

APPENDIX O

VEGETATION REPORT (2010)

**Baseline Vegetation and Habitat Delineation for Current and
Potential Dredged Material Placement Sites adjacent to the
Sacramento Deep Water Ship Channel, Yolo, Solano, and
Sacramento Counties, California**

DRAFT REPORT

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1.0 Introduction

1.1 Background

The U.S. Army Corps of Engineers, San Francisco District (San Francisco District) recently funded this effort to map the vegetation communities and habitats at current and potential dredged material placement site adjacent to the Sacramento River Deep Water Ship Channel SRDWSC) within Yolo, Solano, and Sacramento Counties, California (Figure 1). This report provides support to the San Francisco District and others on the distribution of vegetation communities and associated habitats at current and potential dredged material placement sites to aid in the selection of sites that will minimize environmental impact. Specifically, identifying potential dredged material placement sites that contain wetlands or other high value habitats is critical to decision making when choosing locations to minimize environmental impact.

This report builds upon previous work completed in 2008 (Ericsson Mapping 2008). Areas delineated in the previous work were re-visited to evaluate any changes in the dominant vegetation or habitat during the last 3 years. In addition to those areas previously mapped in 2008, 8 additional potential dredged material placement sites identified by San Francisco District were mapped during this study. The riparian buffer along the shoreline of the SRDWSC was mapped during this effort as well from the Port of West Sacramento to Winter Island.

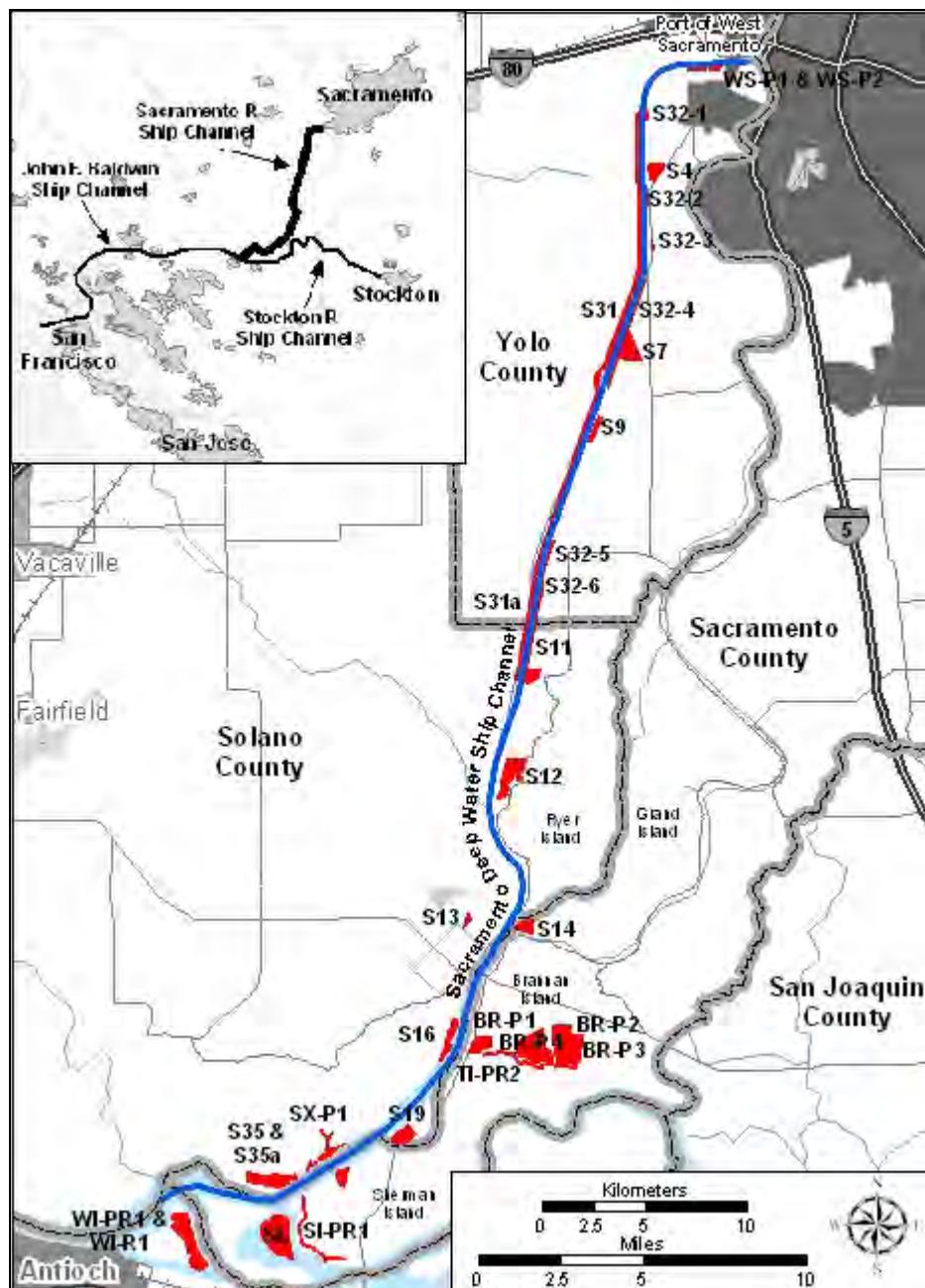


Figure 1. Location of the current and potential dredged material placement sites included in this survey.

1.2 Objectives

The overall objective of this project was to develop vegetation and habitat GIS (Geographic Information System) files and maps to describe the baseline vegetative conditions and distribution patterns at each of the current and potential dredged material placement sites identified by the San Francisco District.

The first task of this study was to determine classification schemes for the vegetation and habitat units. As directed by the San Francisco District, vegetation was identified to the genus level and habitat units were described using the Holland Natural Communities of California (Holland 1986). In addition to the vegetation and habitat classification, areas that meet the U.S. Fish and Wildlife definition of wetlands were identified and coded using the National Wetlands Inventory (NWI) codes (Cowardin 1979). While mapping at this level provides an overview of botanical resources, more detailed surveys should be completed at any location where sensitive species may be present prior to permitting.

The second task was to re-occupy the current and potential dredged material placement sites identified by the San Francisco District in 2008. At these locations any changes in vegetation, habitat, or wetlands were documented and the GIS updated.

The third task was to map the vegetation, habitats, and wetlands located within the current and potential dredged material placement sites identified by the San Francisco District in 2010. Mapping protocols followed are presented in section 3.1 of this report.

The fourth task was to map the riparian buffer shoreline along the entire SRDWSC. Mapping protocols followed are presented in section 3.1 of this report.

The fifth task was to develop the GIS database to support the study. The GIS database was developed using ESRI ArcView 9.3.1 software. The database was referenced to the following coordinate system: Universal Transverse Mercator (UTM), North American Datum (NAD) 1983, zone 10 north (units in meters). The GIS database conforms to all Corps requirements for associated metadata including both the Corps Spatial Data Standard for Facilities, Infrastructure, and Environment (SDSFIE) and Federal Geospatial Database Committee (FGDC) standards.

2.0 Study Area

The Sacramento Deep Water Ship Channel (SDWSC) is a canal that connects the Pacific Ocean to Sacramento, California. The SDWSC originates at the Port of Sacramento and flows approximately 70km through Yolo, Solano, and Sacramento Counties before entering Suisun and San Francisco Bays to the Pacific Ocean. The canal geometry is maintained by periodic channel dredging. The SDWSC lies within the greater San Francisco Bay and Delta region of central California at the confluence of the Sacramento and San Joaquin Rivers. The Sacramento-San Joaquin River Delta has been dramatically altered since the Gold Rush of 1849. Vast areas of tidal marshes were leveed and converted to agricultural land. These levees and filled lands resulted in a mosaic of islands

ringed by levees that make up the landscape of the Delta today. Some of the ecological impacts from this conversion of landuse have resulted in loss of wetlands, alteration of freshwater inflow, decreases in species richness, and water contamination.

2.1 Climate/Hydrology

The Sacramento-San Joaquin River Delta (hereafter referred to as the Delta) is an inverted river delta, where waters converge downstream rather than diverge. The Delta encompasses 1,600 square miles and drains over 40% of California and is home to a number are plant and animal species (SFEP, 1992). The Sacramento River watershed is 27,000 square miles and drains the northern half of the Central Valley of California. The San Joaquin River is 32,000 square miles and drains the central-southern part of the Central Valley. Much of the original hydrology of the Delta has been altered where vast marsh areas have been converted by a network of levees to a mosaic of islands used primarily for agriculture.

The Delta's location at the transition from the San Francisco Bay to the Central Valley creates a unique climate. Temperatures are somewhat lower than the Central Valley and at the higher end of those found in the San Francisco Bay area. Precipitation occurs primarily during the winter months while summer are generally dry. During winter months ground fog locally referred to as "Tule fog" frequently develops. High winds are common in the summer months as the temperature gradient increases during summer months from the San Francisco Bay area and the Central Valley.

2.2 Local Geology

The Delta was formed about 18,000 years ago as melting glaciers in the nearby Sierra Nevada Mountains delivered vast quantities of water and sediment to the San Francisco Bay and Delta region. These alluvial sediments provided the foundation for the extensive marsh that developed at the confluence of the Sacramento and San Joaquin Rivers.

Surficial sediments are primarily Holocene in age, with sand/gravel/silt/mud along sloughs with mud/silt floodplains adjacent. The Montezuma Hills southwest of Rio Vista, CA are composed of Pleistocene sandstone with minor amounts of mudstone (Wentworth 1997).

The altered state of hydrology from levees has had a great impact on the geomorphology of the Delta. Overbank flooding has decreased dramatically reducing sediment supply to floodplains, which has resulted in widespread subsidence. Many of the now leveed "islands" are now wholly or partially below sea level. This condition makes for any potential levee failure even more substantial in magnitude and extent.

2.3 Description of Vegetation Community and Habitat Types

In general the vegetation and habitat communities present within the San Francisco Bay Delta Region can be divided into four major groups. Large tracts of agricultural land exist containing a wide variety of planted crops including rice, corn, various nuts, and grapes to include a few. These low-lying fields are near sea level or below in many locations and are protected by artificial levees. Protected areas not in agricultural use are dominated by ruderal species including Mustard (*Brassica*), Prickly Lettuce (*Lactuca*), and Pepperweed (*Lepidium*). Freshwater marshes located along sloughs and unleveed lowlands adjacent to sloughs are dominated by tules and bulrushes (*Scirpus*). Adjacent to many freshwater sources are forests and woodland dominated by Willows (*Salix*), Alders (*Alnus*), Cottonwoods (*Populus*), and Walnut (*Juglans*).

3.0 Methods

3.1 Mapping Protocols

Vegetation and habitats were identified and delineated by visual confirmation and from interpretation of aerial photography. The aerial photo-mapping base used for this study was acquired in 2009 for the National Agriculture Imagery Program (NAIP) and processed to 1 meter pixel resolution georeferenced images. All current and potential dredged material placement sites included in this study were visited and evaluated for the vegetation and habitats present. The specific locations for each type to be mapped were located on the 2009 digital aerial photos and mapped in the field. All field mapping was performed on a pen-tablet computer within the GIS using the digital aerial photographs and other supporting GIS layers (NWI, USGS topos, hydric soil, FEMA FIRMS, etc). The mapping was performed viewing the aerial photos at a scale of 1:4800 representative fraction (RF), with a minimum mapping unit size of 10^2 meters. This minimum mapping unit size represents the smallest area delineated of contiguous vegetation and/or habitat. Breaks in vegetation and/or habitat resulting in an area smaller than the minimum mapping unit were not mapped as unique areas, but rather lumped into surrounding mapped units. Linear arrangements of vegetation common to the study area (small drainage ditches) we mapped if the width exceeded 3 meters.

Riparian shoreline mapping was completed for the entire length of the SRDWSC, extending from the Port of West Sacramento to Winter Island. The riparian shoreline was mapped for its entire width adjacent to the channel to either a distinct transition to upland vegetation, or up to 500 ft from the bank. At a majority of locations the transition to upland vegetation occurred within 500 ft from the shoreline of the channel.

Seasonal variation in vegetation cover does occur in this region, however the vegetation identified as dominant during this survey were both living or deceased. Accounting for deceased dominants reduces the seasonal variation in dominant species in most habitats. It may be appropriate to field verify dominants across a variety of habitats and dominants identified during the late winter to early spring months to better assess seasonal variability in mapped vegetation.

3.2 Vegetation Classification

All vegetation was described at the community scale to the genus level, a level of accuracy determined sufficient by the San Francisco District. Vegetation nomenclature used is consistent with that of the Jepson Manual (Hickman 1993). The dominant genus present for each mapped area was identified as well as a habitat description. The habitat classification used was the California Natural Community Classification developed by Holland (1986). The Holland classification typically accounts for both the vegetation and landscape setting present to describe the habitat.

3.3 NWI Classification

A new requirement put forth by the Federal Geospatial Data Committee (FGDC) Wetland Subcommittee and Wetland Mapping Standard Workgroup in August 2007 requires U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) classification for all federally funded wetland mapping. All requirements for quality control outlined in the FGDC Working Draft Wetland Mapping Standard (2007) relating to source imagery, detail of the classification, and minimum mapping scale have been met or exceeded. NWI codes included the follow levels: System, Subsystem, Class, Subclass, Water Regime, and Special Modifiers where applicable. The NWI codes were assigned in the field using both aerial imagery and information on the ground including landscape position, habitat, and water regime.

3.4 Field Verification

All site locations were verified after the field mapping was completed for accuracy. At each location, spot checks were performed to visually verify the mapped vegetation, habitat, and NWI classification to ensure labeling was performed accurately and precisely. Locations where the mapped attributes were not identified correctly were corrected and all necessary updates to the GIS were performed in the field.

4.0 Results and Discussion

4.1 Delineation Results

A total of 24 current and potential dredged material placement sites (1,516 hectares (ha) (3,746 acres (ac)) identified by the San Francisco District were included in the 2008 study. All of these locations were re-visited during this study, and any changes to either the dominant vegetation or habitat were documented and the GIS updated. An additional 8 current and potential dredged material placement sites are included in this 2010 baseline inventory (Figure 1). All of the sites combined are 2,235 ha (5,522 ac). In addition to the current and potential placement sites, the shoreline of the SRDWSC was included in this 2010 survey. A summary of the delineation results and site descriptions including vegetation, habitat and wetlands at all current and potential dredged material placement sites and shorelines of the SRDWSC are presented in the following sections. Appendix A includes photo documentation of all sites included in the 2010 survey, with locations and descriptions for each photo. Appendix B includes maps of each site location with vegetation, habitat, and wetlands depicted.

Previously Mapped Sites in 2008

Site WS-P1 and WS-P2 (formerly S1) is located just south of the SDWSC across from the Port of Sacramento in an undeveloped tract of land surrounding the northern end of Lake Washington in West Sacramento, CA. The site is divided into two areas (P1 and P2) adjacent to each other totaling 49.7 hectares (122.8 acres). The areas are dominated by ruderal species, primarily *Brassica*, *Lactuca*, and *Silybum* (Table 1). There are 24.1 hectares (5.9 acres) of wetlands dominated by *Rumex* (Figure 2) and *Polypogon* in the northwestern portion of the site. This wetland is extensive and holds a wide variety of plant species. The wetland is surrounded by a levee preventing any drainage from either WS-PA or WS-P2 into the wetland. The northern border of the site is a levee directly adjacent to the SDWSC. A levee along the western border of the site has a canal just on the other side outside of the site that joins the Main Canal. Although it appears the site is internally drained, both wetlands and drainage canals exist outside of the site boundaries.

A large wetland lies between WS-P1 and WS-P2 that is referred to as Lake Washington on USGS topographic maps. Along the northern border of the site is the SDWSC with a margin of predominately of non-native grasslands and few emergent marsh wetlands.

Re-inspection of sites WS-P1 and WS-P2 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 1. Summary of Vegetation, Habitat, and Wetlands for sites WS-P1 and WS-P2

Genus	Freq	Hectares	Acres
<i>Avena</i>	2	8.6	21.1
<i>Baccharis</i>	1	1.6	4.0
<i>Brassica</i>	8	22.1	54.7

<i>Centaurea</i>	6	2.9	7.2
<i>Lactuca</i>	4	5.0	12.3
<i>Lepidium</i>	3	2.4	6.0
<i>Polypogon</i>	2	1.6	3.9
<i>Quercus</i>	2	0.3	0.6
<i>Rumex</i>	3	3.4	8.3
<i>Salix</i>	1	0.1	0.2
<i>Scirpus</i>	1	0.1	0.3
<i>Silybum</i>	11	2.5	6.3
Unvegetated	2	1.9	4.6
Habitat	Freq	Hectares	Acres
Marsh and swamp	4	3.5	8.6
Non-native grassland	36	45.1	111.4
Riparian scrub	1	1.6	4.0
Riparian woodland	1	0.1	0.2
Unvegetated	2	1.9	4.6
Valley oak woodland	2	0.3	0.6
Wetlands	Freq	Hectares	Acres
PUBA	1	0.3	0.7
PUBCx	6	5.0	12.4
UPL	39	47.0	116.2
Totals		52.4	129.4



Figure 2. *Rumex* located within wetland in site S1 (2008)

Site S4 is located west of Jefferson Blvd at the intersection with Burrows Ave near Riverview, CA. The site is an agricultural field totaling 48.4 hectares (119.6 acres). During the 2008 survey the field was a monotypic stand of *Lactuca* (Figure 3), however during the 2010 survey the field was recently plowed under and was unvegetated (Appendix A). Site S4 is bordered on the west by the east-levee of the SDWSC, the Main Canal to the north and Jefferson Blvd to the east. A small drainage ditch at the base of the SDWSC east-levee runs along the western side of the site.

Table 2. Summary of Vegetation, Habitat, and Wetlands for site S4			
Genus	Freq	Hectares	Acres
<i>Typha</i>	1	0.7	1.8
<i>Salix</i>	1	0.2	0.5
Ag crop	1	47.5	117.3
Habitat	Freq	Hectares	Acres
Marsh and swamp	1	0.7	1.8
Riparian scrub	1	0.2	0.5
Cultivated field	1	47.5	117.3
Wetlands	Freq	Hectares	Acres
UPL	2	47.7	117.8
R2EMx	1	0.7	1.8
Totals		48.4	119.6



Figure 3. Overview of field comprising S4 (2008)

Site S7 is located just north of Willow Point Road at its terminus with the east-levee of the SDWSC. The site is currently farmed and totals 90.8 hectares (224.5 acres), and is dominated with agricultural crops (Table 3) (Figure 4). There are small drainage ditches dominated with *Scirpus* along the northern and western border, as well as two drainage ditches running through the field. The entire site is within the existing NWI maps and is labeled Palustrine-Farmed. This code has been retained for the area within the site still being farmed. There is a small wetland on the western side of the site that is dominated with *Melilotus* that was coded with PUBA NWI code to reflect that it is not currently farmed.

On all but the western side of the site are similar farm fields with small drainage ditches with emergent marsh communities separating them. To the west of site S7 is the east levee of the SRDWSC and site S32. The most direct access to S7 from the SDWSC would be through site S32.

Re-inspection of site S7 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 3. Summary of Vegetation, Habitat, and Wetlands for site S7

Genus	Freq	Hectares	Acres
Ag crop	1	86.8	214.4
<i>Baccharis</i>	1	0.3	0.7
<i>Helianthus</i>	1	0.1	0.3
<i>Lactuca</i>	1	0.3	0.7
<i>Melilotus</i>	1	1.9	4.7
<i>Scirpus</i>	4	4.7	11.7
Unvegetated	1	0.5	1.1
Habitat	Freq	Hectares	Acres
Cultivated field	1	86.8	214.4
Marsh and swamp	6	6.8	16.7
Non-native grassland	1	0.3	0.7
Riparian scrub	1	0.3	0.7
Unvegetated	1	0.5	1.1
Wetlands	Freq	Hectares	Acres
PUBA	4	2.6	6.5
Pf	1	86.8	214.4
R2EMx	4	4.7	11.7
UPL	1	0.5	1.1
Totals		94.6	233.7



Figure 4. Overview of field comprising S7 (2008)

Site S9 is located just east of the east-levee of the SDWSC between Gaffney Rd and Central Ave. The site is currently farmed and totals 24 hectares (59.3 acres), and is dominated with agricultural crops (Table 4) (Figure 5). There is a small drainage on the eastern side of the site with *Scirpus*. There are small drainage ditches just outside of the site boundary on its northern and western sides. The entire site is within the existing NWI maps and is labeled Palustrine-Farmed. This code has been retained to reflect the current status of the site.

On all but the western side of the site are similar farm fields with small drainage ditches with emergent marsh communities separating them. Between the S9 and the SDWSC is a large area of *Bromus* and unvegetated area. Along the margin of the SDWSC is *Bromus* except for a few small narrow communities of *Salix* shrubs.

Re-inspection of site S9 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 4. Summary of Vegetation, Habitat, and Wetlands for site S9

Genus	Freq	Hectares	Acres
Ag crop	1	24.2	59.8
<i>Scirpus</i>	1	2.3	5.6
Habitat	Freq	Hectares	Acres
Cultivated field	1	24.2	59.8

Marsh and swamp	1	2.3	5.6
Wetlands	Freq	Hectares	Acres
Pf	1	24.2	59.8
R2EMx	1	2.3	5.6
Totals		26.5	65.4



Figure 5. Overview of field comprising S9 (2008)

Site S11 is located just east of the east-levee of the SDWSC between Five Points (Miner Slough at north end of Prospect Island) and 1.2 kilometers (0.75 miles) north of the Yolo-Solano County line. The site totals 75 hectares (185.1 acres) and can be divided into two distinct parts. The first part is that which borders the east-levee of the SDWSC, which is dominated with *Brassica* along the levee flank and *Bromus* along the base. There is a small drainage ditch that parallels the levee for the entire length of the site that is dominated with *Scirpus*, but with small sections of *Salix* in places (Figure 6) (Table 5). The other distinct part of site S11 is the very southern part that extends into an agricultural field dominated with agricultural crops. There is a significant drainage ditch along the southeastern border of site with *Salix* in the ditch with a large tract of *Rumex* wetland adjacent (Figure 7). There is a small drainage ditch as well running east west through the field that is dominated by *Scirpus* that was too small to be captured during this effort with a small patch of *Salix* that was captured. The agricultural field on the southern part of site S11 is within the existing NWI maps and is labeled Palustrine-Farmed. This code has been retained for the areas that

are still being farmed. The wetlands outside of the area currently being farmed were coded with PUBA code to reflect their current status.

To the east of site S11 are farm field similar to the northern part of the site with small drainage ditches separating the fields with emergent wetland communities within. The southeastern corner of site S11 is adjacent to Miner Slough that has emergent and forested wetlands along its margin. The SDWSC forms the entire western border of the site and has a wide forested wetland margin with some emergent marsh communities on the southern end.

Re-inspection of site S11 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 5. Summary of Vegetation, Habitat, and Wetlands for site S11

Genus	Freq	Hectares	Acres
Ag crop	1	17.8	43.9
<i>Brassica</i>	4	8.2	20.4
<i>Bromus</i>	2	32.1	79.3
<i>Centaurea</i>	2	6.9	17.0
<i>Cyperus</i>	1	0.8	1.9
<i>Foeniculum</i>	2	0.7	1.8
<i>Helianthus</i>	1	0.1	0.2
<i>Populus</i>	5	0.3	0.7
<i>Rumex</i>	1	5.0	12.4
<i>Salix</i>	11	1.5	3.6
<i>Scirpus</i>	6	4.7	11.6
<i>Typha</i>	4	1.0	2.4
Unvegetated	1	3.2	7.8
Habitat	Freq	Hectares	Acres
Cultivated field	1	17.8	43.9
Marsh and swamp	10	7.4	18.3
Non-native grassland	10	48.0	118.5
Riparian scrub	3	0.6	1.5
Riparian woodland	10	0.9	2.3
Unvegetated	4	3.4	8.3
Valley and foothill grasslands	3	4.1	10.2
Wetlands	Freq	Hectares	Acres
PFO1A	2	0.3	0.7
PFOR	7	0.4	0.9
PUBA	4	6.5	16.0
Pf	1	17.8	43.9
R2EMx	10	5.7	14.0
R2UBx	7	1.1	2.7

UPL	10	50.5	124.7
Totals		82.1	203.0



Figure 6. Agricultural field and drainage ditch (left) at northern end of S11 (2008)



Figure 7. Large wetland at southern end of S11 (2008)

Site S12 is located at the very southern end of Prospect Island where Miner Slough and Cache Slough enter the SDWSC. The site is 116.4 hectares (287.6 acres) and is owned and operated by the Department of Interior Bureau of Land Management. The site has recently been converted from agriculture land back to marshland. Nearly the entire site is partially or completely submerged and a mix of *Salix* and *Scirpus* (Table 6) (Figure 8). A narrow road runs along the western boundary along the SDWSC levee with common ruderal species such as *Brassica* and *Foeniculum*. The northern boundary is a road along a berm separating the potential disposal site with an adjacent wetland with similar characteristics as those found in S12. The eastern boundary is Miner Slough. The entire site is labeled Palustrine-Farmed in the current NWI dataset, reflecting the locations agricultural history. More appropriate NWI codes reflecting the current restored wetland habitats have been applied to this survey.

Along the sites western margin adjacent to the SDWSC is an intermittent thin shrub-scrub wetland with unvegetated land in-between the wetlands. The unvegetated areas are riprap boulders along the channel and the narrow levee road.

Re-inspection of site S12 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 6. Summary of Vegetation, Habitat, and Wetlands for site S12

Genus	Freq	Hectares	Acres
<i>Brassica</i>	2	0.7	1.69
<i>Centaurea</i>	1	0.3	0.67
<i>Foeniculum</i>	4	2.9	7.1
<i>Populus</i>	2	0.2	0.6
<i>Salix</i>	27	59.5	147.0
<i>Scirpus</i>	7	50.5	124.7
<i>Typha</i>	3	0.8	2.1
Unvegetated	2	1.3	3.3
Water	14	4.8	11.8
Habitat	Freq	Hectares	Acres
Marsh and swamp	10	51.3	126.7
Non-native grassland	7	3.8	9.4
Riparian forests	3	3.0	7.3
Riparian scrub	12	51.1	126.4
Riparian woodland	14	5.6	13.9
River	3	0.4	0.9
Unvegetated	2	1.3	3.3

Water	11	4.4	10.9
Wetlands	Freq	Hectares	Acres
PEM1H	3	0.4	0.9
PEM1R	22	55.8	137.8
PFO1F	16	8.5	21.1
PSS1F	6	16.7	41.3
PSS1R	2	30.8	76.2
PSS5H	1	0.4	0.9
PSS5R	3	3.2	8.0
UPL	9	5.2	12.7
Totals		120.9	298.8



Figure 8. View into S12 from western levee road showing open water and drowned *Salix* (2008)

Site S13 is located east of Airport Rd near the intersection of Church Rd in Rio Vista, CA. The site is 12.5 hectares (31 acres) and is currently open space. The site is dominated by *Centaurea* and small stands of *Salix* woodlands (Table 7) (Figure 9). Dirt roads border the site on the south, west, and north. The site drains to the north slightly however no drainage ditches exist within the site boundaries.

There is a drainage ditch to the northwest of site S13 that drains to the northwest before entering a larger ditch with direct connection to SDWSC. There

are two NWI mapped areas downgrade from the site labeled Palustrine-Emergent-Temporarily Flooded. There is no direct access adjacent to the SDWSC from site S13.

Re-inspection of site S13 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 7. Summary of Vegetation, Habitat, and Wetlands for site S13			
Genus	Freq	Hectares	Acres
<i>Centaurea</i>	3	13.5	33.4
<i>Salix</i>	4	0.1	0.2
Unvegetated	2	0.2	0.4
Habitat	Freq	Hectares	Acres
Non-native grassland	3	13.5	33.4
Riparian woodland	4	0.1	0.2
Unvegetated	2	0.2	0.4
Wetlands	Freq	Hectares	Acres
UPL	9	13.8	34.0
Totals		13.8	34.0



Figure 9. View of monotypic field comprising S13 (2008)

Site 14 is on Federal property located at the very western tip of Grand Island where Steamboat Slough and the Sacramento River join the SDWSC.

The site is surrounded by water on all sides except for the eastern side, which is accessible by walking 0.6 kilometers (0.4 miles) along the levee from Grand Island Road. A narrow berm bisects the site into northern and southern halves, each with different characteristics. The northern half is dominated by *Lepidium*, with minor amounts of *Salix* along the northern margin (Table 8) (Figure 10). The southern half in contrast is dominated by *Salix* shrubs (Figure 11), with *Populus* and *Salix* forests along its southern border. There is a small wetland present in the southeastern corner of the site that is a *Salix* forest with scattered *Scirpus* below the canopy (Figure 12).

Between S14 and Grand Island Road is piece of property of similar size to S14 that has a number of Scrub-Shrub and Emergent Marsh wetlands that are seasonally flooded according to the NWI maps of the area. Adjacent to the site on the north along the margin with Steamboat Slough is a mix of forested and shrub-scrub wetlands. Adjacent to the site on the south along the margin with the Sacramento River is a wide forested wetland.

Re-inspection of site S14 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 8. Summary of Vegetation, Habitat, and Wetlands for site S14

Genus	Freq	Hectares	Acres
<i>Bromus</i>	2	2.3	5.7
<i>Lepidium</i>	8	16.1	39.9
<i>Lepidospartum</i>	1	0.2	0.4
<i>Poa</i>	2	0.5	1.1
<i>Populus</i>	9	2.2	5.4
<i>Quercus</i>	1	0.1	0.2
<i>Salix</i>	11	14.1	34.7
Habitat	Freq	Hectares	Acres
Non-native grassland	12	18.9	46.7
Riparian scrub	11	13.6	33.5
Riparian woodland	9	2.7	6.6
Valley and foothill grasslands	1	0.2	0.4
Valley oak woodland	1	0.1	0.2
Wetlands	Freq	Hectares	Acres
PFO1A	2	0.8	1.9
PFOR	2	1.1	2.6
UPL	30	33.5	82.9
Totals		35.4	87.4



Figure 10. View of northern half of S14 dominated by *Lepidium* (2008)



Figure 11. View along berm dividing S14, with the *Salix* dominated southern half on the left (2008)



Figure 12. Wetland located in the southeastern corner of S14 (2008)

Site S16 is on Federal property located just south of Sand Beach County Park (Solano County) south of Rio Vista, CA. The site is 75 ha (186 ac) between the SDWSC and the Montezuma Hills. The entire site is predominately unvegetated fill material and *Lepidium* (Figure 13) except for a large vegetated area in the middle of the site, much of which is considered a wetland (Table 9). This large wetland comprises 30% of the total area of S16 and is roughly evenly split between scrub-shrub (*Salix*) and non-emergent herbaceous (*Lepidium* and *Lactuca*) vegetation (Figure 14). During the 2008 field assessment a large open water lake (2.2 ha) was located within the center of S16. This lake was not observed to be present during the 2010 field assessment (Appendix A). Where the lake was located in 2008, *Distichlis* was the dominant genus present. The persistence of this open water feature is unknown, and would require a review of historic air photos to better constrain its intermittence. Along the shoreline of the SDWSC within the site boundaries is *Arundo* that is also considered a wetland.

Directly adjacent to the site along the entire eastern border is the SDWSC with a wetland margin along its entire length. The northern border is the Sand Beach County Park and the edge of the Montezuma Hills. The Montezuma Hills (Non-native grasslands) extend from the western boundary of S16 and are rolling hills with little to no wetlands. Any wetlands present within the Montezuma hills would be constrained to the valley bottoms along intermittent stream channels where present. A small impoundment of water is located at the base of the Montezuma Hills adjacent to S16 at the northern end of the wetland within S16 that is thought to contribute the hydrology supporting this wetland.

Table 9. Summary of Vegetation, Habitat, and Wetlands for site S16

Genus	Freq	Hectares	Acres
<i>Arundo</i>	5	7.7	19.0
<i>Baccharis</i>	2	0.2	0.6
<i>Brassica</i>	3	3.9	9.7
<i>Bromus</i>	3	10.1	24.9
<i>Distichlis</i>	1	1.7	4.2
<i>Lactuca</i>	3	2.5	6.1
<i>Lepidium</i>	6	13.6	33.5
Park	1	6.6	16.4
<i>Salix</i>	12	12.1	30.0
<i>Scirpus</i>	2	0.3	0.6
<i>Silybum</i>	4	1.7	4.1
Unvegetated	3	14.4	35.5
Water	2	0.3	0.8
Habitat	Freq	Hectares	Acres
Developed	1	6.6	16.4
Marsh and swamp	2	0.3	0.6
Non-native grassland	26	41.4	102.2
Riparian forest	1	0.2	0.6
Riparian scrub	4	0.9	2.2
Riparian woodland	8	11.0	27.2
River	2	0.3	0.8
Unvegetated	3	14.4	35.5
Wetlands	Freq	Hectares	Acres
PSSC	1	0.2	0.6
PSSE	8	12.6	31.1
PSSF	1	0.6	1.5
PUBC	4	2.6	6.4
PUBK	4	2.8	6.8
R1UBV	2	0.3	0.8
R2US	11	11.6	28.8
UPL	16	44.3	109.6
Totals		75.1	185.5



Figure 13. Unvegetated fill material within S16 at southern end of the site (2008)



Figure 14. Wetland within S16 showing open water and surrounding *Lactuca* and *Salix* vegetated margin (2008)

Site S19 is located on Decker Island within the SDWSC and is accessible by boat. The site encompasses the entire island except for the northern part that is owned by the US Fish & Wildlife Service, much of which is a wetland restoration site. A large berm runs northeast – southwest through the site dividing it into two distinct parts with very different characteristics. The southern half of the site is largely a wetland complex dominated by *Lepidium* on the northern half and gradating to an emergent marsh of *Scirpus* and *Typha* on the southern half (Table 10) (Figure 15). The transition zone from non-emergent wetland (UB) to emergent marsh is dominated by *Distichlis* and *Juncus* wetlands (Figure 16). The eastern boundary of S16 along the margin of the SDWSC is dominated by *Foeniculum*, *Alnus*, and *Populus* within the site boundaries. North of the berm the site is dominated by *Lepidium*, *Bromus*, and *Silybum* (Figure 17). There is a large Tamarix community around the center of the northern half surrounding a recently disturbed area next to an old landing. At the very southern extent of the northern half is an active dredged material placement site.

Adjacent to S19 on all but the northern side is the SDWSC with a wetland margin dominated by *Scirpus* and *Salix* scrub-shrub. Adjacent to the northern border is a continuation of vegetation communities described north of the berm that roughly bisects S19. At the very northern tip of Decker Island is the wetland restoration site managed by the Fish & Wildlife Service.

Re-inspection of site S19 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 10. Summary of Vegetation, Habitat, and Wetlands for site S19

Genus	Freq	Hectares	Acres
<i>Alnus</i>	2	0.2	0.4
<i>Arundo</i>	1	0.1	0.3
<i>Baccharis</i>	1	0.2	0.5
<i>Bromus</i>	3	23.8	58.8
<i>Carex</i>	1	0.8	2.0
<i>Centaurea</i>	5	11.6	28.7
<i>Distichlis</i>	2	4.1	10.2
<i>Eucalyptus</i>	1	0.2	0.4
<i>Foeniculum</i>	7	5.0	12.5
<i>Juncus</i>	2	0.6	1.6
<i>Lepidium</i>	7	93.0	229.7
<i>Melilotus</i>	1	0.6	1.5
<i>Phalaris</i>	1	0.2	0.4
<i>Populus</i>	6	1.5	3.6
<i>Rosa</i>	7	1.7	4.1
<i>Rubus</i>	1	0.3	0.8
<i>Salix</i>	7	0.6	1.4

<i>Scirpus</i>	1	16.1	39.8
<i>Silybum</i>	8	14.0	34.7
<i>Tamarix</i>	6	14.0	34.6
<i>Typha</i>	2	2.0	4.8
Unvegetated	4	9.0	22.1
Water	3	0.6	1.5
Habitat	Freq	Hectares	Acres
Alkali meadow	2	4.1	10.2
Freshwater marsh	5	2.6	6.5
Marsh and swamp	14	36.8	90.8
Non-native grassland	28	129.3	319.4
Riparian scrub	9	2.2	5.4
Riparian woodland	7	1.6	3.9
River	1	0.1	0.3
Tamarisk scrub	6	14.0	34.6
Unvegetated	5	9.0	22.3
Water	2	0.5	1.2
Wetlands	Freq	Hectares	Acres
PEMC	7	21.1	52.2
PFO1R	3	0.8	2.0
PFOC	1	0.1	0.3
PSSC	3	0.4	0.9
PSSR	6	1.1	2.7
PUBC	16	32.9	81.4
PUBK	1	6.0	14.7
PUBR	1	0.1	0.3
R1UBV	1	0.1	0.3
UPL	40	137.5	339.7
Totals		200.1	494.5



Figure 15. Emergent wetland on the southern half of S19 dominated by *Scirpus* and *Typha* (2008)



Figure 16. Transition zone from non-emergent to emergent wetland on the southern half of site S19 (2008)



Figure 17. *Bromus* and *Silybum* communities in the foreground with *Lepidium* in the background north of the berm on S19 (2008)

Site S20 is located just south of Sherman Island Road approximately 3 kilometers (2 miles) from State Highway 160 south of the Rio Viento RV Park. The site is 36.9 hectares (91.2 acres) and is owned by the California Department of Water Resources. The site can be divided roughly into thirds, with northern, middle, and southern parts. The northern part is the Rio Viento RV Park which is dominated by unvegetated paved surfaces with manicured *Distichlis* on the western side and upland field of *Bromus* and *Lepidospartum* on the eastern side (Figure 18) (Table 11). There are no identified wetlands in the northern part of S20. The middle part is bermed on all sides with *Salix* scrub-shrub on the northern side and *Lepidium* on the remaining east, west, and southern sides. Within the bermed area the vegetation is dominated by *Lactuca* with minor pockets of *Salix* shrubs. The *Salix* and *Lactuca* communities are considered a wetland within S20. The southern part is bounded by a berm on all sides dominated by *Lepidium*. Within the bermed area is an emergent wetland of *Scirpus* and *Juncus* (Figure 19).

Along the northern border of S20 is the SDWSC with a narrow wetland margin of *Salix*. On all remaining sides of S20 are fields currently being grazed that are all coded as wetland on NWI maps. The fields are bounded by raised berms or small drainage ditches with emergent wetland vegetation.

Re-inspection of site S20 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 11. Summary of Vegetation, Habitat, and Wetlands for site S20

Genus	Freq	Hectares	Acres
<i>Bromus</i>	1	1.3	3.28
<i>Distichlis</i>	5	1.9	4.71
<i>Foeniculum</i>	2	0.7	1.64
<i>Juncus</i>	1	5.6	13.91
<i>Lactuca</i>	1	10.0	24.71
<i>Lepidium</i>	2	6.7	16.61
<i>Lepidospartum</i>	1	0.8	2.07
<i>Salix</i>	3	1.5	3.77
<i>Scirpus</i>	2	6.2	15.25
Unvegetated	2	4.0	9.78
Habitat	Freq	Hectares	Acres
Alkali meadow	5	1.9	4.7
Marsh and swamp	3	11.8	29.2
Non-native grassland	6	18.7	46.3
Riparian scrub	2	0.2	0.6
Riparian woodland	1	1.3	3.2
Unvegetated	2	4.0	9.8
Valley and foothill grasslands	1	0.8	2.1
Wetlands	Freq	Hectares	Acres
PEMC	3	11.8	29.2
PSSA	3	1.5	3.8
PUBA	2	10.5	26.0
UPL	12	14.9	36.8
Totals		38.7	95.7



Figure 18. View of eastern side of the northern part of S20 in the foreground with middle part dominated by *Lactuca* and *Salix* in the background (2008)



Figure 19. View of adjacent field in foreground and southern part of S20 in background with emergent wetland (2008)

Site S31 and S31a (formerly S31) is located along the west-levee of the SDWSC on property owned by the Port of Sacramento. The site is the largest single site at 432 hectares (1067 acres) and extends from river mile 36 to river mile 22.5. During the 2008 survey the site is dominated by ruderals including *Lepidium*, *Brassica*, and *Centaurea*. However much of S31 has been modified in the interim from placement of dredged material, resulting in dramatic changes to the vegetation and habitats present. During the 2010 survey S31 was dominated by *Bromus*, *Silybum* and *Centaurea* (Table 12). The abundance of these two genus increased 145% and 277% respectively from their abundance during the 2008 survey. In contrast *Lepidium* and *Brassica* decreased 43% and 70% respectively from their abundance during the 2008 survey. Other notable decreases in abundance were *Lactuca* (80%), *Grindelia* (82%), and Unvegetated (23%). These shifts in vegetation genus present are a direct response to the placement of dredged material. Interpretation of the changes observed indicate that the areas unvegetated during the 2008 survey (Figure 20) have re-vegetated primarily with *Silybum* (Appendix A), and additional dredged material was placed after the 2008 survey and has begun re-vegetation as well.

Grasses such as *Bromus*, *Poa*, and *Avena* make up a large portion of the site as well. The southernmost half of the study area includes both sides of the levee while the northernmost half is just from the top of the levee to the SDWSC. A toe-drain exists on the western side of the levee that is included in some portions of the southernmost half. This inclusion resulted in large tracts of additional riparian vegetation being captured within the site boundaries in this site, however these locations are not under consideration for the placement of dredged material. Riparian vegetation mapped in these areas included *Salix*, *Populus*, *Fraxinus*, and *Cichorium* (Figure 21). In general the sides of the levee are primarily *Centaurea*, while the area between the levee and the SDWSC is dominated by *Bromus* and *Silybum*.

Along the entire western border of site S31 is a toe drain that maintains a thin riparian buffer consisting of forested and scrub-shrub wetlands. This toe drain is within the site boundaries in some locations. To the west of the toe drain are agriculture fields, and large tracts of emergent wetlands. Toward the southern end of the study site to the west is Prospect Slough with diverse and abundant wetland habitats. Along the entire eastern border of site S32 is the SDWSC that maintains a riparian buffer of varying width and composition. In general the riparian buffer is wider and more forested wetland to the south and becomes thinner with more scrub-shrub and emergent marsh wetlands to the north. The forested wetlands are dominated by *Salix* with minor amounts of *Populus*. The scrub-shrub wetlands are dominated by *Salix*, and the emergent wetlands are dominated by *Scirpus*.

