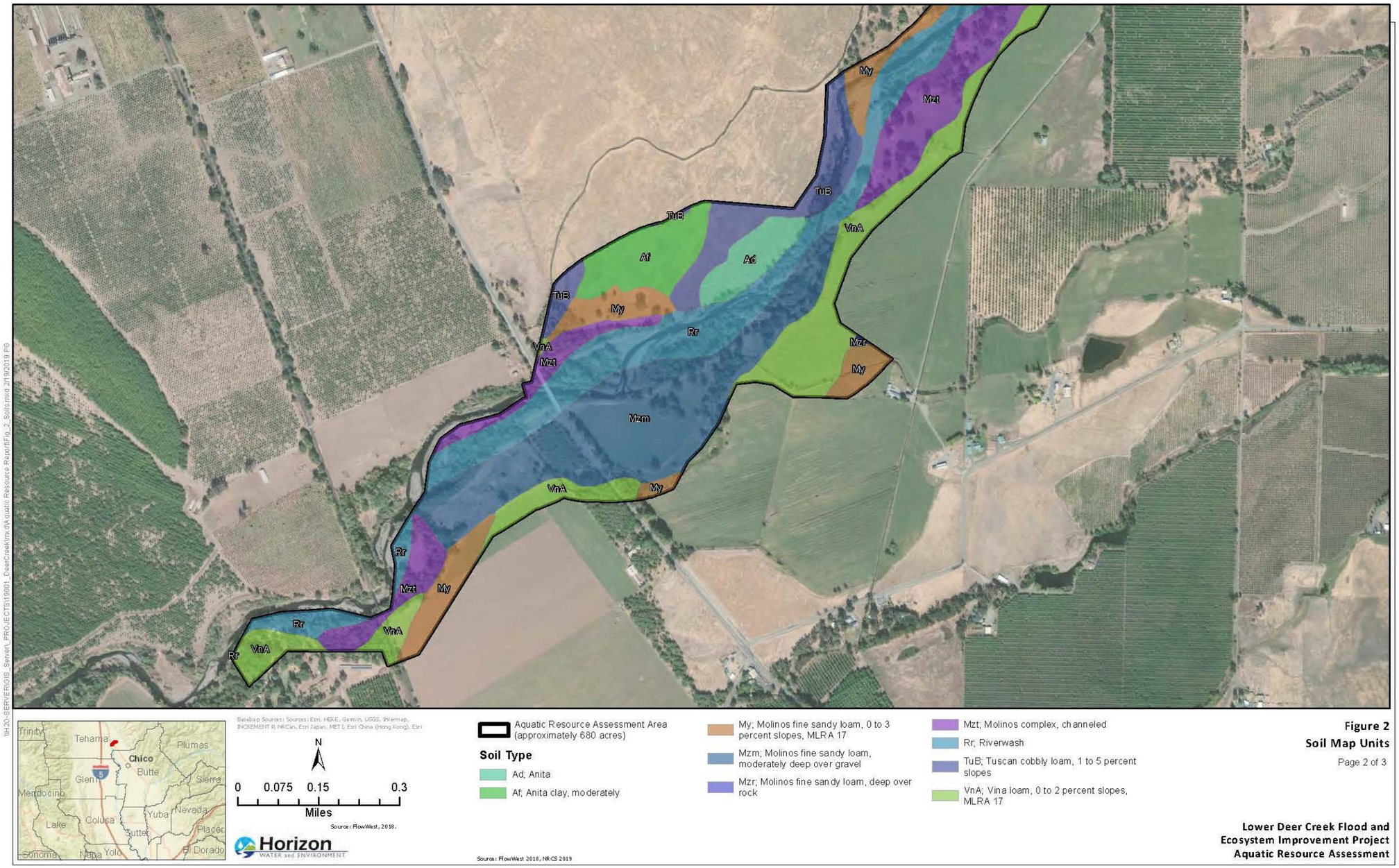

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Figure 2. Soils Map - Sheet 3 of 3

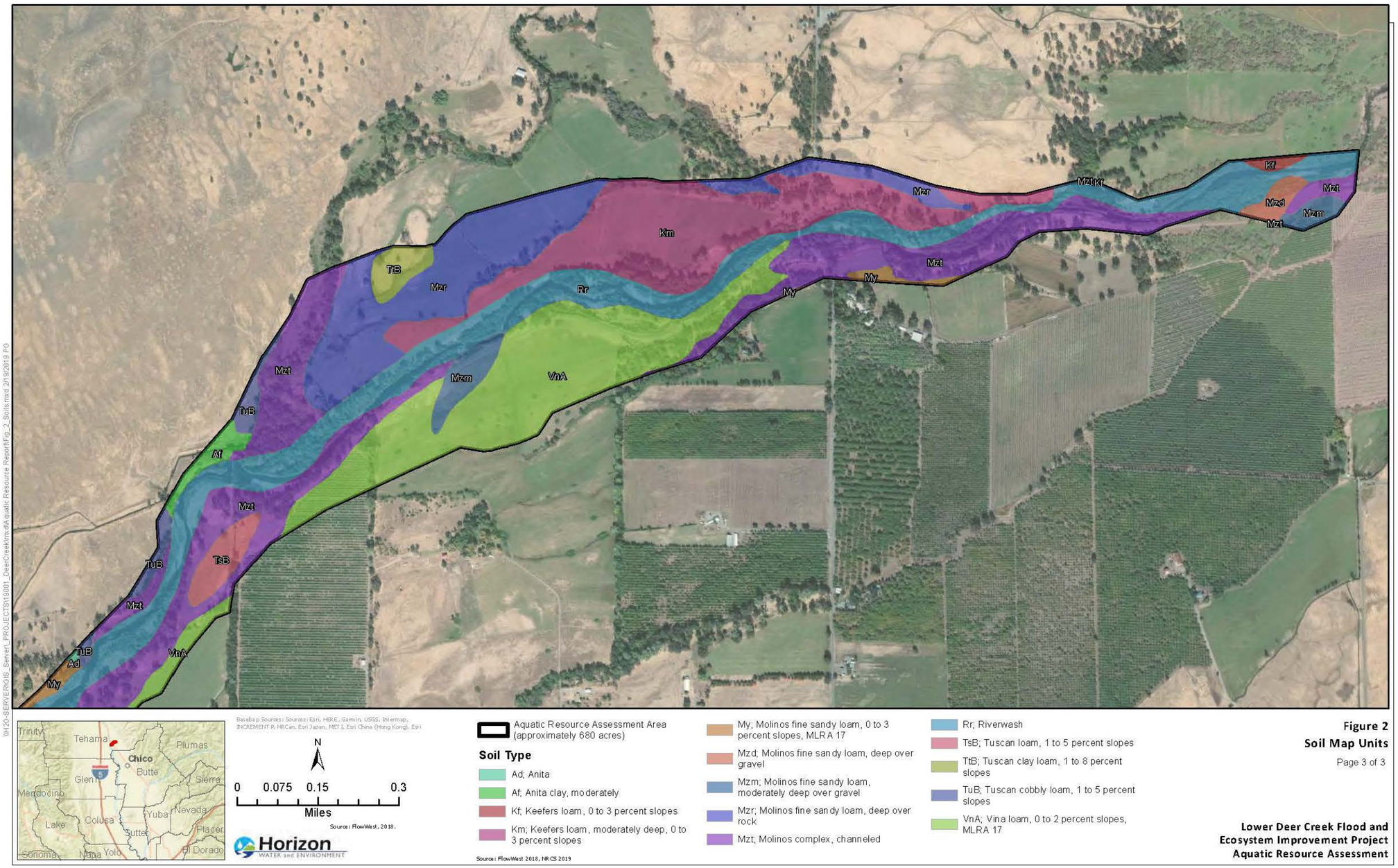

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Figure 3. National Wetland Inventory Sheet 1 of 3

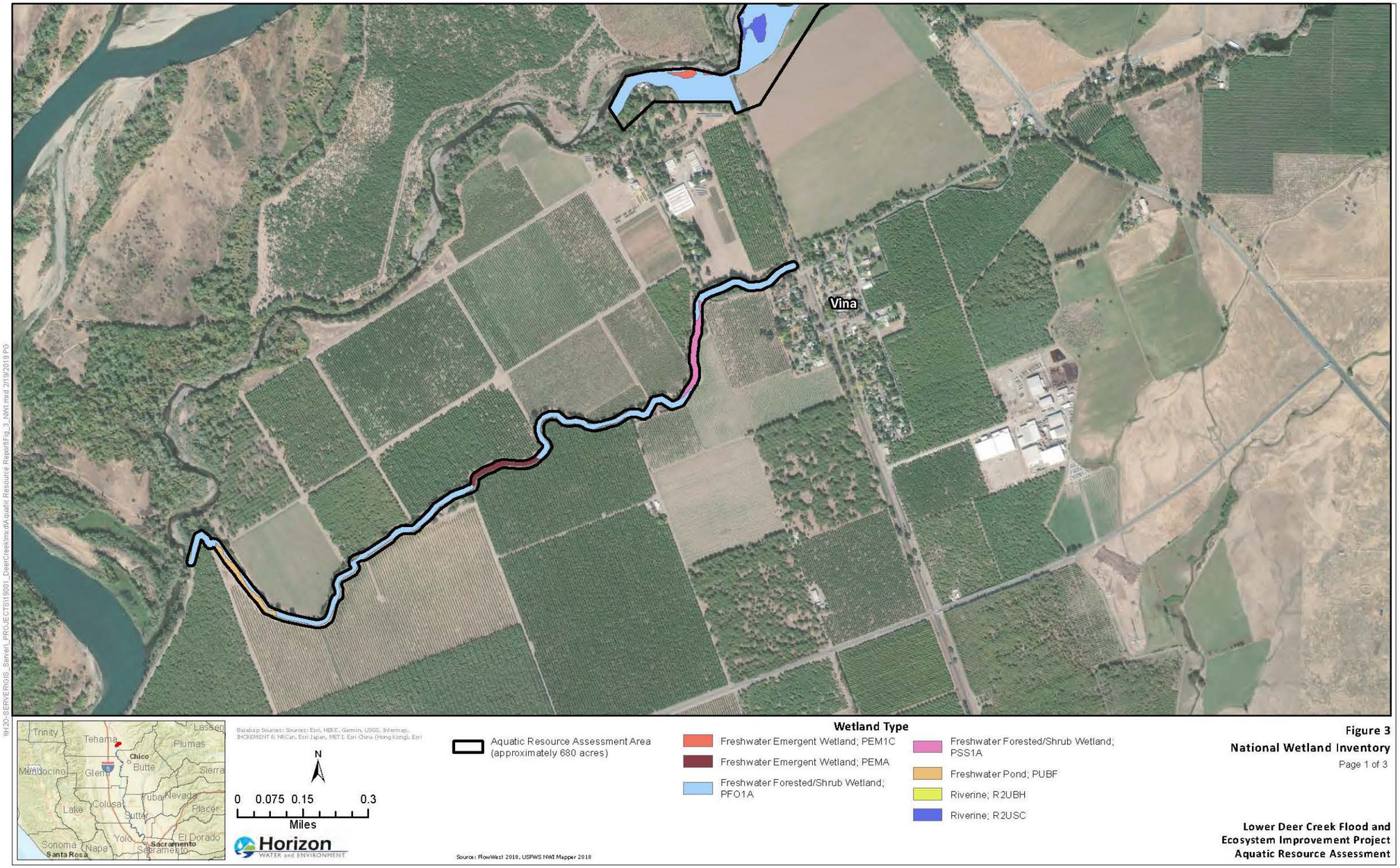

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Figure 3. National Wetland Inventory Sheet 2 of 3