Table 12. Summary of Vegetation, Habitat, and Wetlands for site S31

Genus	Freq	Hectares	Acres
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<i>Alnus</i>	3	0.5	1.2
<i>Avena</i>	17	7.4	18.4
<i>Brassica</i>	19	18.7	46.2
<i>Bromus</i>	4	96.8	239.1
<i>Centaurea</i>	36	55.7	137.6
<i>Cichorium</i>	12	2.1	5.1
<i>Daucus</i>	1	0.3	0.6
<i>Distichlis</i>	1	0.4	0.9
<i>Foeniculum</i>	20	2.3	5.8
<i>Fraxinus</i>	4	0.6	1.5
<i>Grindelia</i>	3	1.5	3.7
<i>Hordeum</i>	1	3.4	8.4
<i>Lactuca</i>	3	1.9	4.7
<i>Lepidium</i>	26	41.0	101.2
<i>Melilotus</i>	13	1.1	2.7
<i>Phalaris</i>	1	0.1	0.3
<i>Poa</i>	18	26.6	65.6
<i>Populus</i>	52	13.6	33.6
<i>Rubus</i>	1	0.1	0.2
<i>Salix</i>	44	27.6	68.1
<i>Scirpus</i>	12	8.2	20.4
<i>Silybum</i>	32	98.7	243.9
<i>Sonchus</i>	2	4.4	10.8
<i>Sorghum</i>	2	1.2	2.9
<i>Typha</i>	2	0.3	0.7
Unvegetated	7	16.7	41.2
Water	3	0.7	1.6
Habitat	Freq	Hectares	Acres
Alkali meadow	1	0.4	0.9
Freshwater marsh	3	0.7	1.8
Marsh and swamp	41	13.8	34.0
Non-native grassland	187	357.9	884.5
Riparian scrub	8	1.4	3.3
Riparian woodland	89	40.2	99.3
River	2	0.5	1.1
Unvegetated	7	16.7	41.2
Water	1	0.2	0.5
Wetlands	Freq	Hectares	Acres
PEM2Khsx	6	2.7	6.8
PEMA	2	0.4	1.1
PEMV	6	2.2	5.5
PFO	4	1.4	3.4

PFOF	2	6.4	15.8
PFOV	35	14.2	35.0
PSS	2	0.7	1.6
PSSF	4	0.6	1.5
PSSV	5	1.5	3.7
PUBA	7	0.9	2.3
R1UBVx	2	0.5	1.1
R2UB	1	0.2	0.5
R2US	72	121.5	300.3
UPL	191	278.5	688.1
Totals		432	1067



Photo 20. Unvegetated area within site S31 (2008)



Figure 21. Riparian vegetation adjacent to the toe drain along the west levee of the SDWSC (2008)

Site S32-1 is located along the east-levee of the SDWSC on property owned by Reclamation Districts #999 and #900 (Figure 1). The site is 7 ha (18 ac). During the 2008 assessment the site was dominated by Unvegetated, *Bromus*, *Poa*, and *Centaurea* (Figure 22). Subsequent re-inspection in 2010 revealed that much of the site was recently burned (approximately 40%) (Appendix A). In locations that did not burn, the vegetation communities remained the same as identified during the 2008 survey (Table 13).

S32-1 is bounded on the west by the SRDWSC and to the east by residential housing. A toe drain exists at the eastern base of the east levee between S32-1 and the residential housing that supports a riparian woodland community. Between S32-1 and the SRDWSC is *Foeniculum*.

Table 13. Summary of Vegetation, Habitat, and Wetlands for site S32-1			
Genus	Freq	Hectares	Acres
<i>Avena</i>	1	0.1	0.2
<i>Brassica</i>	2	0.5	1.3
Burn	1	3.0	7.4
<i>Centaurea</i>	1	0.2	0.4
<i>Festuca</i>	1	0.4	0.9
<i>Foeniculum</i>	2	2.4	6.0

<i>Populus</i>	1	0.1	0.3
<i>Silybum</i>	1	0.1	0.2
Unvegetated	2	0.7	1.6
Habitat	Freq	Hectares	Acres
Non-native grassland	8	3.6	8.9
Riparian woodland	1	0.1	0.3
Unvegetated	3	3.6	9.0
Wetlands	Freq	Hectares	Acres
R2US	5	3.0	7.4
UPL	7	4.3	10.7
Totals		7.3	18.1



Figure 22. Southern segment of site S32-1 overview (2008)

Site S32-2 is located along the east-levee of the SDWSC on property owned by Reclamation Districts #999 and #900 (Figure 1). The site is 7 ha (18 ac). Approximately 66% of S32-2 is unvegetated and are locations where dredged material was recently placed (Table 14). Surrounding these unvegetated locations are non-native communities of *Brassica*, *Centaurea*, and *Poa*.

S32-2 is bounded by the SRDWSC to the west and agricultural field to the east. The site is located on the east levee of the SRDWSC (RM 38) immediately south of where Jefferson Blvd rises onto the levee near Riverview.

Re-inspection of site S32-2 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 14. Summary of Vegetation, Habitat, and Wetlands for site S32-2			
Genus	Freq	Hectares	Acres
<i>Brassica</i>	2	0.6	1.4
<i>Centaurea</i>	1	0.6	1.5
<i>Foeniculum</i>	1	0.1	0.2
<i>Poa</i>	1	0.4	0.9
<i>Silybum</i>	1	0.1	0.2
Unvegetated	1	3.3	8.3
Habitat	Freq	Hectares	Acres
Non-native grassland	6	1.7	4.2
Unvegetated	1	3.3	8.3
Wetlands	Freq	Hectares	Acres
UPL	7	5.1	12.5
Totals		5.1	12.5

Site S32-3 is located at the eastern toe of the east-levee of the SDWSC. The site is 2.8 ha (6.9 ac). Nearly half of S32-3 is unvegetated road or open water (Table 15). A significant portion of the site is located in a settlement pond for water as it is transferred into irrigation canals from the SRDWSC.

S32-3 is bounded by Jefferson Blvd to the west and a canal to the east. The site is located at the east toe of the east levee of the SRDWSC (RM 36.3).

Re-inspection of site S32-3 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 15. Summary of Vegetation, Habitat, and Wetlands for site S32-3			
Genus	Freq	Hectares	Acres
Ag crop	1	0.4	1.0
<i>Brassica</i>	1	0.3	0.8
<i>Bromus</i>	1	1.0	2.5
<i>Lepidium</i>	2	0.4	0.9
<i>Quercus</i>	2	0.2	0.6
Road	1	0.9	2.3
Water	2	1.0	2.4
Habitat	Freq	Hectares	Acres
Cultivated field	1	0.4	1.0
Non-native grassland	4	1.7	4.2

River	1	0.4	1.1
Unvegetated	1	0.9	2.3
Valley oak woodland	2	0.2	0.6
Wetlands	Freq	Hectares	Acres
PUBHx	1	0.5	1.3
PUBJ	1	0.1	0.2
R2UBHx	1	0.4	1.1
R2US	1	0.3	0.8
UPL	6	2.9	7.1
Totals		4.3	10.6

Site S32-4 is located along the east-levee of the SDWSC on property owned by Reclamation Districts #999 and #900 (Figure 1). The site is 65 ha (159 ac). Approximately 45% of S32-4 is Ag crop and 26% is Poa (Table 16). The change in landuse to Agriculture (Appendix A) occurred after the 2008 survey, replacing an area mapped as unvegetated in 2008. The remaining area is unchanged and is a mix of *Centaurea*, *Foeniculum*, and unvegetated areas (Table 16). The unvegetated areas are location where dredged material has been recently placed.

S32-4 is bounded by the SRDWSC to the west and agricultural field to the east. The site is located on the east levee of the SRDWSC (RM 31.8 to 35.5).

Table 16. Summary of Vegetation, Habitat, and Wetlands for site S32-4			
Genus	Freq	Hectares	Acres
Ag crop	1	28.9	71.4
<i>Centaurea</i>	3	4.5	11.0
<i>Distichlis</i>	1	0.1	0.2
<i>Foeniculum</i>	7	8.4	20.7
<i>Lepidium</i>	1	0.1	0.2
<i>Lepidospartum</i>	3	1.3	3.3
<i>Poa</i>	3	16.8	41.5
<i>Quercus</i>	1	0.0	0.1
<i>Salix</i>	1	0.0	0.1
<i>Silybum</i>	2	0.2	0.5
Unvegetated	1	4.2	10.3
Habitat	Freq	Hectares	Acres
Alkali meadow	1	0.1	0.2
Cultivated field	1	28.9	71.4
Non-native grassland	16	29.9	73.9
Riparian woodland	1	0.0	0.1
Unvegetated	1	4.2	10.3

Valley and foothill grasslands	3	1.3	3.3
Valley oak woodland	1	0.0	0.1
Wetlands	Freq	Hectares	Acres
R2US	9	8.6	21.1
UPL	15	55.9	138.2
Totals		64.5	159.3

Site S32-5 is located along the east-levee of the SDWSC on property owned by Reclamation Districts #999 and #900 (Figure 1). The site is 23 ha (56 ac). Approximately 50% of S32-5 is Unvegetated (Appendix A), a change that occurred after the 2008 survey. The now unvegetated area covered in dredged material was mapped as *Bromus* and *Amsinckia* during the 2008 survey. The remaining area is unchanged and is a mix of *Bromus*, *Foeniculum*, and *Centaurea* areas (Table 17).

S32-5 is bounded by the SRDWSC to the west and agricultural field to the east. The site is located on the east levee of the SRDWSC (RM 25.8 to 26.8).

Table 17. Summary of Vegetation, Habitat, and Wetlands for site S32-5			
Genus	Freq	Hectares	Acres
<i>Brassica</i>	2	0.6	1.4
<i>Bromus</i>	2	2.4	6.0
<i>Centaurea</i>	4	2.1	5.2
<i>Foeniculum</i>	5	5.6	13.8
<i>Lepidium</i>	1	0.1	0.1
<i>Lepidospartum</i>	1	1.9	4.7
<i>Poa</i>	1	1.0	2.4
<i>Populus</i>	2	1.9	4.8
<i>Salix</i>	4	1.4	3.6
<i>Silybum</i>	1	0.1	0.1
Unvegetated	2	5.7	14.0
Habitat	Freq	Hectares	Acres
Non-native grassland	16	11.8	29.1
Riparian scrub	3	1.2	3.1
Riparian woodland	3	2.2	5.3
Unvegetated	2	5.7	14.0
Valley and foothill grasslands	1	1.9	4.7
Wetlands	Freq	Hectares	Acres
PFOR	1	0.3	0.7
PSS	3	1.2	3.1

R2US	8	6.2	15.3
UPL	13	15.0	37.0
Totals		22.7	56.1

Site S32-6 is located along the east-levee of the SDWSC on property owned by Reclamation Districts #999 and #900 (Figure 1). The site is 19 ha (46 ac). Approximately 76% of S32-6 is *Bromus* (45%) and *Lactuca* (31%). The remaining area is a mix of *Silybum*, *Centaurea*, and Agricultural areas (Table 17).

S32-6 is bounded by the SRDWSC to the west and agricultural field to the east. The site is located on the east levee of the SRDWSC (RM 25.0 to 25.8).

Re-inspection of site S32-6 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 18. Summary of Vegetation, Habitat, and Wetlands for site S32-6			
Genus	Freq	Hectares	Acres
Ag crop	1	1.0	2.5
<i>Avena</i>	1	0.5	1.1
<i>Brassica</i>	1	0.4	1.0
<i>Bromus</i>	2	8.4	20.7
<i>Centaurea</i>	2	1.3	3.1
<i>Lactuca</i>	4	5.8	14.3
<i>Lepidium</i>	2	0.1	0.3
<i>Silybum</i>	1	1.2	3.0
Habitat	Freq	Hectares	Acres
Cultivated field	1	1.0	2.5
Non-native grassland	10	15.9	39.4
Unvegetated	3	1.7	4.2
Wetlands	Freq	Hectares	Acres
R2US	2	1.6	4.0
UPL	12	17.0	42.1
Totals		18.6	46.1

Site S35 is located just south of Stratton Lane near the intersection with Talbert Lane on private property owned and operated by Sacramento Municipal Utility District. The site is between the Montezuma Hills to the north and the SDWSC to the south and is 113.8 hectares (281.1 acres). There are two sections of the site, dividing it into eastern (Figure 23) and western (Figure 24) sections. The eastern section is dominated by *Bromus*, *Atriplex*, and *Lepidospartum* (Table 19). There are no wetlands located in the eastern section of S35. The western section of S35 is 45% wetland, most of which is emergent and is dominated by *Scirpus* and *Salicornia*. Along the margins of the emergent

wetland are no-emergent *Frankenia* saltbush scrub wetlands. The upland areas in the western section are dominated by *Centaurea*. The channelized lower reach of a tributary draining the Montezuma Hills adjacent to S35 runs through the western section of S35.

The Montezuma Hills forming the northern border of S35 are gently to steeply rolling hills dominated by Non-native grasslands with the only potential wetland occurring in the valley bottoms along intermittent streams. The SDWSC is just beyond the southern border of the eastern section of S35 and has a thin emergent wetland margin. South of the western section of S35 is a continuation of both wetland and upland communities found within the section to its border with the SDWSC. Along the SDWSC margin south of the western section is a wide emergent wetland.

Re-inspection of site S35 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 19. Summary of Vegetation, Habitat, and Wetlands for site S35

Genus	Freq	Hectares	Acres
<i>Atriplex</i>	3	3.0	7.4
<i>Bromus</i>	4	46.0	113.6
<i>Centaurea</i>	2	28.4	70.3
<i>Frankenia</i>	2	3.2	7.9
<i>Lepidospartum</i>	1	2.1	5.2
<i>Salicornia</i>	5	15.0	37.0
<i>Scirpus</i>	2	18.3	45.3
Water	2	3.3	8.1
Habitat	Freq	Hectares	Acres
Alkali meadow	5	15.0	37.0
Marsh and swamp	2	18.3	45.3
Non-native grassland	6	74.4	183.9
Valley and foothill grasslands	1	2.1	5.2
Valley saltbush scrub	5	6.2	15.3
Water	2	3.3	8.1
Wetlands	Freq	Hectares	Acres
PEMA	5	17.0	42.1
PEMC	2	18.3	45.3
PEMS	2	1.1	2.8
PUBC	1	2.6	6.4
R2EMx	1	0.7	1.6
UPL	10	79.5	196.5
Totals		119.3	294.7



Figure 23. Photo of upland eastern section of S35 (2008)



Figure 24. Overview of western section of S35 with emergent marsh (2008)

The Sherman Lake (SL) site is located on the western end of Sherman Island within the SDWSC just upstream from Antioch, CA. The site is part of the Sherman Island Waterfowl Management Area. The entire site is considered a wetland with a NWI code of Riverine-Tidal-Unconsolidated Bottom-Permanent-Tidal. The only vegetation present was along the margins of the site near intertidal marshes. The dominant vegetation types were *Scirpus* and *Ludwigia*.

(Table 20) (Figure 25), however together they totaled less than 3% of the site. The remaining 97% was open water.

Re-inspection of the Sherman Lake (SL) during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 20. Summary of Vegetation, Habitat, and Wetlands for Sherman Lake site			
Genus	Freq	Hectares	Acres
<i>Ludwigia</i>	13	0.5	1.4
<i>Scirpus</i>	12	5.6	13.8
Water	2	217.8	538.1
Habitat	Freq	Hectares	Acres
Marsh and swamp	25	6.1	15.2
Water	2	217.8	538.1
Wetlands	Freq	Hectares	Acres
PEMT	25	6.1	15.2
R1UBV	2	217.8	538.1
Totals		223.9	553.3



Figure 25. *Ludwigia* along border of Sherman Lake site (2008)

Site Sx-P1 is located between the northern end of Stratton Lane and the southern end of Toland Lane on private property owned and operated by Sacramento Municipal Utility District. The site is between the Montezuma Hills to

the north and the SDWSC to the south and is 37.8 hectares (93.4 acres). Currently much of the site is used as grazing pasture. Approximately 25% of the site is considered a wetland, most of which is emergent wetland dominated by *Distichlis* and *Scirpus* (Table 21) (Figure 26). Wetlands are located along the southern border adjacent to the SDWSC and in a confined valley within the Montezuma Hills where two tributaries meet. The uplands within site Sx-P1 were dominated by *Bromus* (Figure 27).

The Montezuma Hills forming the northern border of Sx-P1 are gently to steeply rolling hills dominated by Non-native grasslands with the only potential wetland occurring in the valley bottoms along intermittent streams. The SDWSC is just beyond the southern border of Sx-P1 and has a wide emergent wetland margin.

Re-inspection of site Sx-P1 during this 2010 survey revealed that there was no change in the dominant vegetation, habitat, or wetlands.

Table 21. Summary of Vegetation, Habitat, and Wetlands for site Sx-P1			
Genus	Freq	Hectares	Acres
<i>Ambrosia</i>	1	0.1	0.3
<i>Brassica</i>	1	4.4	10.9
<i>Bromus</i>	8	13.6	33.5
<i>Centaurea</i>	7	5.4	13.5
<i>Distichlis</i>	10	10.3	25.4
<i>Juncus</i>	2	0.1	0.3
<i>Lepidium</i>	5	4.5	11.0
<i>Lepidospartum</i>	1	0.5	1.2
<i>Rubus</i>	4	0.9	2.1
<i>Salix</i>	1	0.1	0.2
<i>Scirpus</i>	6	2.6	6.4
<i>Silybum</i>	3	0.3	0.6
Water	1	0.2	0.5
<i>Xanthium</i>	2	0.4	0.9
Habitat	Freq	Hectares	Acres
Alkali meadow	10	10.3	25.4
Marsh and swamp	10	3.1	7.6
Non-native grassland	25	28.2	69.7
Riparian scrub	4	0.9	2.1
Riparian woodland	1	0.1	0.2
Valley and foothill grasslands	1	0.5	1.2
Water	1	0.2	0.5
Wetlands	Freq	Hectares	Acres

PEMC	14	8.6	21.2
PEMF	3	1.5	3.7
PSSC	2	0.5	1.1
PSSF	1	0.2	0.4
PUBA	1	0.2	0.5
UPL	31	32.3	79.9
Totals		43.2	106.7



Figure 26. Wetland at the southern end of site Sx-P1 (2008)



Figure 27. Upland area of site Sx dominated by Non-native grasslands (2008)

Site BR-P1 is located immediately east of California State Highway 160 just north of Brannan Island State Recreational Area. The SRDWSC is to the west of the site, with Highway 160 separating the site from the channel. Immediately to the south of the site is W Brannan Island Road. The BR-P1 site is predominately an agricultural field (73%) with minor amounts of non-native grassland (17%) and Salix woodland (13%) (Table 22).

Sensitive habitats are largely confined to the southwestern corner of the site (Figure 28), minus a small *Typha* wetland in the middle of a field on the eastern side of the site. Several small irrigation ditches run between the fields and contain narrow strips of *Typha* and *Sorghum*.

BR-P1 was not included in the 2008 survey, therefore no comparison to previous conditions is provided.

Table 22. Summary of Vegetation, Habitat, and Wetlands for site BR-P1

Genus	Freq	Hectares	Acres
Ag crop	2	46.2	114.2
<i>Avena</i>	1	0.4	1.0
<i>Brassica</i>	1	8.1	20.1
<i>Conium</i>	1	1.1	2.8

<i>Poa</i>	1	0.1	0.3
<i>Populus</i>	1	0.1	0.2
<i>Quercus</i>	2	0.2	0.5
<i>Salix</i>	2	2.9	7.2
<i>Sorghum</i>	2	1.2	3.0
<i>Typha</i>	2	0.3	0.7
Unvegetated	6	2.4	5.9
Habitat	Freq	Hectares	Acres
Cultivated field	2	46.2	114.2
Marsh and swamp	2	0.3	0.7
Non-native grassland	6	11.0	27.1
Riparian scrub	2	2.9	7.2
Riparian woodland	3	0.3	0.7
Unvegetated	6	2.4	5.9
Wetlands	Freq	Hectares	Acres
R2US	1	8.1	20.1
UPL	20	54.9	135.8
Totals		63.1	155.8



Figure 28. Overview of site BR-P1 from southwestern corner with *Salix* forest to the left (2010)

Site BR-P2 is located immediately to the east of an unnamed road running north-south halfway between Tomato and Jackson Sloughs and halfway between California State Highway 12 and Sevenmile Slough. The SRDWSC is to the west of the site, with Highway 160, BR-P1, and BR-P 4 separating the site from the channel. Immediately to the south of the site is BR-P3. The BR-P2 site is predominately an agricultural field (>99%) (Figure 29) with a minor inclusion of unvegetated land (Table 23).

There are no sensitive habitats present within BR-P2, minus 2 small irrigation ditches dominated by *Sorghum*.

BR-P2 was not included in the 2008 survey, therefore no comparison to previous conditions is provided.

Table 23. Summary of Vegetation, Habitat, and Wetlands for site BR-P2			
Genus	Freq	Hectares	Acres
Ag crop	1	47.2	116.8
Unvegetated	1	0.1	0.3
Habitat	Freq	Hectares	Acres
Cultivated field	1	47.2	116.8
Unvegetated	1	0.1	0.3
Wetlands	Freq	Hectares	Acres
UPL	2	47.3	117.1
Totals		47.3	117.1



Figure 29. Overview of site BR-P2 from southwestern corner (2010)

Site BR-P3 is located immediately to the northwest of the junction of Jackson and Sevenmile Sloughs at Owl Harbor. W. Brannan Island Rd immediately south of the site. The SRDWSC is to the west of the site, with Highway 160 and BR-P1 separating the site from the channel. The BR-P2 site is predominately an agricultural field (>99%) (Figure 30) with minor inclusions of *Sorghum* and *Salix* (Table 24).

Sensitive habitats are largely confined to the southeastern corner of the site (Figure 30) including a small *Salix* woodland. A small inclusion of *Sorghum* in the middle of a field on the southern end of BR-P3 suggests sufficient persistent hydrology the area is left fallow. Several small irrigation ditches run between the fields and contain narrow strips of *Typha* and *Sorghum*.

BR-P3 was not included in the 2008 survey, therefore no comparison to previous conditions is provided.

Table 24. Summary of Vegetation, Habitat, and Wetlands for site BR-P3

Genus	Freq	Hectares	Acres
Ag crop	1	175.8	434.4
<i>Rubus</i>	1	0.1	0.3
<i>Salix</i>	1	0.2	0.5
<i>Sorghum</i>	1	0.2	0.4

Habitat	Freq	Hectares	Acres
Cultivated field	1	175.8	434.4
Non-native grassland	1	0.2	0.4
Non-native riparian scrub	1	0.1	0.3
Riparian woodland	1	0.2	0.5
Wetlands	Freq	Hectares	Acres
PFO	1	0.2	0.5
R2US	1	0.1	0.3
UPL	2	175.9	434.8
Totals		176.3	435.5



Figure 30. Overview of site BR-P3 from southeastern corner, small *Salix* woodland to left (2010)

Site BR-P4 is located immediately north of W. Brannan Island Rd between BR-P1 to the west and BR-P3 to the east. The SRDWSC is to the west of the site, with Highway 160 and BR-P1 separating the site from the channel. The BR-P4 site is predominately agricultural field (85%) and unvegetated (15%) (Figure 31) (Table 25).

Sensitive habitats include a small inclusion of *Typha* in a field on the southern side of BR-P4. Additional potential sensitive habitats include several small irrigation ditches which run between fields that contain narrow strips of *Typha* and *Sorghum*.

BR-P4 was not included in the 2008 survey, therefore no comparison to previous conditions is provided.

Table 25. Summary of Vegetation, Habitat, and Wetlands for site BR-P4			
Genus	Freq	Hectares	Acres
Ag crop	2	164.2	405.7
<i>Typha</i>	1	0.2	0.6
Unvegetated	2	28.2	69.7
Habitat	Freq	Hectares	Acres
Cultivated field	2	164.2	405.7
Marsh and swamp	1	0.2	0.6
Unvegetated	2	28.2	69.7
Wetlands	Freq	Hectares	Acres
PUB	1	0.2	0.6
UPL	4	192.4	475.4
Totals		192.6	476.0



Figure 31. Overview of site BR-P4 from southwestern side with large unvegetated raised road running through the site (2010)

Site TI-PR2 is located immediately south of W. Twitchell Island Rd from the intersection with W. Brannan Island Rd to the west and Owl Harbor where

Jackson Slough meets Sevenmile Slough to the east. The SRDWSC is to the west of the site, with Highway 160 and the northern end of Brannan Island State Recreational Area separating the site from the channel. The TI-PR2 site is predominately (Table 26) agricultural field (60%) and non-native grassland (24%) (Figure 32).

Sensitive habitats include a small inclusion of adjacent to Twitchell Island Rd approximately in the middle of the site, and several small irrigation ditches which run between fields that contain narrow strips of *Typha* and *Sorghum*. In addition a potential vernal pool location was recorded during the field inspection (Figure 33). The location is located behind the second residence from the western end of TI-PR2 and is within a fallow field. The site is located on private property, prohibiting further immediate investigation. However, additional surveying of this location should be completed prior to any permitting of the placement of dredged material at this site.

TI-PR2 was not included in the 2008 survey, therefore no comparison to previous conditions is provided.

Table 26. Summary of Vegetation, Habitat, and Wetlands for site TI-PR2

Genus	Freq	Hectares	Acres
Ag crop	7	32.5	80.2
<i>Brassica</i>	1	0.1	0.2
<i>Bromus</i>	5	2.8	6.8
<i>Erodium</i>	5	4.8	11.9
<i>Eucalyptus</i>	1	0.1	0.3
<i>Foeniculum</i>	2	1.1	2.7
<i>Juglans</i>	4	0.8	2.1
<i>Poa</i>	2	2.4	6.0
<i>Populus</i>	1	0.1	0.2
<i>Quercus</i>	2	0.6	1.5
Road	6	2.1	5.3
<i>Rubus</i>	2	0.5	1.1
<i>Salix</i>	2	0.2	0.5
<i>Sambucus</i>	1	0.3	0.8
<i>Scirpus</i>	1	0.2	0.5
<i>Silybum</i>	4	1.8	4.5
<i>Sonchus</i>	1	0.1	0.3
<i>Typha</i>	1	0.1	0.1
Unvegetated	7	4.0	9.9
Habitat	Freq	Hectares	Acres
Cultivated field	7	32.5	80.2
Marsh and swamp	2	0.3	0.6

Non-native grassland	20	13.1	32.4
Non-native riparian scrub	2	0.5	1.1
Non-native woodland	1	0.1	0.3
Riparian scrub	2	0.4	1.1
Riparian woodland	8	1.6	4.0
Unvegetated	13	6.2	15.2
Wetlands	Freq	Hectares	Acres
PFO	6	1.0	2.5
PSS	2	0.4	1.1
PUB	1	0.1	0.1
R2US	10	3.7	9.1
UPL	36	49.5	122.2
Totals		54.6	135.0



Figure 32. Overview of site TI-PR2 from eastern end with agricultural fields and drainage ditch with emergent habitat (2010)



Figure 33. View of potential vernal pool within TI-PR2 from W Twitchell Island Rd (2010)

Site SI-PR1 is located on the western and southwestern side of Sherman Island from just east of Sand Beach Park on the northern end to approximately 0.5 miles west of the Highway 160 bridge. The SRDWSC is immediately north of the site, with navigation available through Sherman Lake to access the remainder of the site. The SI-PR1 site is predominately (Table 27) *Distichlis* (24%), agricultural field (19%), *Lepidium* (11%), and other non-native vegetation (Figure 34).

Sensitive habitats include the western shoreline (emergent marsh of *Salix* and *Scirpus*) along the road leading to Sherman Lake Marina on the northern end of SI-PR1, the shoreline (*Typha* emergent marsh) of Mayberry Slough within Sherman Lake Marina, the shoreline (emergent marsh of *Salix* and *Scirpus*) along Sherman Lake along the southwestern end of SI-PR1, and a open water wetland complex (*Distichlis* and *Scirpus*) at the southeastern end of SI-PR1. In addition to these locations, a small *Typha* wetland is present approximately in the middle of SI-PR1 north and adjacent to a road leading into the farm fields. Between 400 and 800 ft to the south of this road is a potential vernal pool dominated with *Distichlis* (Figure 35) within a gated field. An additional potential vernal pool location (Figure 36) was observed to the west of another farm road running north-northeast 1,400 from the southeast end of SI-PR1. The potential vernal pool is approximately 400 ft down the farm road from the levee road within a gated field. The site is located on private property, prohibiting further immediate

investigation. However, additional surveying of this location should be completed prior to any permitting of the placement of dredged material at this site.

SI-PR1 was not included in the 2008 survey, therefore no comparison to previous conditions is provided.

Table 27. Summary of Vegetation, Habitat, and Wetlands for site SI-PR1

Genus	Freq	Hectares	Acres
Ag crop	7	32.5	80.2
<i>Ambrosia</i>	1	0.3	0.7
<i>Arundo</i>	3	0.4	1.0
<i>Brassica</i>	1	0.1	0.2
<i>Bromus</i>	5	2.8	6.8
<i>Centaurea</i>	4	6.9	17.1
<i>Daucus</i>	4	17.6	43.5
<i>Distichlis</i>	10	42.6	105.2
<i>Erodium</i>	8	17.9	44.2
<i>Eucalyptus</i>	3	0.5	1.2
<i>Euthamia</i>	1	0.7	1.7
<i>Foeniculum</i>	10	3.0	7.4
<i>Juglans</i>	4	0.8	2.1
<i>Lepidium</i>	10	18.9	46.6
<i>Poa</i>	2	2.4	6.0
<i>Populus</i>	1	0.1	0.2
<i>Quercus</i>	2	0.6	1.5
Road	7	3.2	7.9
<i>Rubus</i>	32	7.4	18.3
<i>Salix</i>	8	1.5	3.7
<i>Sambucus</i>	1	0.3	0.8
<i>Scirpus</i>	6	3.7	9.1
<i>Silybum</i>	9	3.1	7.6
<i>Sonchus</i>	1	0.1	0.3
<i>Typha</i>	3	0.9	2.1
Unvegetated	8	4.7	11.6
Water	5	1.6	4.0
Habitat	Freq	Hectares	Acres
Alkali meadow	8	42.3	104.5
Cultivated field	7	32.5	80.2
Marsh and swamp	10	5.0	12.4
Non-native grassland	59	74.2	183.2
Non-native riparian scrub	32	7.4	18.3

Non-native woodland	3	0.5	1.2
Riparian scrub	3	0.5	1.3
Riparian woodland	12	2.3	5.8
Unvegetated	15	7.9	19.5
Vernal pool	2	0.2	0.4
Water	5	1.7	4.2
Wetlands	Freq	Hectares	Acres
PFO	11	2.0	4.9
PSS	3	0.5	1.3
PUB	10	5.3	13.1
R2UB	6	1.4	3.3
R2US	59	17.3	42.6
UPL	67	148.1	365.9
Totals		174.5	431.1



Figure 34. View of non-native grassland from levee rd (2010)



Figure 35. View of potential vernal pool (background beyond *Typha* in foreground) within SI-PR1 from the end of farm rd looking southeast (2010)



Figure 36. View of potential vernal pool (middle of photo) within SI-PR1 from farm rd looking west into field. (2010)

Sites WI-PR1 and WI-PR2 compose Winter Island, which is located between Browns Island and the Sherman Island Waterfowl Management Area. Broad Slough separated Winter Island and the Sharman Island Waterfowl Management Area. The SRDWSC is immediately to the north of Winter Island, making navigable access to WI-PR1 and WI-PR2 possible. WI-PR1 and WI-PR2 are predominately (Table 28) *Scirpus* (67%) and *Cortaderia* (12%) emergent marsh including open water (13%) inclusions (Figure 37). A largely unvegetated riprap levee surrounds the island composed of a mix of rock and other debris (Figure 38).

Sensitive habitats include most of the emergent marsh complex interior of the island.

WI-PR1 and WI-PR2 were not included in the 2008 survey, therefore no comparison to previous conditions is provided.

Table 28. Summary of Vegetation, Habitat, and Wetlands for sites WI-PR1 and WI-PR2

Genus	Freq	Hectares	Acres
<i>Alnus</i>	1	0.1	0.2
<i>Arundo</i>	3	1.4	3.4
<i>Cortaderia</i>	34	22.9	56.7
<i>Lepidium</i>	3	0.4	1.1
<i>Populus</i>	1	0.2	0.4
Riprap	6	4.7	11.7
<i>Rosa</i>	1	0.1	0.2
<i>Salix</i>	4	0.9	2.2
<i>Scirpus</i>	10	123.5	305.1
Unvegetated	1	5.7	14.1
Water	20	24.6	60.7
Habitat	Freq	Hectares	Acres
Marsh and swamp	44	146.4	361.8
Non-native grassland	6	1.8	4.5
Riparian scrub	3	0.7	1.7
Riparian woodland	4	0.6	1.4
Unvegetated	7	10.5	25.8
Water	20	24.6	60.7
Wetlands	Freq	Hectares	Acres
E2EM1h	69	171.6	424.1
R2RS2	6	4.7	11.7

R2US	3	1.4	3.4
UPL	6	6.8	16.7
Totals		184.5	455.9



Figure 37. View of WI-PR1 and WI-PR2 with interior emergent marsh to the left, riprap embankment in the middle, and the shoreline with Broad Slough to the right (2010)



Figure 38. View of WI-PR1 and WI-PR2 outer levee composed of various debris (derelict barges) (2010)

5.0 Literature Cited

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Appendix B. Maps of site vegetation, habitat, and wetlands

GENUS

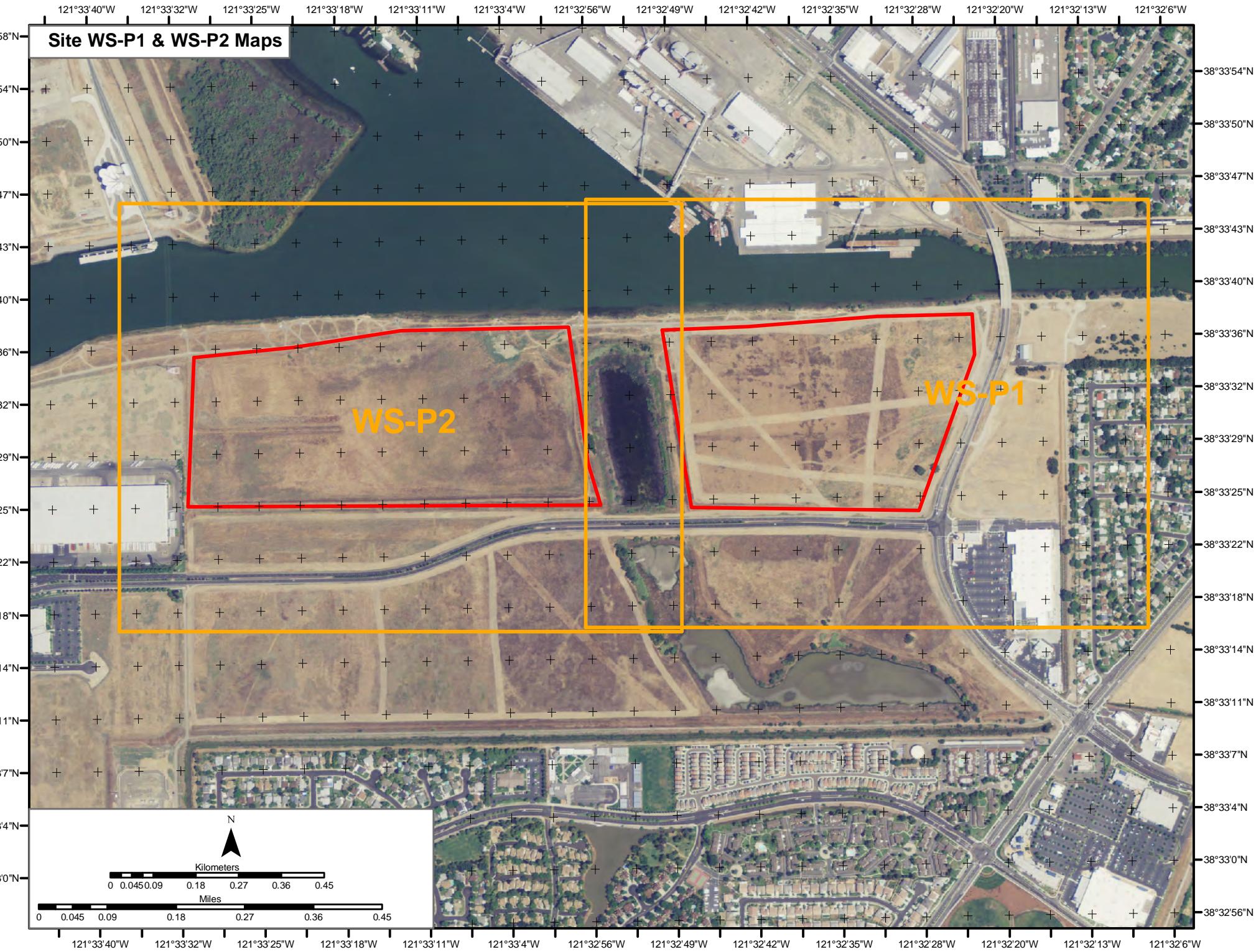
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Alnus	Cortaderia	Helianthus	Phalaris	Rumex	
Ambrosia	Cyperus	Hordeum	Plantago	Salicornia	
Arundo	Daucus	Industrial	Platanus	Salix	
Atriplex	Distichlis	Juglans	Poa	Sambucus	
Avena	Erodium	Juncus	Polypogon	Scirpus	
Baccharis	Eucalyptus	Lactuca	Populus	Silybum	
Brassica	Euthamia	Lepidium	Quercus	Sonchus	
Bromus	Federal Facility	Lepidospartum	Raphanus	Sorghum	
Burn	Festuca	Ludwigia	Residential	Tamarix	
Carex	Foeniculum	Marina	Riprap	Typha	
Centaurea	Frankenia	Melilotus	Road	Unvegetated	
Cichorium	Fraxinus	Park	Rosa	Water	

HOLLAND

Alkali meadow	River
Cultivated field	Tamarisk scrub
Developed	Unvegetated
Freshwater marsh	Valley and foothill grasslands
Freshwater seep	Valley oak woodland
Marsh and swamp	Valley saltbush scrub
Meadows and seeps	Vernal pool
Non-native grassland	Water
Non-native riparian scrub	
Non-native woodland	
Riparian forest	
Riparian scrub	
Riparian woodland	

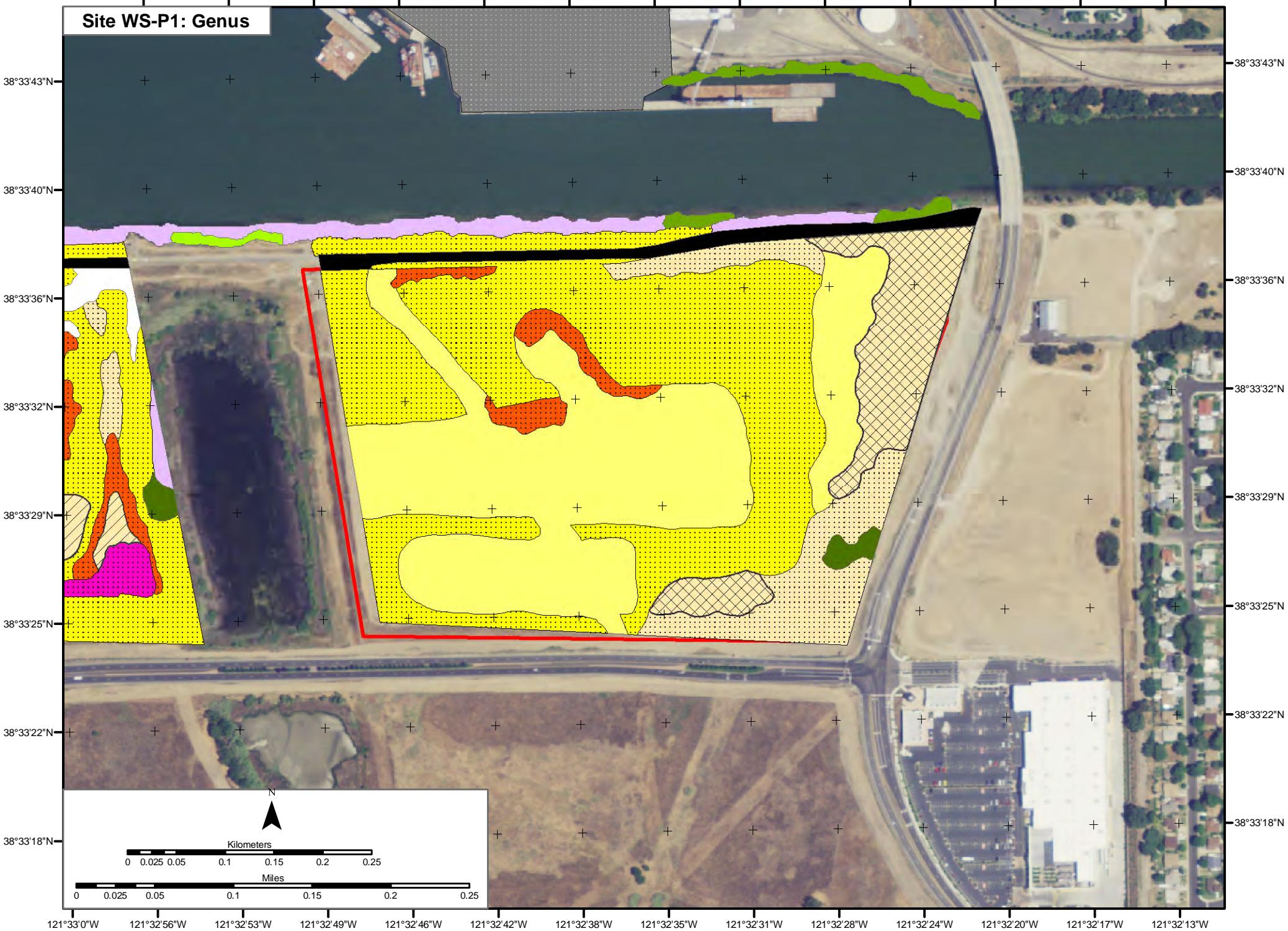
NWI

E2EM1	PFO1A	PSSC	Pf
E2EM1h	PFO1F	PSSE	R1UBV
E2US	PFO1R	PSSF	
PEM	PFOC	PSSR	
PEM1H	PFOF	PSSV	
PEM1R	PFOR	PUB	
PEM2Khsx	PFOV	PUBA	
PEMA	PSS	PUBC	
PEMC	PSS1F	PUBCx	
PEMF	PSS1R	PUBHx	
PEMS	PSS5H	PUBJ	
PEMV	PSS5R	PUBK	
PFO	PSSA	PUS	



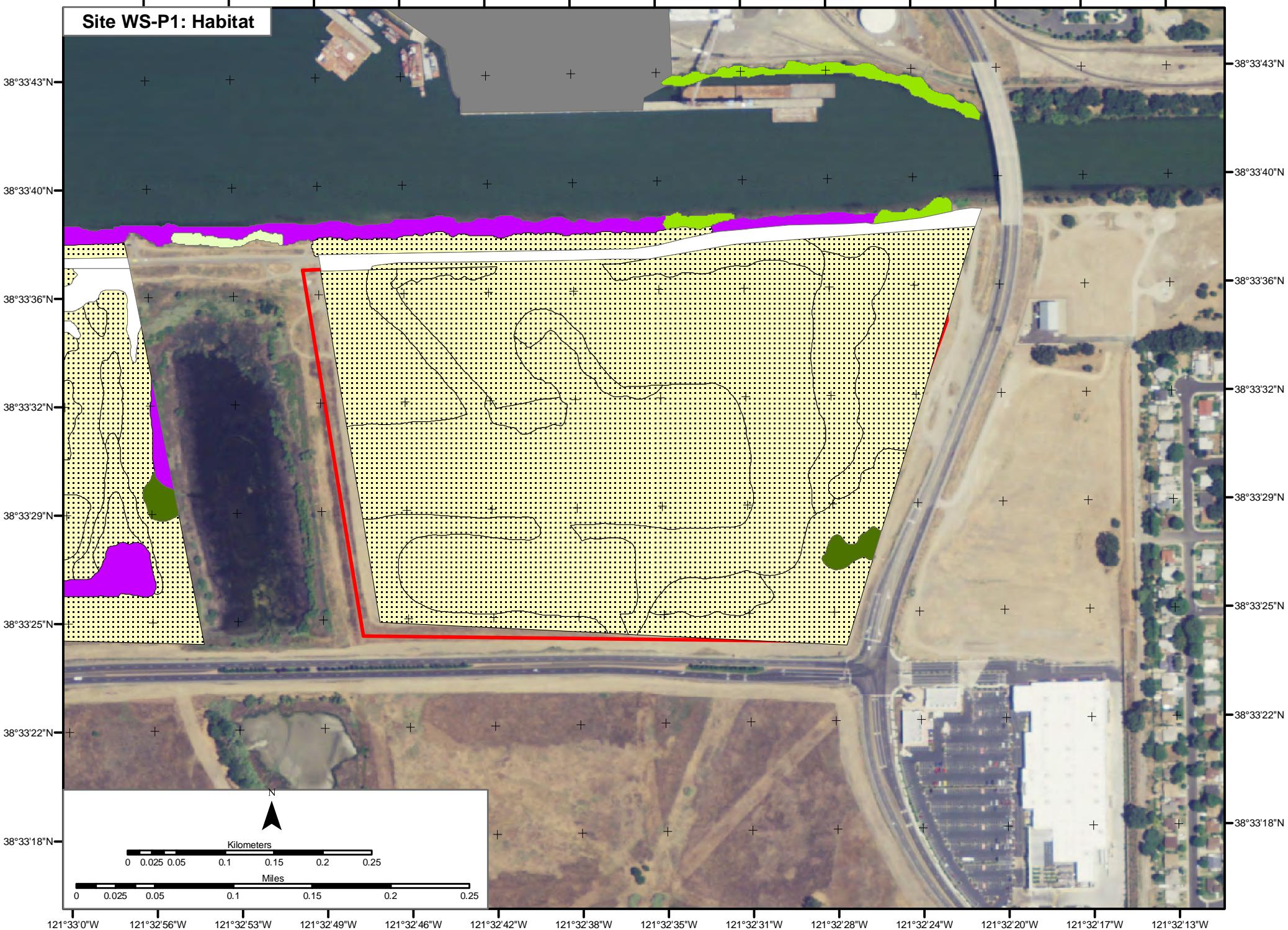
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Site WS-P1: Genus



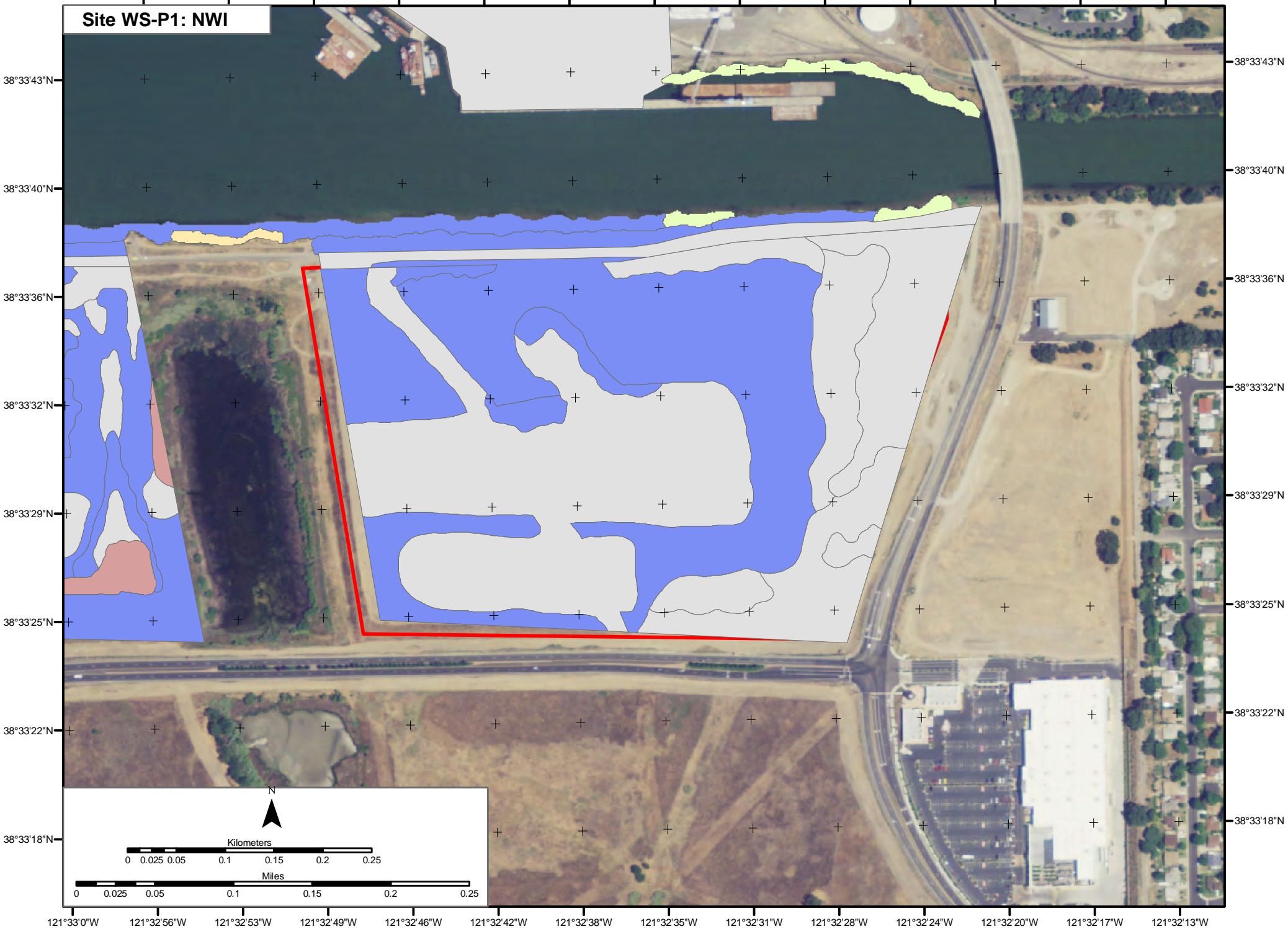
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Site WS-P1: Habitat



121°32'56"W 121°32'53"W 121°32'49"W 121°32'46"W 121°32'42"W 121°32'38"W 121°32'35"W 121°32'31"W 121°32'28"W 121°32'24"W 121°32'20"W 121°32'17"W 121°32'13"W

Site WS-P1: NWI



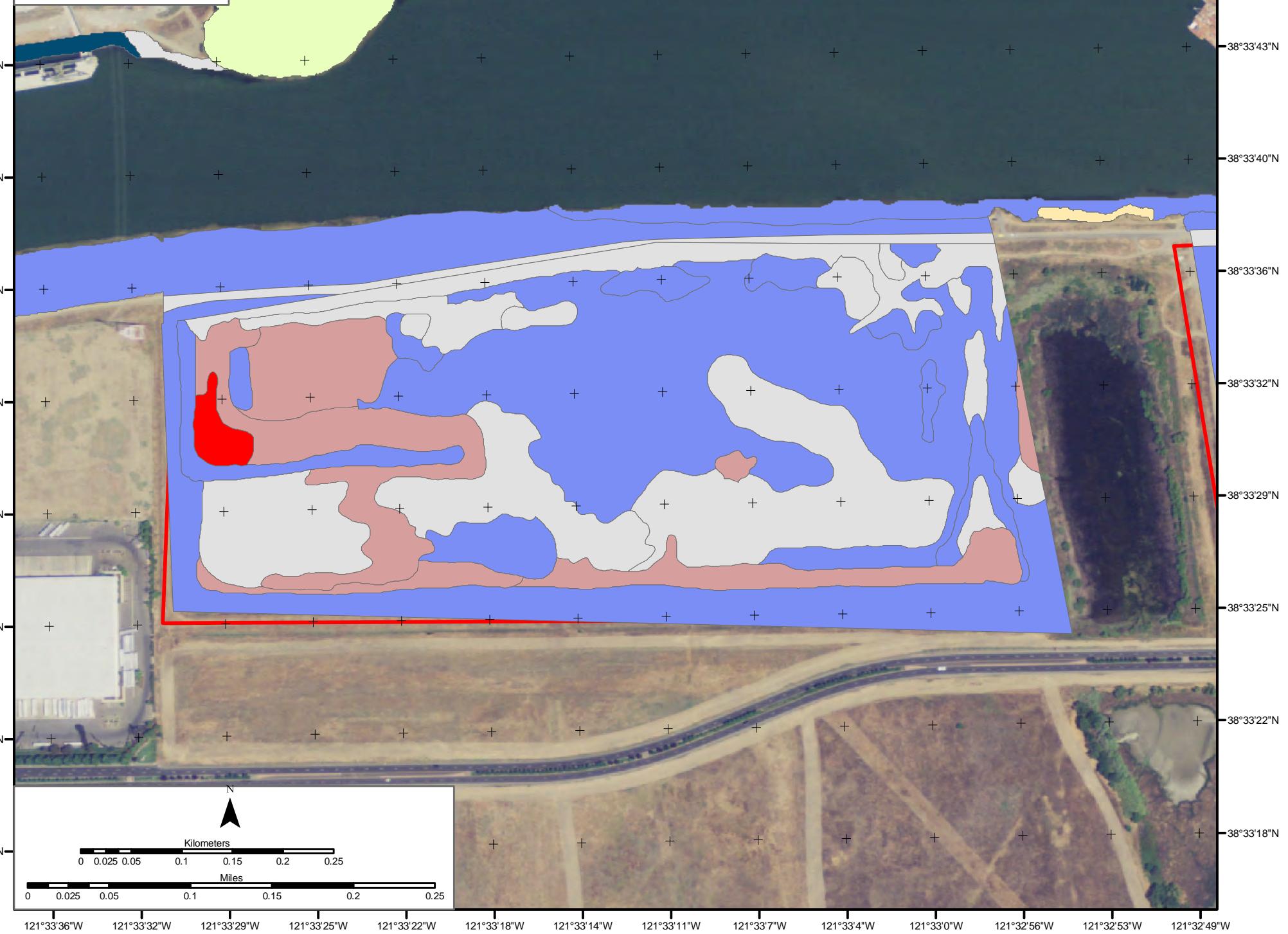
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Site WS-P2: Genus



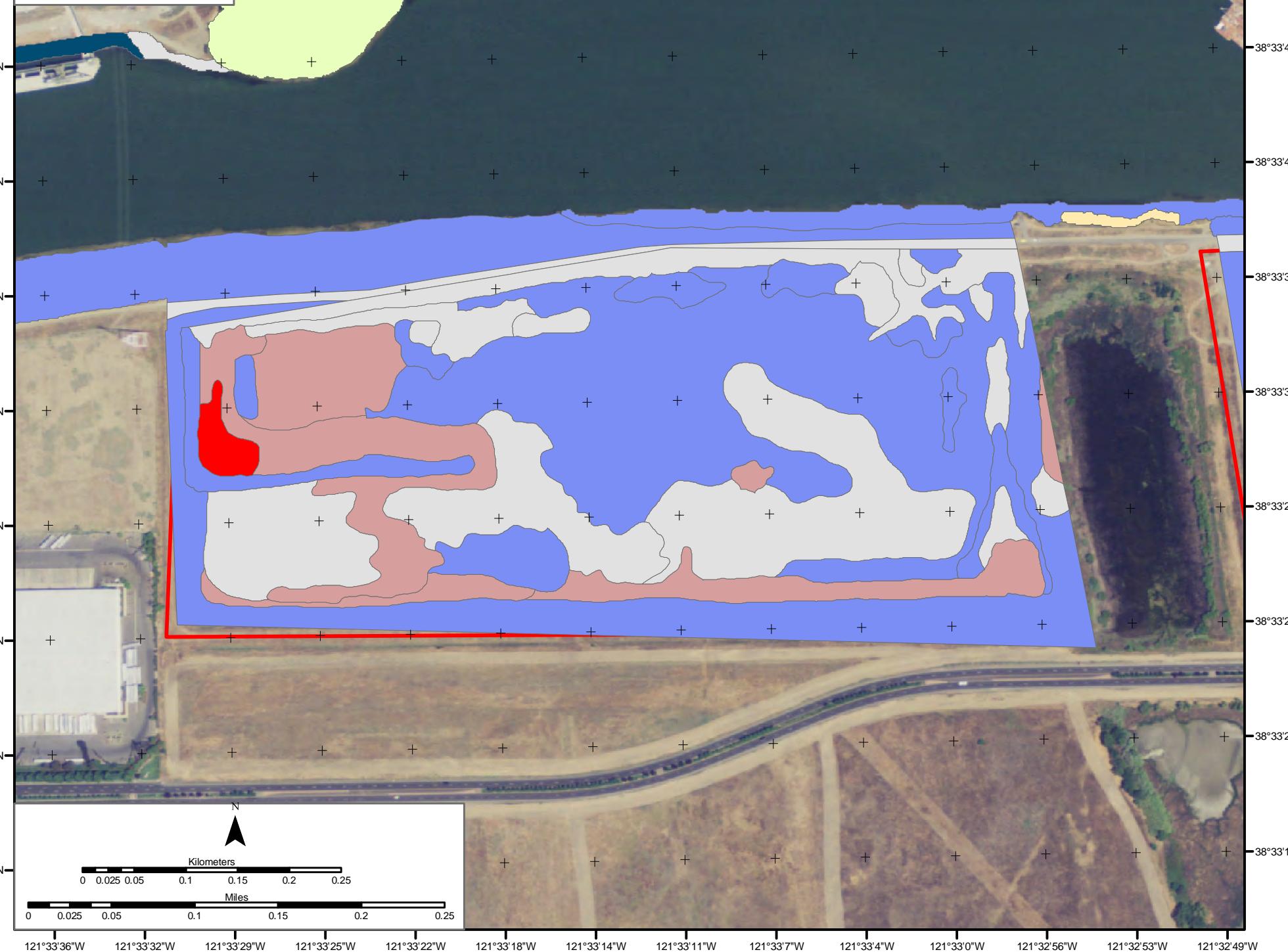
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Site WS-P2: Habitat



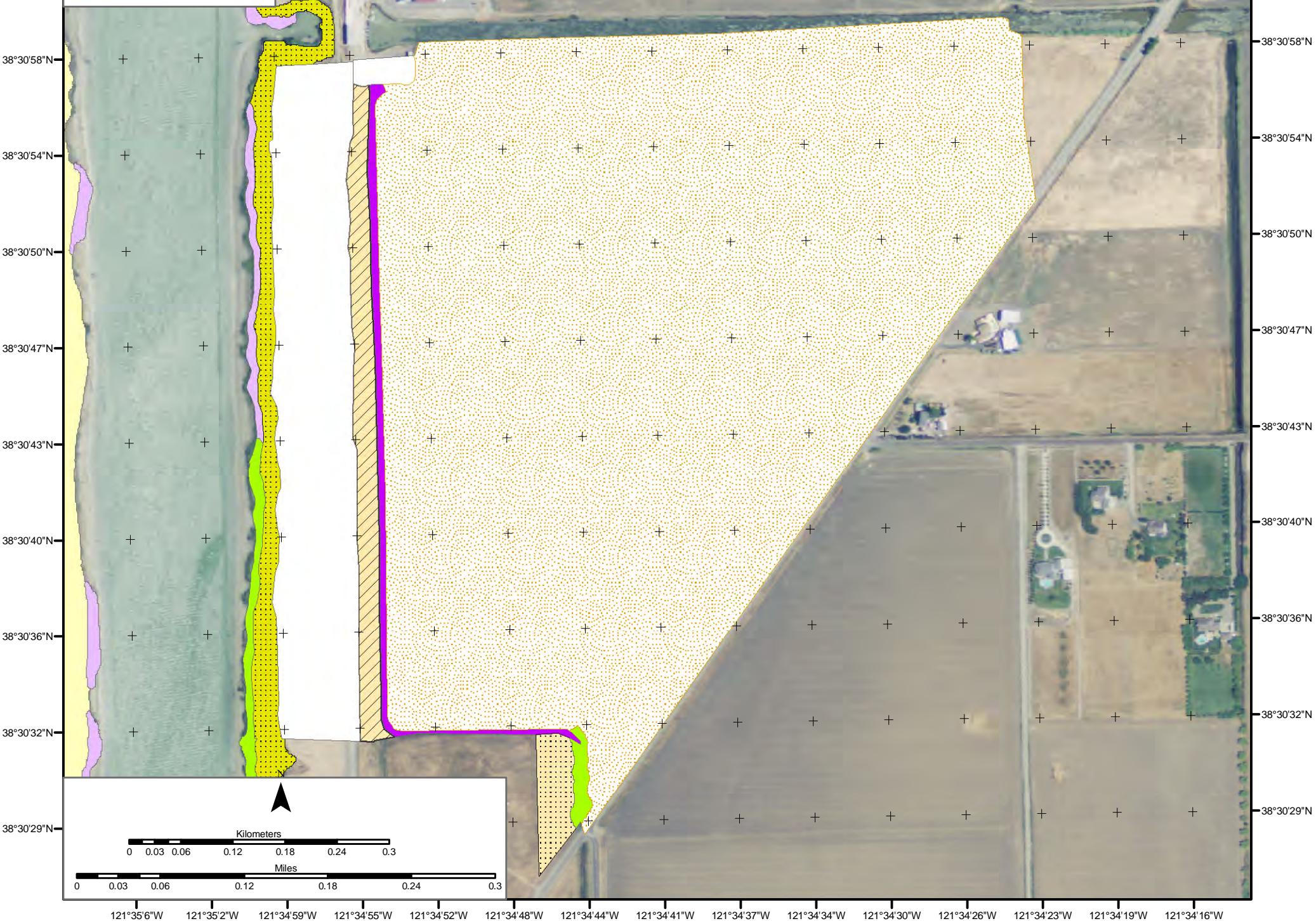
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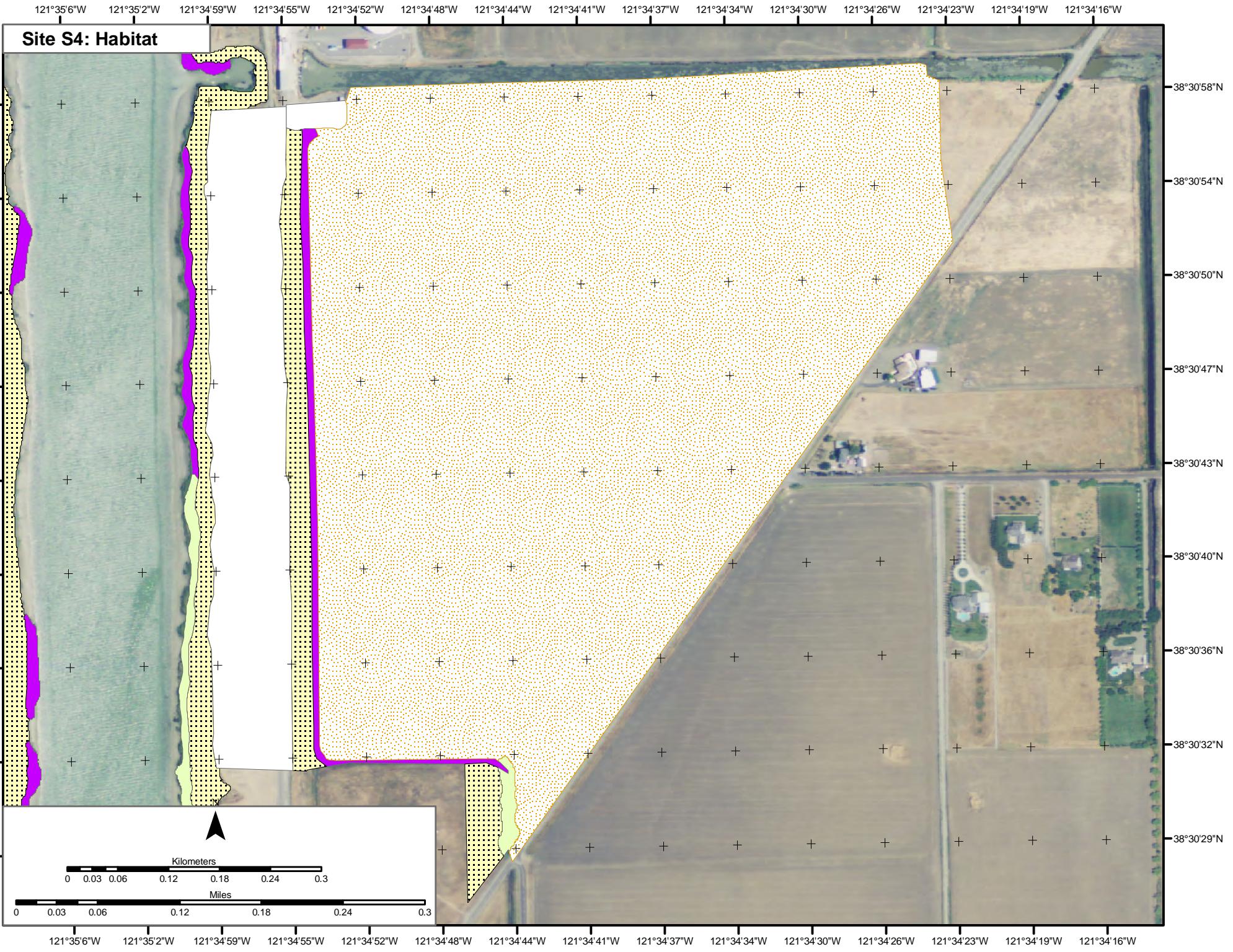
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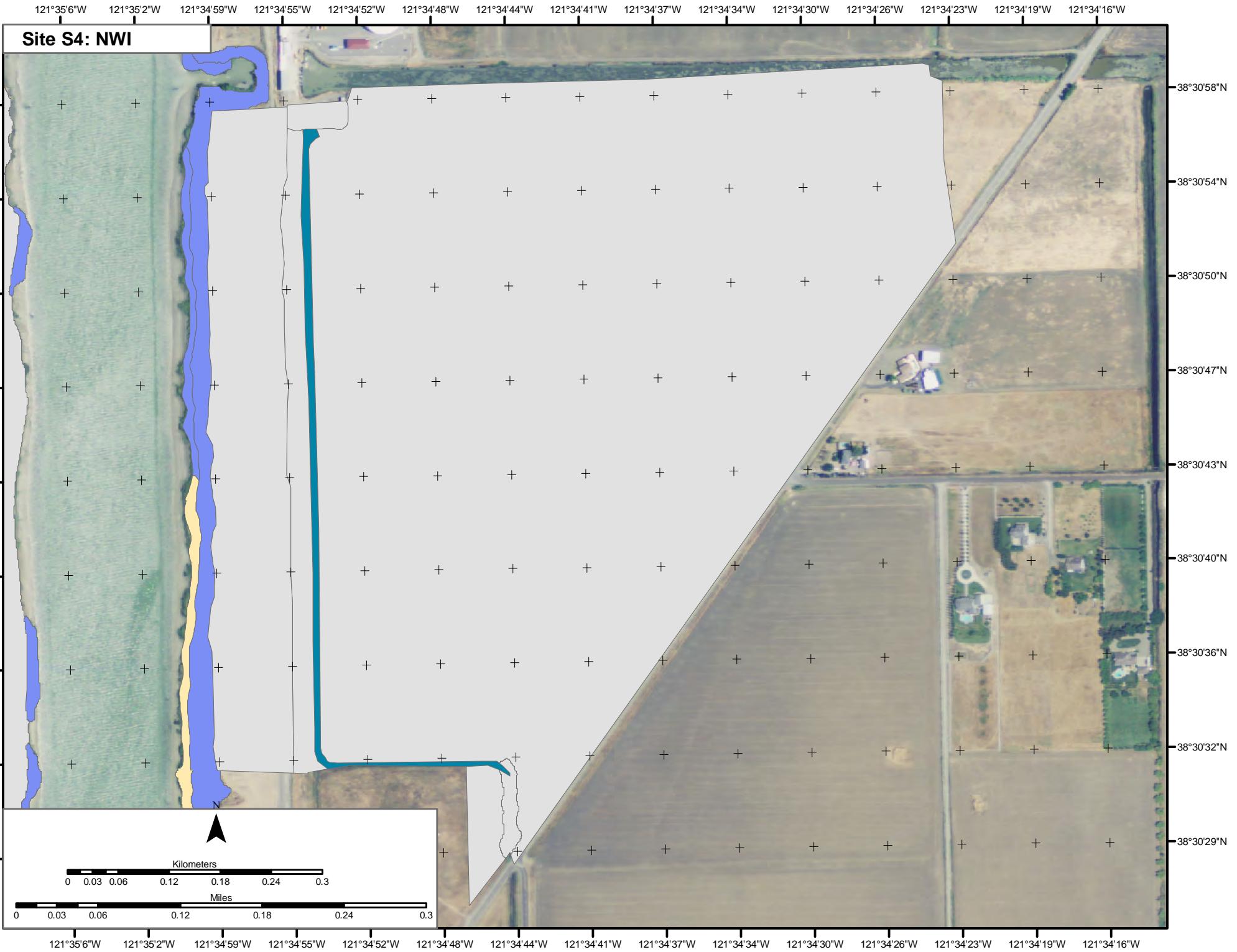


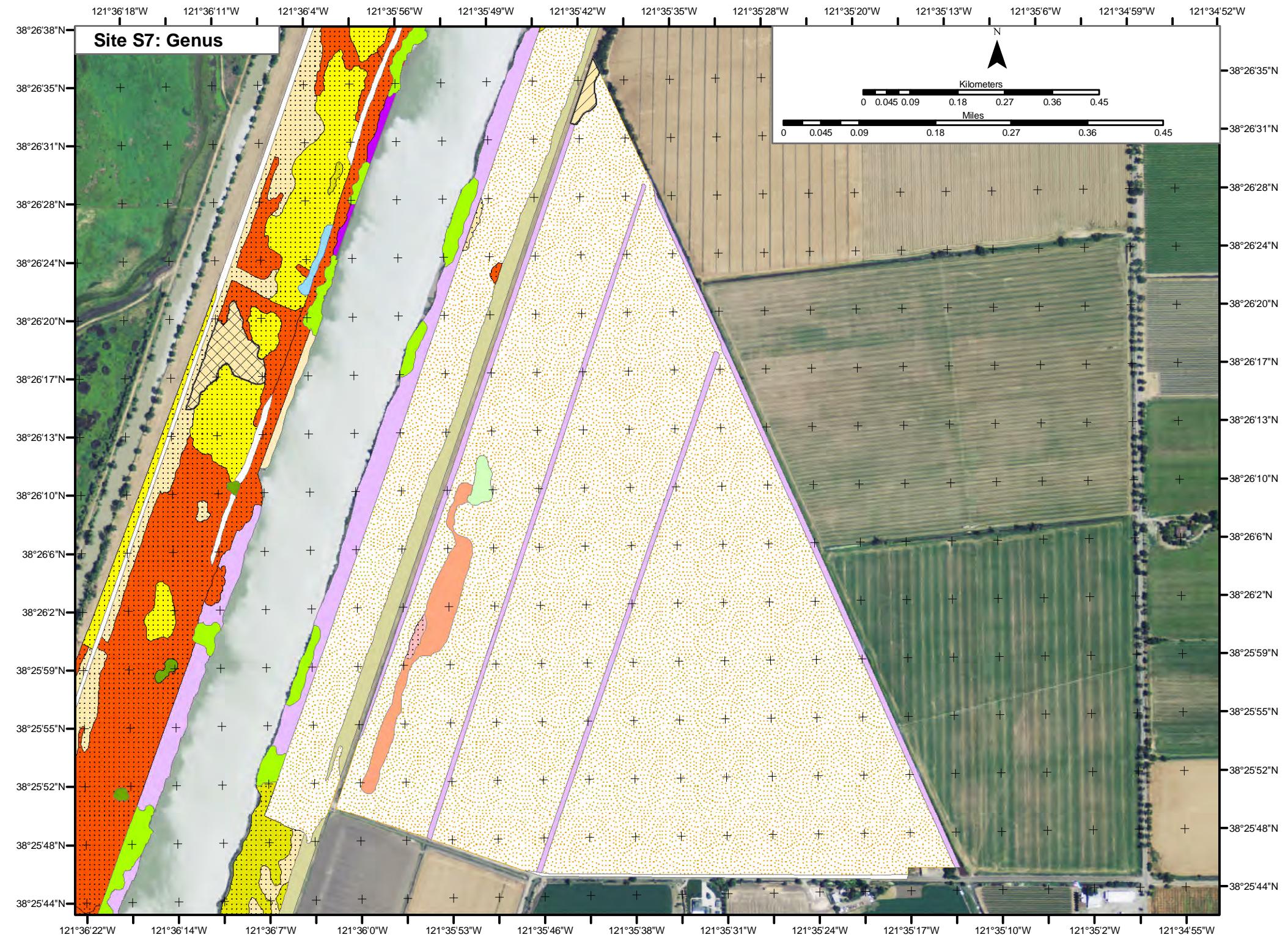
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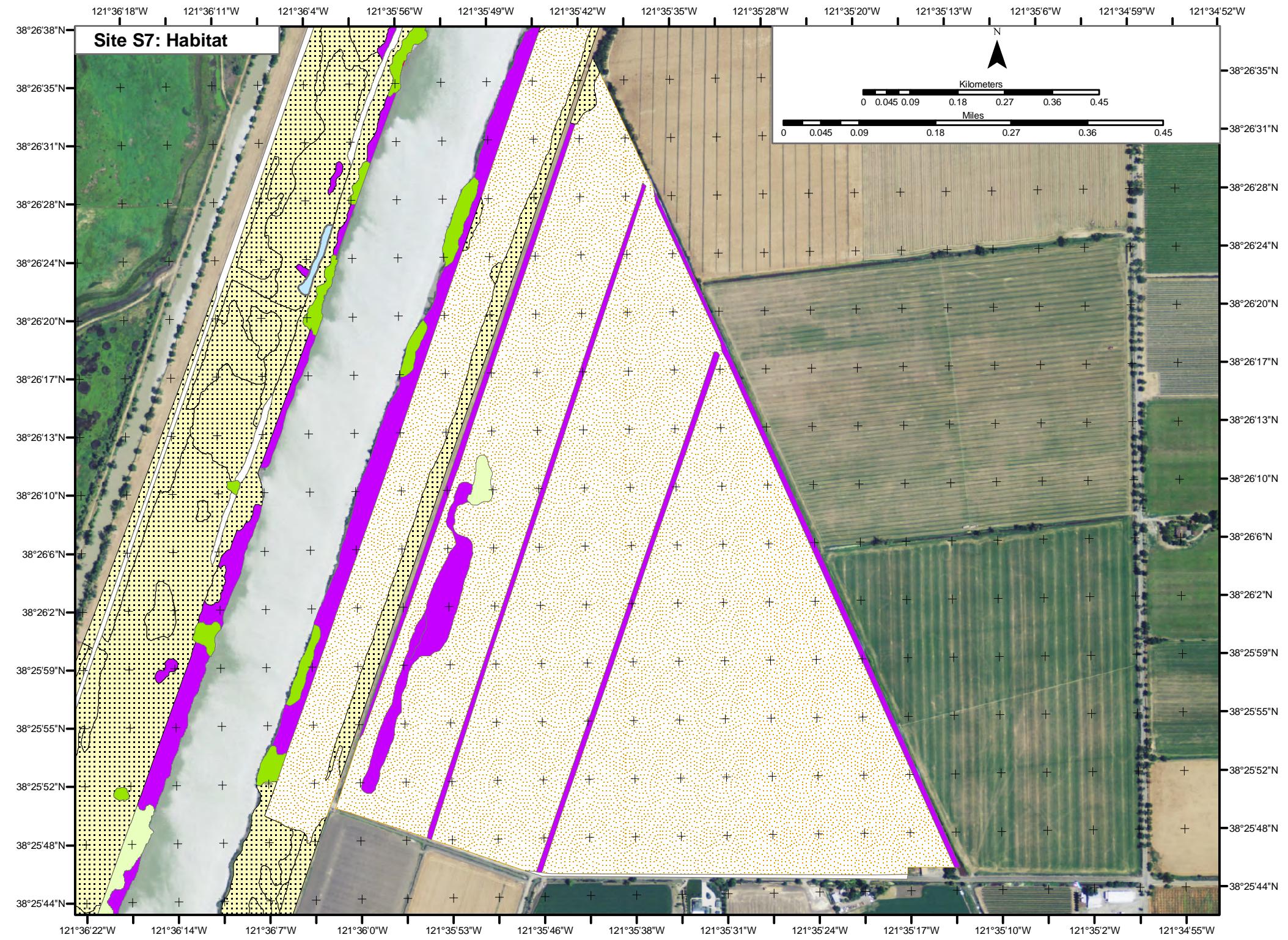
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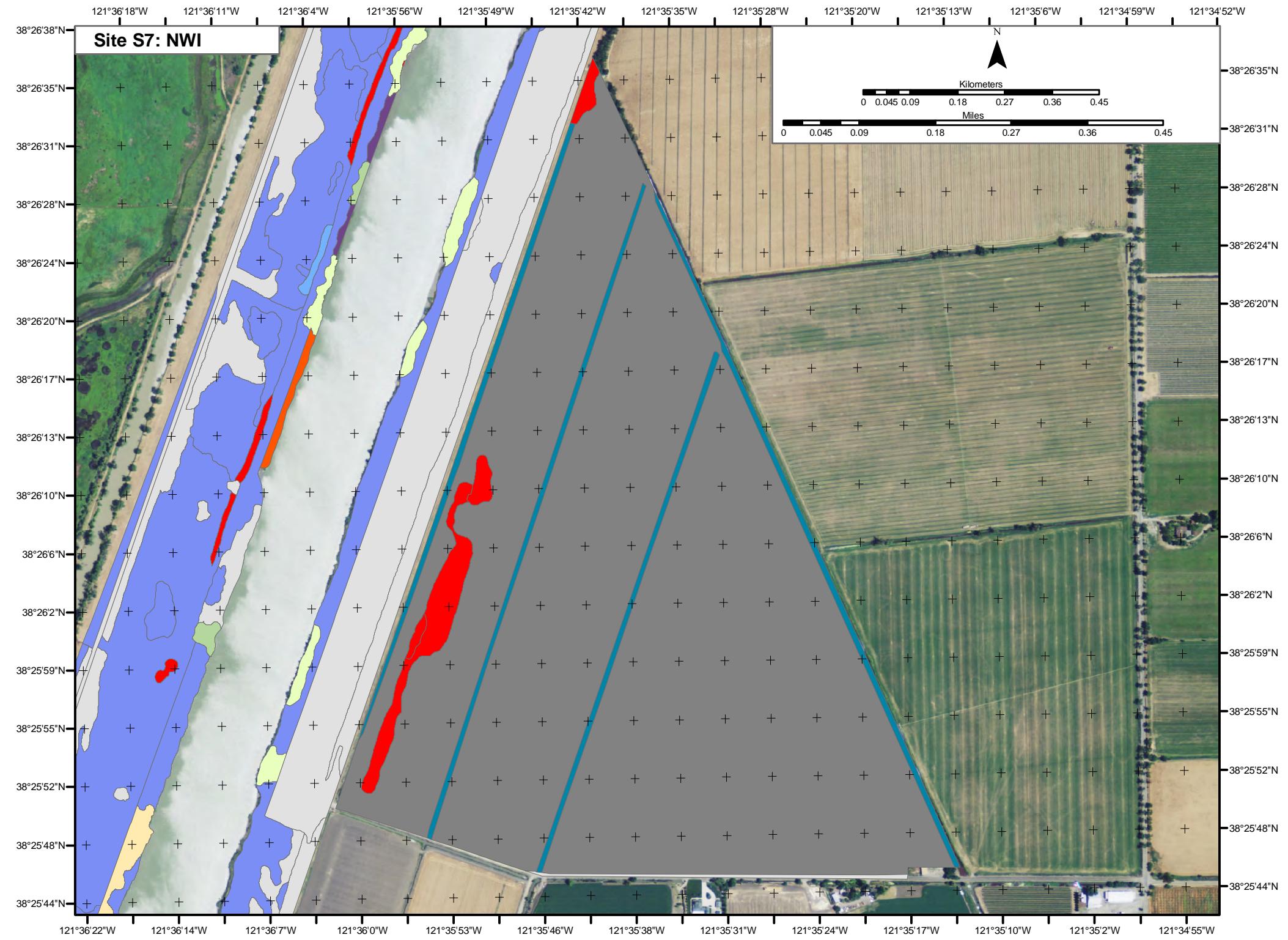




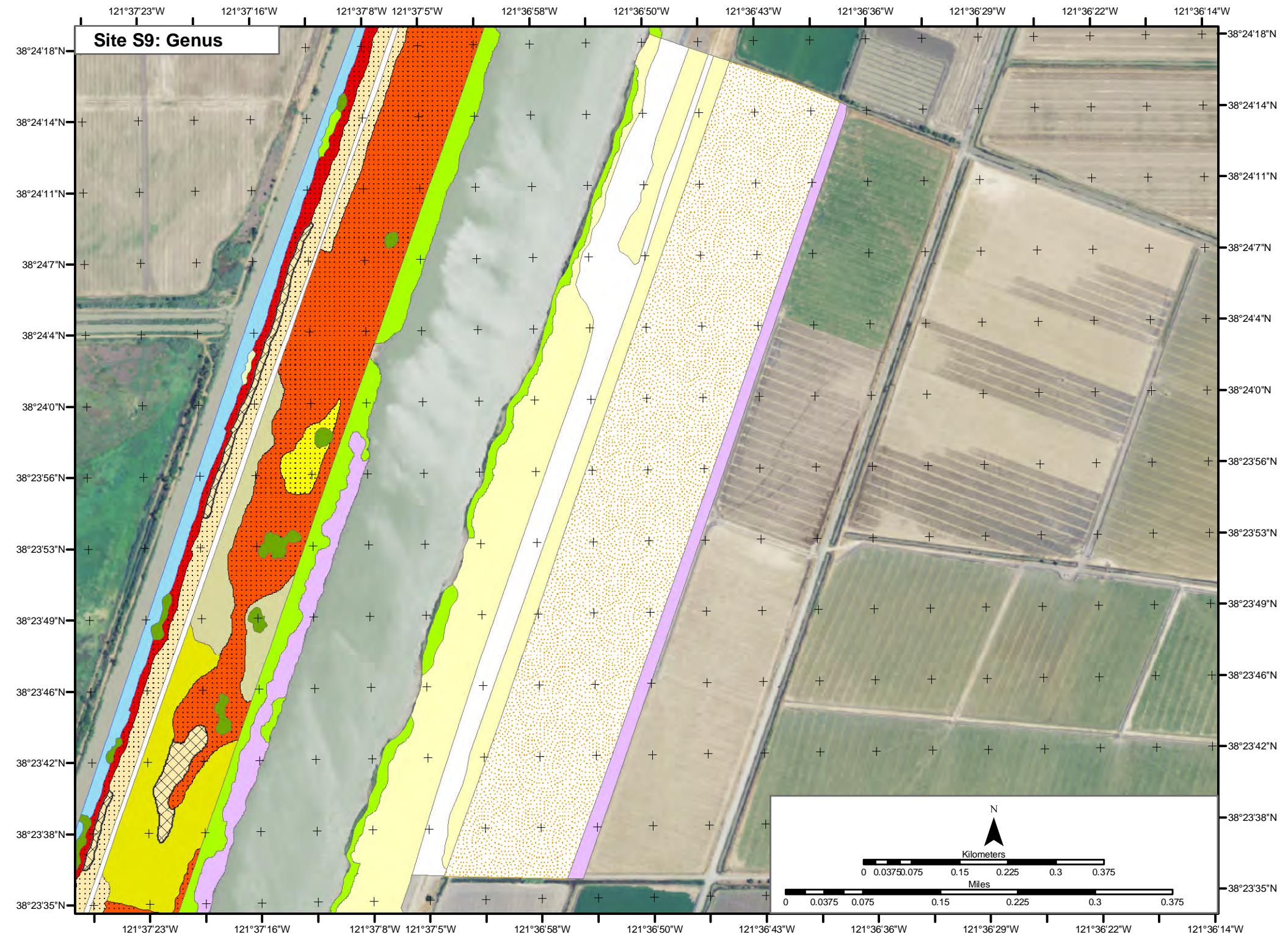






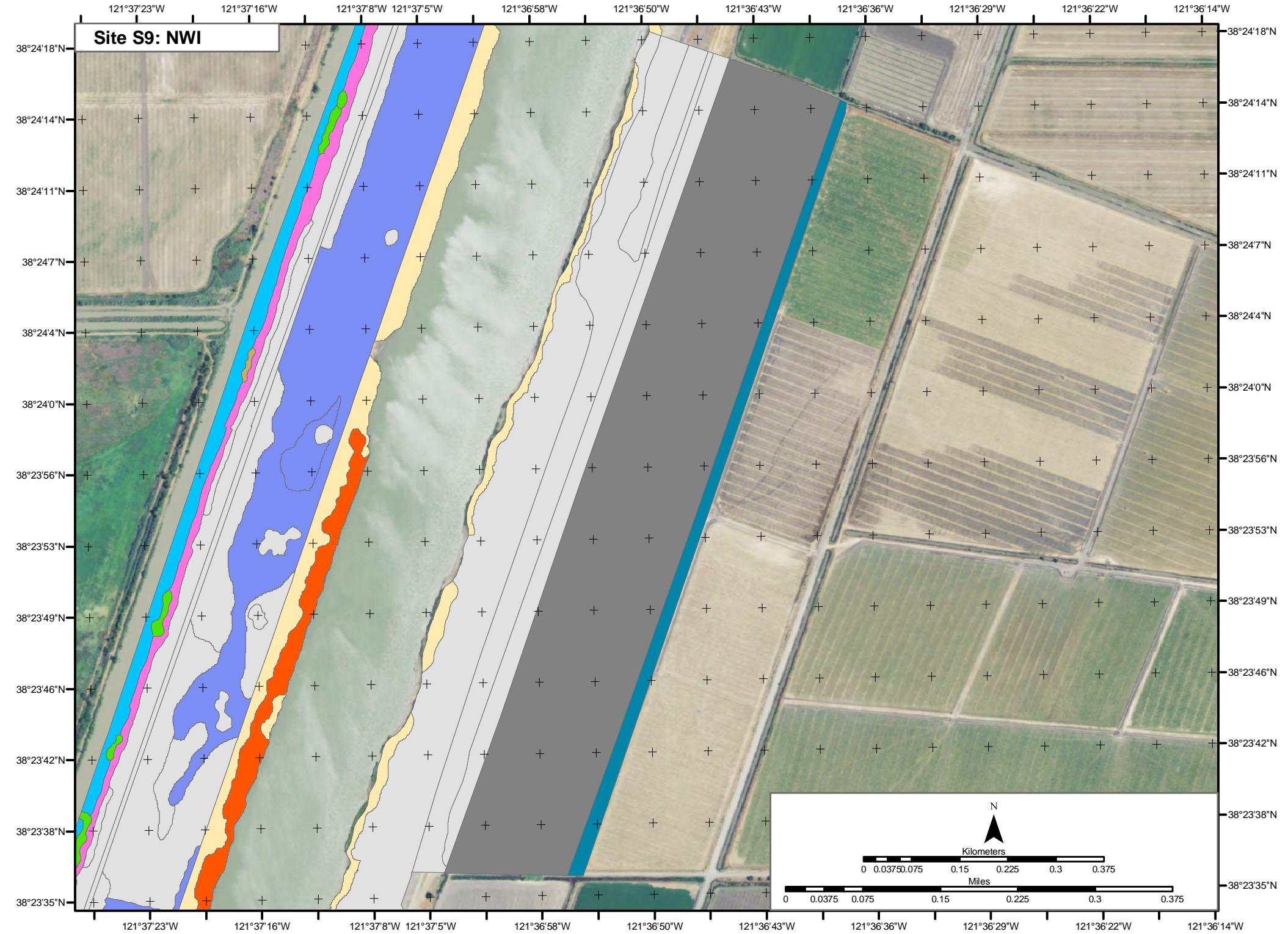


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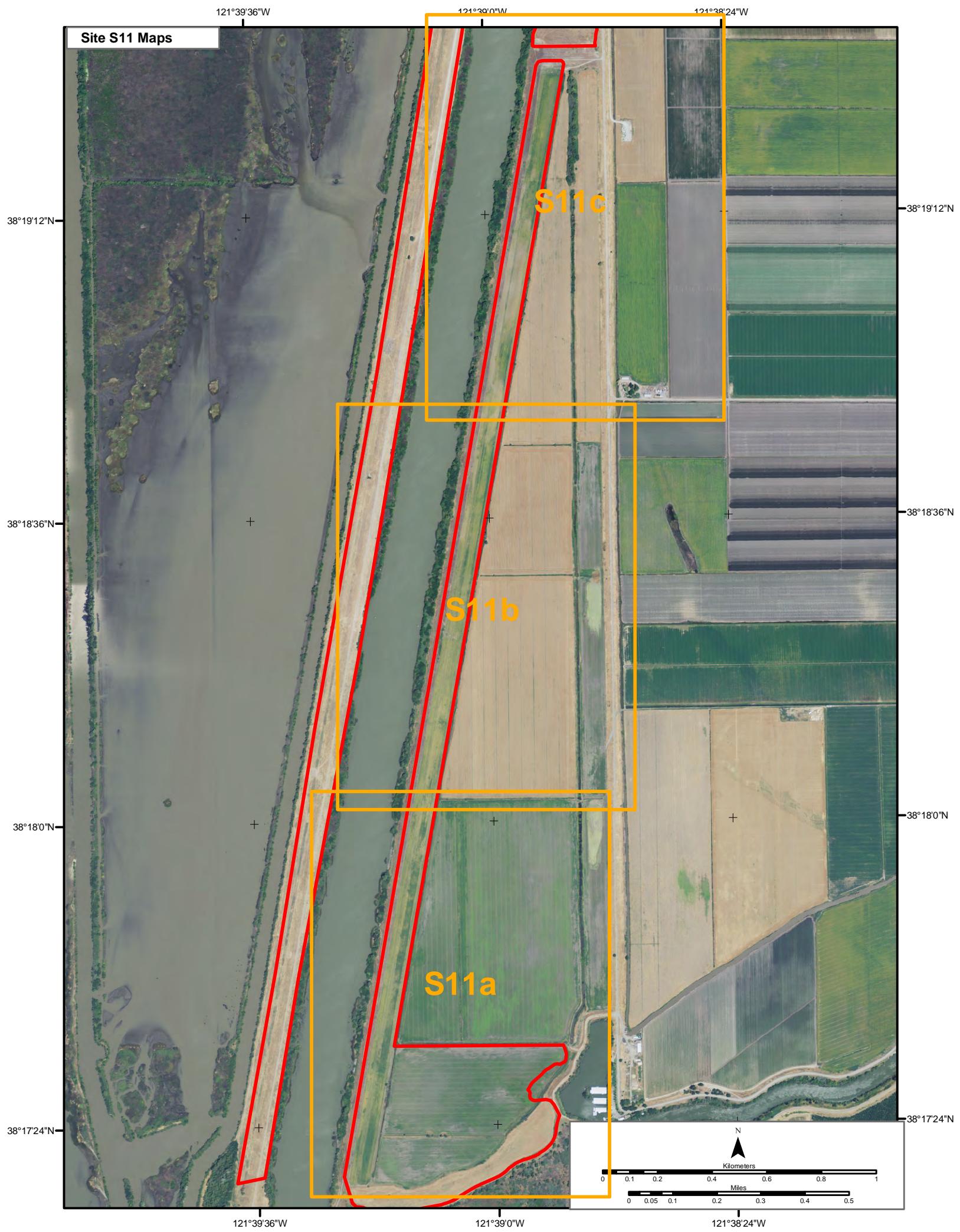