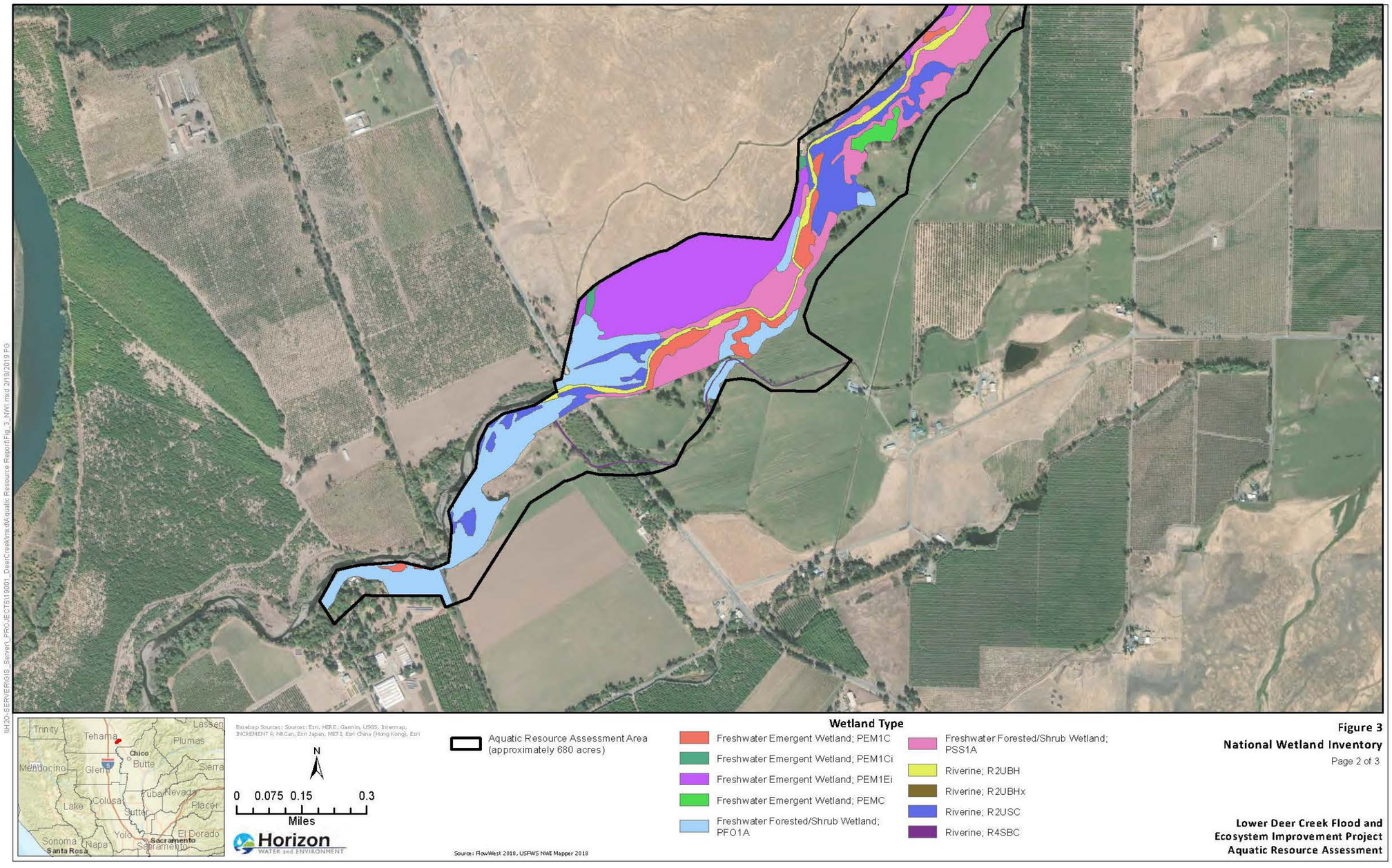

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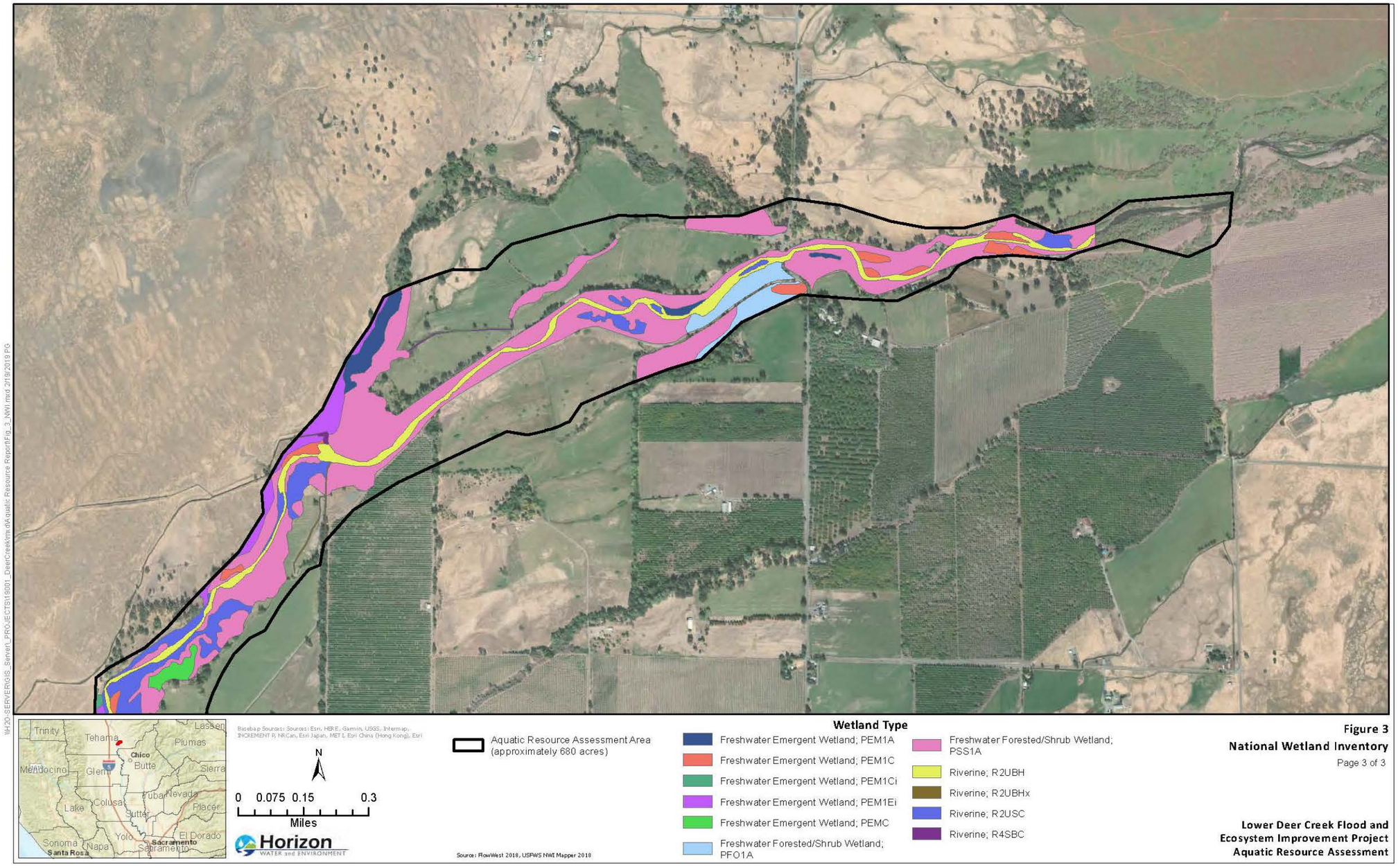
Figure 3. National Wetland Inventory Sheet 3 of 3



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2.8.4 Seasonal Wetland Ditch

Seasonal wetland ditches are artificial channels that have been excavated for the purpose of conveying water, but have remained unmaintained or unmanaged for a duration sufficient to support a dominance of wetland plant species. Seasonal wetland ditches in the assessment area are dominated by a variety of species expected to be associated with the local inundation period. Cocklebur, common bog rush, and Himalayan blackberry were observed in most ditches, while tule and broadleaf cattail were observed in more frequently inundated, deeper ditches.

2.8.5 Irrigated Seasonal Wetland

Irrigated seasonal wetlands in the assessment area are dominated by Italian ryegrass, Lemmon's canary grass (*Phalaris lemmonii*), and Mediterranean barley. These species are also commonly found in nearby irrigated pastures. Saturation, rather than inundation, is the dominant hydrological regime for these habitats. Hydrology for these features is provided via irrigation.

2.8.6 Seasonal Swale

Seasonal swales in the assessment area are typically narrow depressional areas that convey water during the wet season. Seasonal swales are typically inundated from direct rainfall and runoff of adjacent surroundings. A restricting layer (e.g., hardpan, claypan, duripan) prevents infiltration of water into deeper soil layers, so water accumulates until soils are saturated and surface inundation occurs. Seasonal swales typically collect and convey water to and from other wetland features within greater complexes. Vegetation species commonly associated with seasonal swales include species also found in seasonal wetlands.

2.8.7 Willow Scrub Wetland

Willow scrub wetlands are characterized by a dense overstory of willows with an understory of emergent vegetation or bare ground. Within the assessment area, these wetlands are found often found adjacent to freshwater marsh.

2.8.8 Riparian Woodland

This habitat occurs along and near the banks of Deer Creek. Riparian woodland in the assessment area is dominated by California sycamore (*Platanus racemosa*), box elder (*Acer negundo*), and valley oak (*Quercus lobata*). Understory species include several species of willows, such as narrowleaf willow (*Salix exigua*), red willow (*S. laevigata*), and arroyo willow (*S. lasiolepis*). Subdominant understory species include white alder (*Alnus rhombifolia*), blue elderberry (*Sambucus nigra* ssp. *caerulea*), spicebush (*Calycanthus occidentalis*), California blackberry (*Rubus ursinus*), Himalayan blackberry, and California wild rose (*Rosa californica*).