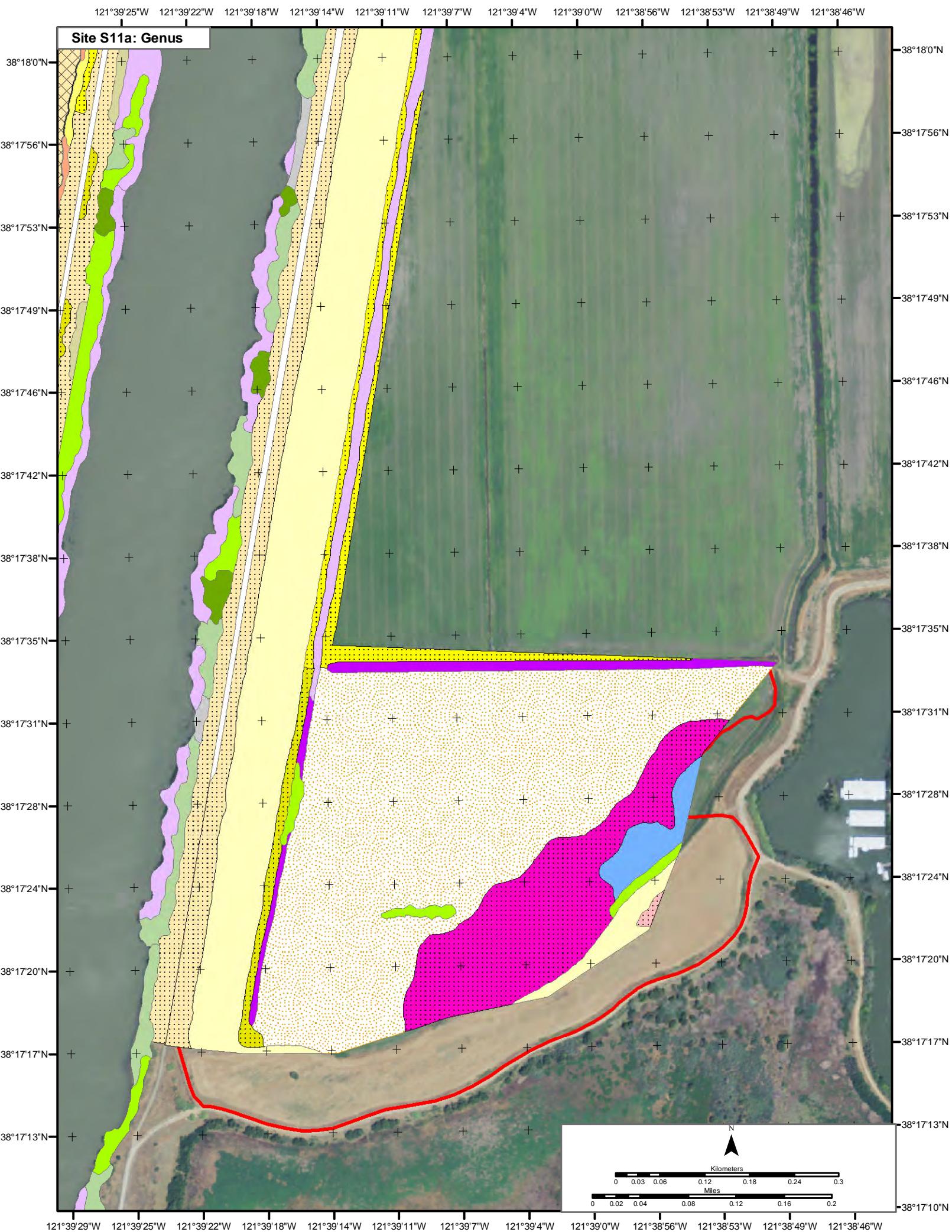


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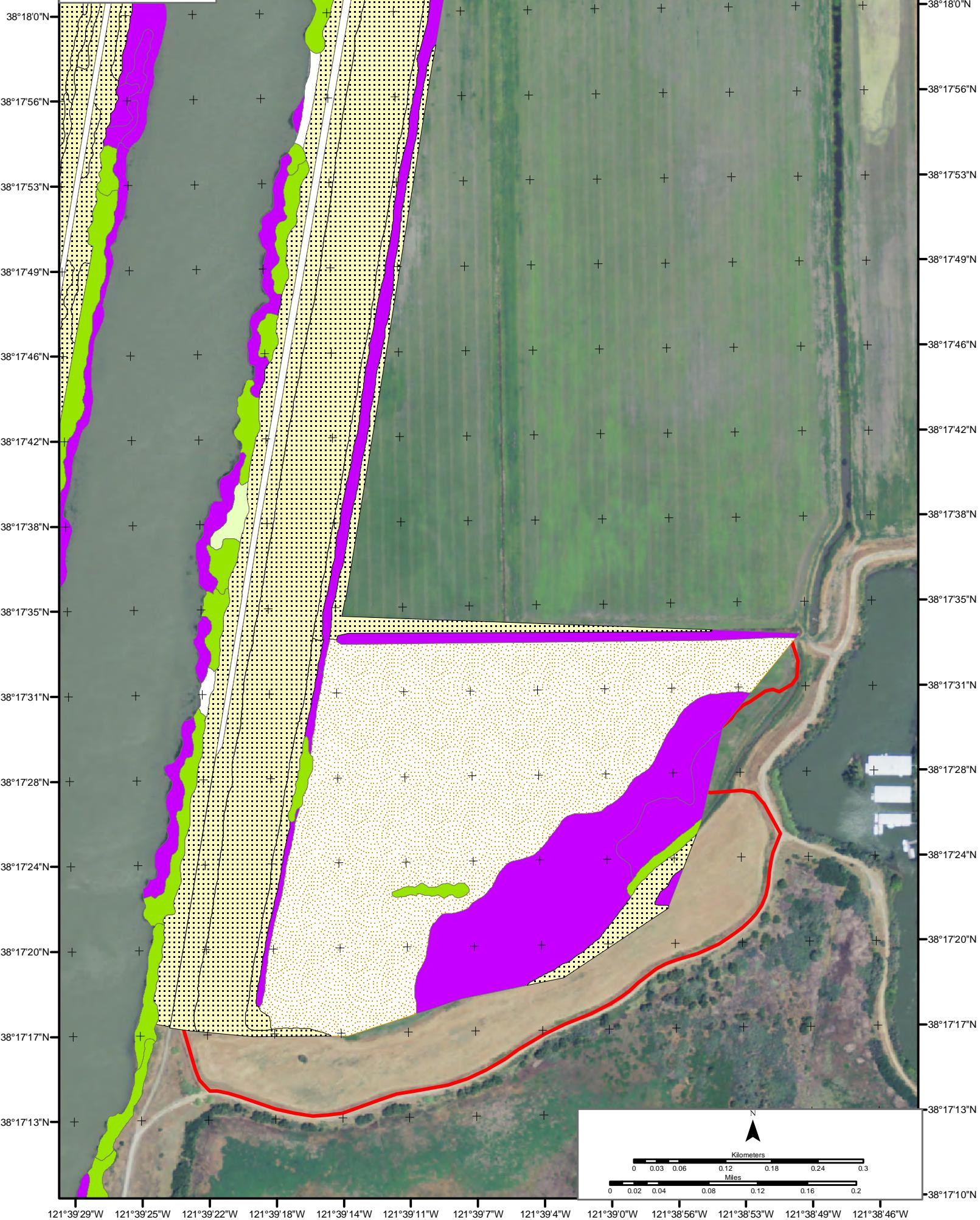
Site S11 Maps





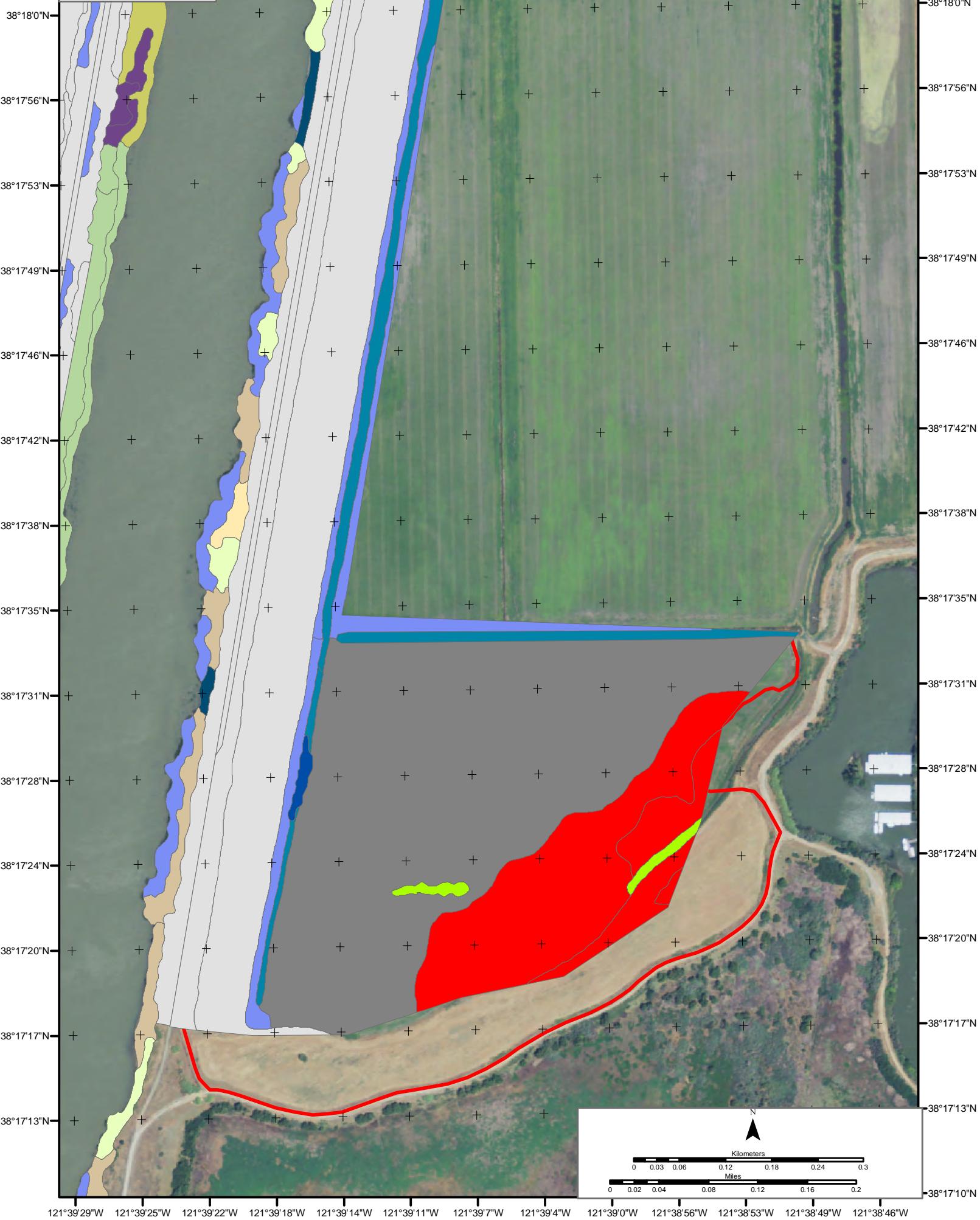
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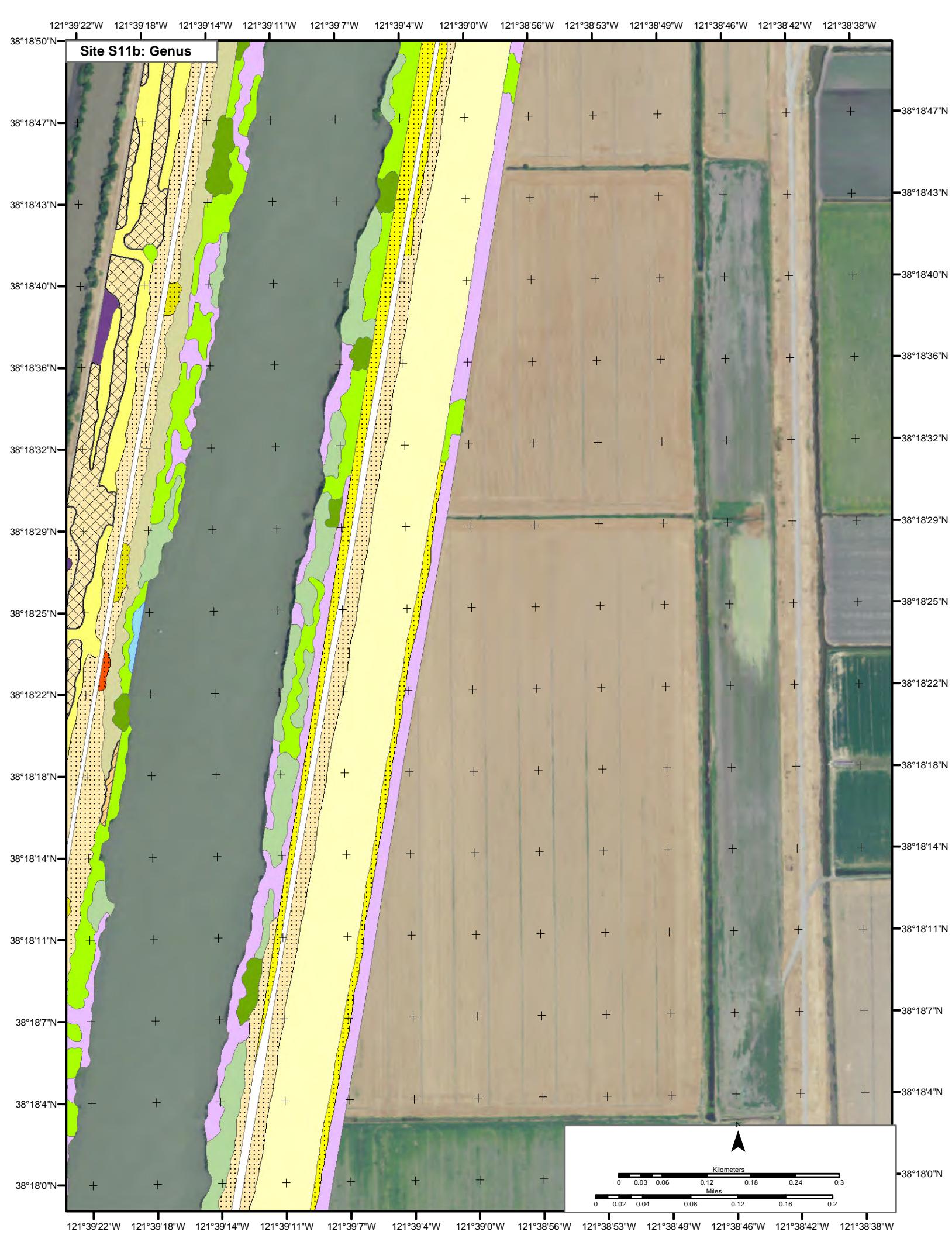
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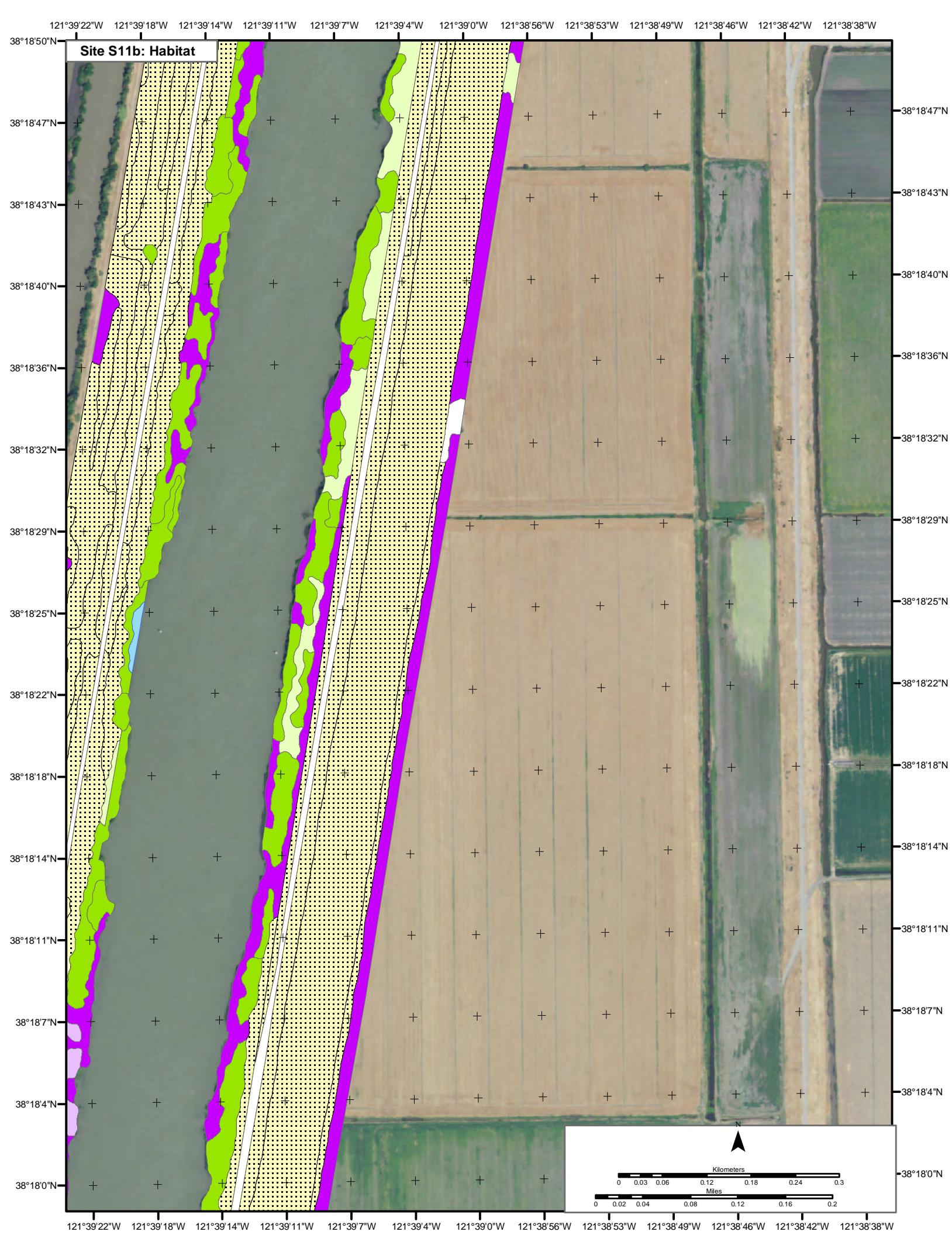


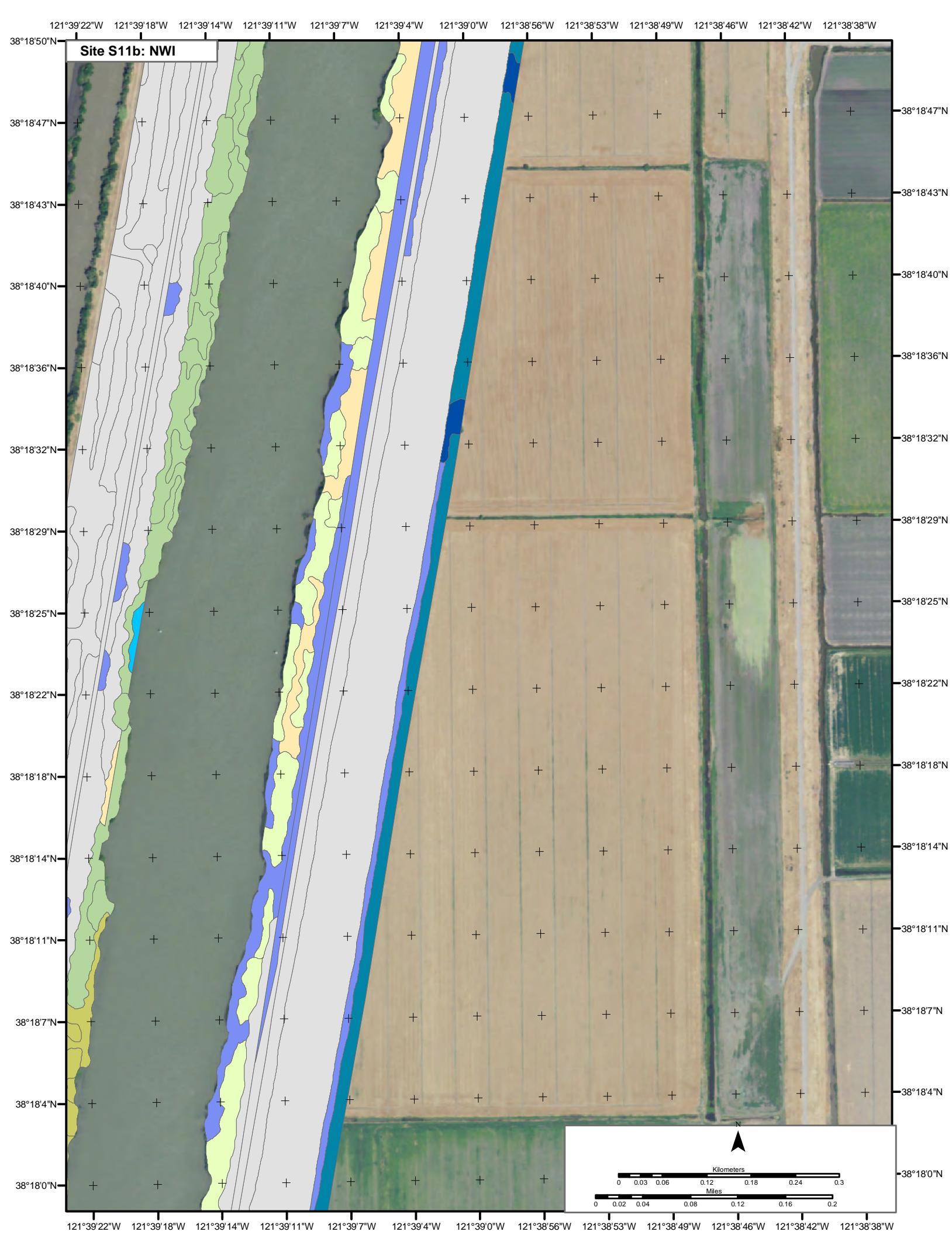
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Site S11a: NWI



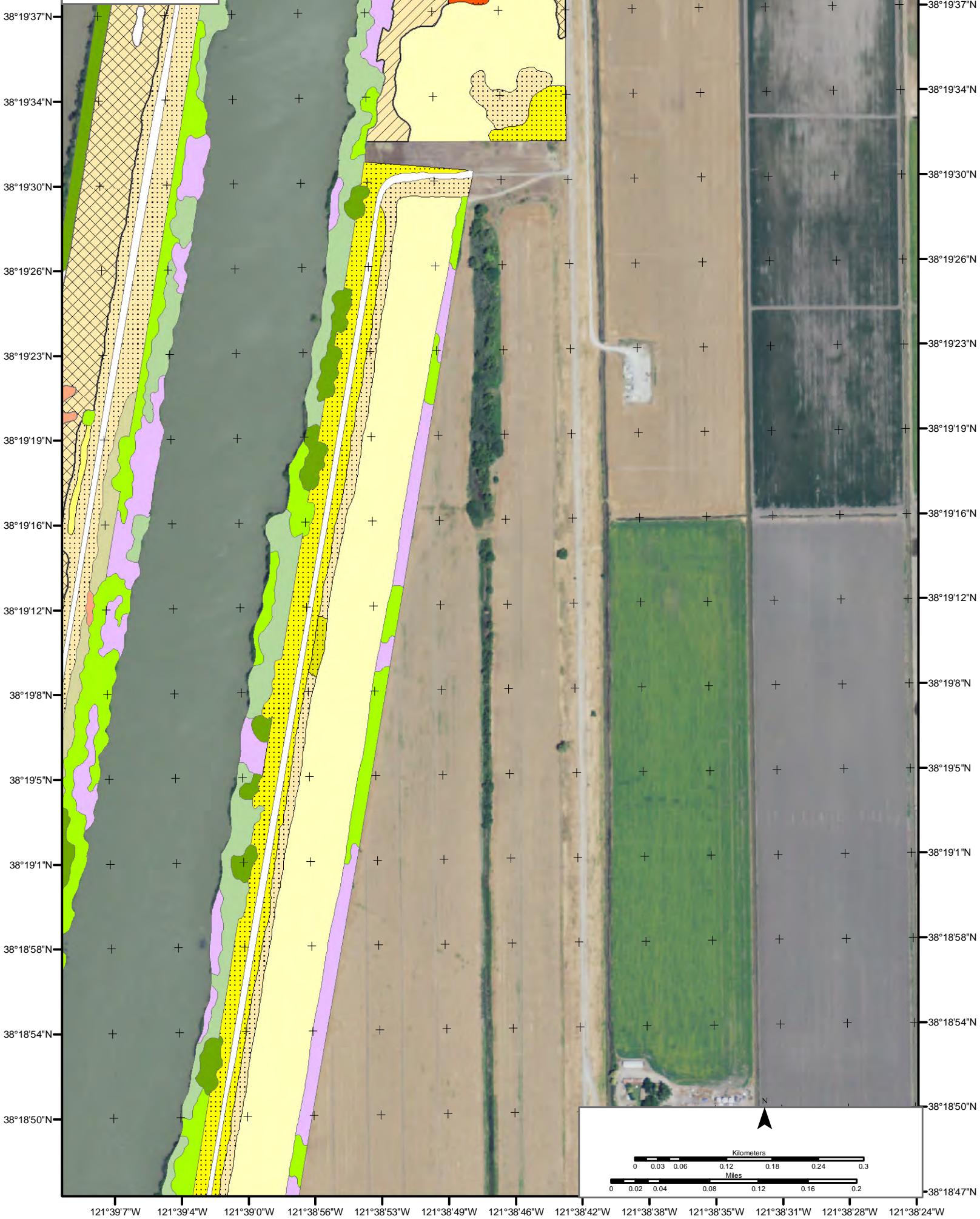






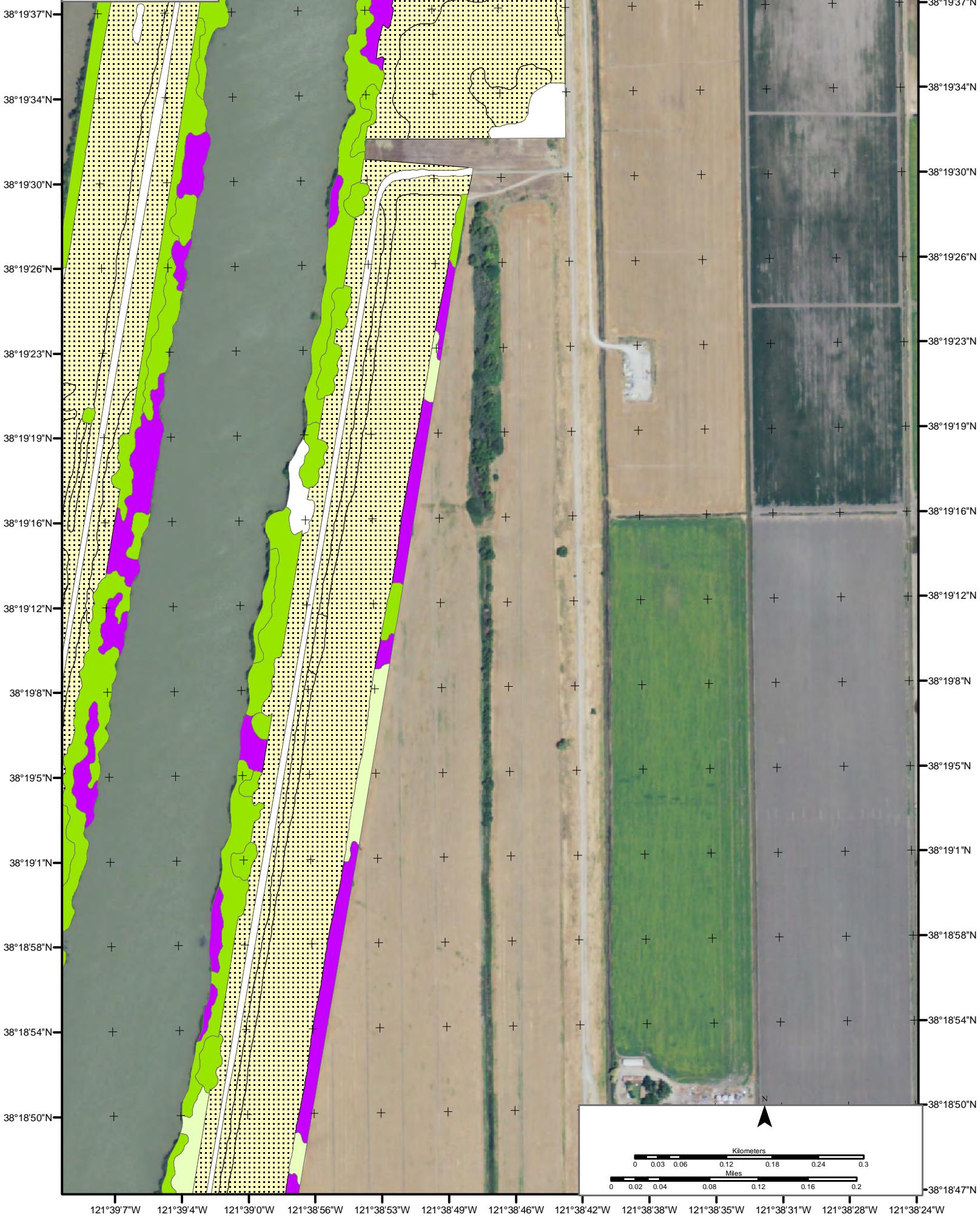
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Site S11c: Genus

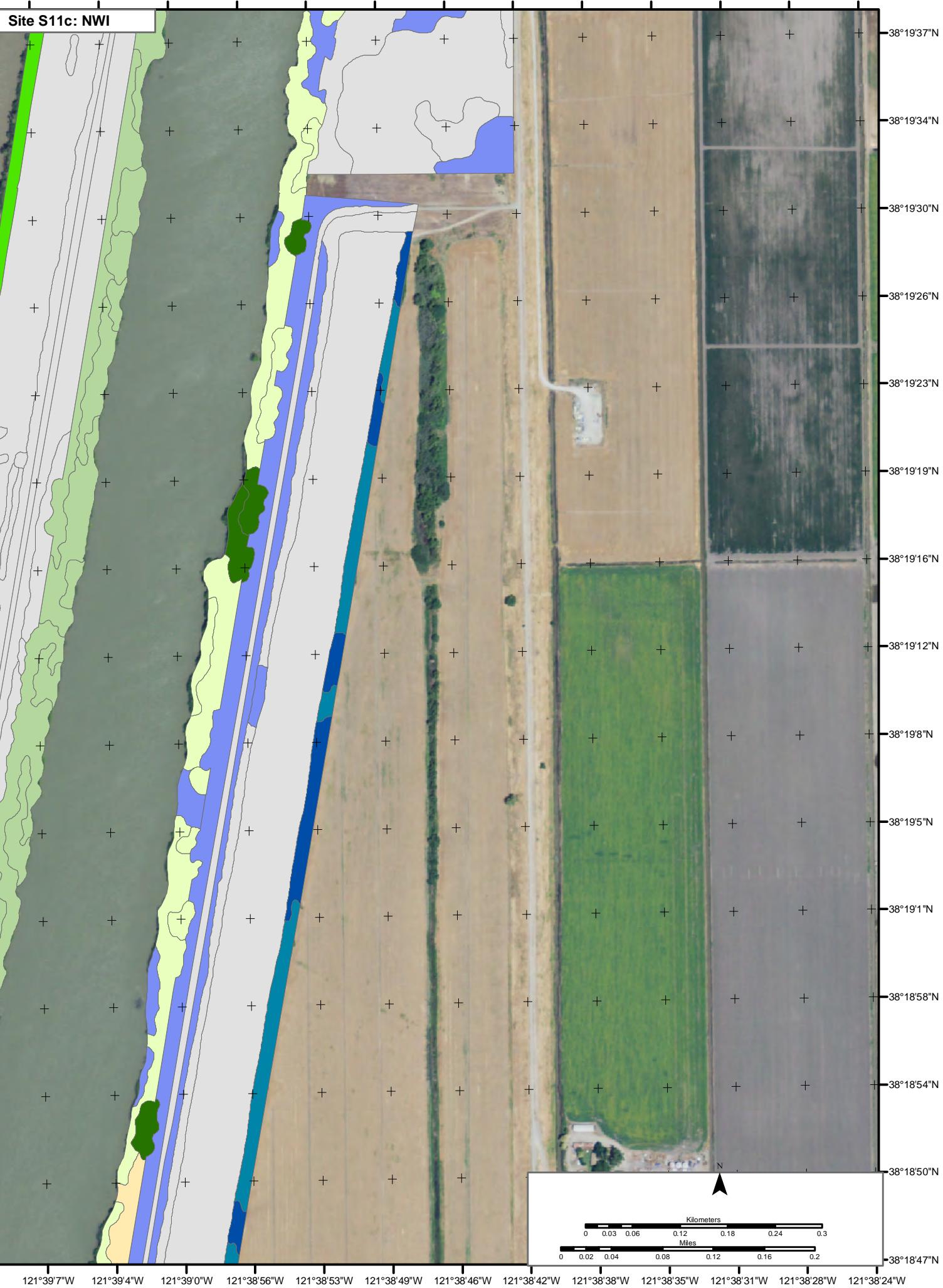


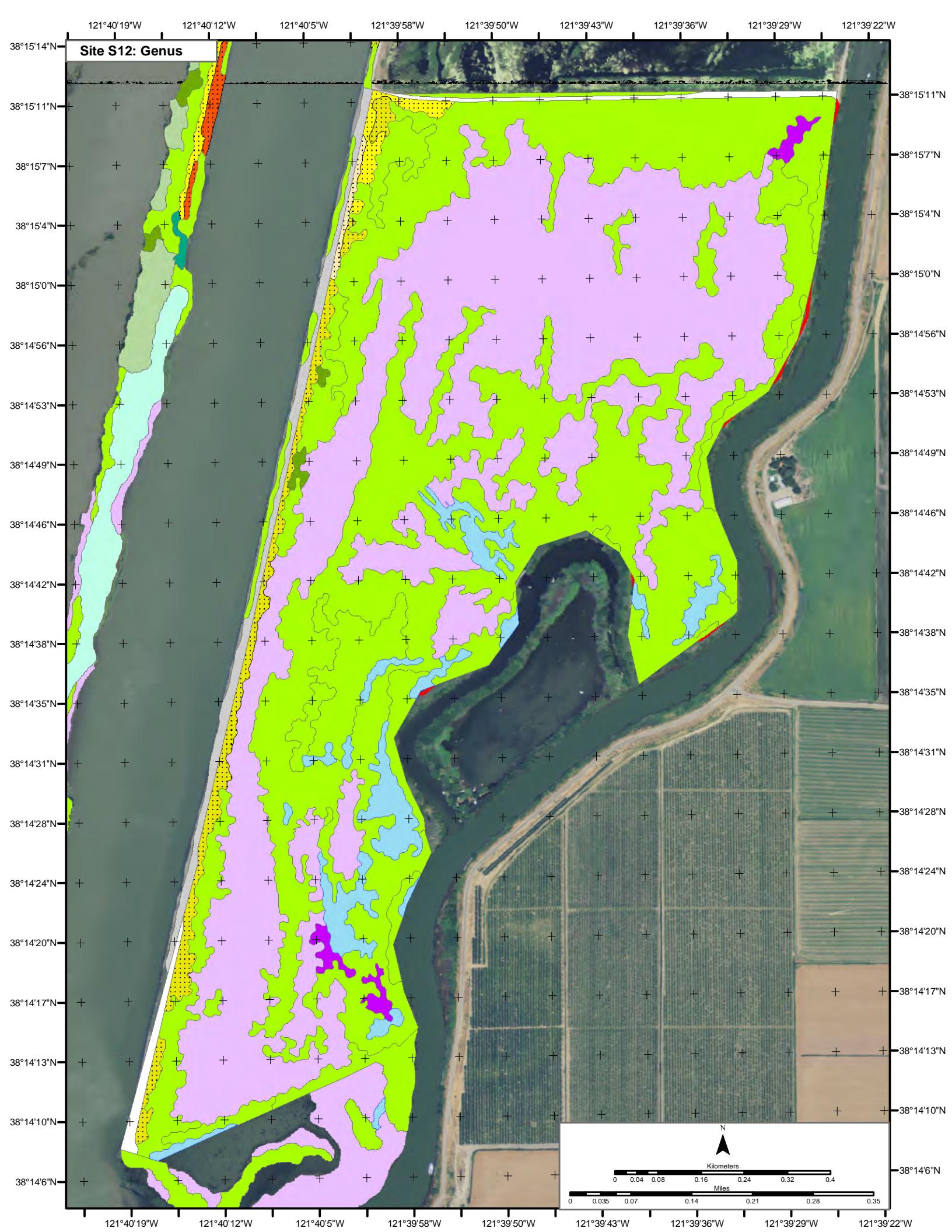
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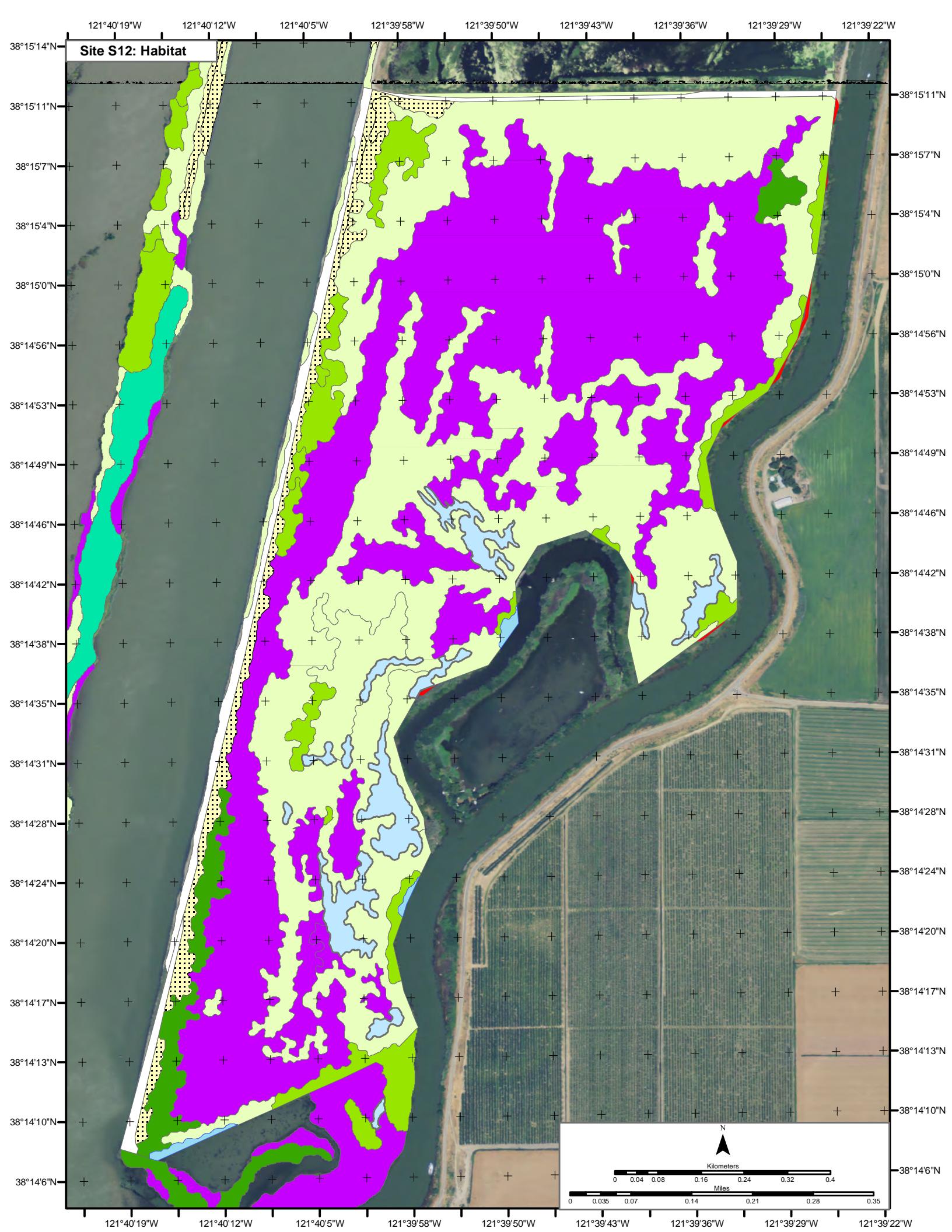
Site S11c: Habitat