2.8.9 Riparian Wetland

Vegetation structure in riparian wetlands often varies, and can include mature stands of riparian trees or a more typical mixture of shrubs and forbs. Riparian wetlands occur along Deer Creek but lack the contiguous riparian canopy cover of riparian woodlands. Vegetation found within riparian wetlands is similar to species commonly found in the understory of riparian woodlands. These wetlands may be inundated during high-water events in adjacent riverine habitat, but water is typically subsurface in these areas.

2.8.10 Developed

Developed cover includes roads and anthropogenic features such as landscaped vegetation, buildings, and parking lots. Vegetation in these areas, if present at all, is usually sparse, dominated by weedy herbaceous species.

2.8.11 Ruderal

Ruderal vegetation is characterized by non-native forbs and grasses in a disturbed habitat, typically along the edges of development or areas with frequent anthropogenic (human-caused) impacts. In the assessment area it is found in the vicinity of State Route 99 and other roadside locations.

2.8.12 Agricultural

Agricultural cover in the assessment area is mainly composed of irrigated orchards, such as walnut (*Juglans regia*) and almond (*Prunus dulcis*) orchards, and irrigated pastures.

2.8.13 Annual Grassland

Dominant species in annual grassland include wild oats (*Avena spp.*), ripgut brome (*Bromus diandrus*), and soft brome (*Bromus hordeaceus*). This community is typically used as dryland pasture, as it is grazed by cattle within the assessment area.

3.0 METHODS

The aquatic resource assessment was conducted in accordance with the 1987 Corps of Engineers Wetland Delineation Manual (USACE 1987), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0) (USACE 2008a), and A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (USACE 2008b).

3.1 Background Information

The following information was reviewed prior to conducting the assessment:

- NRCS Soil Survey Data (NRCS 2019b),
- NRCS National Hydric Soils List (NRCS 2019c),
- U.S. Fish and Wildlife Service NWI data (USFWS 2019), and
- *Lower Deer Creek Biological Resources Assessment* (WRA, Inc. 2018).

3.2 Field Surveys

Field surveys were conducted on January 23-25, 2018, by biologists Eric Christensen and Robin Hunter of Horizon Water and Environment. The surveyors searched the assessment area for evidence of wetland indicators such as hydrophytic vegetation, ponding, or saturated conditions. Evidence of the ordinary high water mark (OHWM) (e.g., presence of bed/banks, scour lines, change in vegetative cover, changes in soil texture, presence of leaf litter and debris deposits) was mapped along channels. The OHWM was used to determine the extents of potential non-wetland waters of the U.S.

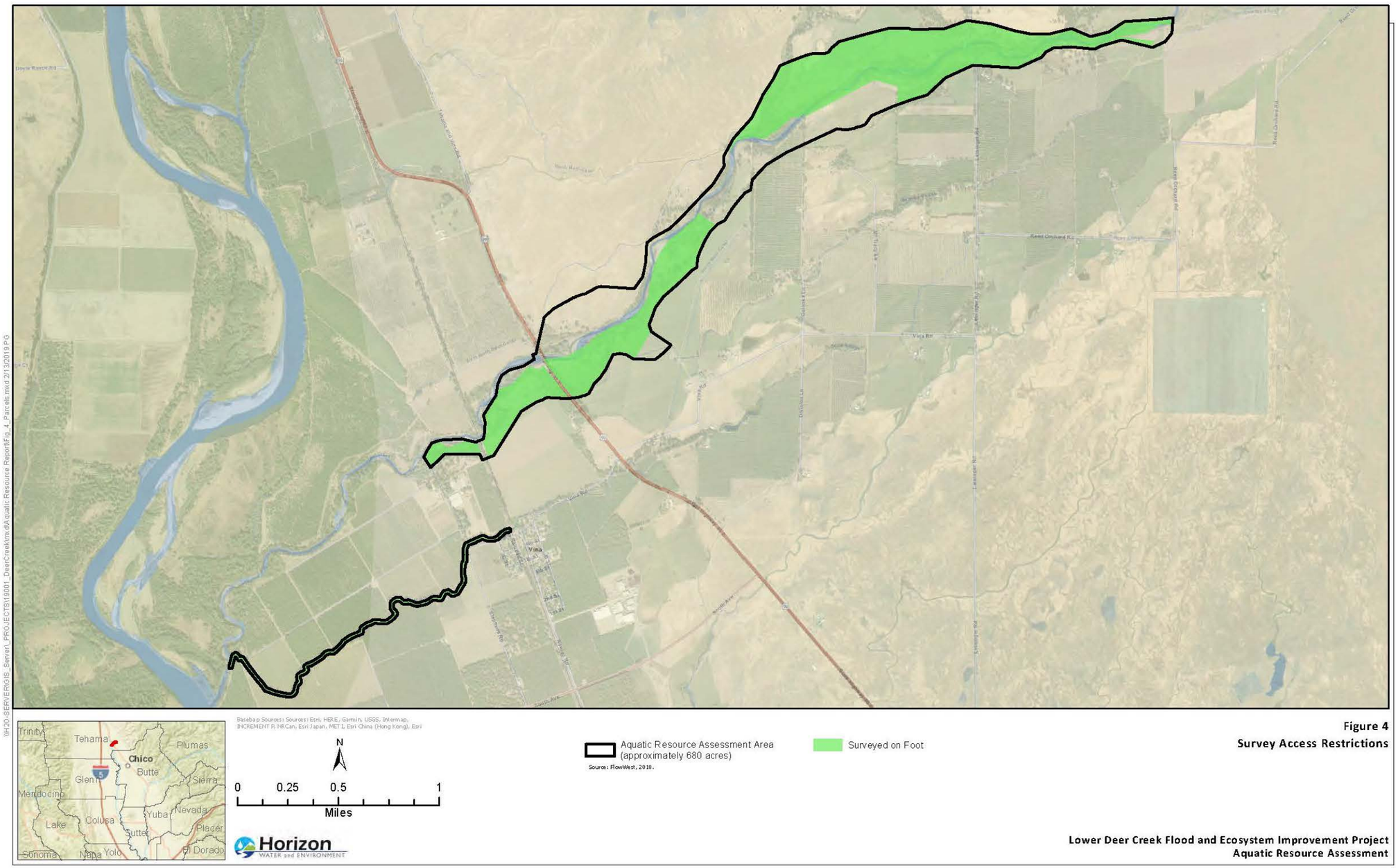
The locations of wetland boundaries and OHWM were mapped using a Trimble GeoXT Global Positioning System (GPS) receiver with sub-meter accuracy, as well as the ESRI ArcCollector application on an Apple iPad. GPS data were imported into ESRI ArcGIS 10.6 software for developing aquatic resource maps. Georeferenced, high-resolution aerial photographs and elevation data were also used in ArcGIS software to interpret boundaries of potential waters and wetlands in conjunction with field-collected data. Field notes were collected on maps, hard-copy map sheets, and as comments on the iPad.

3.3 Limitations of Survey

This survey was constrained by the lack of access to certain portions of the assessment area, where permission to access privately owned parcels or portions of such parcels was denied. Additionally, due to the lack of access permission and physical barriers (e.g., deep channels

with near-vertical sides), some portions of parcels where permission was granted were not accessible on foot during the field survey. As a result, the field survey effort was limited to visual observations of these areas from adjacent parcels or from the opposite side of Deer Creek. In such cases, visual aids (e.g., binoculars) were used to visually search for the presence of indicators of potential wetlands and non-wetland waters of the U.S.. **Figure 4** shows the extent of areas surveyed on foot during the field effort. Potential features in parcels with prohibited access were later mapped based on aerial imagery, previously mapped aquatic features, and digital elevation data.

Figure 4. Survey Access Restrictions



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4.0 AQUATIC RESOURCES ASSESSMENT RESULTS

This section presents the results of the aquatic resources assessment, which are summarized in **Table 4**. **Figure 5** depicts the spatial extent of aquatic resources in the assessment area.

Table 4. Summary of Potential Wetlands and Other Waters of the U.S. in the Assessment Area

Feature Type	Acres	Square Feet	Linear Feet
Wetlands			
Freshwater Marsh	6.707	292,146	NA
Seasonal Wetland	25.074	1,092,213	NA
Seasonal Wetland Ditch	0.905	39,426	NA
Irrigated Seasonal Wetland	0.898	39,105	NA
Seasonal Swale	0.205	8,947	NA
Willow Scrub Wetland	7.466	325,205	NA
Riparian Wetland	4.388	191,145	NA
Wetlands Total [1]	**45.642**	**1,988,186**	**NA**
Other Waters of the U.S.			
Perennial Stream	78.154	3,404,401	24,773
Intermittent Stream	6.890	300,123	16,674
Ephemeral Channel	0.206	8,961	881
Canal	3.891	169,496	12,829
Culverted Waters	NA	NA	511
Other Waters of the U.S. Total [1]	90.810	3,946,728	55,157
Waters of the U.S. Total [1]	136.453	5,943,876	55,157

[1] The sum of some numbers may not add up due to rounding.

4.1 Potential Wetlands and Other Waters of the U.S.

4.1.1 Potential Wetlands

A total of 45.642 acres of potential wetlands were mapped within the assessment area (Figure 5). Potential wetlands within the assessment area are described in more detail below.

Freshwater Marsh

A total of 6.707 acres of freshwater marsh was mapped in the assessment area (Table 5). The potential wetlands are mapped in Figure 5 (FM-1 through FM-7). The upland-wetland boundary was typically mapped based on the change from hydrophytic vegetation to upland vegetation or, in the case of freshwater marsh adjacent to other wetlands or waters, the change to a different vegetation type or open waters. Dominant species in freshwater marsh included tule, Himalayan blackberry, broadleaf cattail, common rush, and Santa Barbara sedge.

Seasonal Wetland

Seasonal wetlands were the most abundant wetland type within the assessment area. A total of 25.074 acres of seasonal wetlands was mapped in the assessment area, including features SW-1 through SW-24 (Figure 5). Seasonal wetlands were dominated by species such as Italian ryegrass and Mediterranean barley, with coyote thistle, goldfields, blennosperma, cocklebur, common bog rush, and Santa Barbara sedge also present. Many of these features exhibited surface inundation during the survey.

Seasonal Wetland Ditch

Seasonal wetland ditches mapped within the assessment area totaled 0.905 acre and include features WD-1 and WD-2 (Figure 5). These features have been excavated in the past to convey water and currently contain wetland vegetation.

Irrigated Seasonal Wetland

A total of 0.898 acre of irrigated seasonal wetland was mapped in the assessment area (Figure 5, ISW-1 and ISW-2). Irrigation appears to be the hydrologic source for these wetlands.