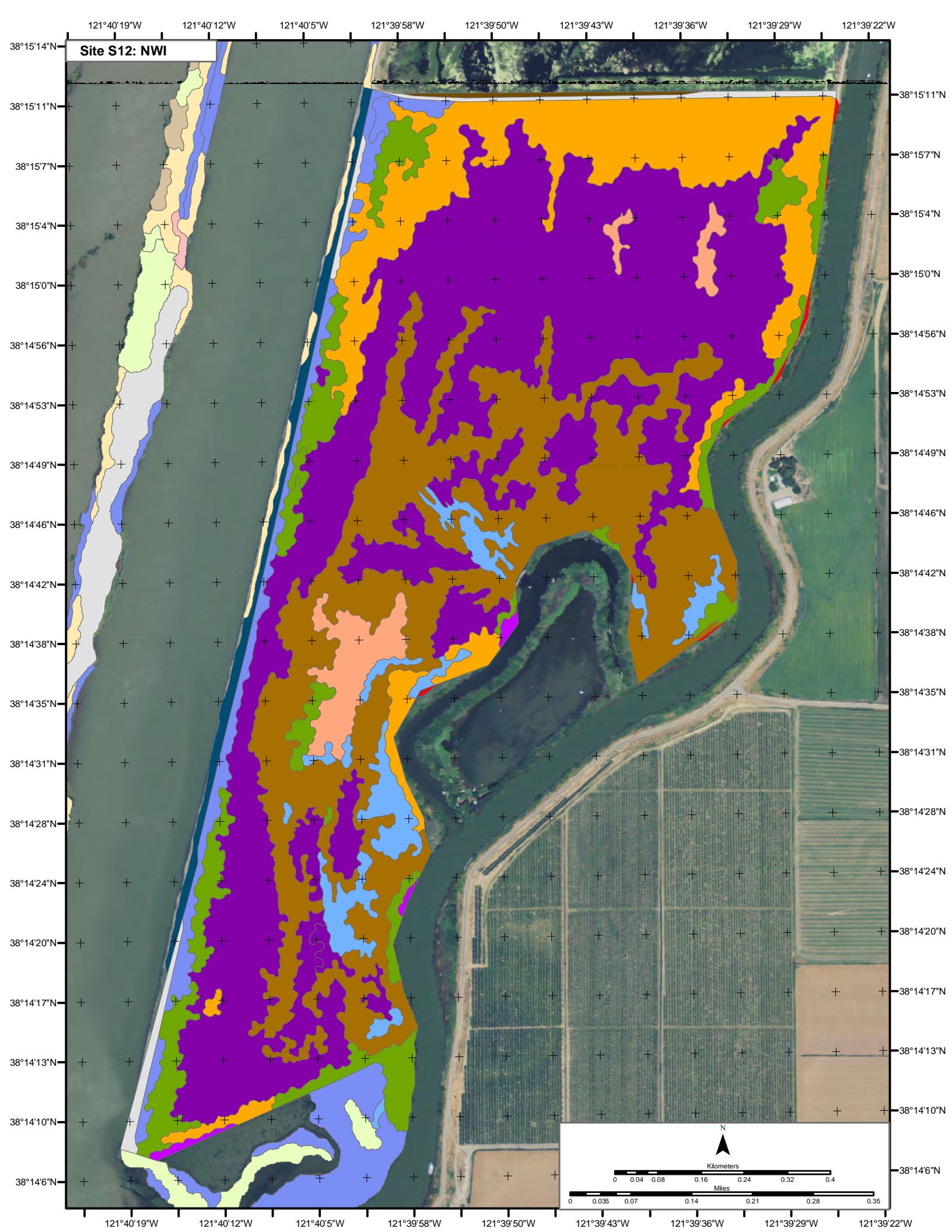


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121°41'35"W

121°41'31"W

121°41'28"W

121°41'24"W

121°41'20"W

121°41'17"W

Site S13: Genus

+

+

+

+

+

38°11'16"N

+

+

+

+

38°11'12"N

+

+

+

+

38°10'59"N

+

+

+

+

38°10'55"N

+

+

+

+

38°10'52"N

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+

+

+

38°10'48"N

+

+

+

+

38°10'44"N

121°41'35"W

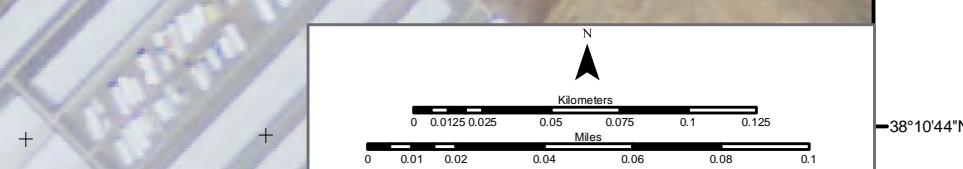
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121°41'28"W

121°41'24"W

121°41'20"W

121°41'17"W



121°41'35"W

121°41'31"W

121°41'28"W

121°41'24"W

121°41'20"W

121°41'17"W

Site S13: Habitat

+

+

+

38°11'16"N

+

+

+

38°11'12"N

+

+

+

38°10'59"N

+

+

+

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+

+

+

38°10'52"N

+

+

+

38°10'48"N

+

+

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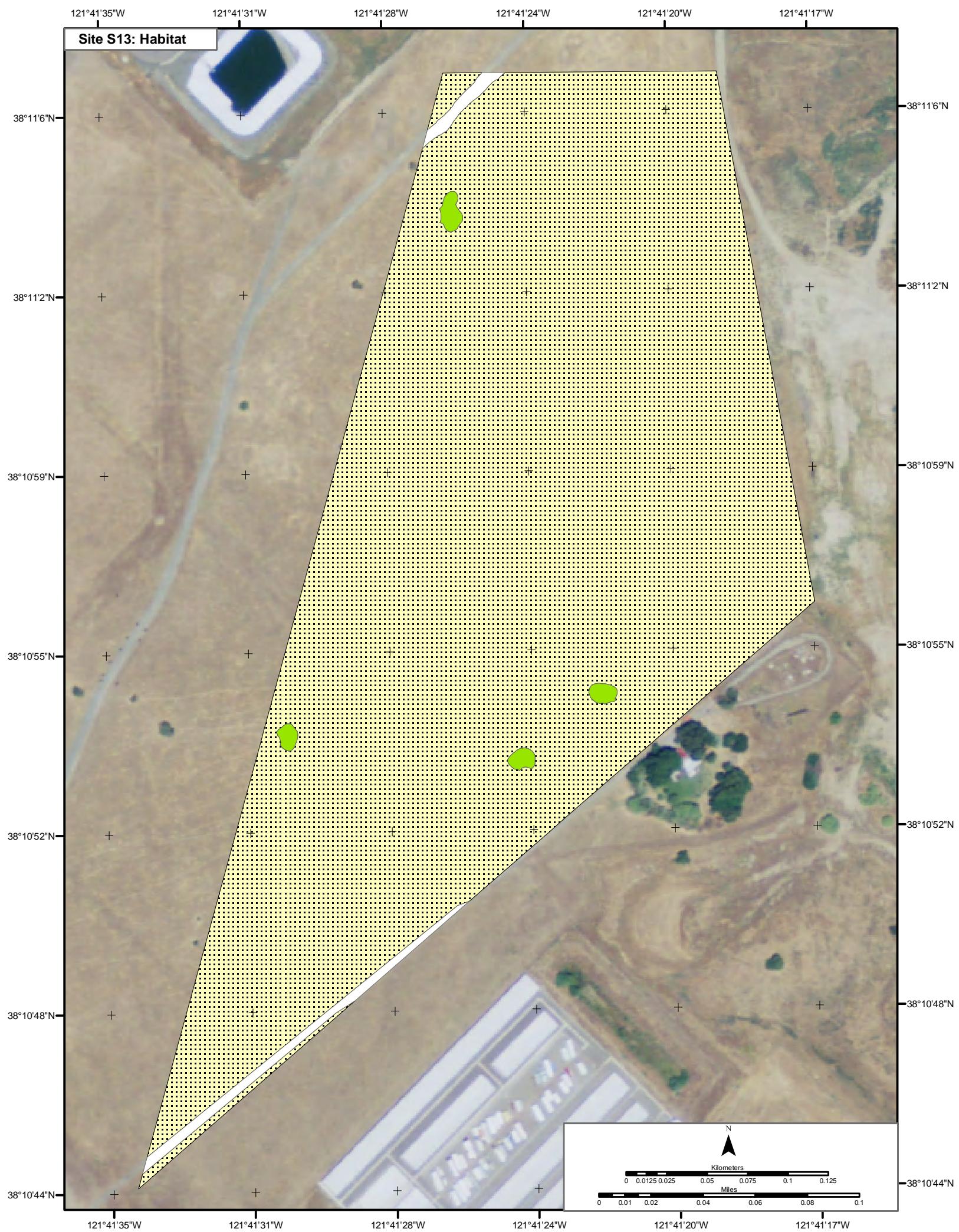
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121°41'20"W

121°41'17"W



121°41'35"W

121°41'31"W

121°41'28"W

121°41'24"W

121°41'20"W

121°41'17"W

Site S13: NWI

38°11'6"N

38°11'6"N

38°11'2"N

38°11'2"N

38°10'59"N

38°10'59"N

38°10'55"N

38°10'55"N

38°10'52"N

38°10'52"N

38°10'48"N

38°10'48"N

38°10'44"N

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121°41'17"W

121°41'35"W

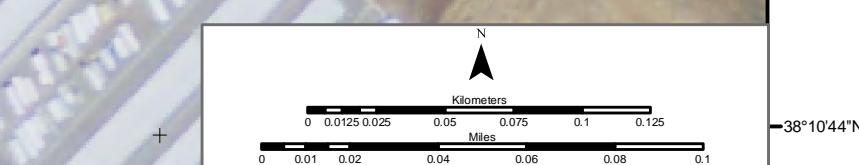
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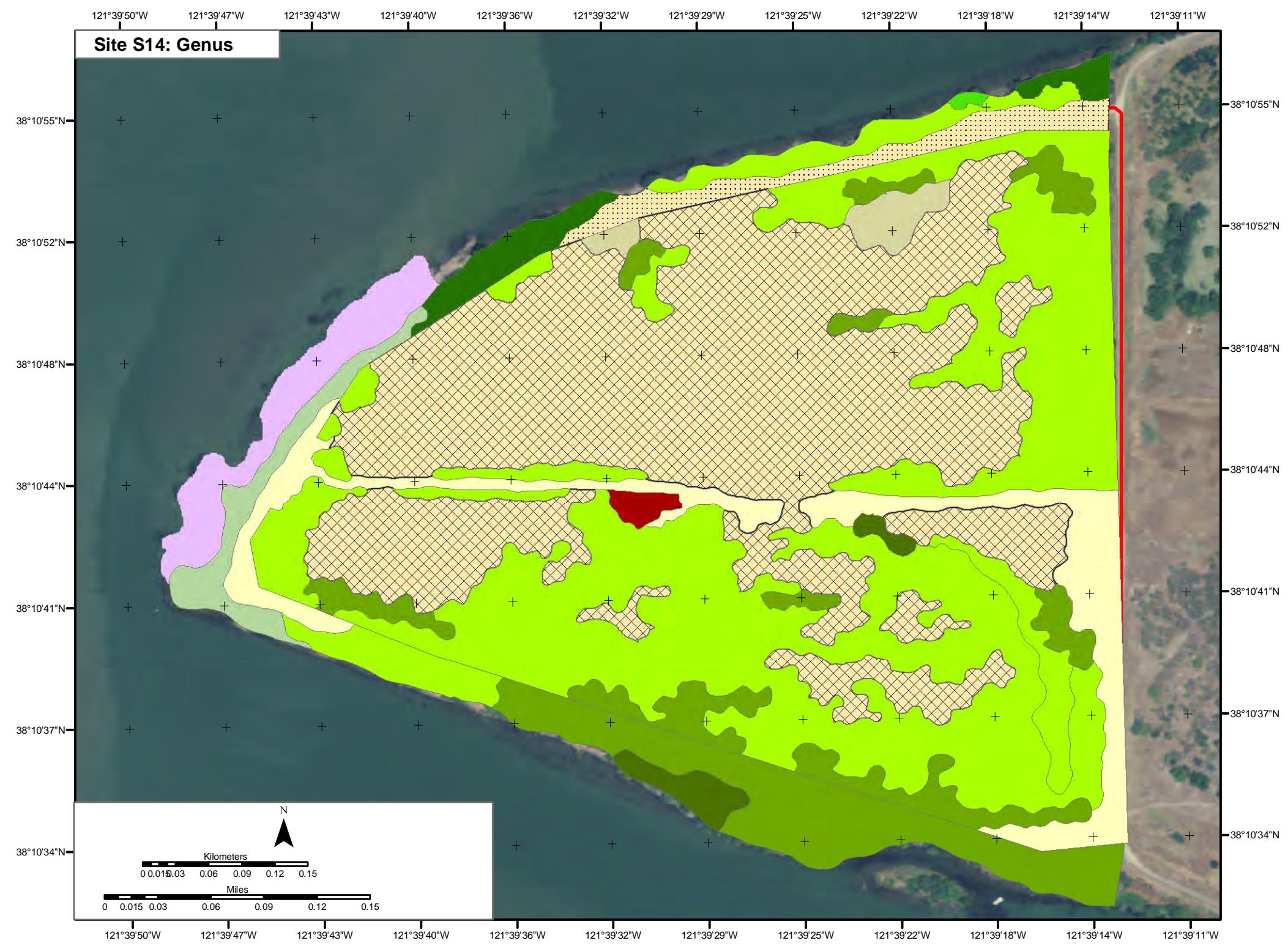
121°41'24"W

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121°41'17"W



Site S14: Genus



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Site S14: Habitat

38°10'55"N

38°10'55"N

38°10'52"N

38°10'52"N

38°10'48"N

38°10'48"N

38°10'44"N

38°10'44"N

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38°10'37"N

38°10'37"N

38°10'34"N

38°10'34"N



Kilometers

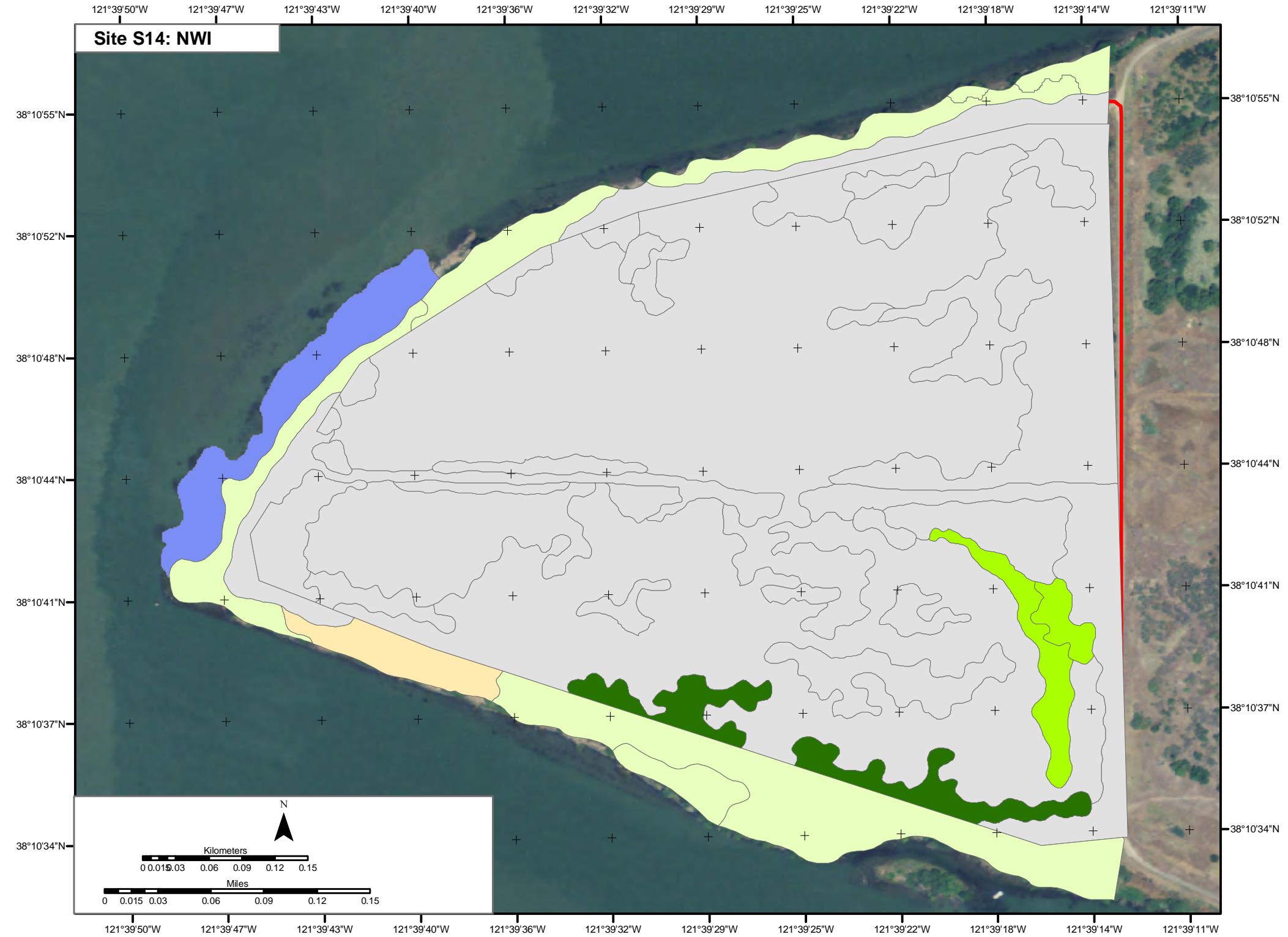
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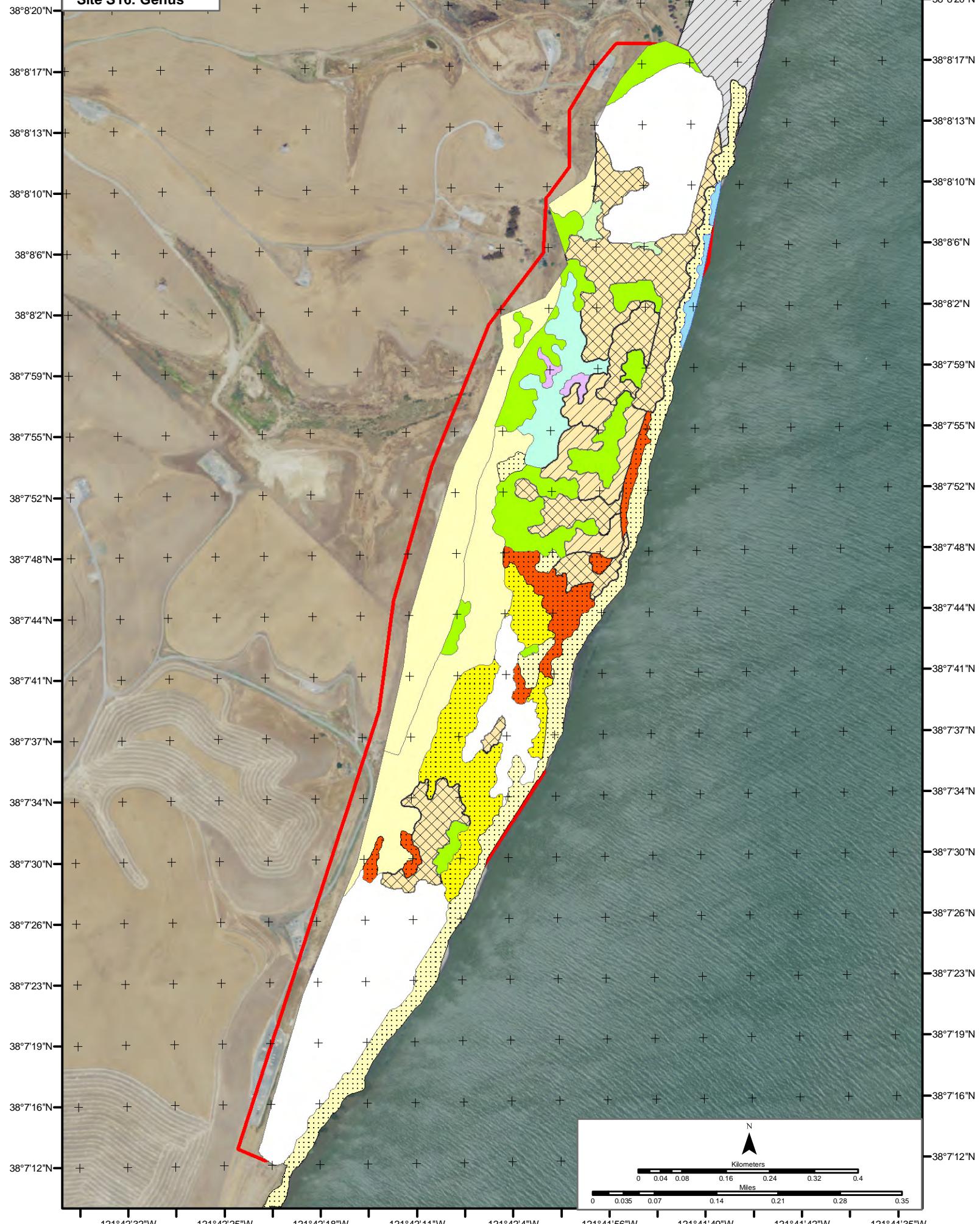
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Site S14: NWI



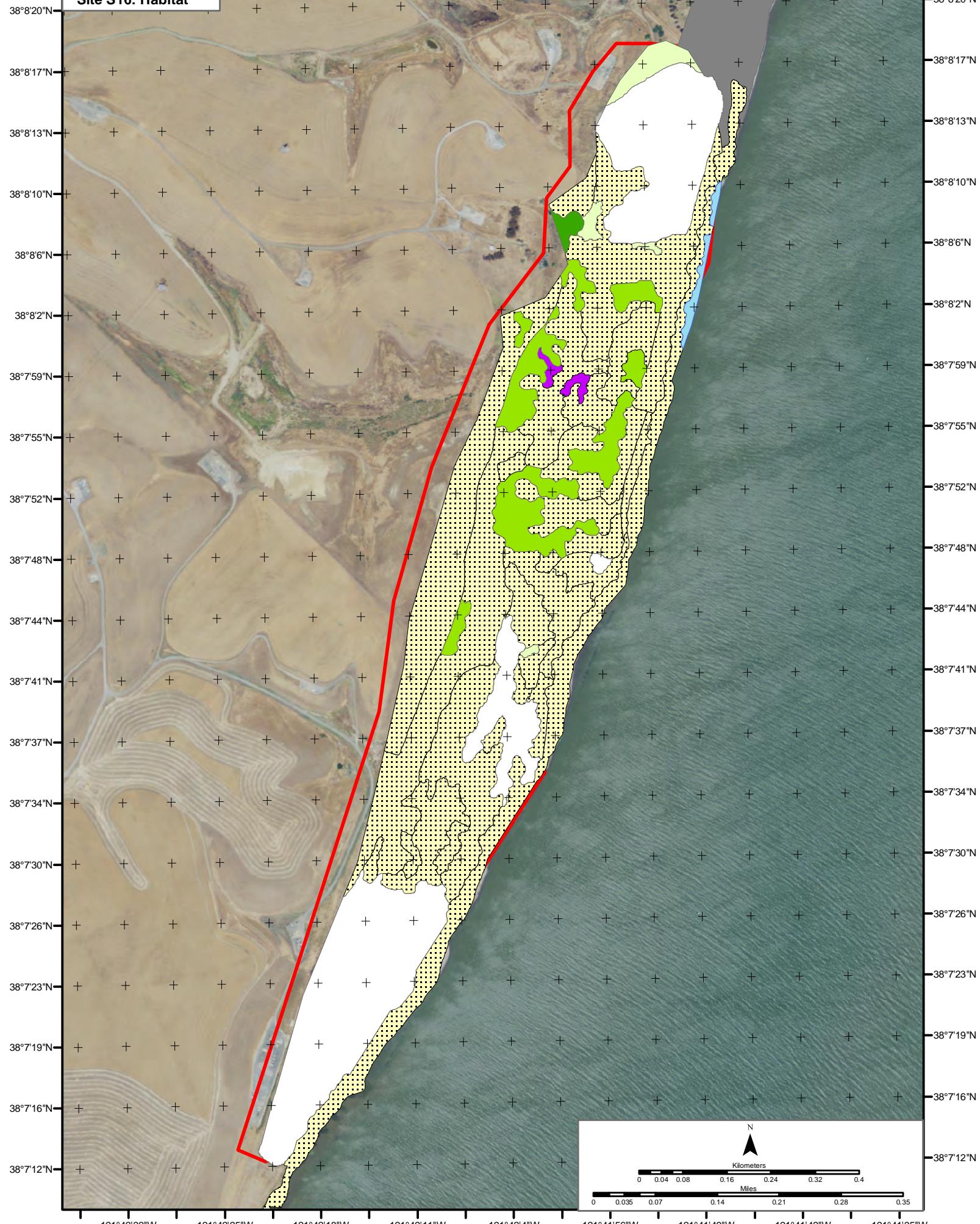
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Site S16: Genus



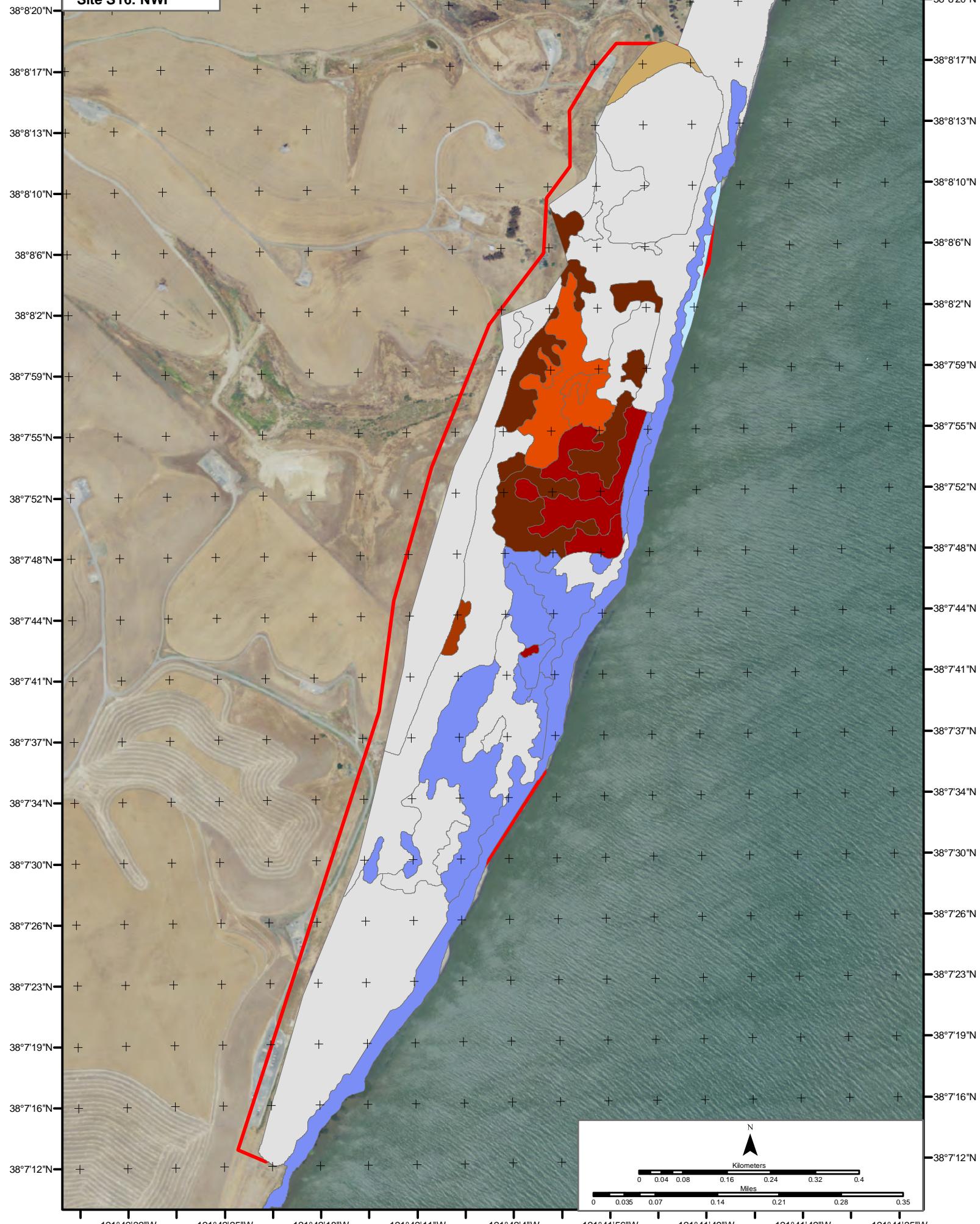
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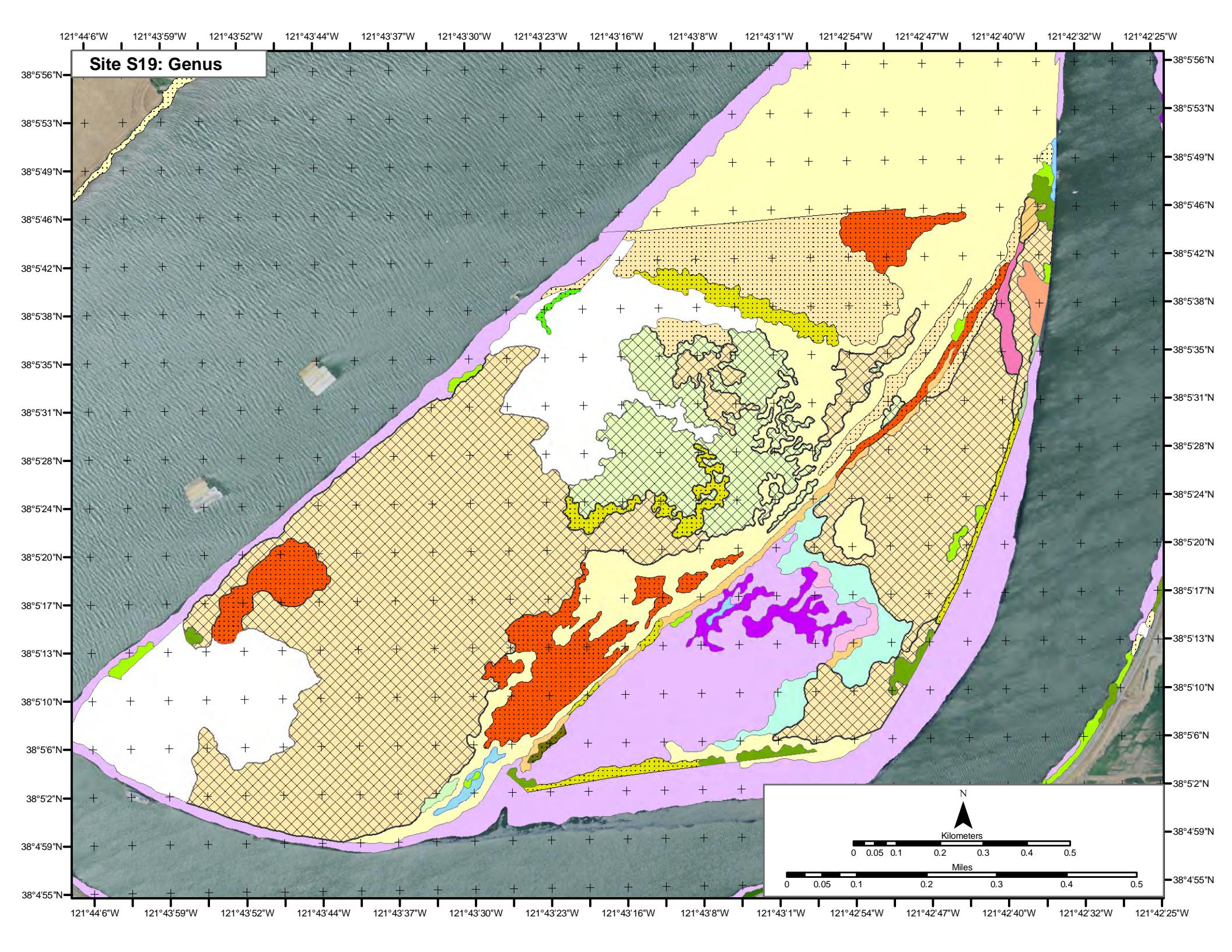
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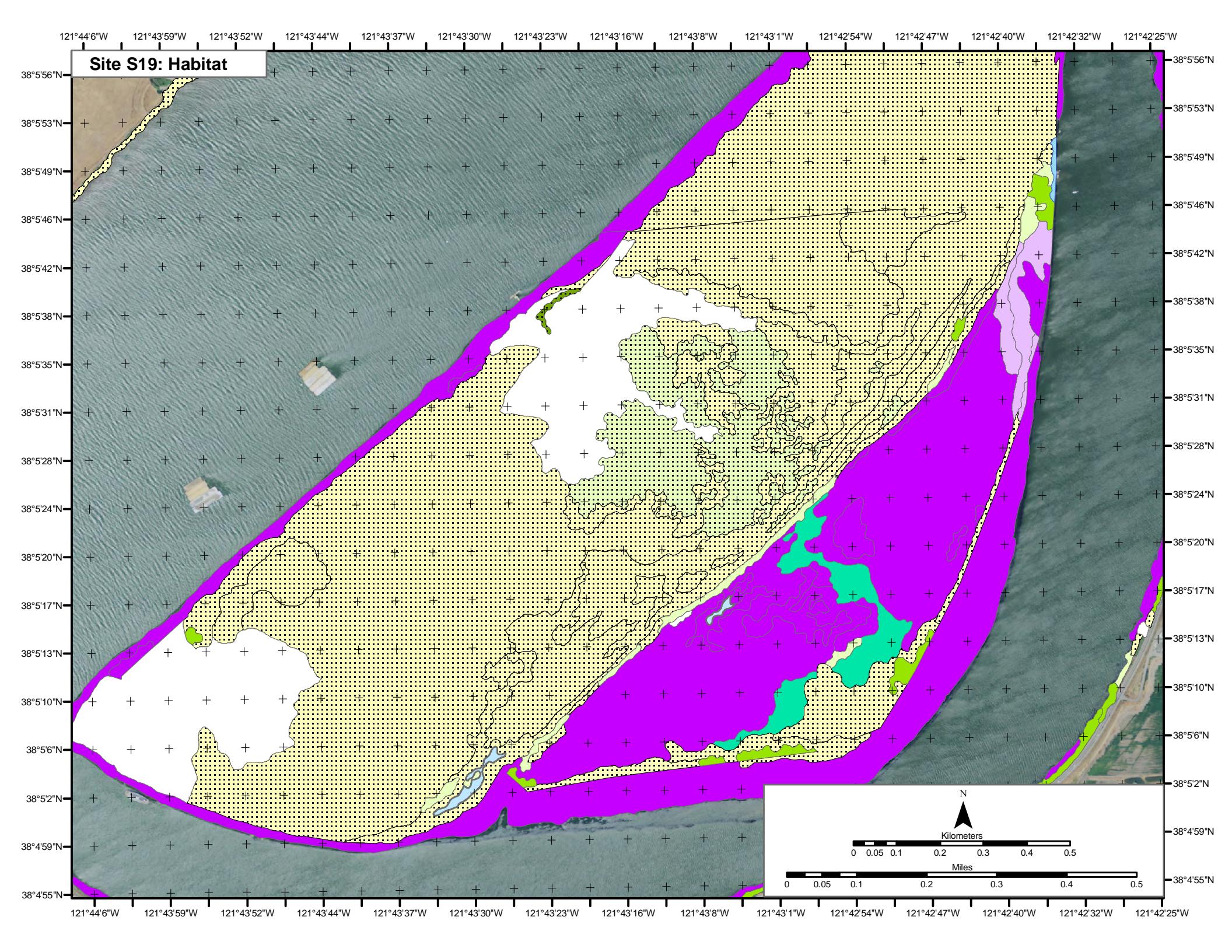


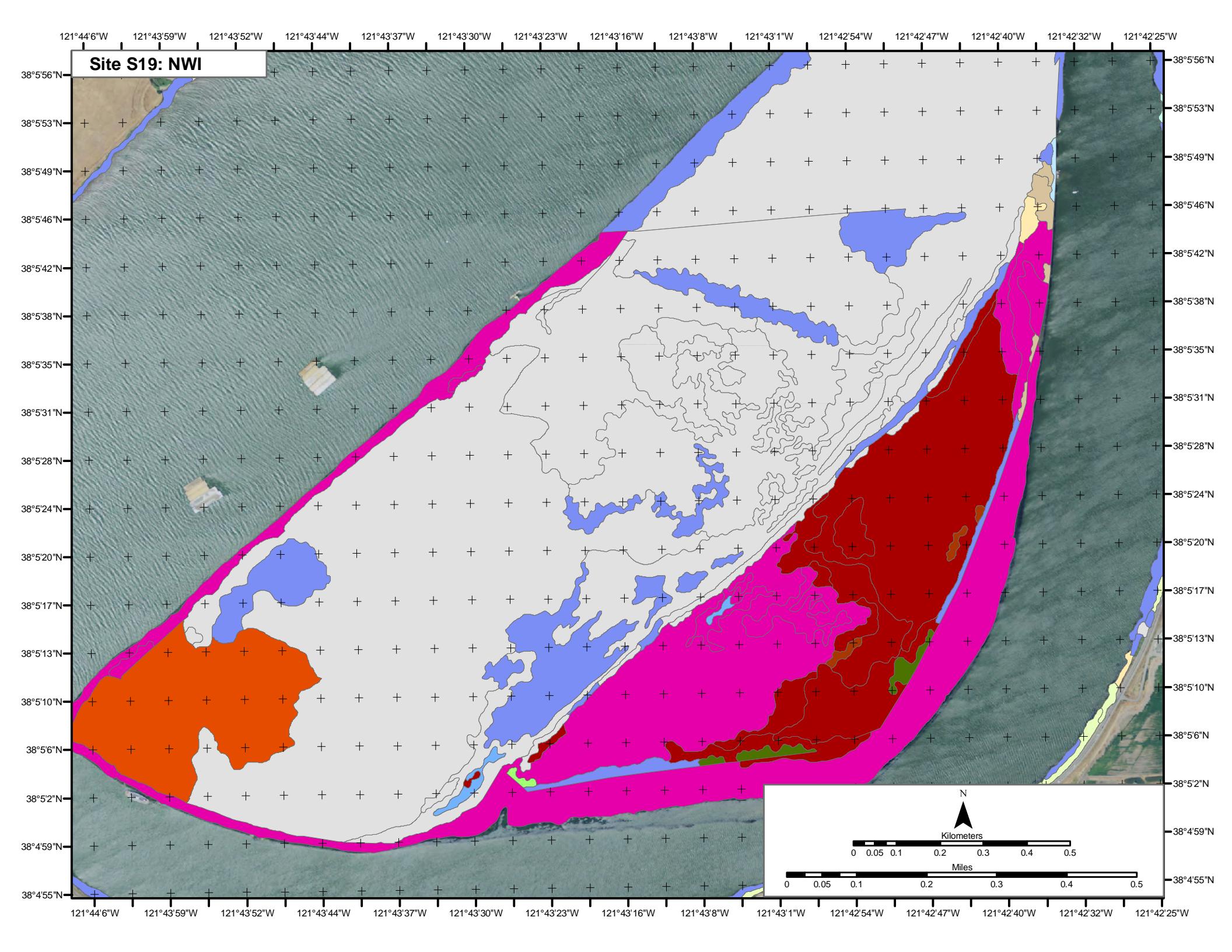
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Site S16: NWI