Seasonal Swale

Two seasonal swales (SS-1 and SS-2), totaling 0.205 acre, were mapped in the assessment area (Figure 5).

Willow Scrub Wetland

A total of 7.466 acres of willow scrub wetland was mapped in the assessment area (Figure 5, WS-1 through WS-7). These wetlands are dominated by willow species and are found in association with streams and seasonal wetlands in the assessment area.

Figure 5. Aquatic Resources Sheet 1 of 11

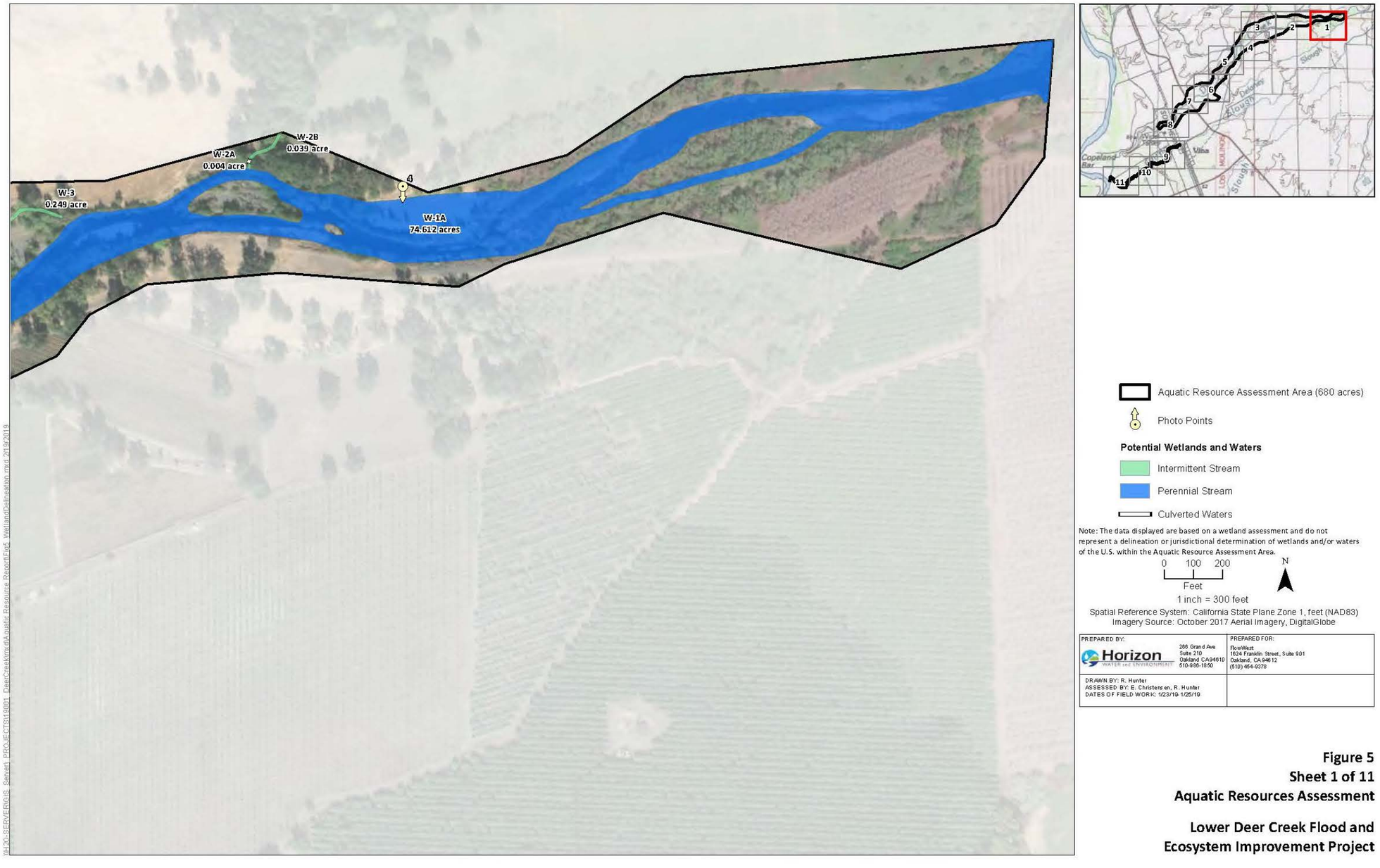

Figure 5
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Aquatic Resources Assessment

Lower Deer Creek Flood and Ecosystem Improvement Project

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Figure 5. Aquatic Resources Sheet 2 of 11

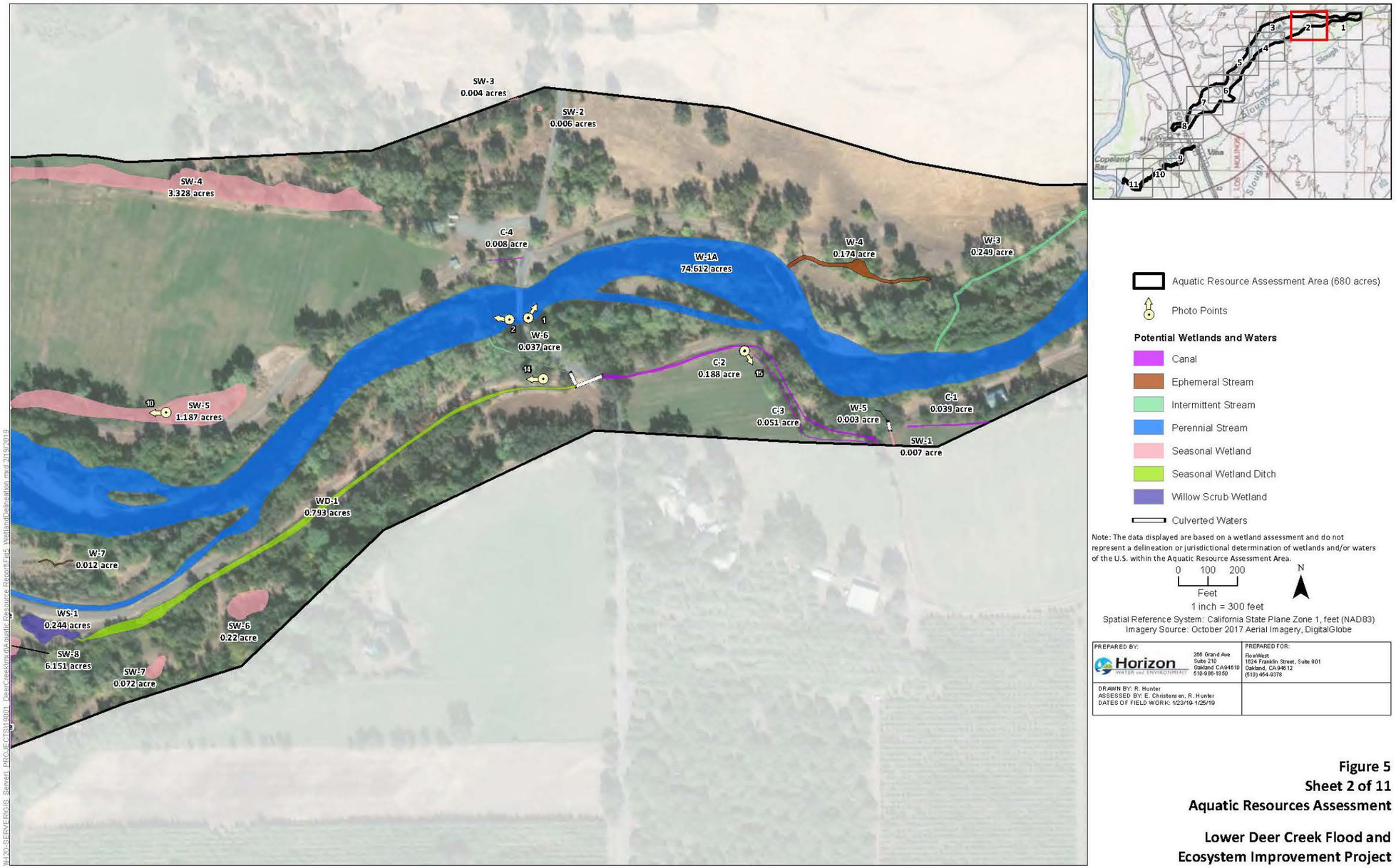

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Figure 5. Aquatic Resources Sheet 3 of 11

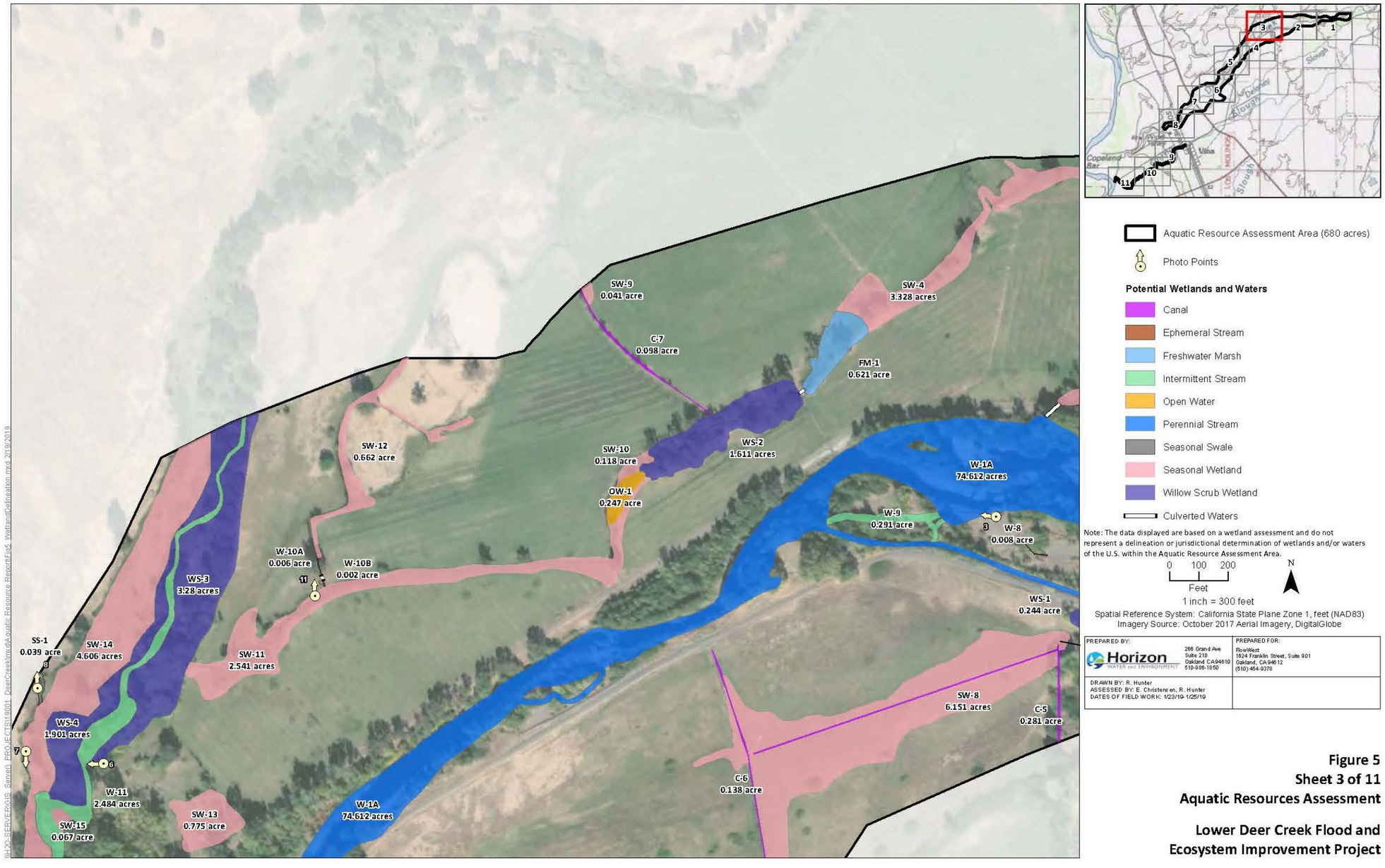

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Figure 5. Aquatic Resources Sheet 4 of 11

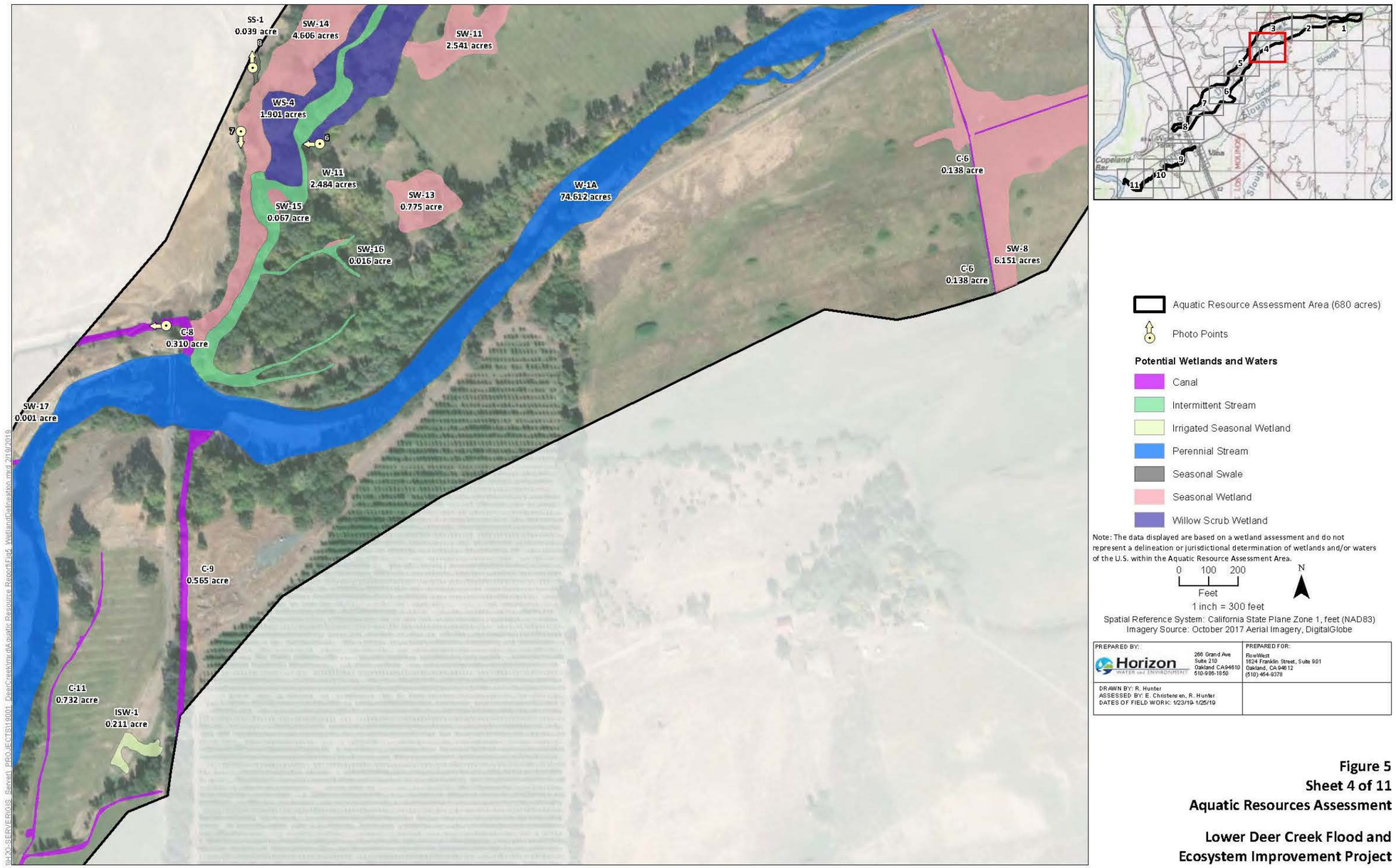

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Figure 5. Aquatic Resources Sheet 5 of 11

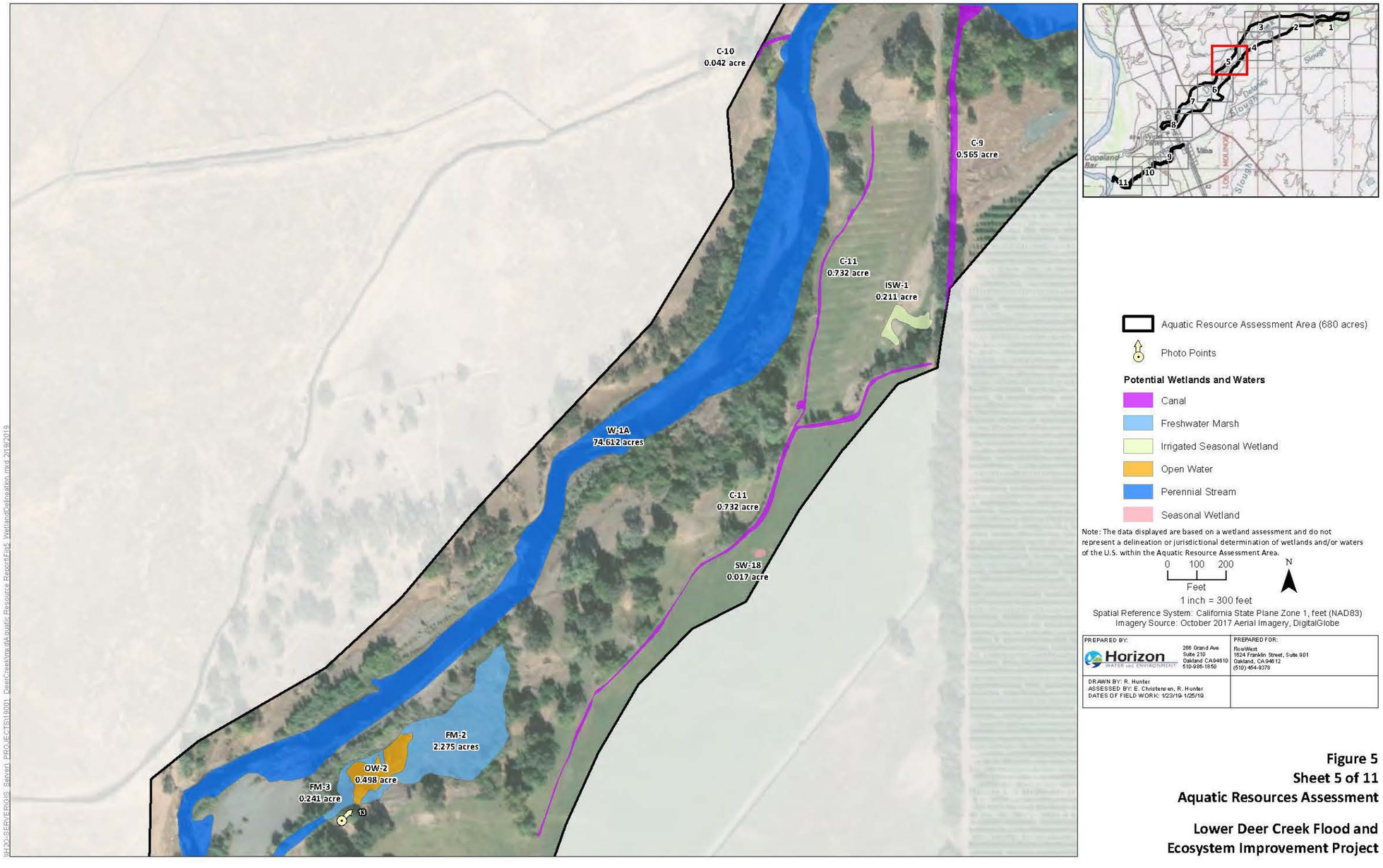

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Figure 5. Aquatic Resources Sheet 6 of 11