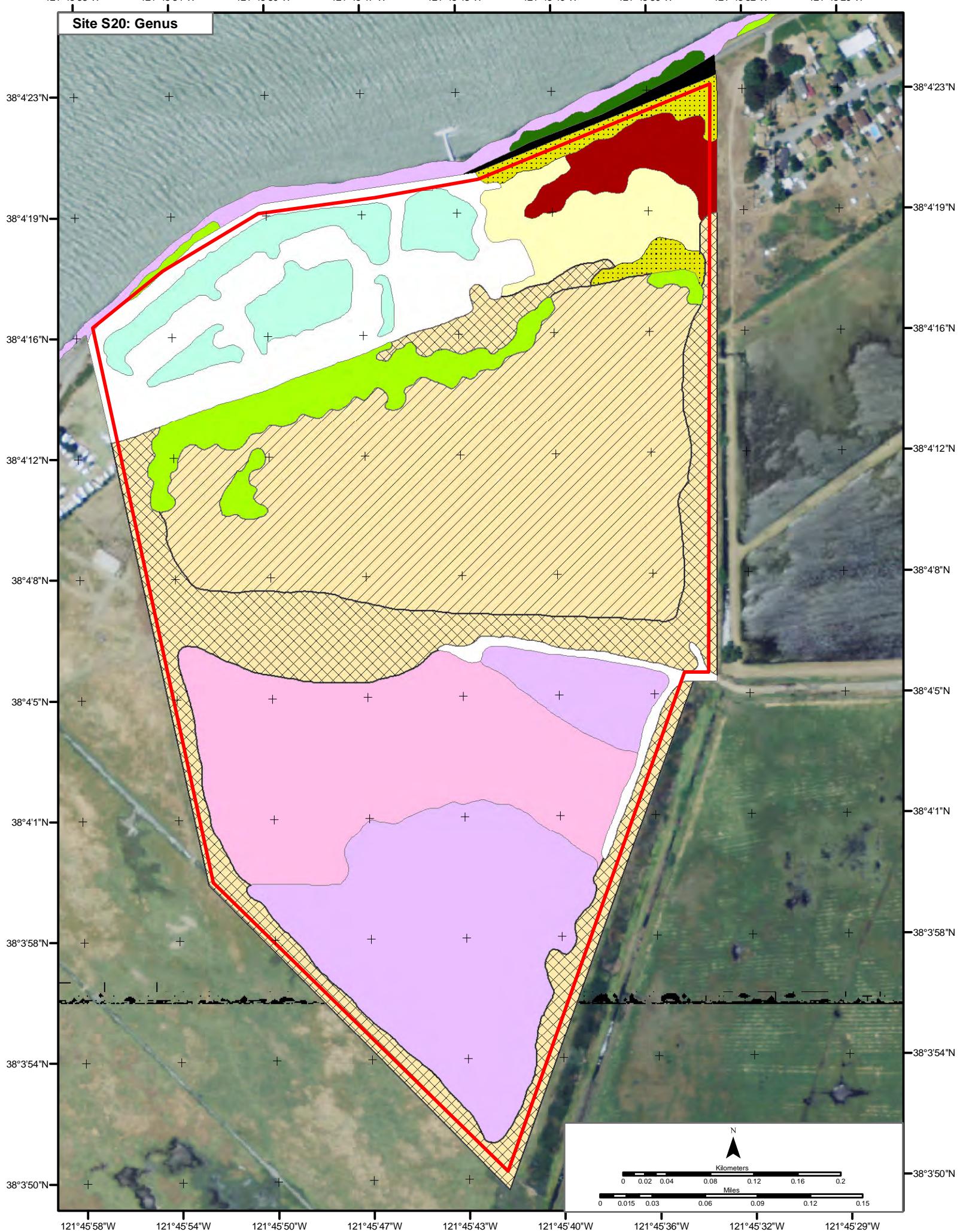






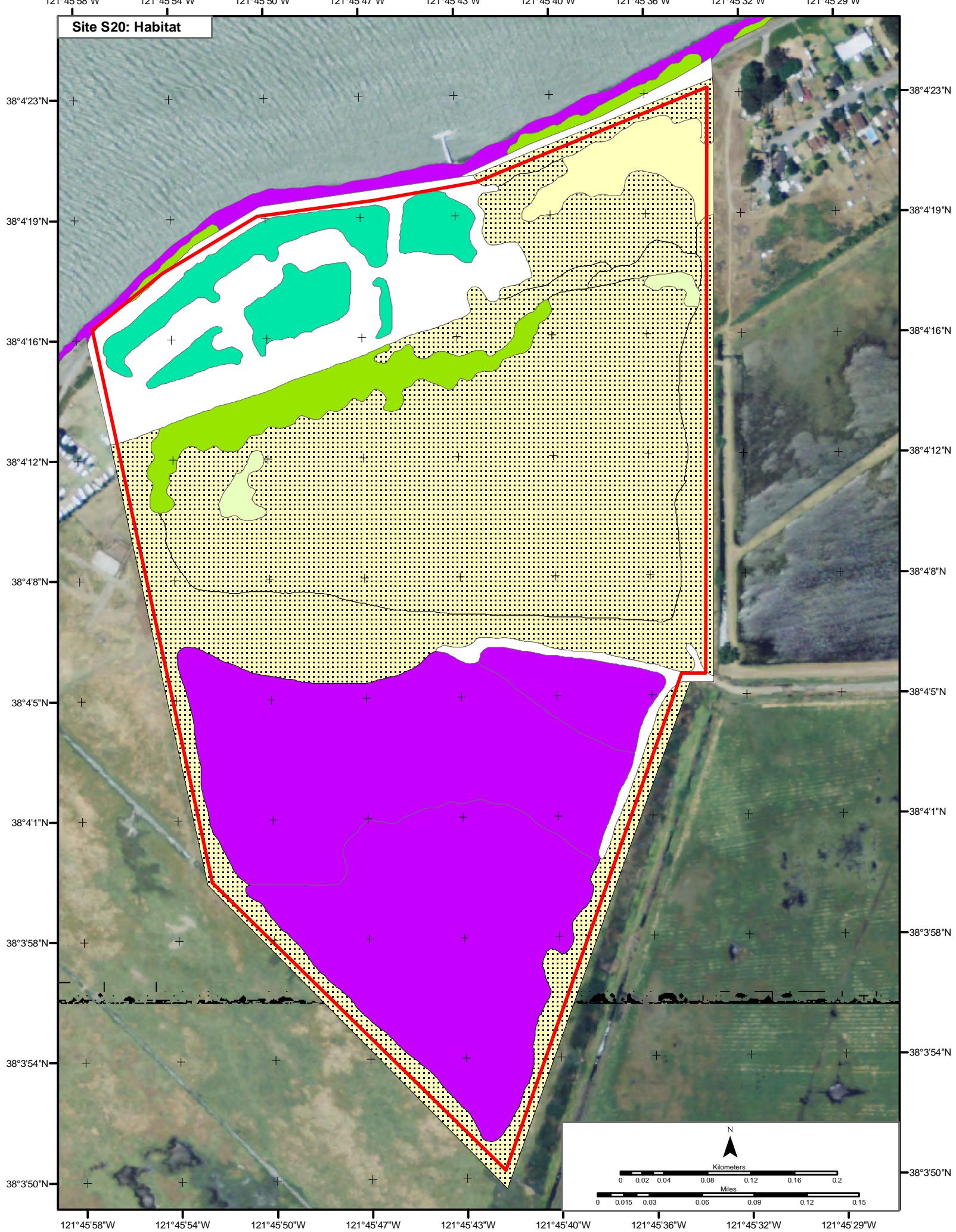
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Site S20: Genus



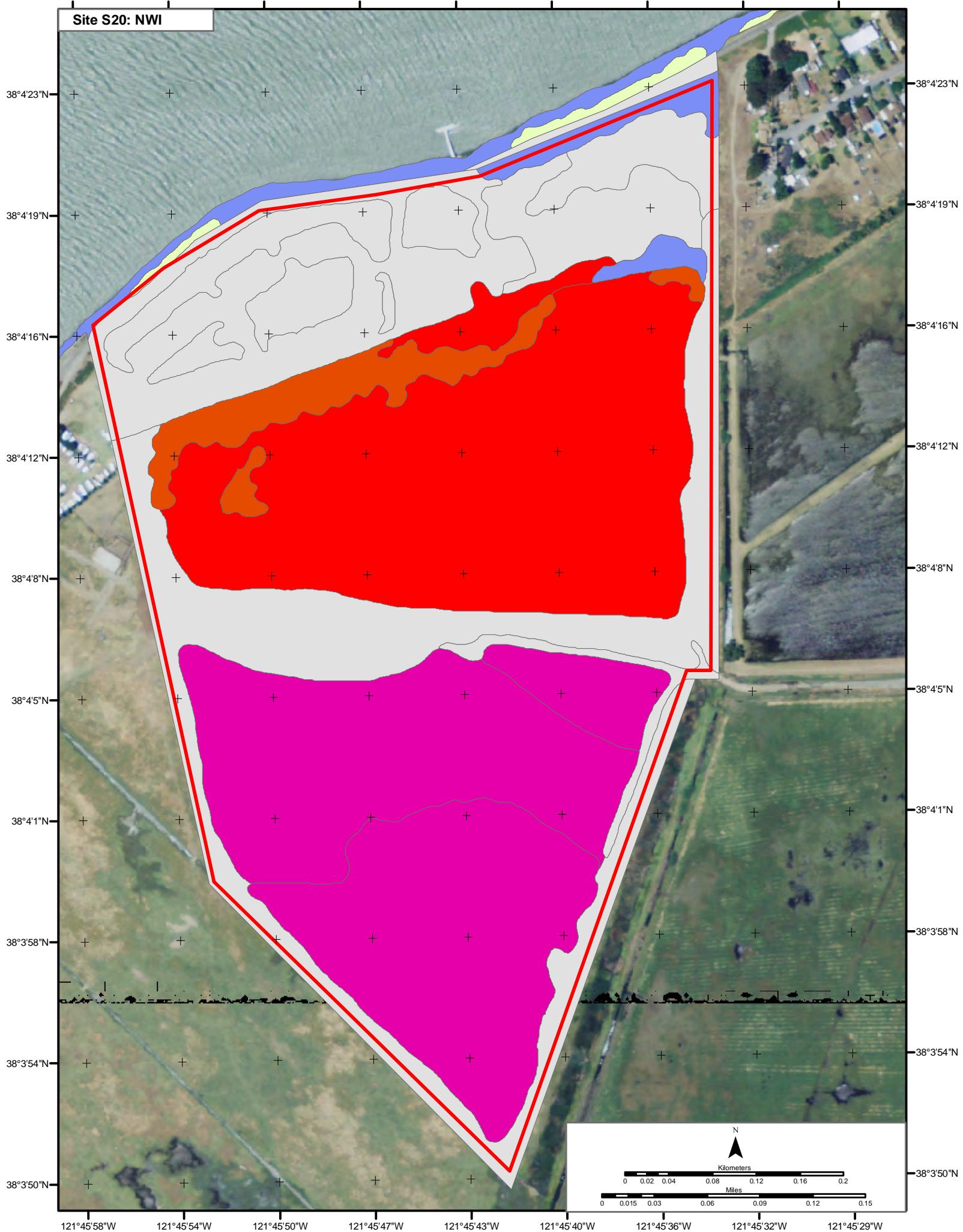
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Site S20: Habitat

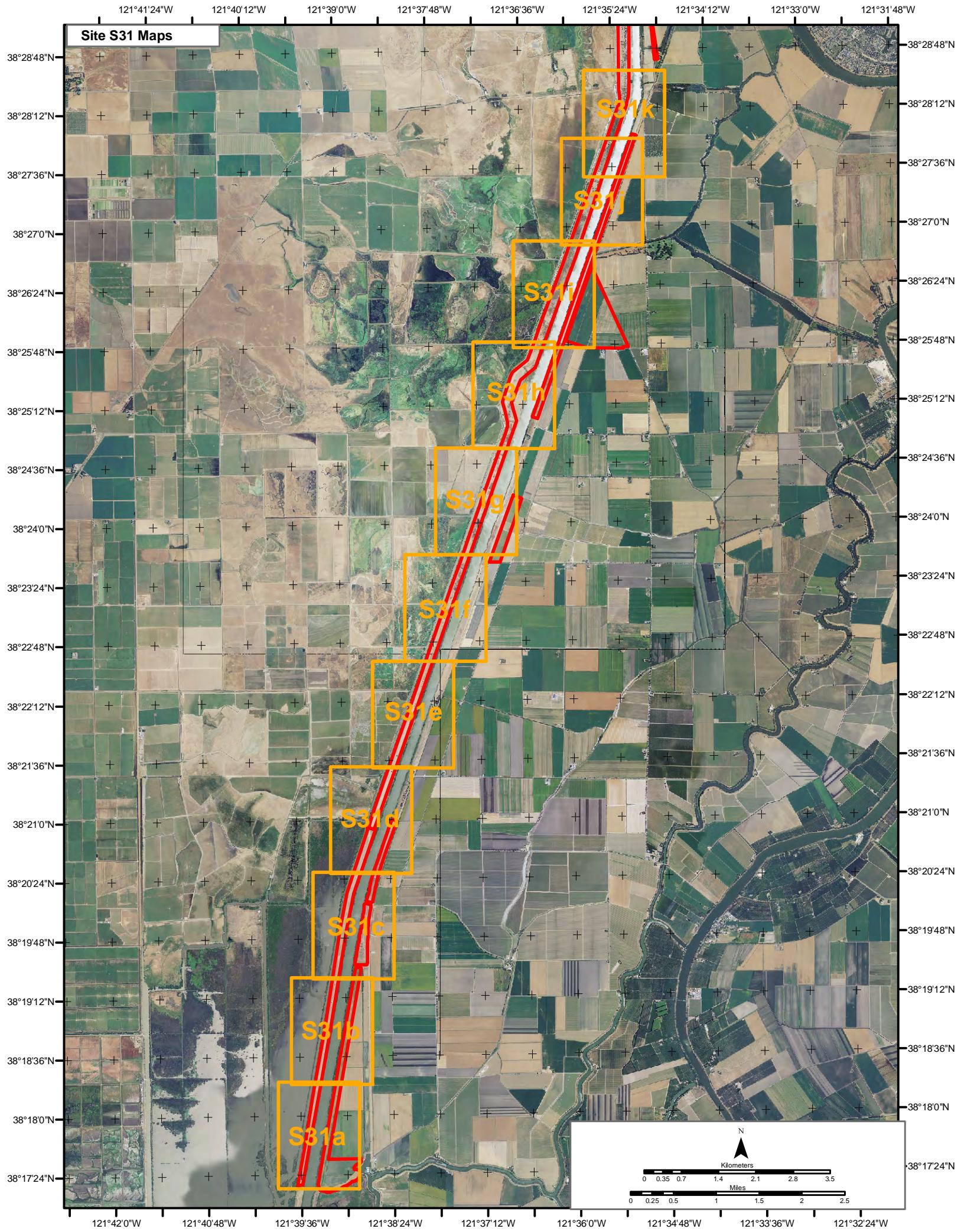


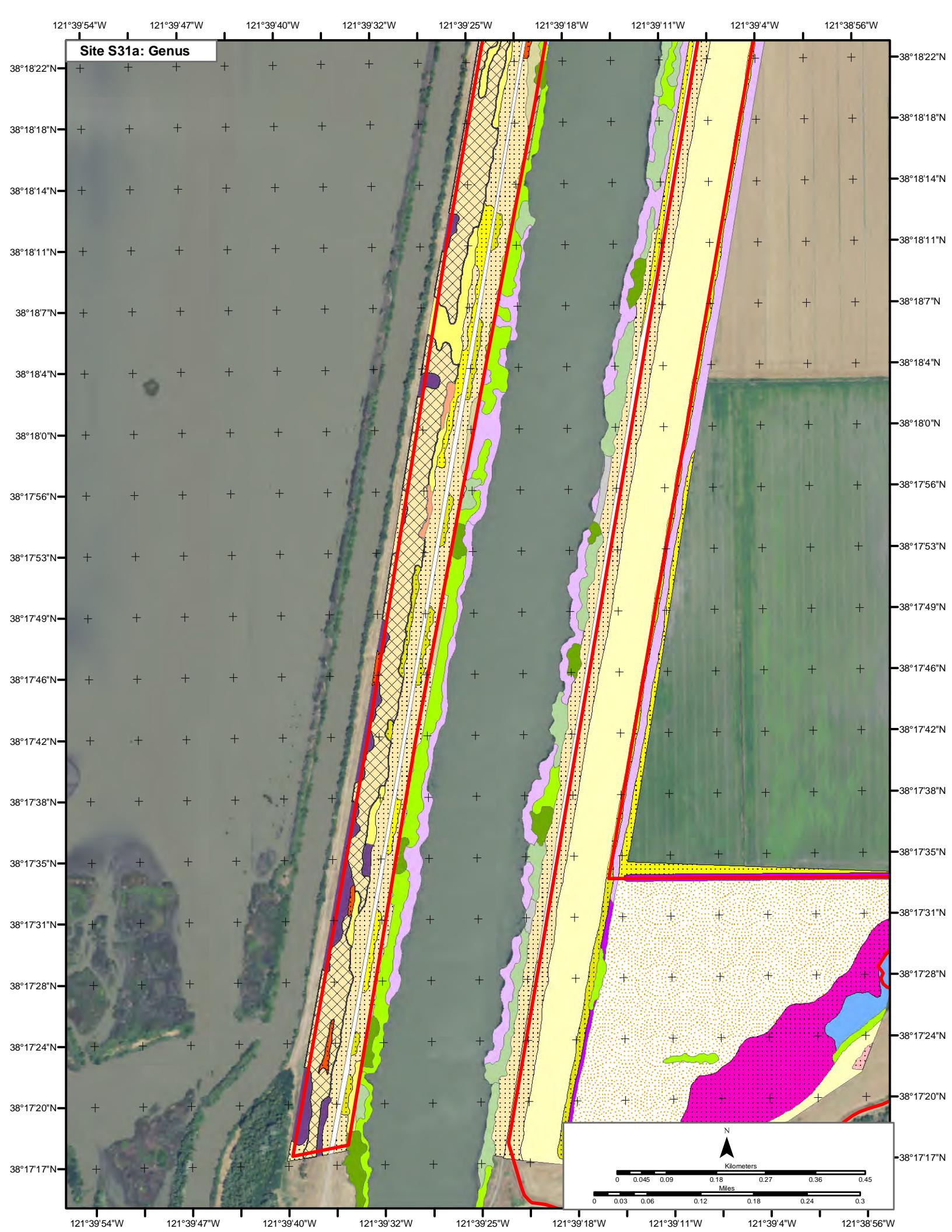
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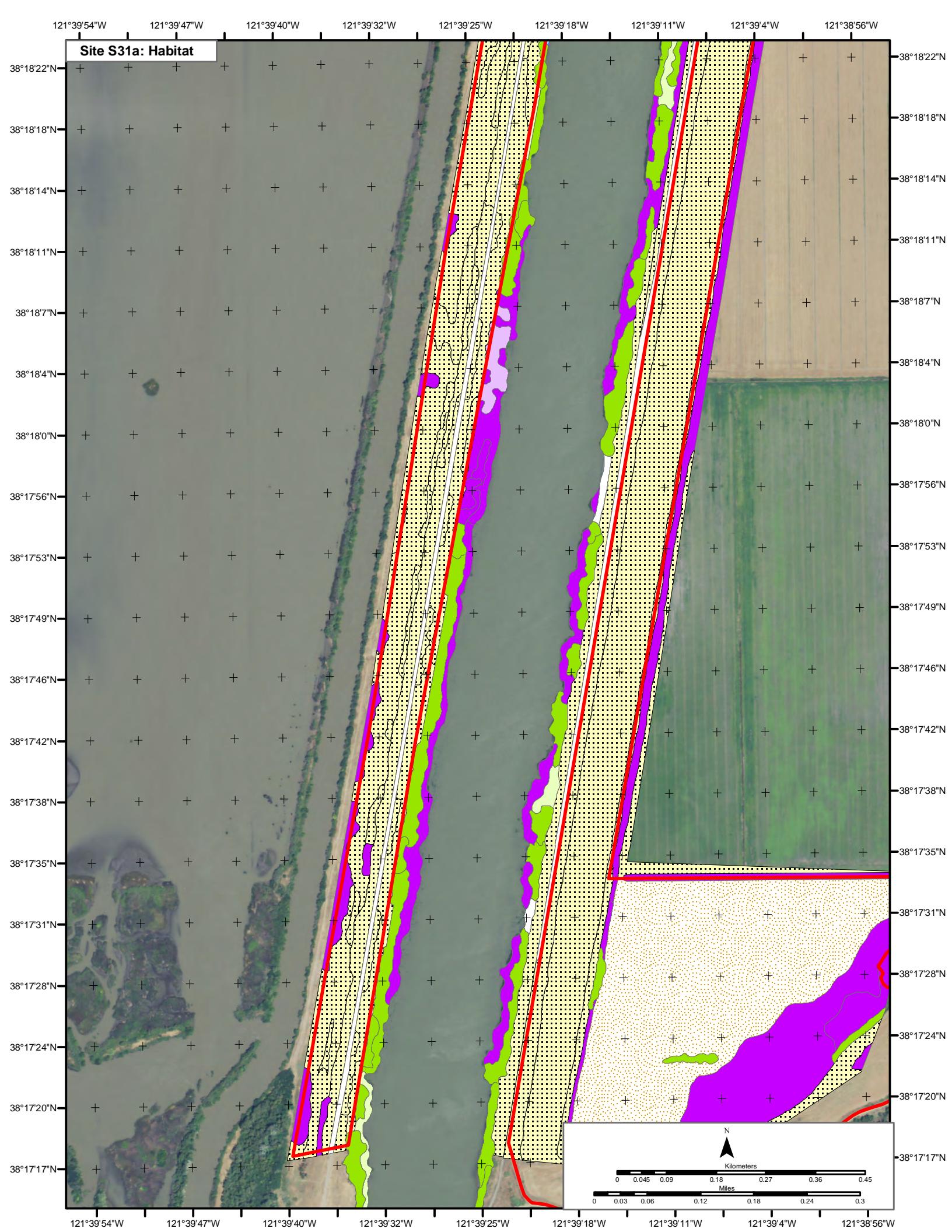
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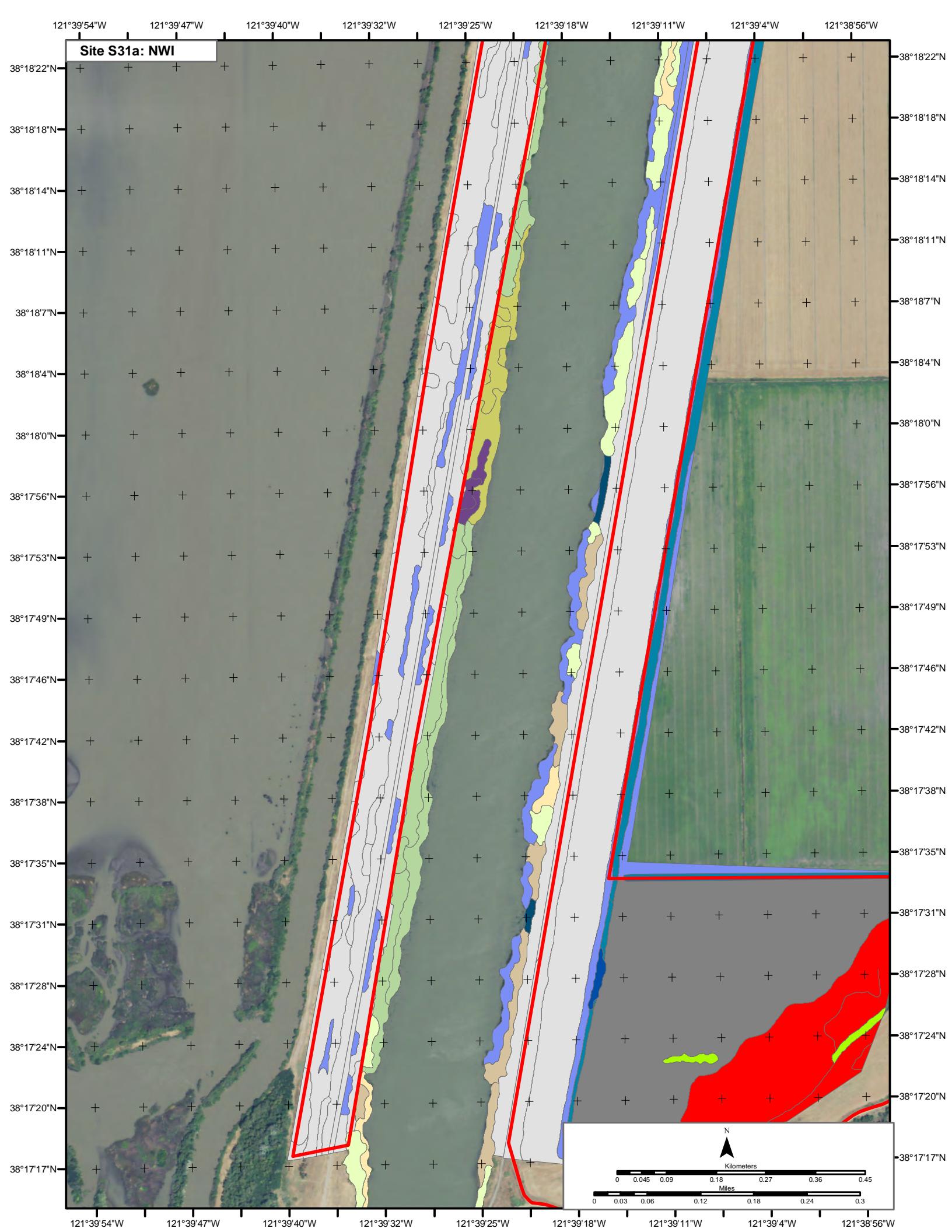