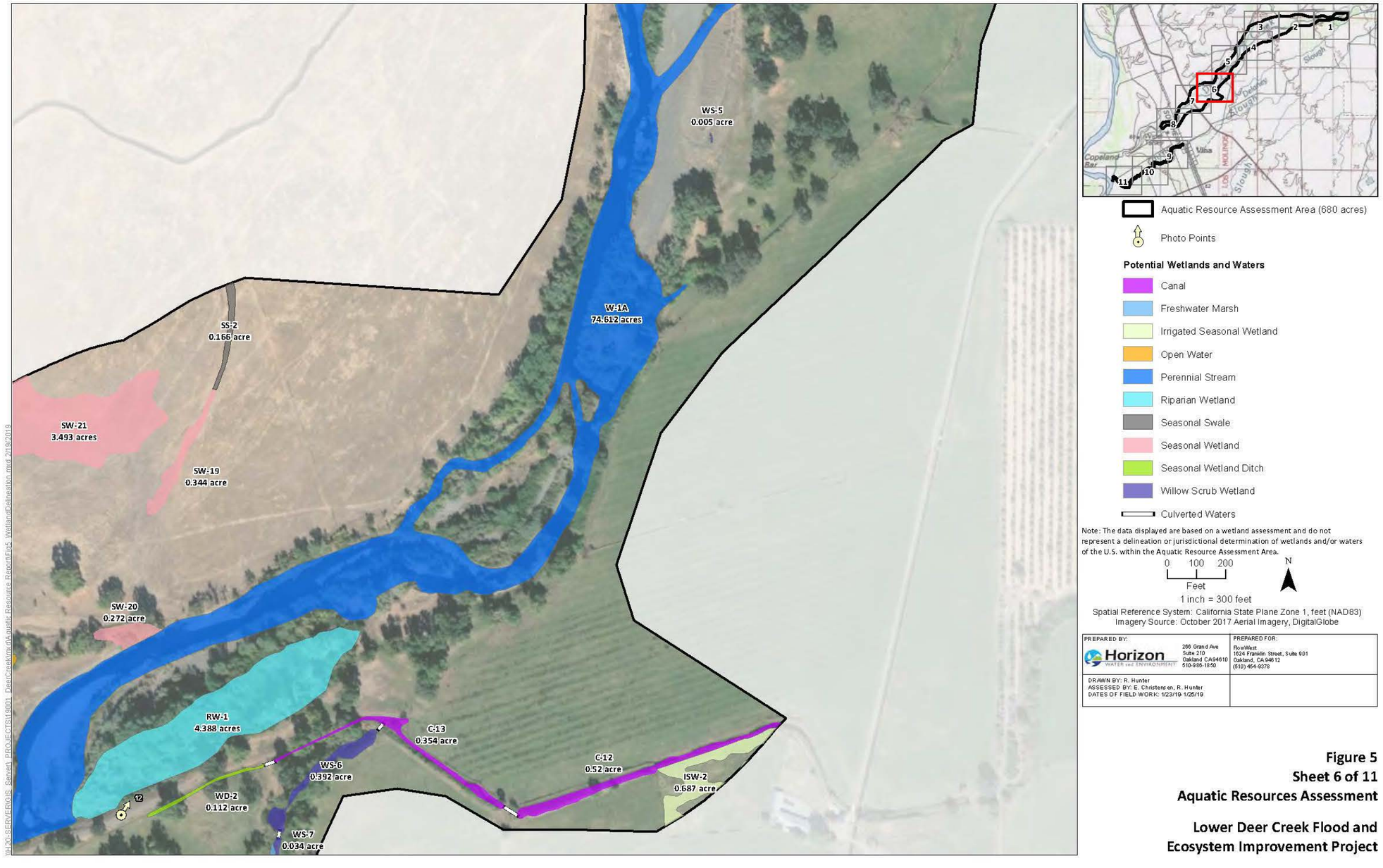

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Figure 5. Aquatic Resources Sheet 7 of 11

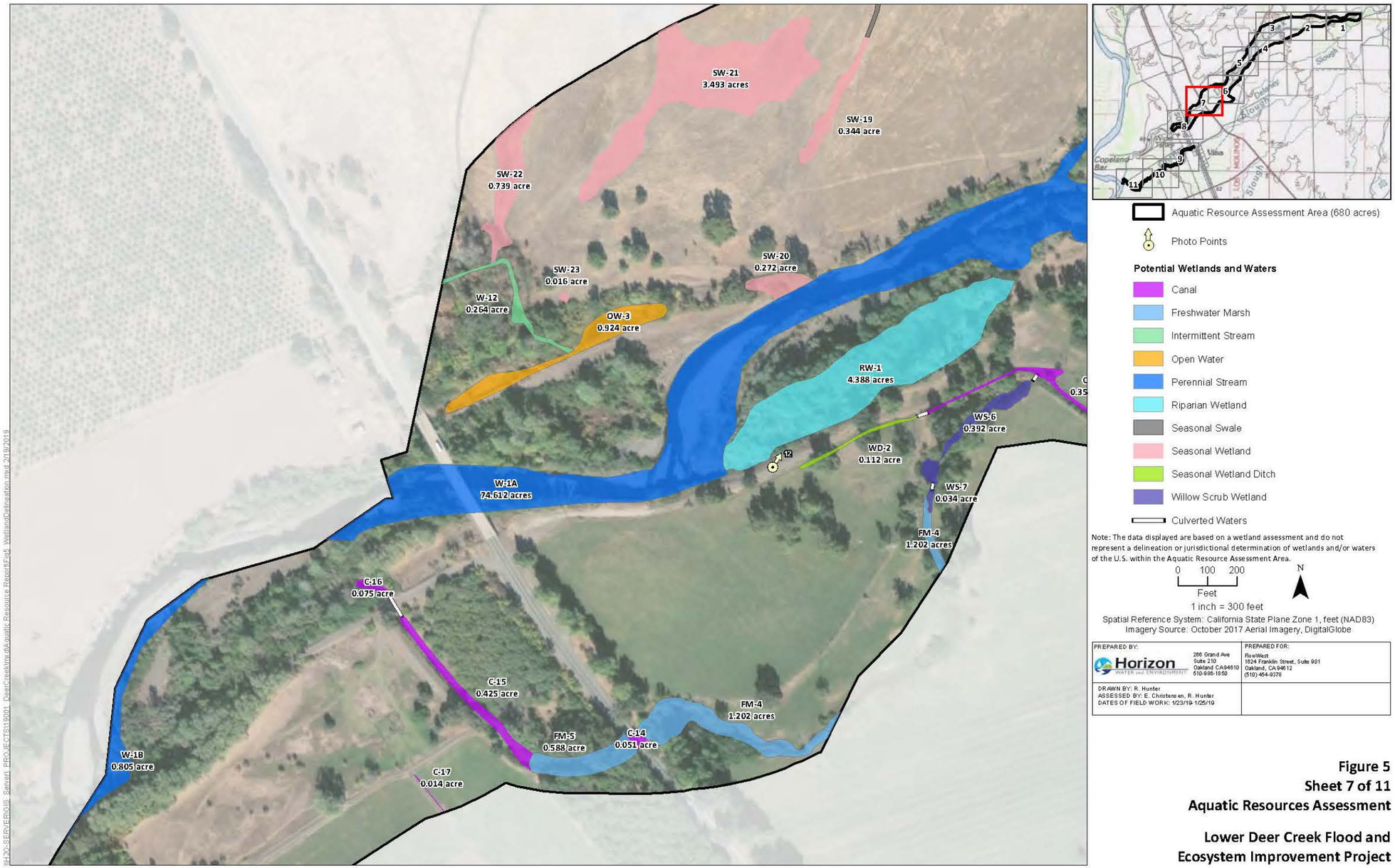

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Figure 5. Aquatic Resources Sheet 8 of 11

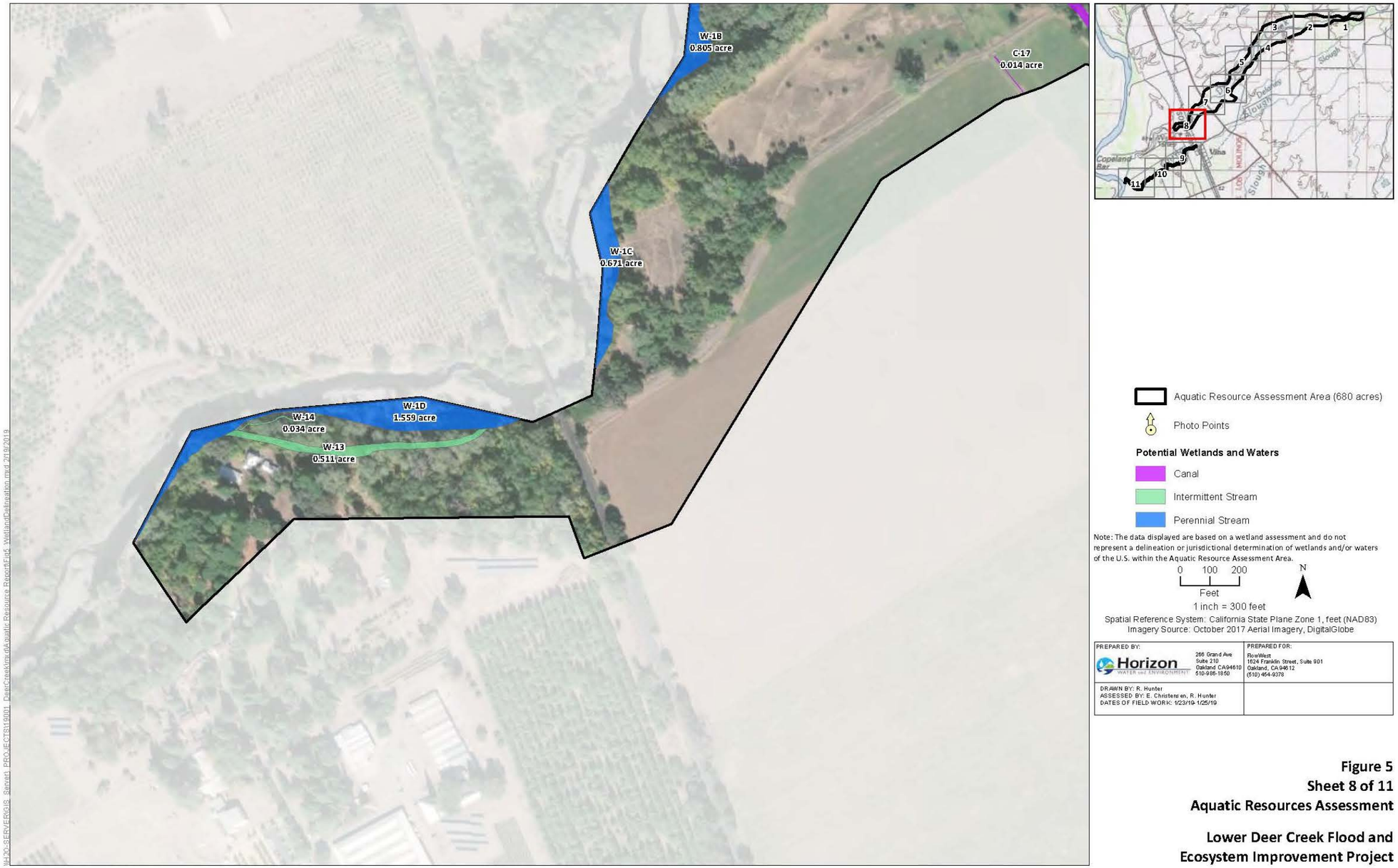

Figure 5
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Aquatic Resources Assessment

Lower Deer Creek Flood and Ecosystem Improvement Project

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Figure 5. Aquatic Resources Sheet 9 of 11

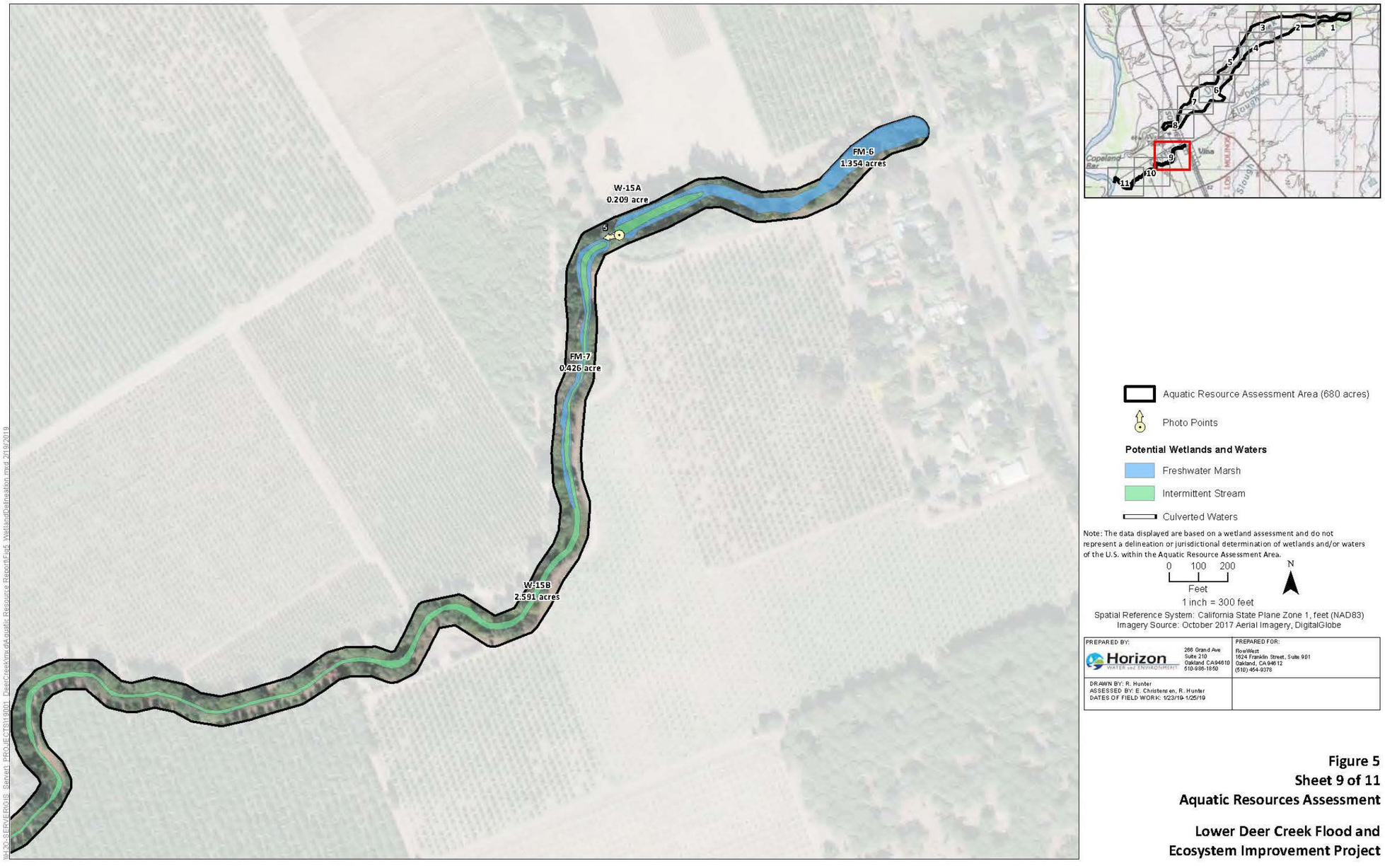

Figure 5
Sheet 9 of 11
Aquatic Resources Assessment

Lower Deer Creek Flood and Ecosystem Improvement Project

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Figure 5. Aquatic Resources Sheet 10 of 11

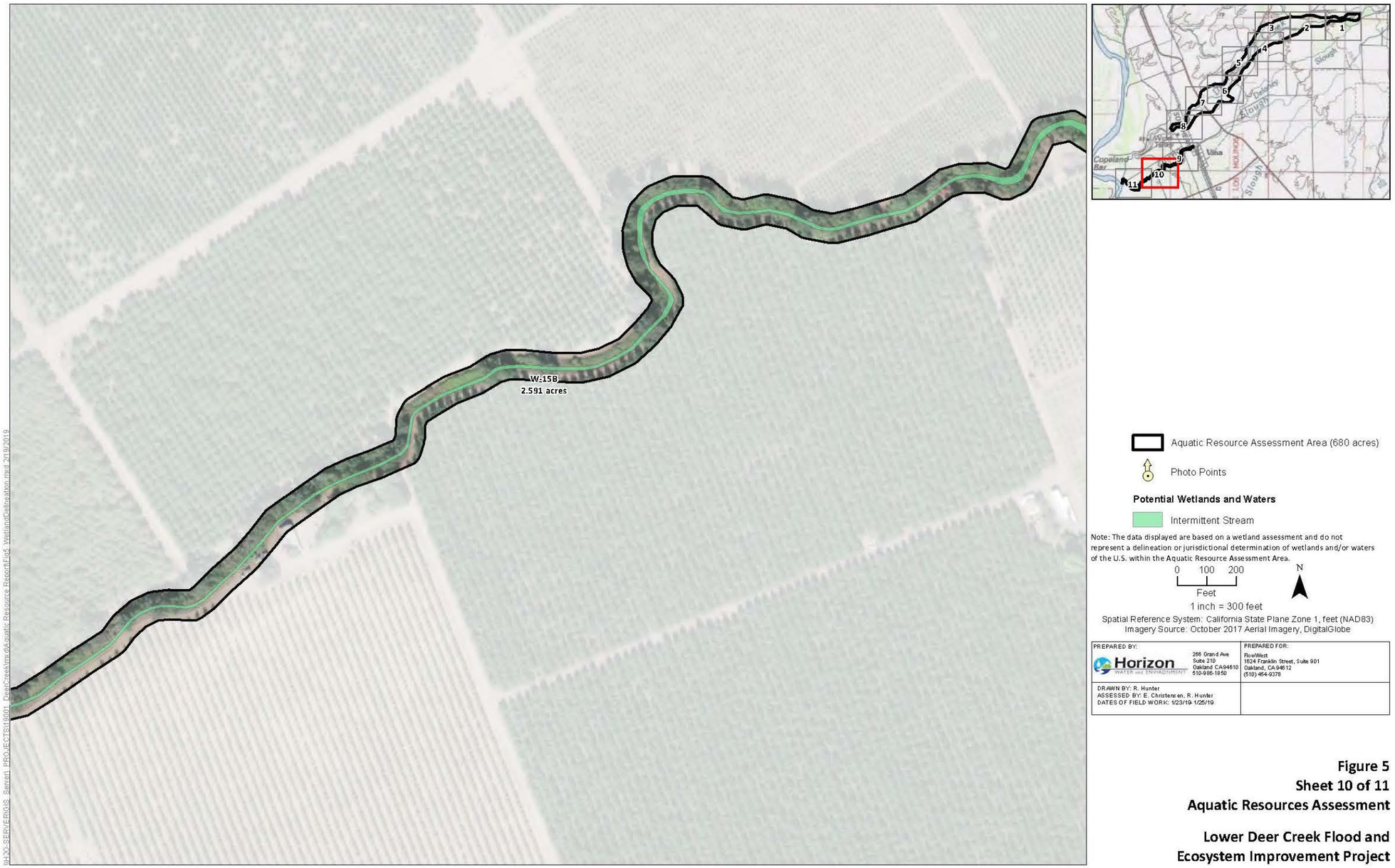

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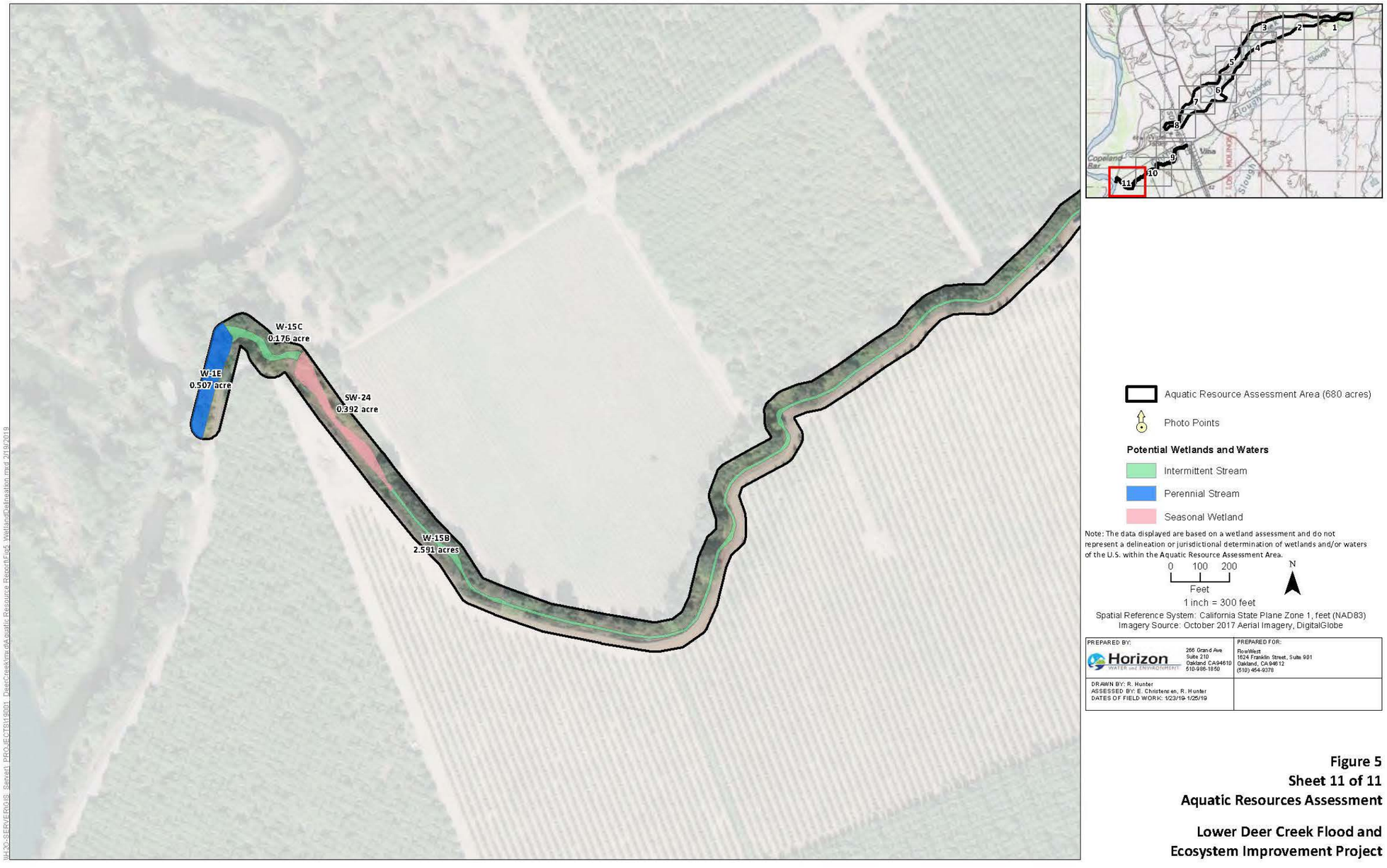
Figure 5. Aquatic Resources Sheet 11 of 11



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Riparian Wetland

One 4.388-acre riparian wetland (RW-1) was mapped in the assessment area, south of Deer Creek (Figure 5). This wetland is dominated by woody riparian vegetation. Species composition is similar to adjacent, non-wetland riparian areas, but this wetland has more sustained saturation than non-wetland riparian areas.