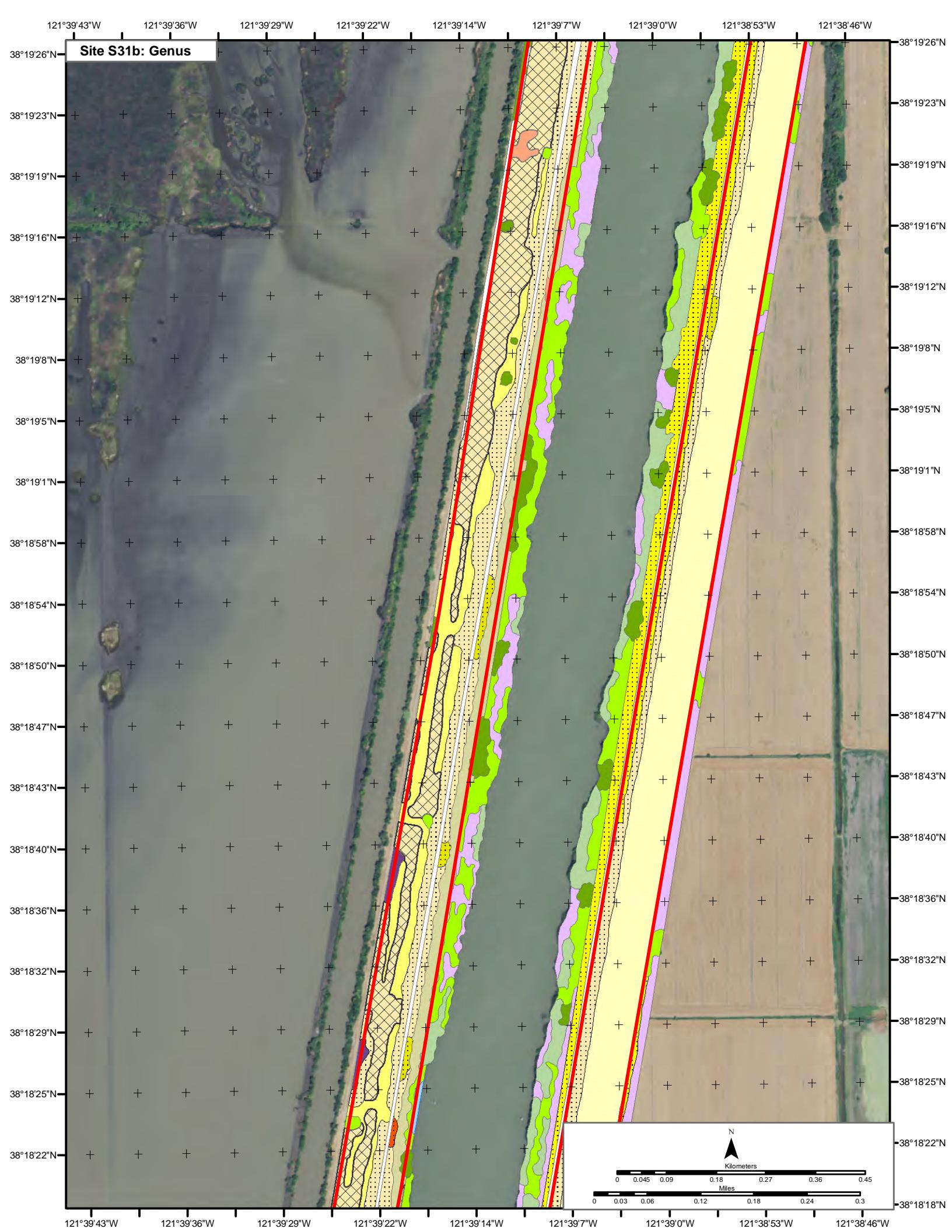
Site S31 Maps

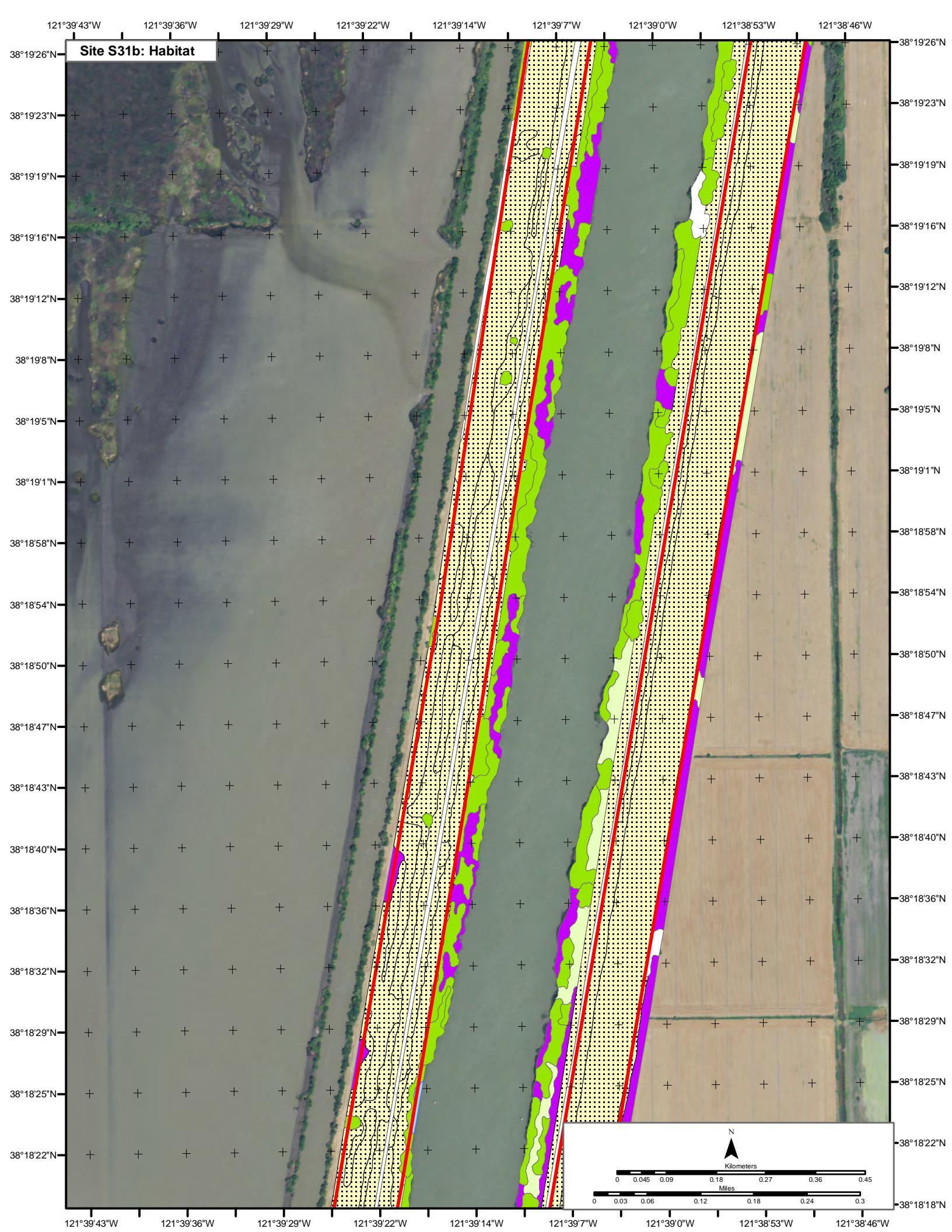


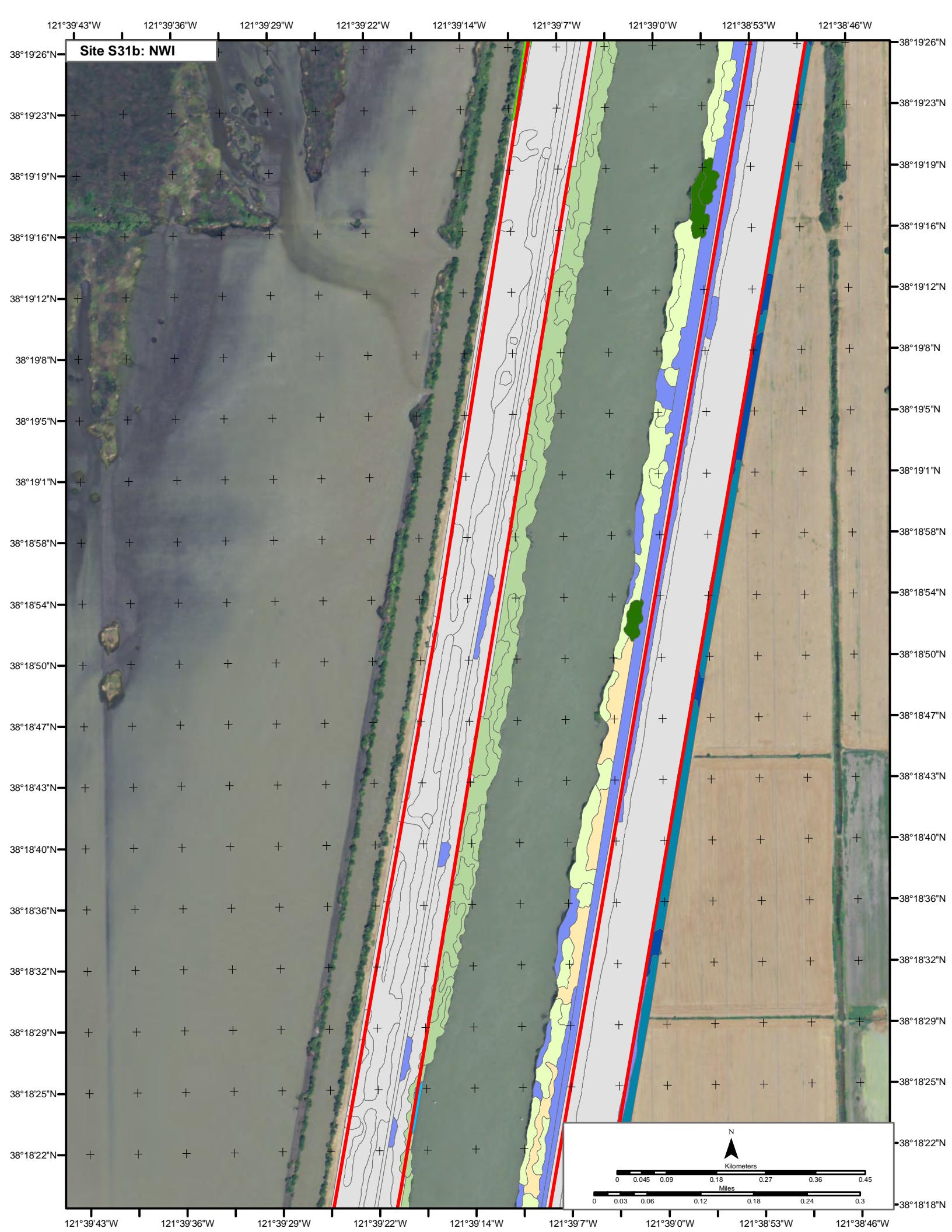


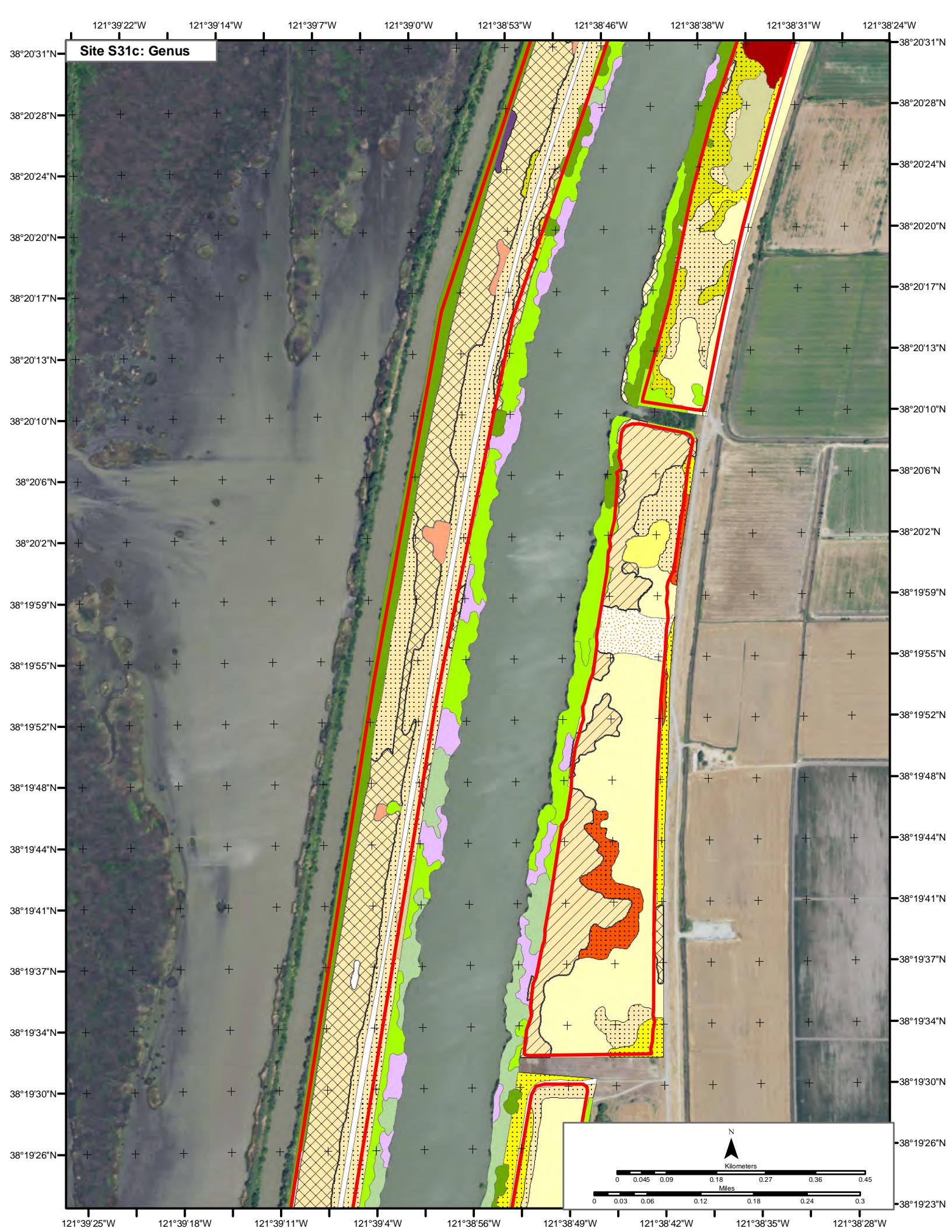


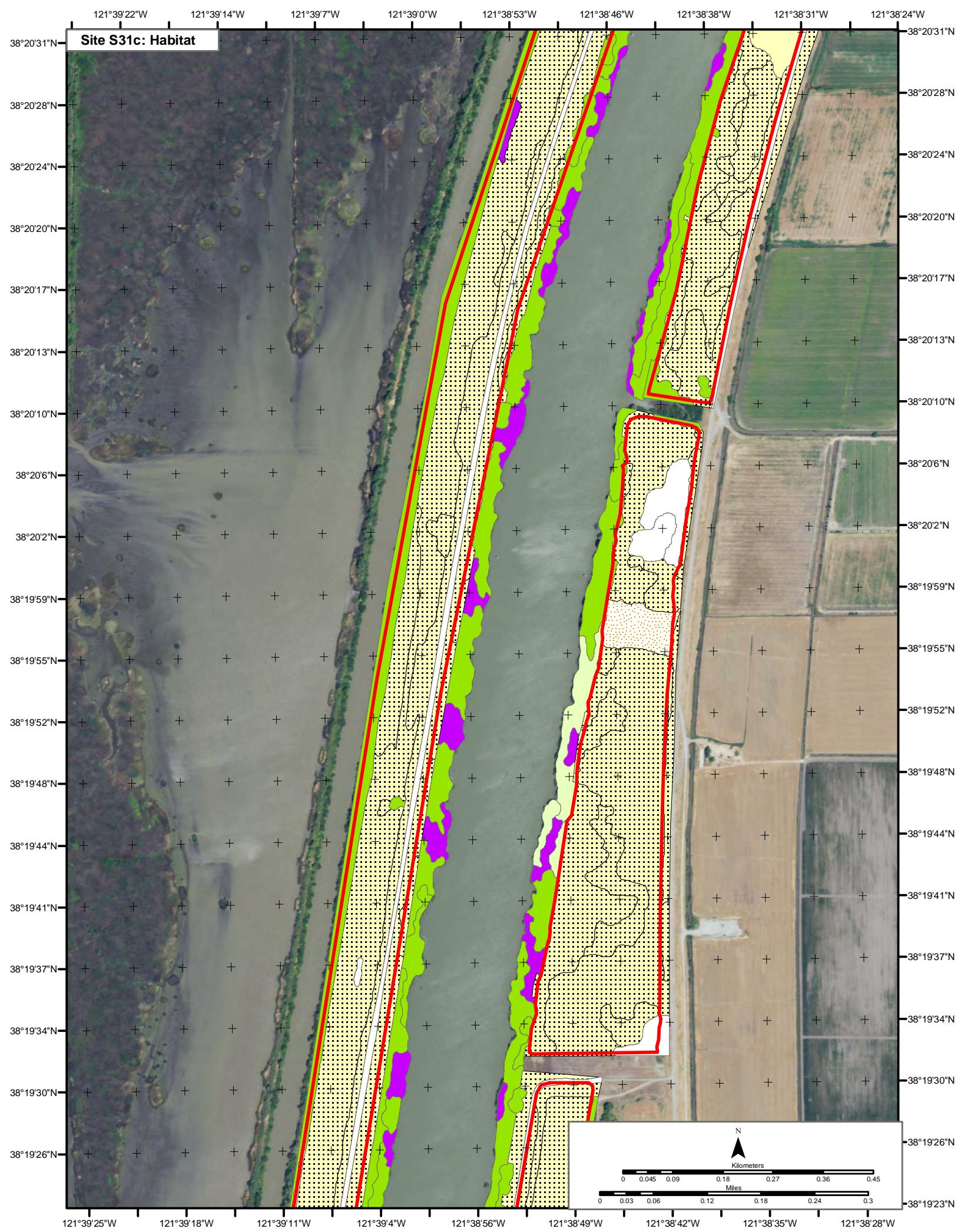


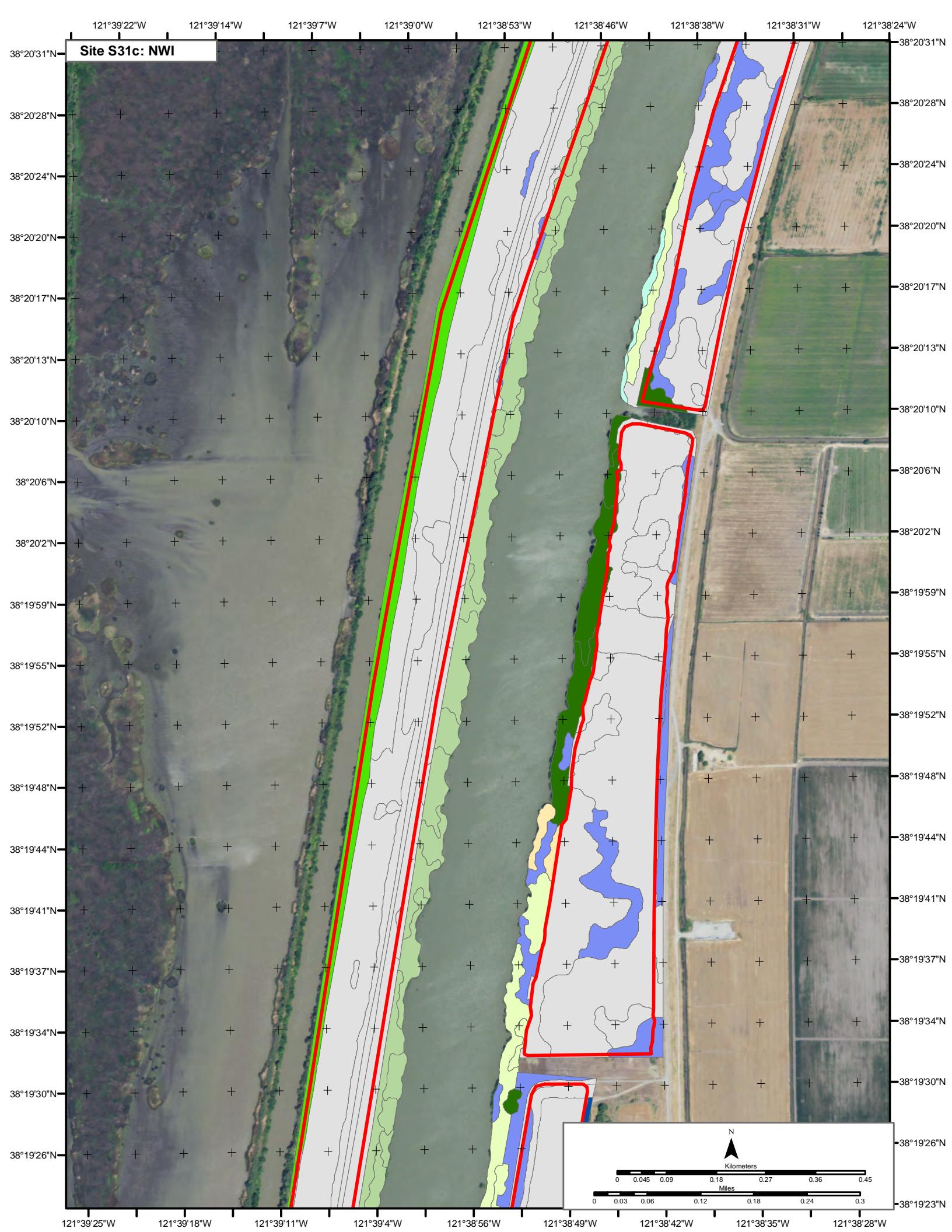


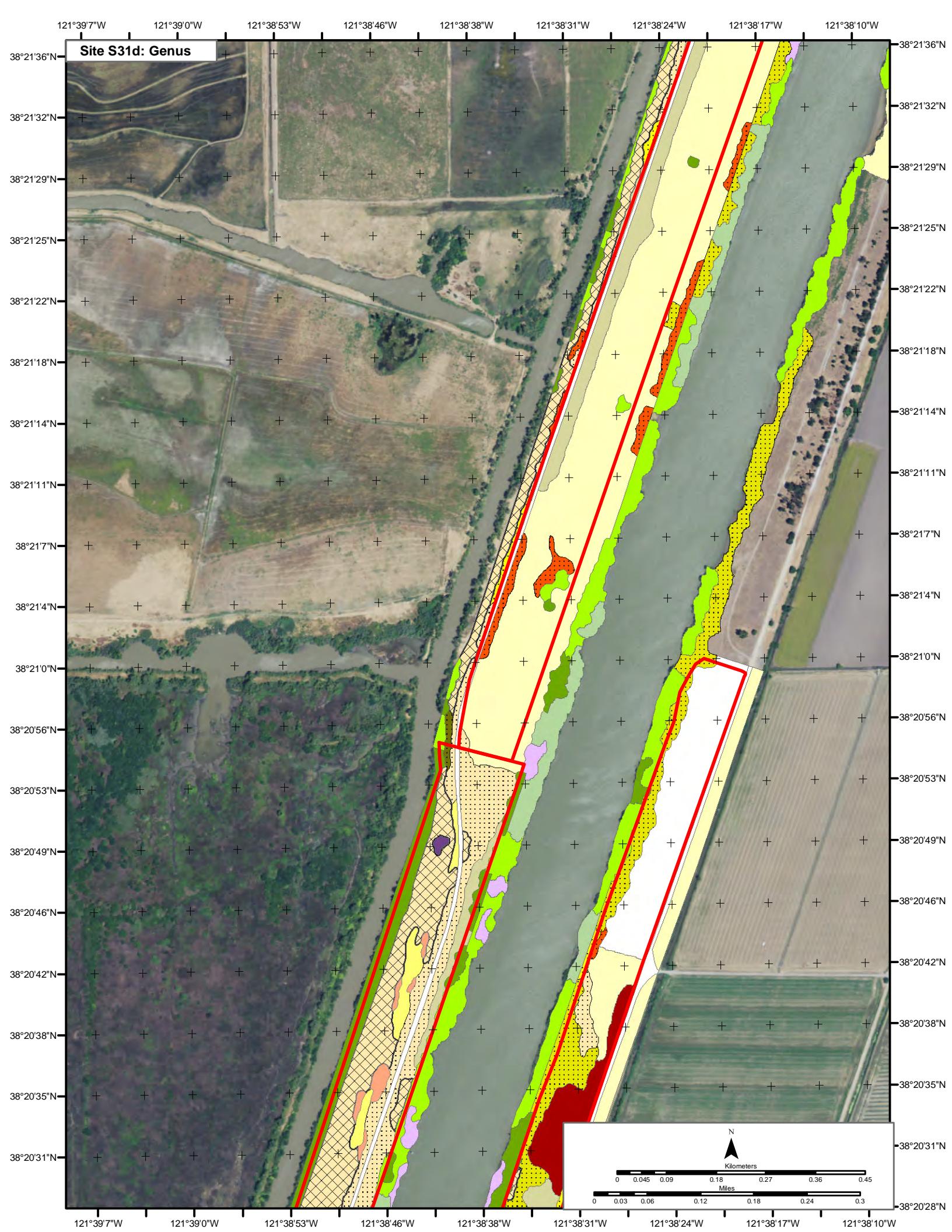


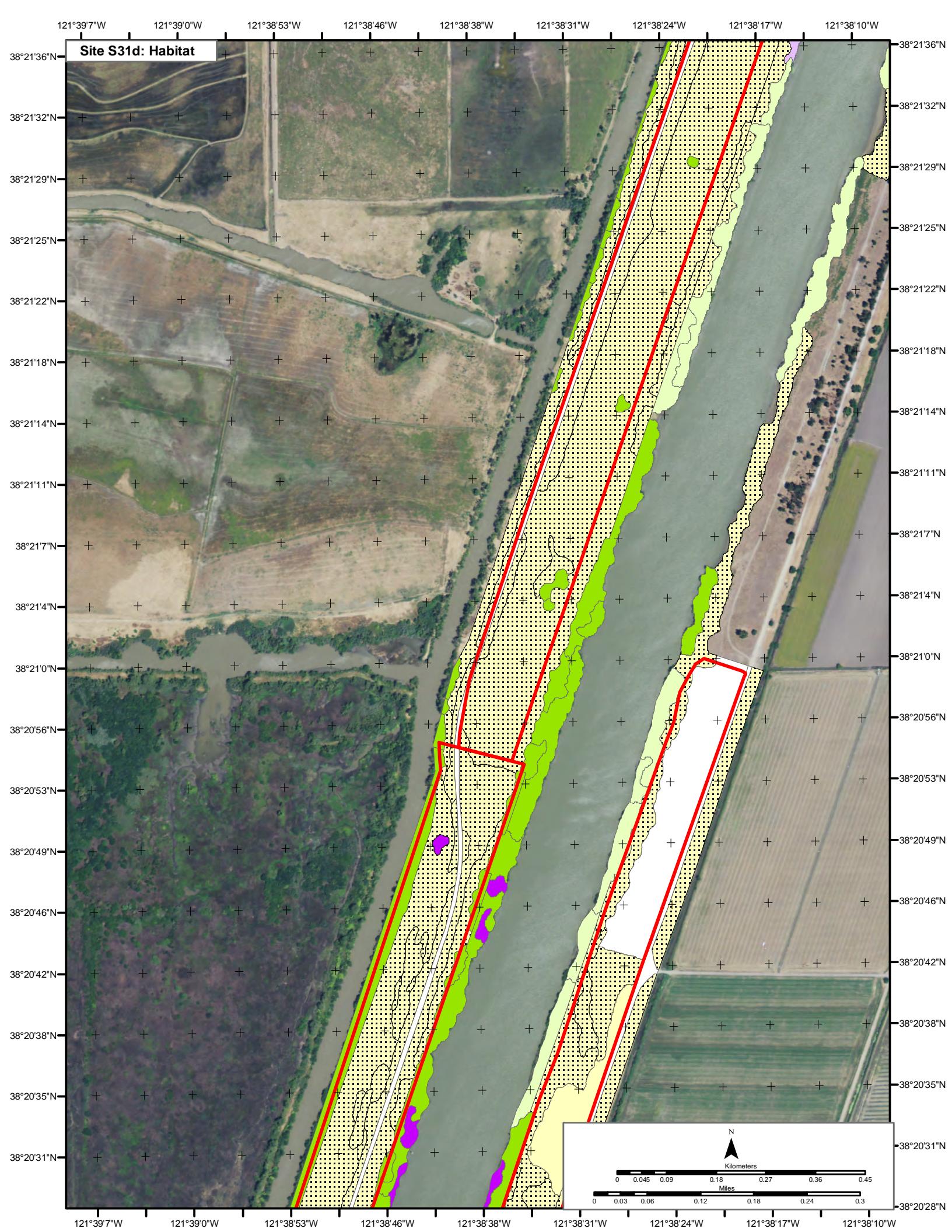


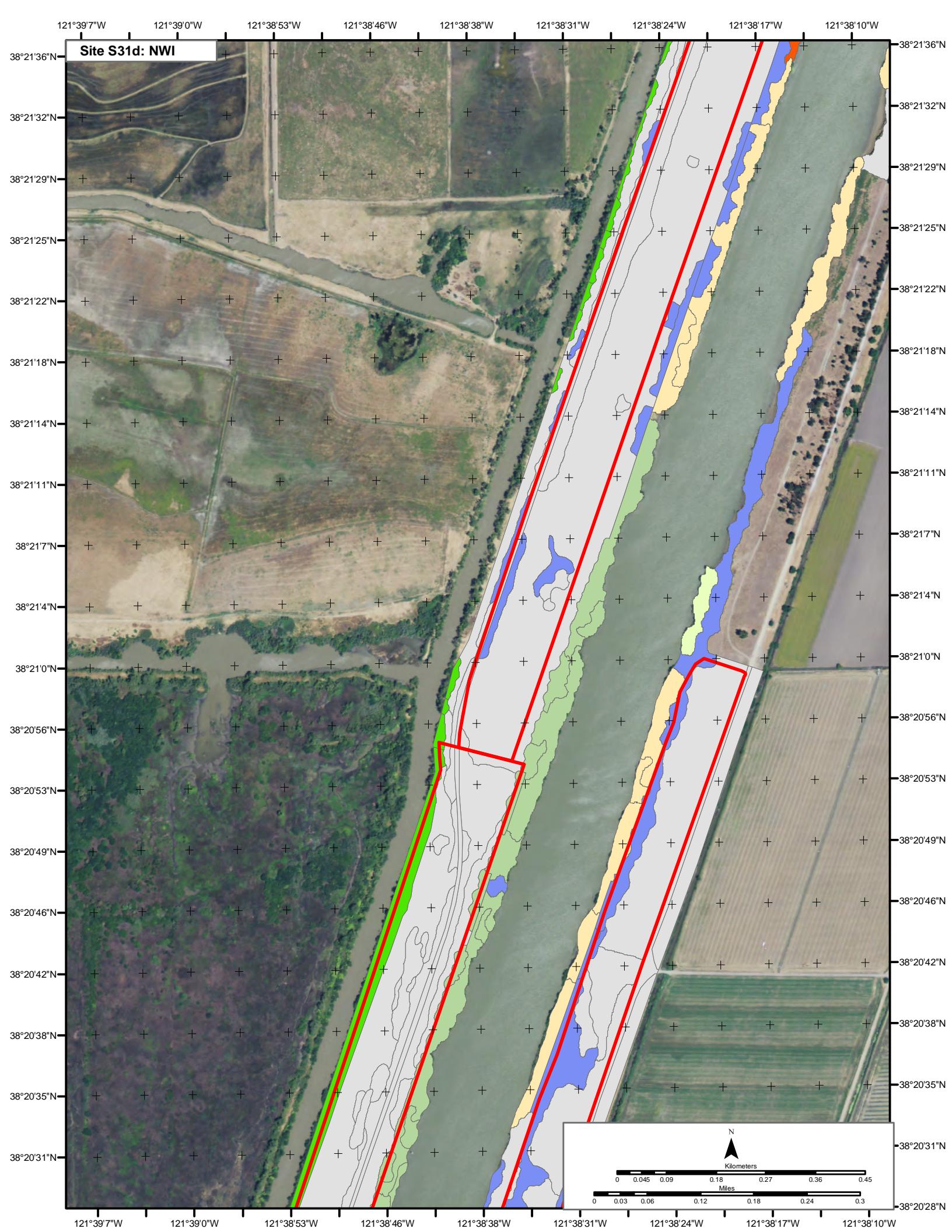


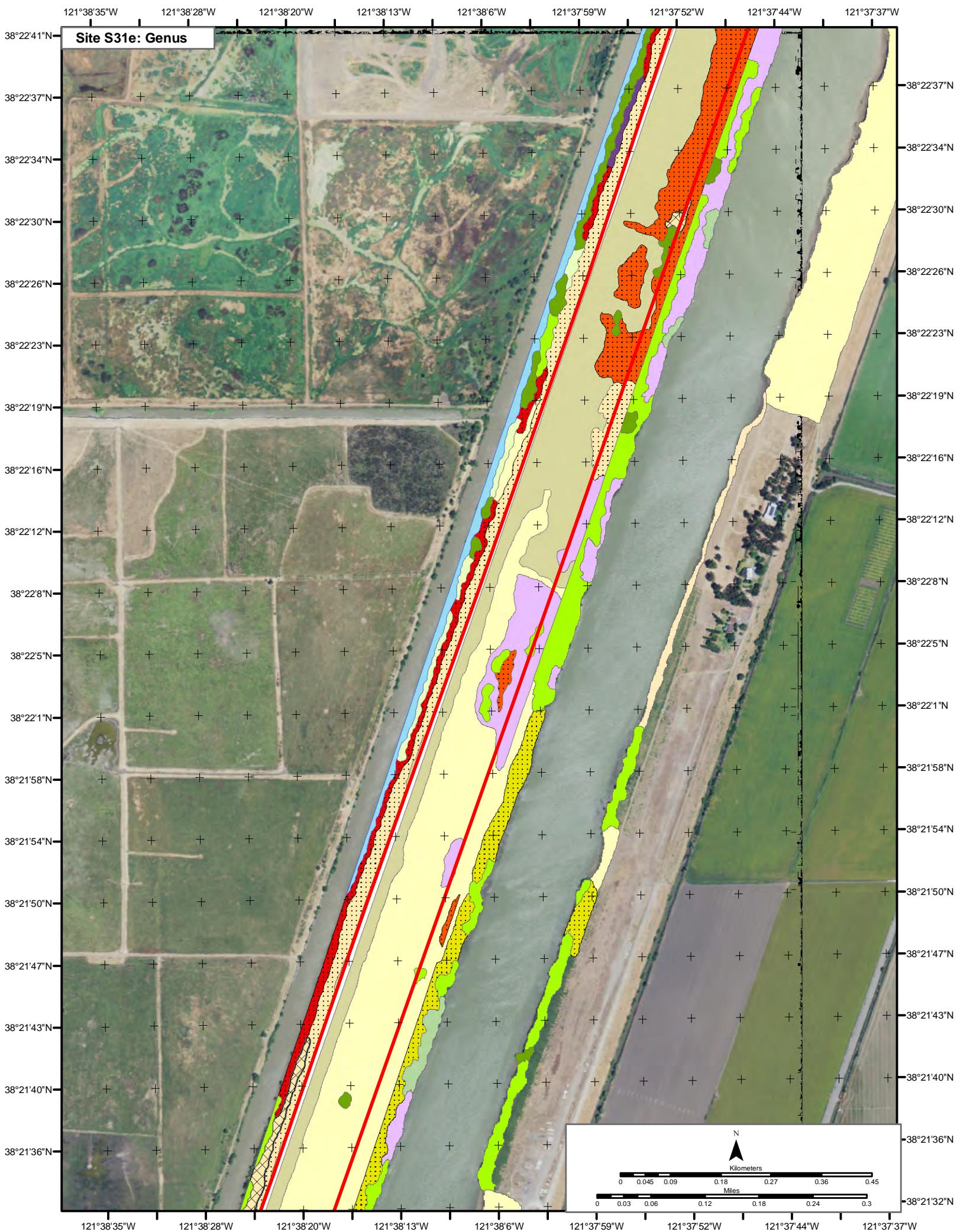


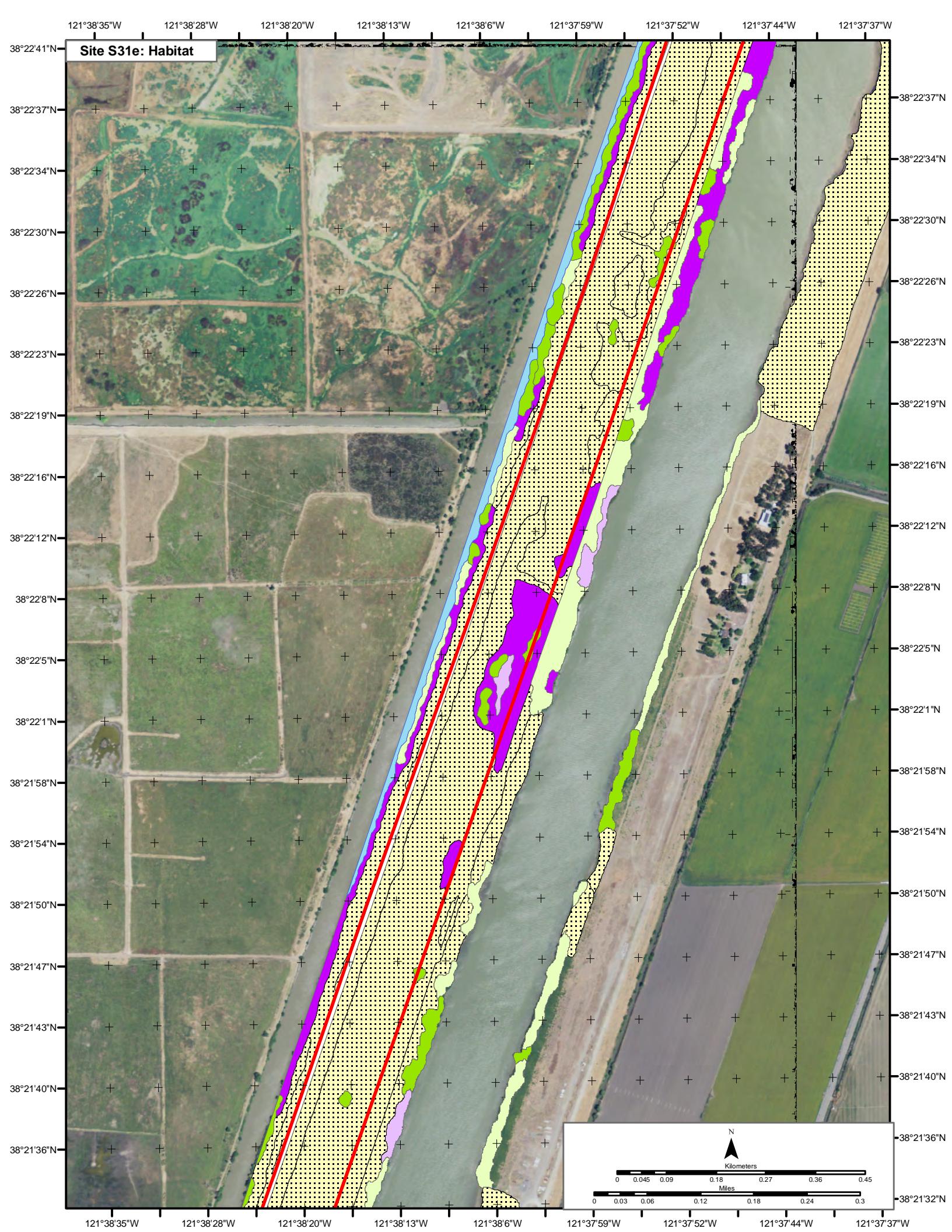


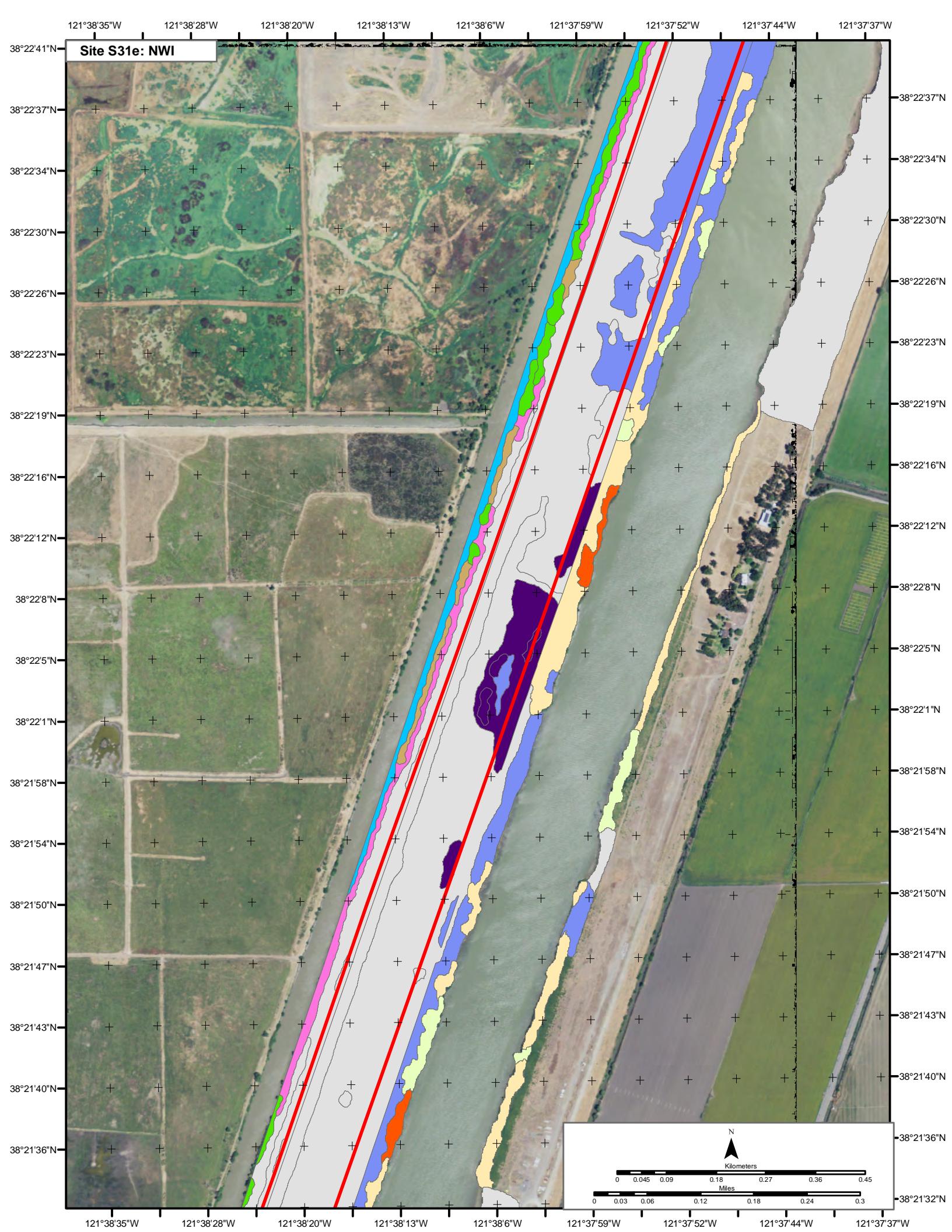


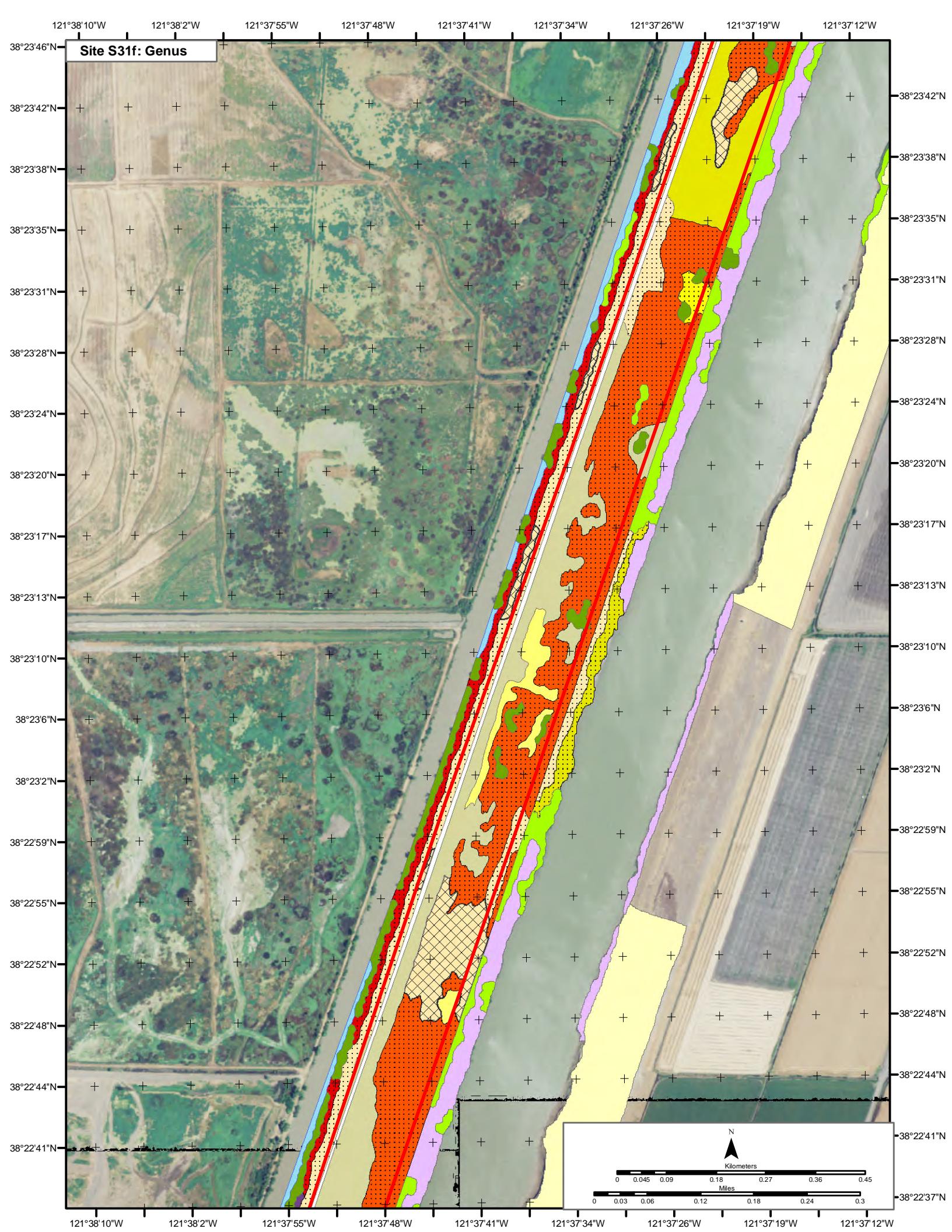


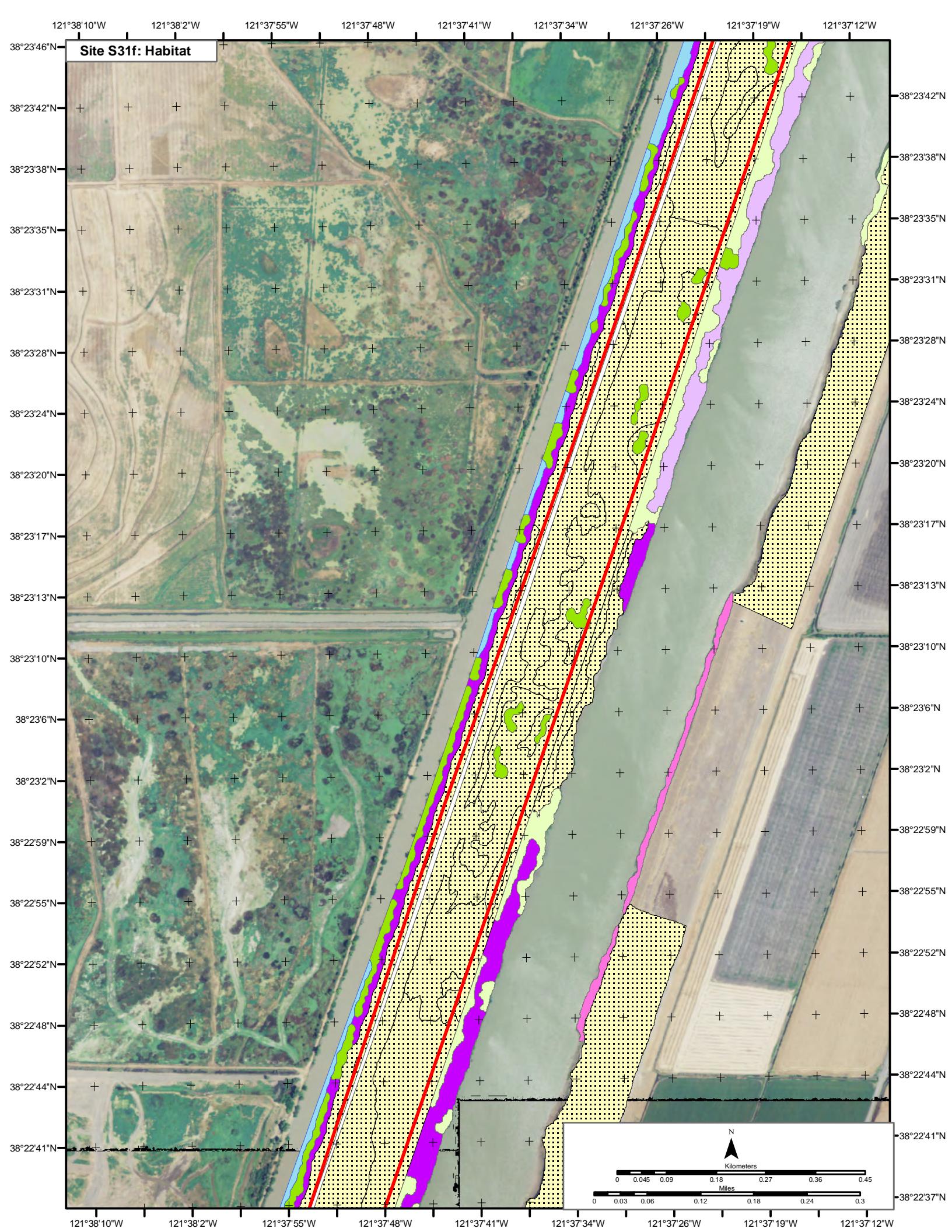


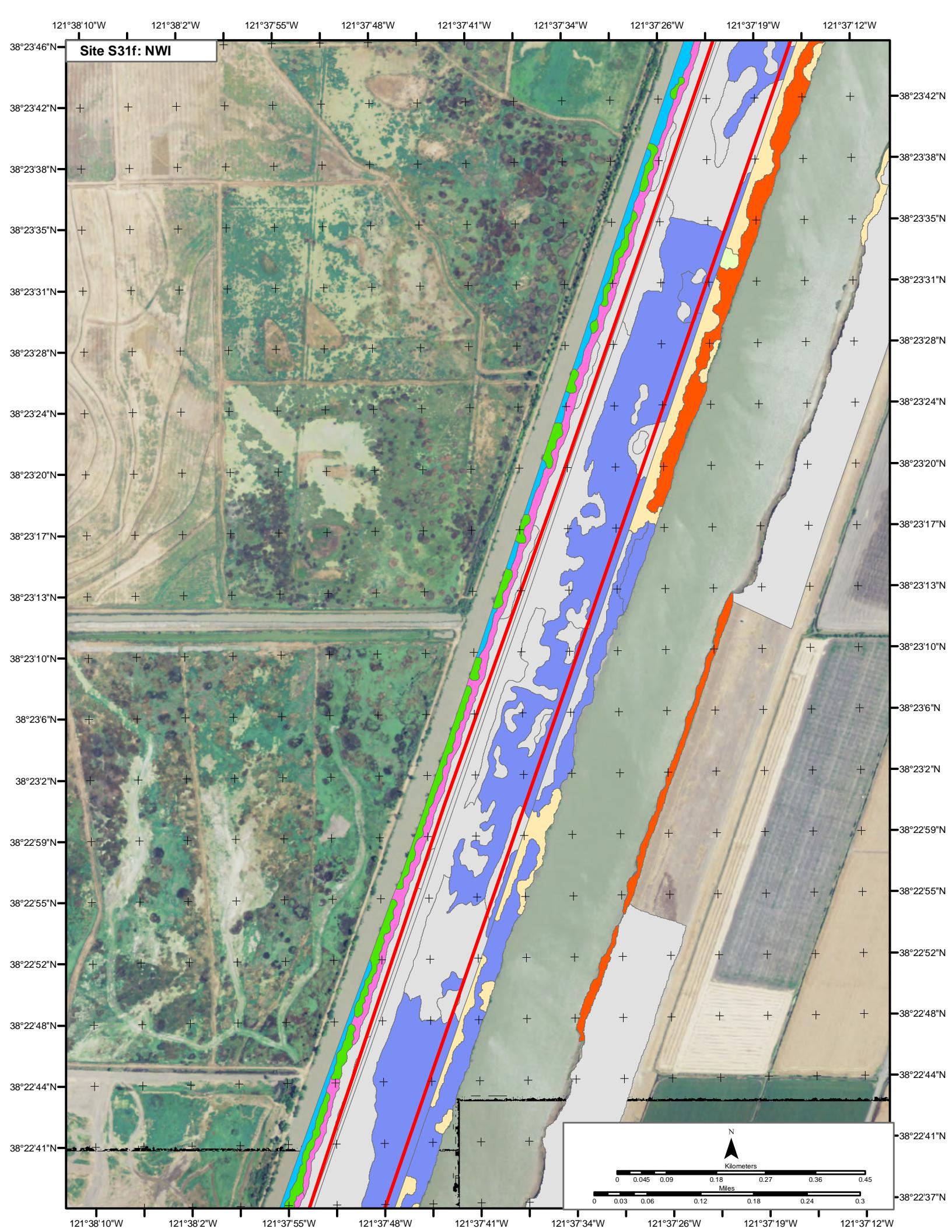


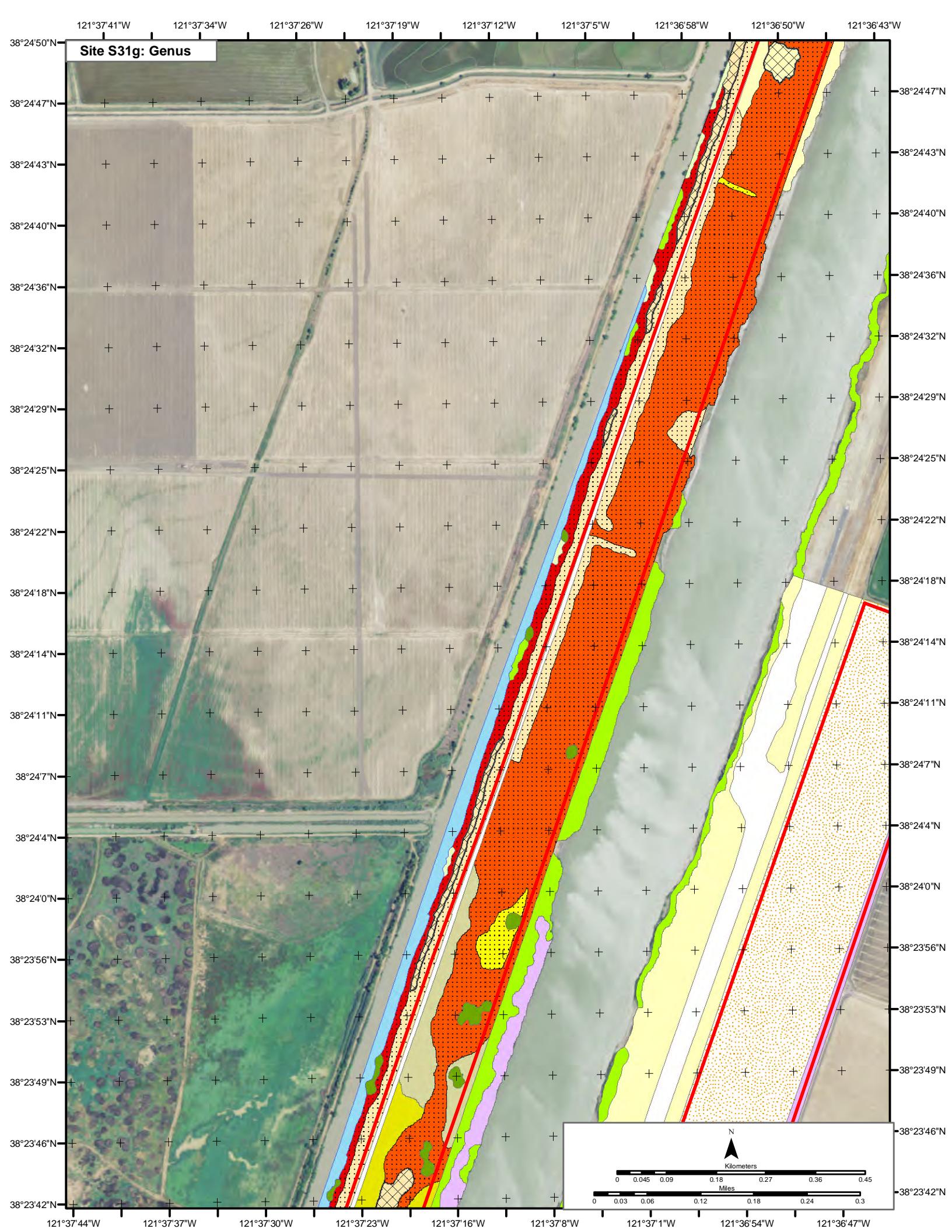


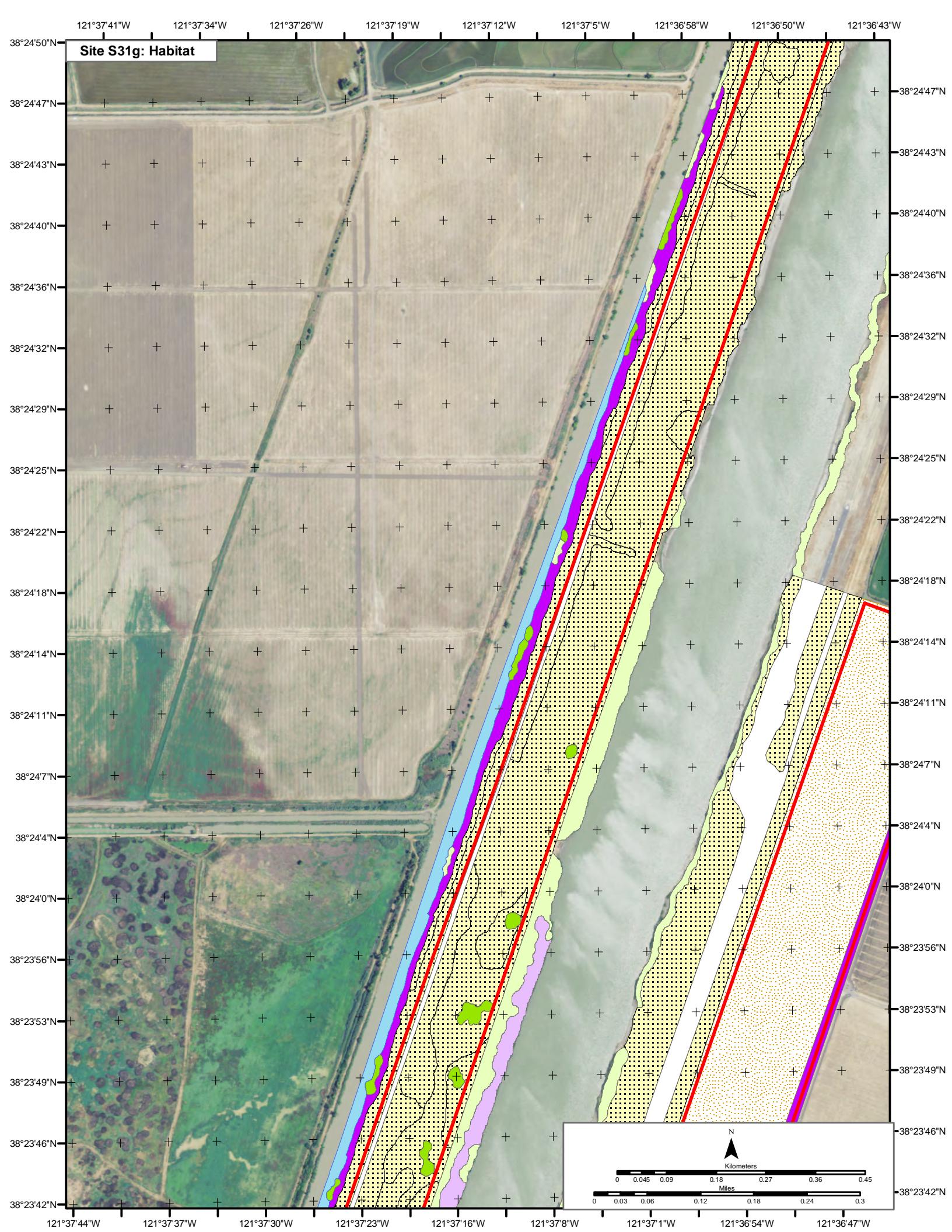


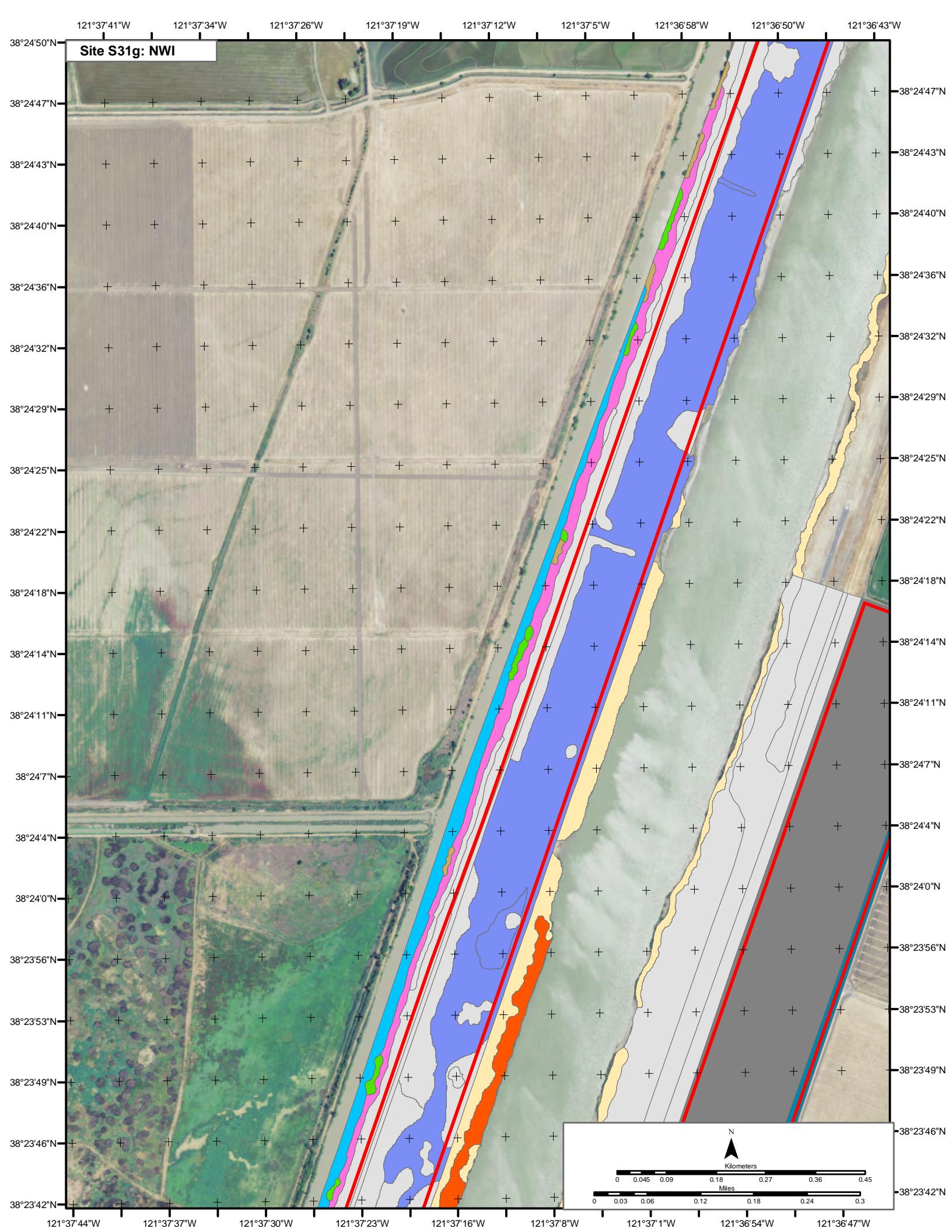


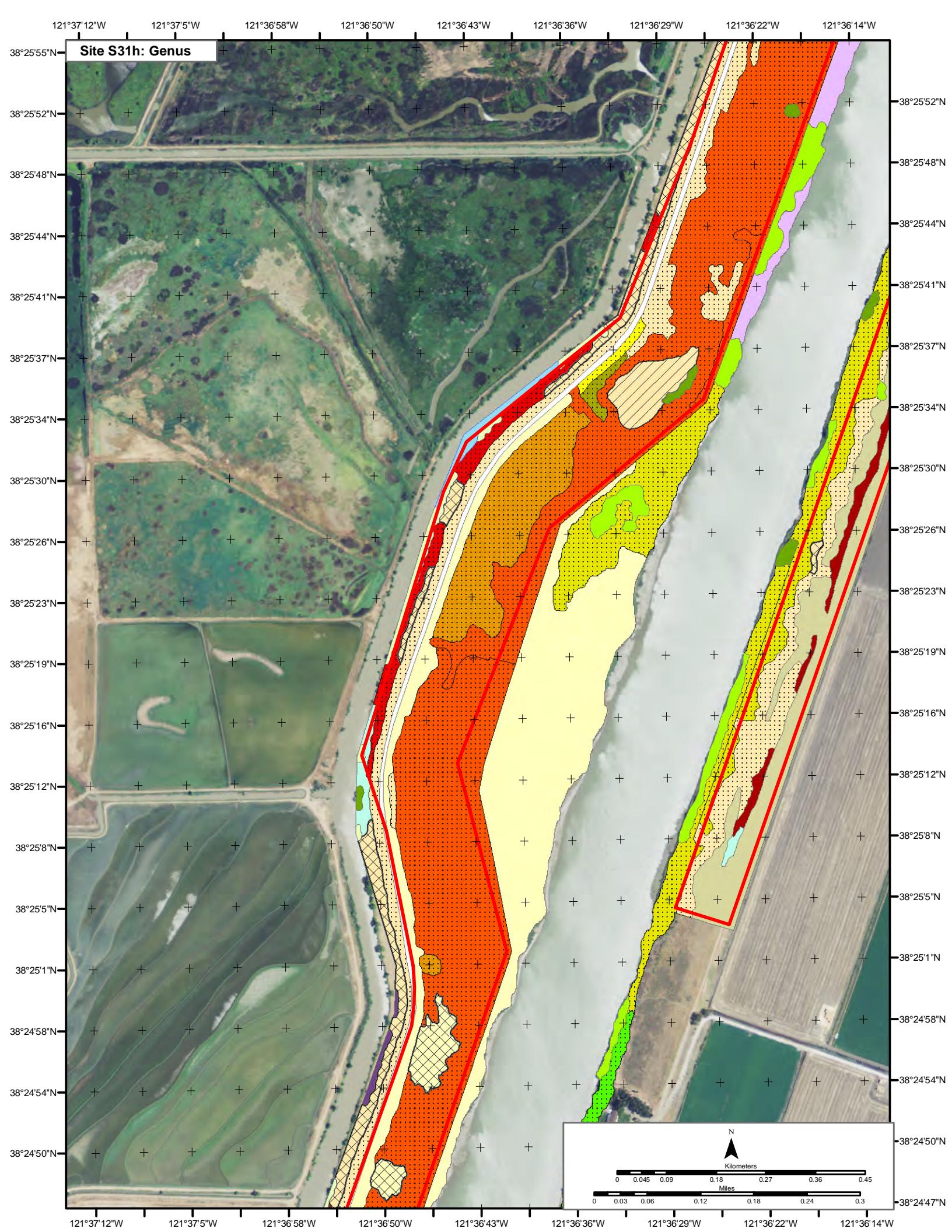


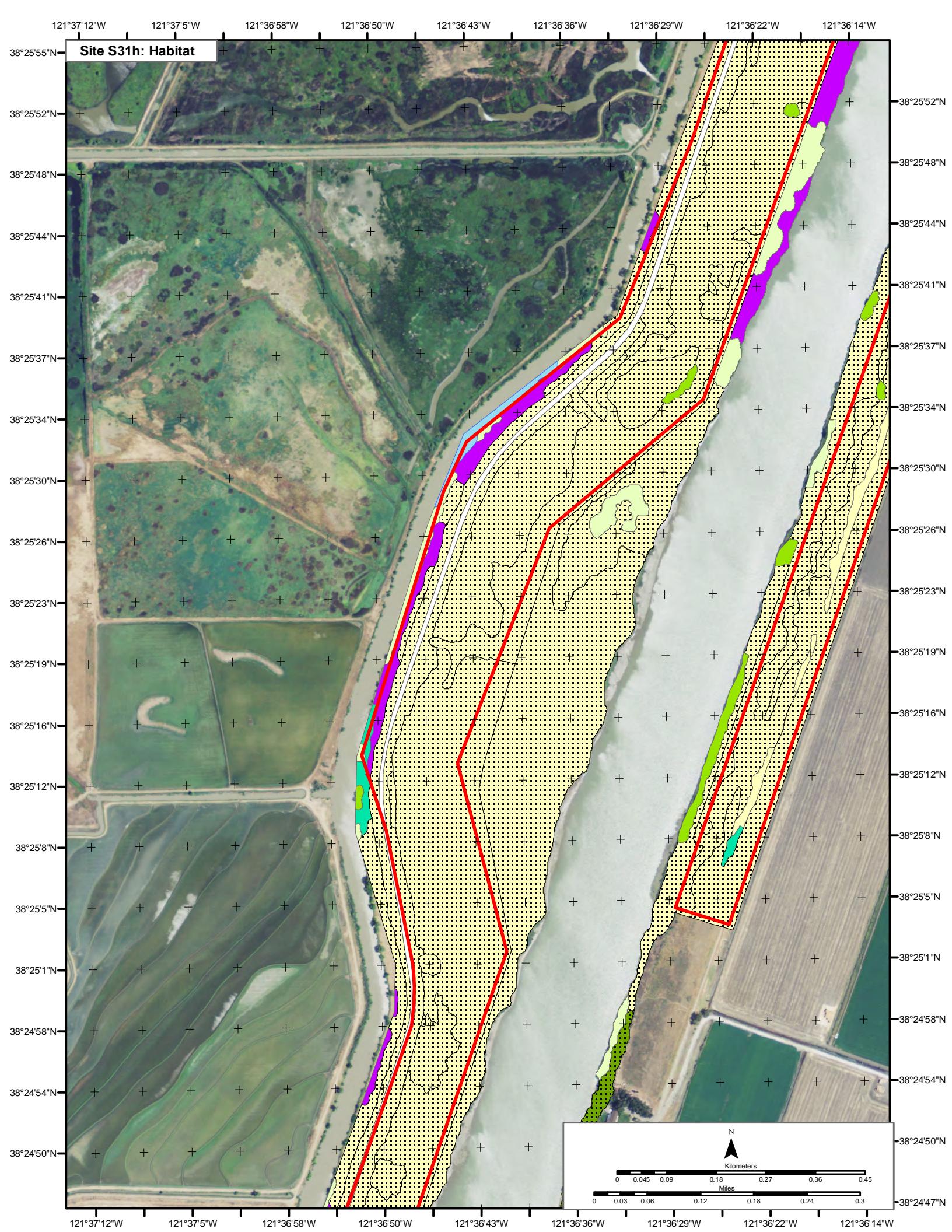


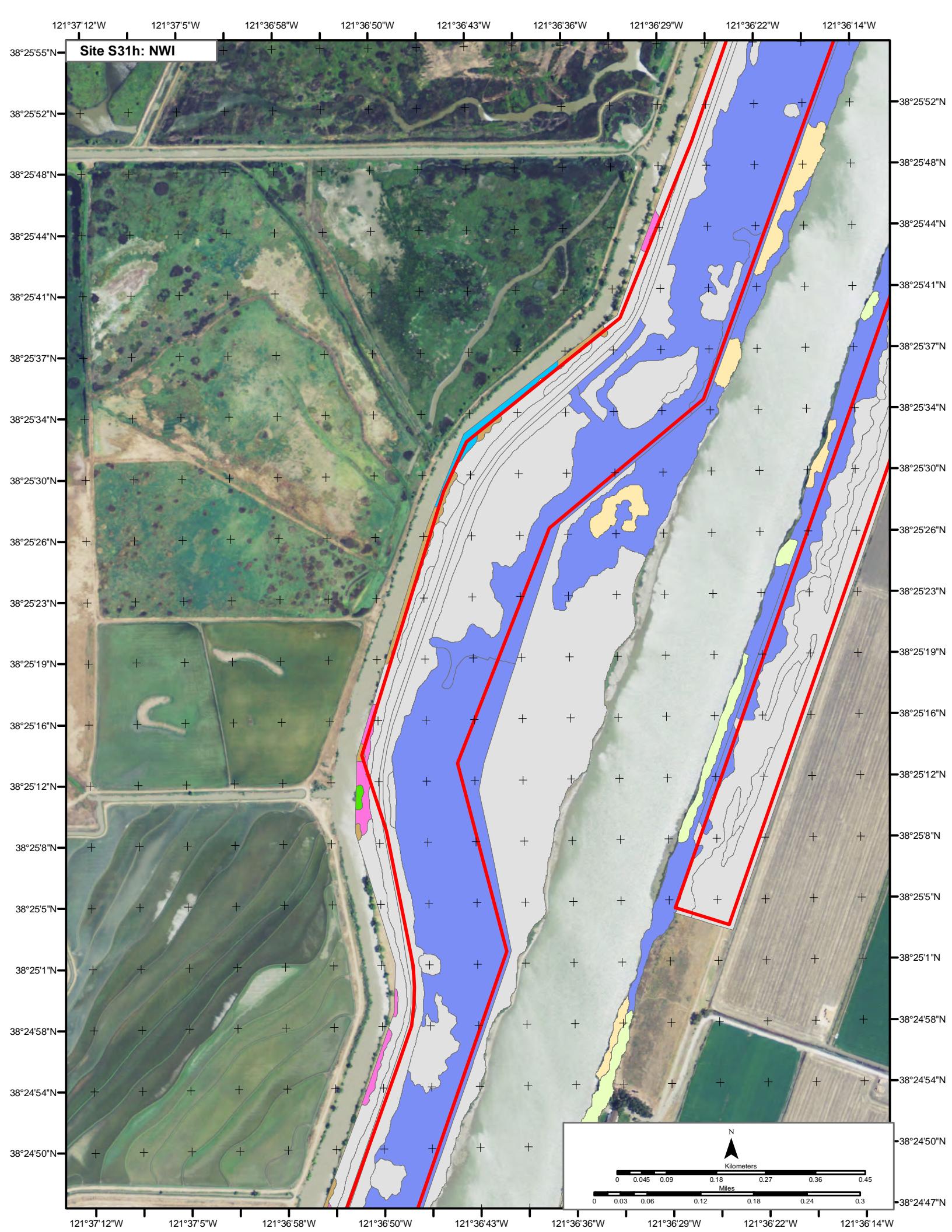






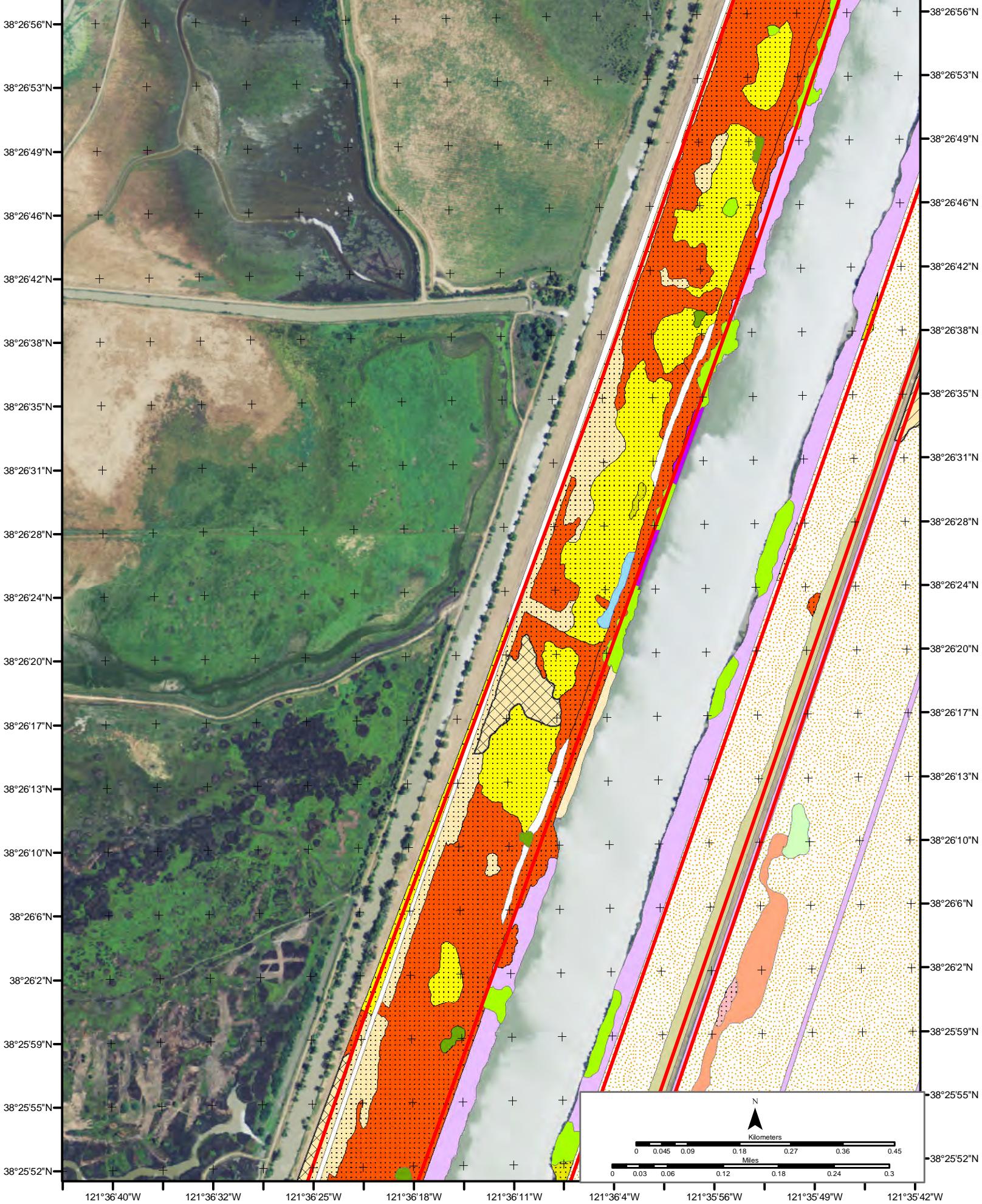




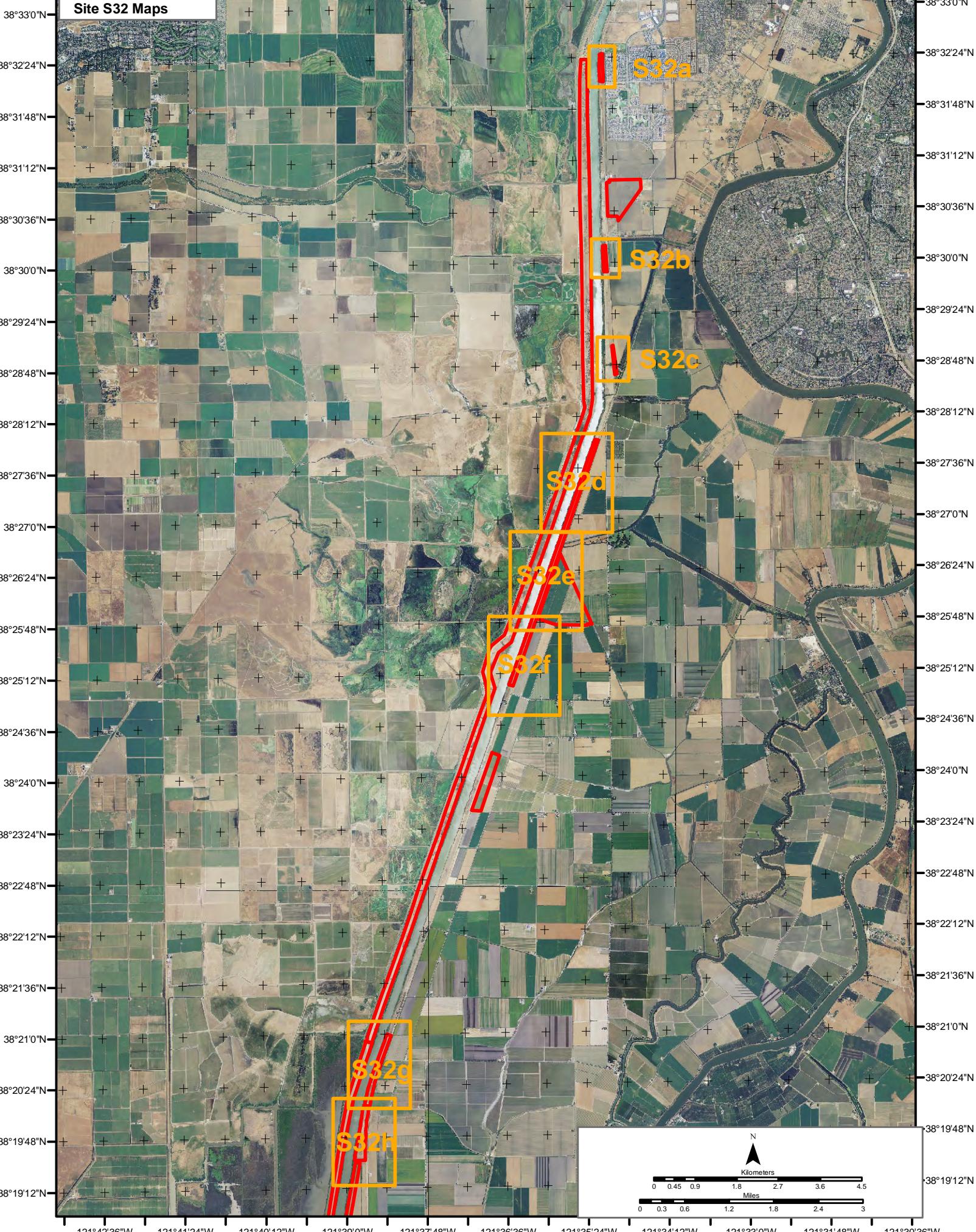


121°36'40"W 121°36'32"W 121°36'25"W 121°36'18"W 121°36'11"W 121°36'4"W 121°35'56"W 121°35'49"W 121°35'42"W

Site S31i: Genus

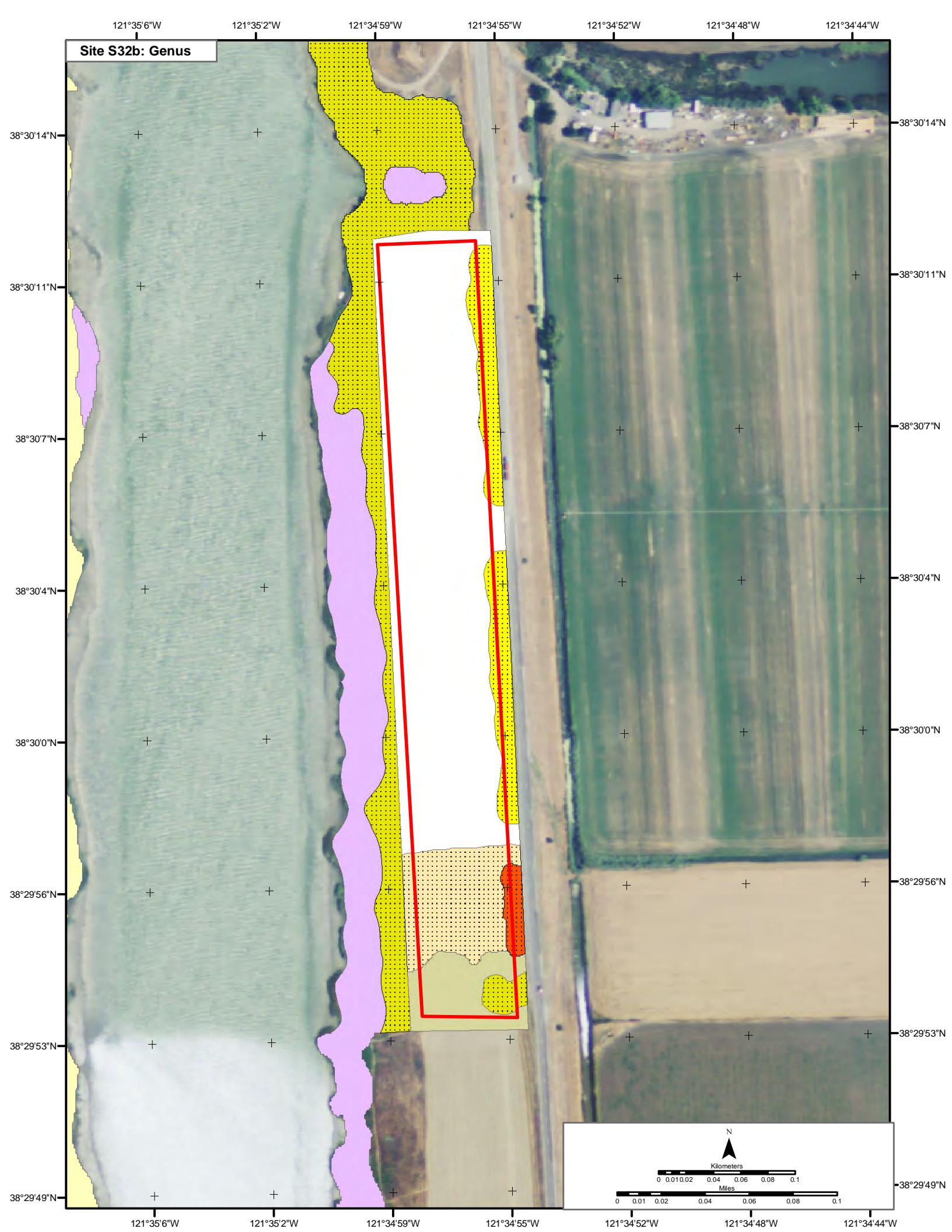