Table 5. Aquatic Resources in the Assessment Area

Aquatic Resource Classification Code	Aquatic Resource Classification Type	Location (Decimal Degrees)	Aquatic Resource Size (acre)	Aquatic Resource Size (linear feet)
Potential Non-Wetland Waters				
W-1A	Waters	39.962323 / -122.027101	74.612	21,905
W-1B	Waters	39.945019 / -122.057455	0.805	899
W-1C	Waters	39.942441 / -122.058694	0.671	513
W-1D	Waters	39.940969 / -122.061638	1.559	1,069
W-1E	Waters	39.924994 / -122.082007	0.507	387
W-2A	Waters	39.971078 / -122.005051	0.004	146
W-2B	Waters	39.971251 / -122.004836	0.039	20
W-3	Waters	39.970176 / -122.00864	0.249	885
W-4	Waters	39.970133 / -122.010594	0.174	506
W-5	Waters	39.968776 / -122.010277	0.003	64
W-6	Waters	39.969333 / -122.014652	0.037	318
W-7	Waters	39.967404 / -122.020286	0.012	126
W-8	Waters	39.96746 / -122.02112	0.008	90
W-9	Waters	39.967763 / -122.022868	0.291	477
W-10A	Waters	39.96732 / -122.029871	0.006	69
W-10B	Waters	39.967166 / -122.029818	0.002	26
W-11	Waters	39.965044 / -122.032771	2.484	3,822
W-12	Waters	39.948804 / -122.052811	0.264	637
W-13	Waters	39.940769 / -122.061725	0.511	873
W-14	Waters	39.940986 / -122.062688	0.034	293
W-15A	Waters	39.93393 / -122.059499	0.209	329
W-15B	Waters	39.927931 / -122.06803	2.591	8,593

Aquatic Resource Classification Code	Aquatic Resource Classification Type	Location (Decimal Degrees)	Aquatic Resource Size (acre)	Aquatic Resource Size (linear feet)
W-15C	Waters	39.925305 / -122.081398	0.176	281
C-1	Waters	39.968685 / -122.009465	0.039	275
C-2	Waters	39.969079 / -122.012076	0.188	1,108
C-3	Waters	39.968799 / -122.011206	0.051	552
C-4	Waters	39.970225 / -122.014822	0.008	118
C-5	Waters	39.966068 / -122.022242	0.281	1,417
C-6	Waters	39.965419 / -122.024654	0.138	926
C-7	Waters	39.969332 / -122.026035	0.098	632
C-8	Waters	39.963706 / -122.034555	0.310	475
C-9	Waters	39.961528 / -122.034126	0.565	982
C-10	Waters	39.962438 / -122.036364	0.042	130
C-11	Waters	39.958486 / -122.036451	0.732	3,338
C-12	Waters	39.947619 / -122.043474	0.520	956
C-13	Waters	39.947844 / -122.046107	0.354	927
C-14	Waters	39.944743 / -122.051306	0.051	47
C-15	Waters	39.945099 / -122.053317	0.425	660
C-16	Waters	39.946147 / -122.054501	0.075	118
C-17	Waters	39.944231 / -122.053827	0.014	168
OW-1	Waters	39.967984 / -122.026165	0.247	N/A
OW-2	Waters	39.95561 / -122.04117	0.498	N/A
OW-3	Waters	39.948358 / -122.05217	0.924	N/A
Total Potential Non-wetland Waters[1]:	**N/A**	**N/A**	**90.810**	**55,157**
Potential Wetlands				
FM-1	Wetland	39.969386 / -122.023575	0.621	N/A
FM-2	Wetland	39.955953 / -122.040193	2.275	N/A
FM-3	Wetland	39.955448 / -122.041529	0.241	N/A
FM-4	Wetland	39.945058 / -122.050004	1.202	N/A
FM-5	Wetland	39.944528 / -122.051932	0.588	N/A
FM-6	Wetland	39.934291 / -122.057706	1.354	N/A
FM-7	Wetland	39.932549 / -122.060434	0.426	N/A

Aquatic Resource Classification Code	Aquatic Resource Classification Type	Location (Decimal Degrees)	Aquatic Resource Size (acre)	Aquatic Resource Size (linear feet)
SW-1	Wetland	39.968563 / -122.010154	0.007	N/A
SW-2	Wetland	39.971631 / -122.014425	0.006	N/A
SW-3	Wetland	39.971717 / -122.014736	0.004	N/A
SW-4	Wetland	39.970588 / -122.020267	3.328	N/A
SW-5	Wetland	39.96885 / -122.019231	1.187	N/A
SW-6	Wetland	39.967016 / -122.017958	0.220	N/A
SW-7	Wetland	39.966416 / -122.019075	0.072	N/A
SW-8	Wetland	39.96576 / -122.023175	6.151	N/A
SW-9	Wetland	39.969893 / -122.026582	0.041	N/A
SW-10	Wetland	39.968269 / -122.026025	0.118	N/A
SW-11	Wetland	39.966919 / -122.029206	2.541	N/A
SW-12	Wetland	39.968386 / -122.029244	0.662	N/A
SW-13	Wetland	39.964935 / -122.031254	0.775	N/A
SW-14	Wetland	39.966511 / -122.032485	4.606	N/A
SW-15	Wetland	39.964954 / -122.033028	0.067	N/A
SW-16	Wetland	39.964541 / -122.03232	0.016	N/A
SW-17	Wetland	39.962752 / -122.03608	0.001	N/A
SW-18	Wetland	39.957632 / -122.036513	0.017	N/A
SW-19	Wetland	39.950597 / -122.048964	0.344	N/A
SW-20	Wetland	39.948971 / -122.049593	0.272	N/A
SW-21	Wetland	39.950818 / -122.050425	3.493	N/A
SW-22	Wetland	39.949954 / -122.052878	0.739	N/A
SW-23	Wetland	39.948846 / -122.052192	0.016	N/A
SW-24	Wetland	39.92466 / -122.080498	0.392	N/A
WD-1	Wetland	39.967662 / -122.017606	0.793	N/A
WD-2	Wetland	39.947513 / -122.048661	0.112	N/A
ISW-1	Wetland	39.959804 / -122.034746	0.211	N/A
ISW-2	Wetland	39.947659 / -122.042538	0.687	N/A
SS-1	Wetland	39.966179 / -122.033272	0.039	N/A
SS-2	Wetland	39.951843 / -122.048358	0.166	N/A
WS-1	Wetland	39.966781 / -122.020392	0.244	N/A
WS-2	Wetland	39.968618 / -122.024927	1.611	N/A
WS-3	Wetland	39.966985 / -122.031449	3.280	N/A

Aquatic Resource Classification Code	Aquatic Resource Classification Type	Location (Decimal Degrees)	Aquatic Resource Size (acre)	Aquatic Resource Size (linear feet)
WS-4	Wetland	39.966546 / -122.032224	1.901	N/A
WS-5	Wetland	39.953653 / -122.042439	0.005	N/A
WS-6	Wetland	39.947653 / -122.047203	0.392	N/A
WS-7	Wetland	39.946963 / -122.047752	0.034	N/A
RW-1	Wetland	39.948152 / -122.048504	4.388	N/A
Total Potential Wetlands[1]:	**N/A**	**N/A**	**45.642**	**N/A**
Total	**N/A**	**N/A**	**136.453**	**55,157**

[1] The sum of some numbers may not add up exactly due to rounding.

4.1.2 Potential Non-wetland Waters

A total of 90.810 acres of non-wetland waters was mapped within the assessment area (Figure 5). These include perennial, intermittent, and ephemeral riverine features; canals; and open water, as described in detail below.

Perennial Stream

Deer Creek is the only perennial stream in the assessment area (78.154 acres). Deer Creek intersects the assessment area in several locations, and has thus been divided into sub-features (W-1A, W-1B, W-1C, W-1D, W-1E) (Figure 5). Indicators of OHWMs used in the assessment of Deer Creek include break in bank slope, presence of recent wrack (i.e., drift) and debris, presence of natural scour lines, recent bank erosion, benches, upper limit of sand-sized particles, staining of rocks, exposed roots and root hairs below intact soil layer, and changes in vegetation cover and maturity. In-channel bars located beneath ordinary high water are included within Deer Creek.

Intermittent Stream

A total of 6.890 acres of intermittently flowing potential non-wetland waters of the U.S. were mapped. These features include China Slough (W-15A, W-15B, and W-15C) and unnamed streams (W-2A, W-2B, W-3, W-6, W-9, W-11, W-12, W-13, W-14). These features were mapped based on the following ordinary high water indicators: break in bank slope, change in vegetation cover and maturity, and presence of wrack and/or debris.

Ephemeral Channel

A total of 0.206 acre of ephemeral potential non-wetland waters of the U.S. was mapped (Figure 5). These unnamed ephemeral features are W-4, W-5, W-7, W-8, W-10A, and W-10B. Ephemeral features were mapped based on changes in vegetation cover, wrack and/or debris, and break in bank slope.

Canal

Many canals constructed to convey water were mapped in the assessment area (C-1 through C-17), totaling 3.891 acres (Figure 5). These features typically lacked emergent wetland vegetation and were delineated based on changes in vegetation cover and break in bank slope.

Open Water

Open water (1.669 acres) was present in ponded, non-riverine portions of the assessment area (OW-1 through OW-3) (Figure 5).

Culverted Waters

A total of approximately 511 linear feet of culverted waters within the assessment area are potentially subject to USACE jurisdiction, due to their connectivity to other potentially jurisdictional wetlands and other waters. The locations of these culverted waters of the U.S. are shown in Figure 5.

5.0 SUMMARY

An aquatic resource assessment was conducted in the 680-acre assessment area in Tehama County for the Lower Deer Creek Flood and Ecosystem Improvement Project (Figure 1). Table 5 provides a summary of the aquatic resources in the assessment area. A total of 90.810 acres of potential non-wetland waters and 45.642 acres of potential wetlands were mapped within the assessment area.

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