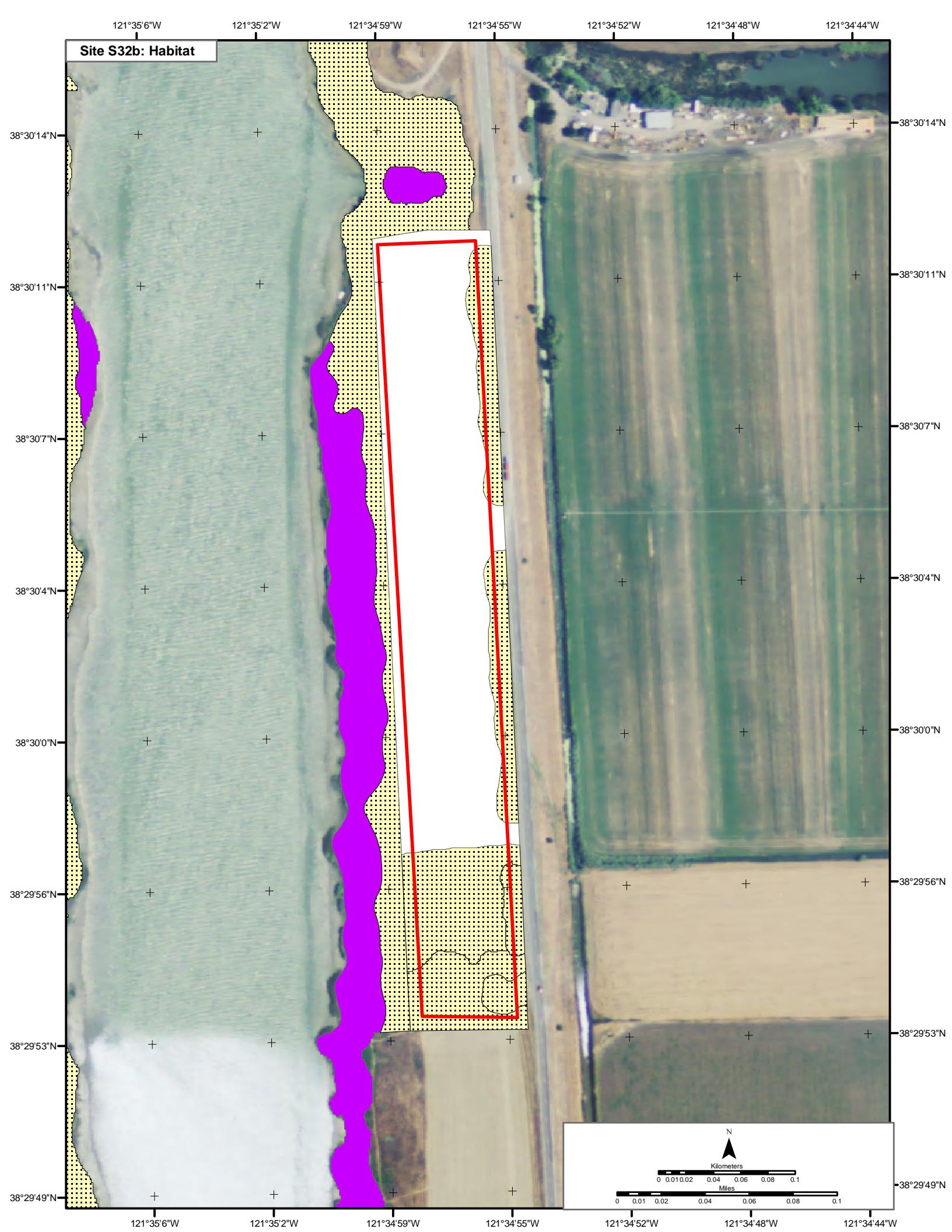
121°42'36"W 121°41'24"W 121°40'12"W 121°39'0"W 121°37'48"W 121°36'36"W 121°35'24"W 121°34'12"W 121°33'0"W 121°31'48"W 121°30'36"W





Site S32b: Genus



Site S32b: Habitat

121°35'6"W

121°35'2"W

121°34'59"W

121°34'55"W

121°34'52"W

121°34'48"W

121°34'44"W

Site S32b: NWI

38°30'14"N

38°30'11"N

38°30'7"N

38°30'4"N

38°30'0"N

38°29'56"N

38°29'53"N

38°29'49"N

121°35'6"W

121°35'2"W

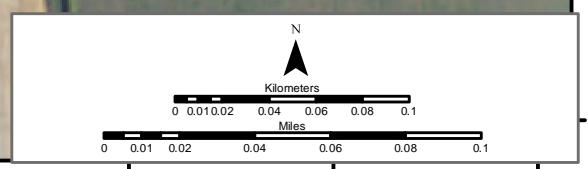
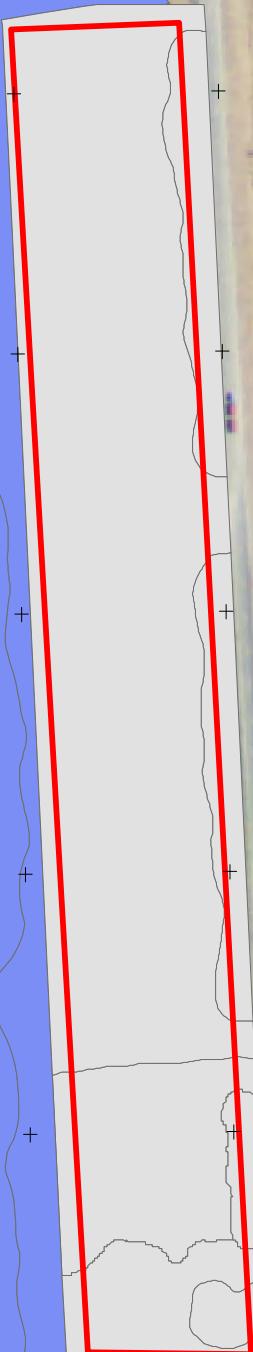
121°34'59"W

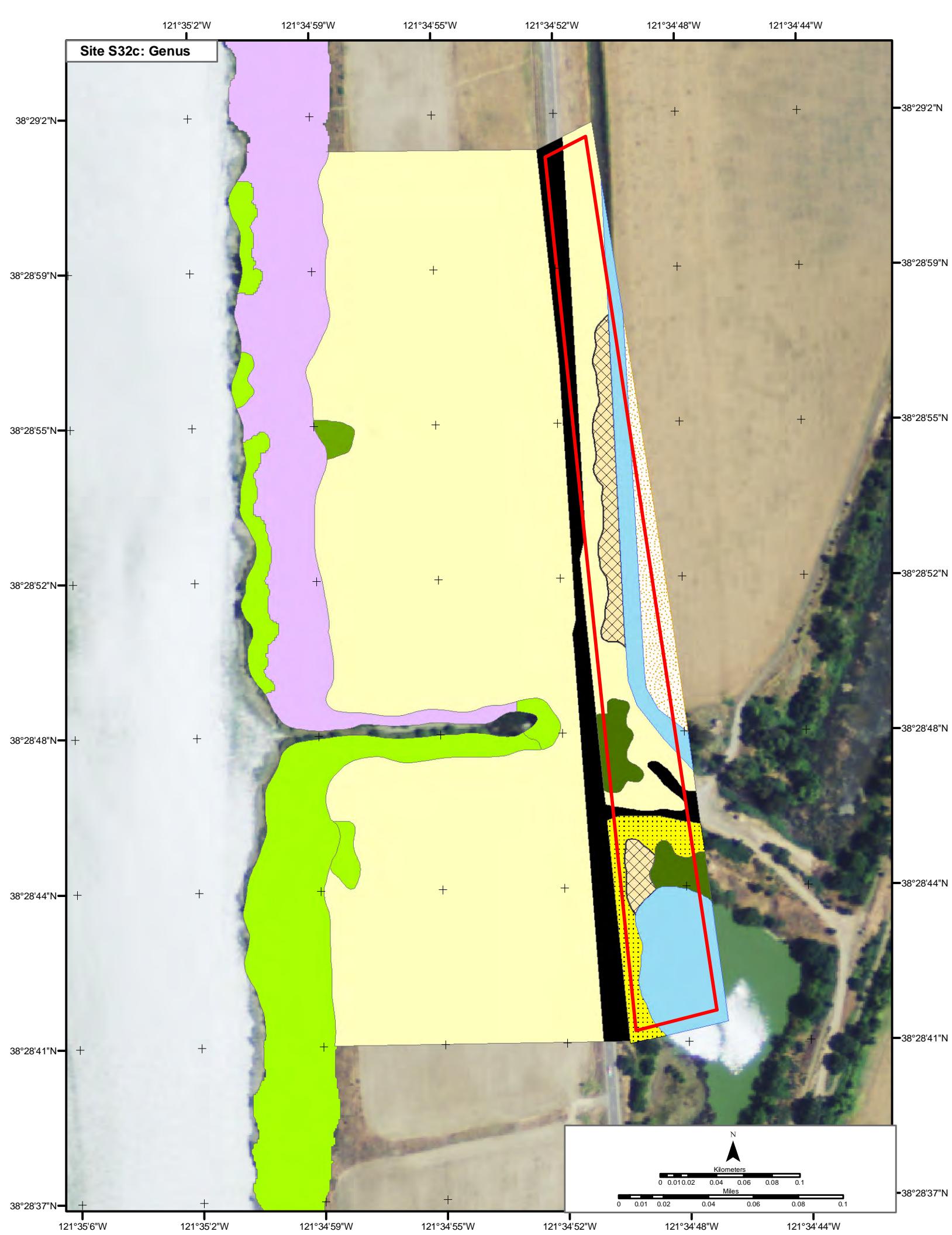
121°34'55"W

121°34'52"W

121°34'48"W

121°34'44"W





121°35'2"W

121°34'59"W

121°34'55"W

121°34'52"W

121°34'48"W

121°34'44"W

Site S32c: Habitat

38°29'2"N

38°29'2"N

38°28'59"N

38°28'59"N

38°28'55"N

38°28'55"N

38°28'52"N

38°28'52"N

38°28'48"N

38°28'48"N

38°28'44"N

38°28'44"N

38°28'41"N

38°28'41"N

38°28'37"N

38°28'37"N

121°35'6"W

121°35'2"W

121°34'59"W

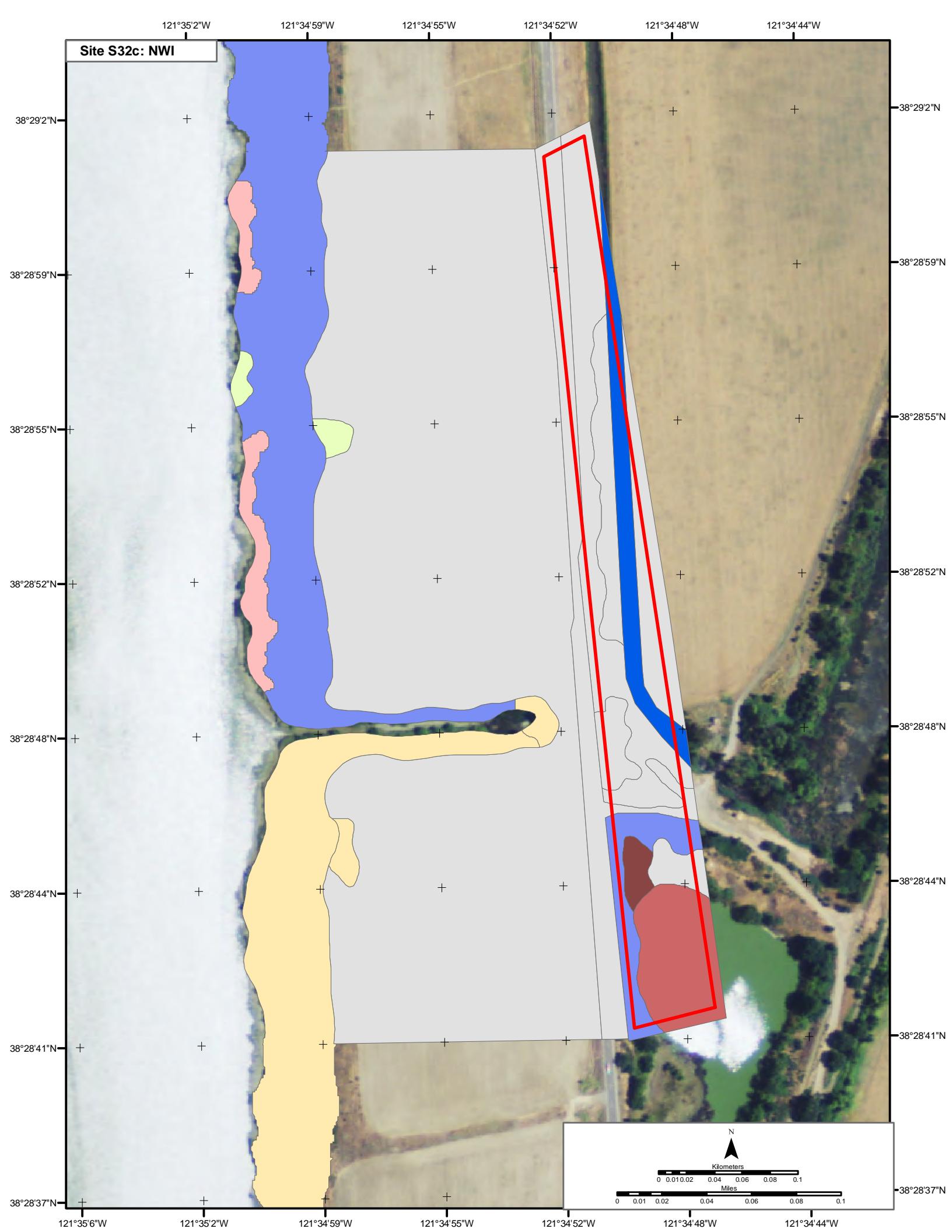
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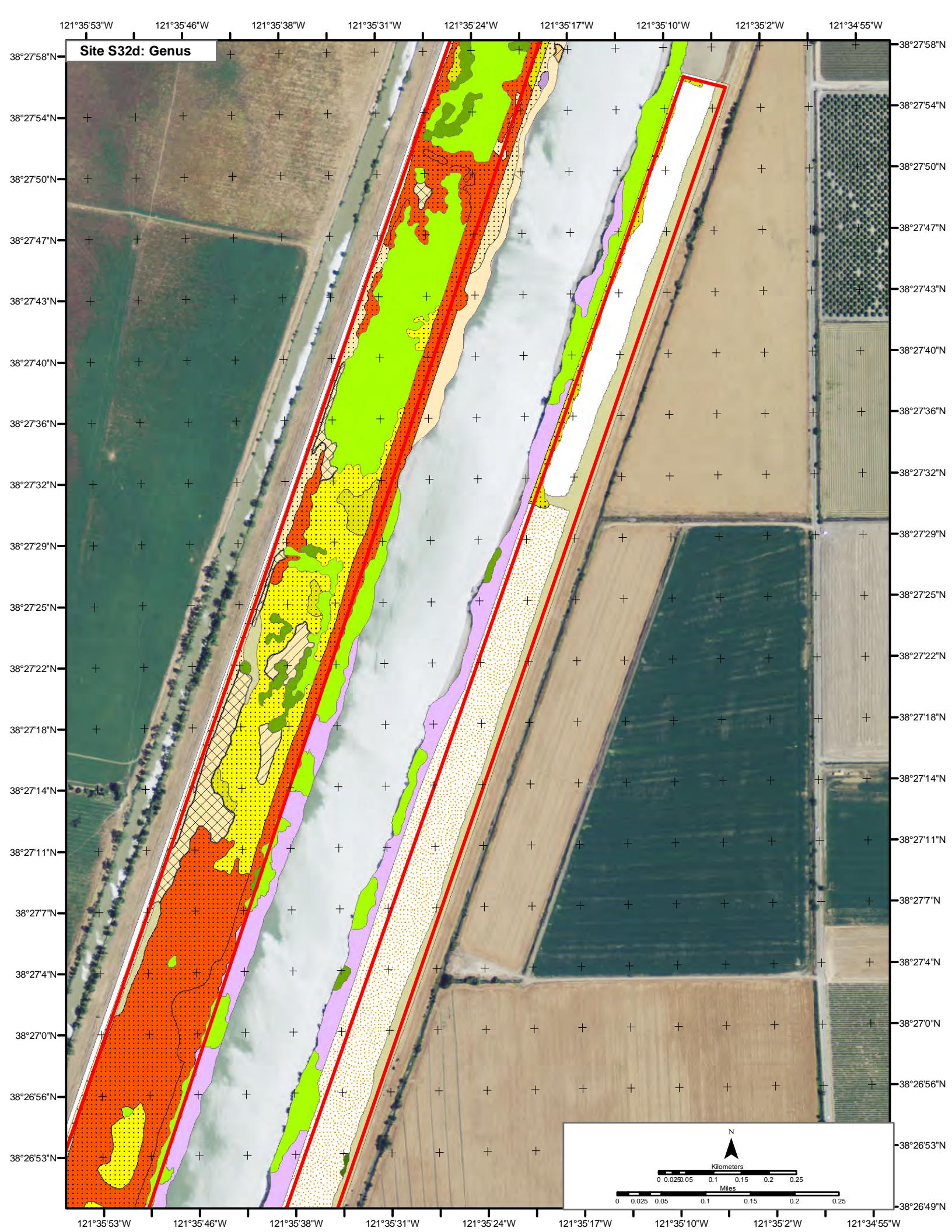
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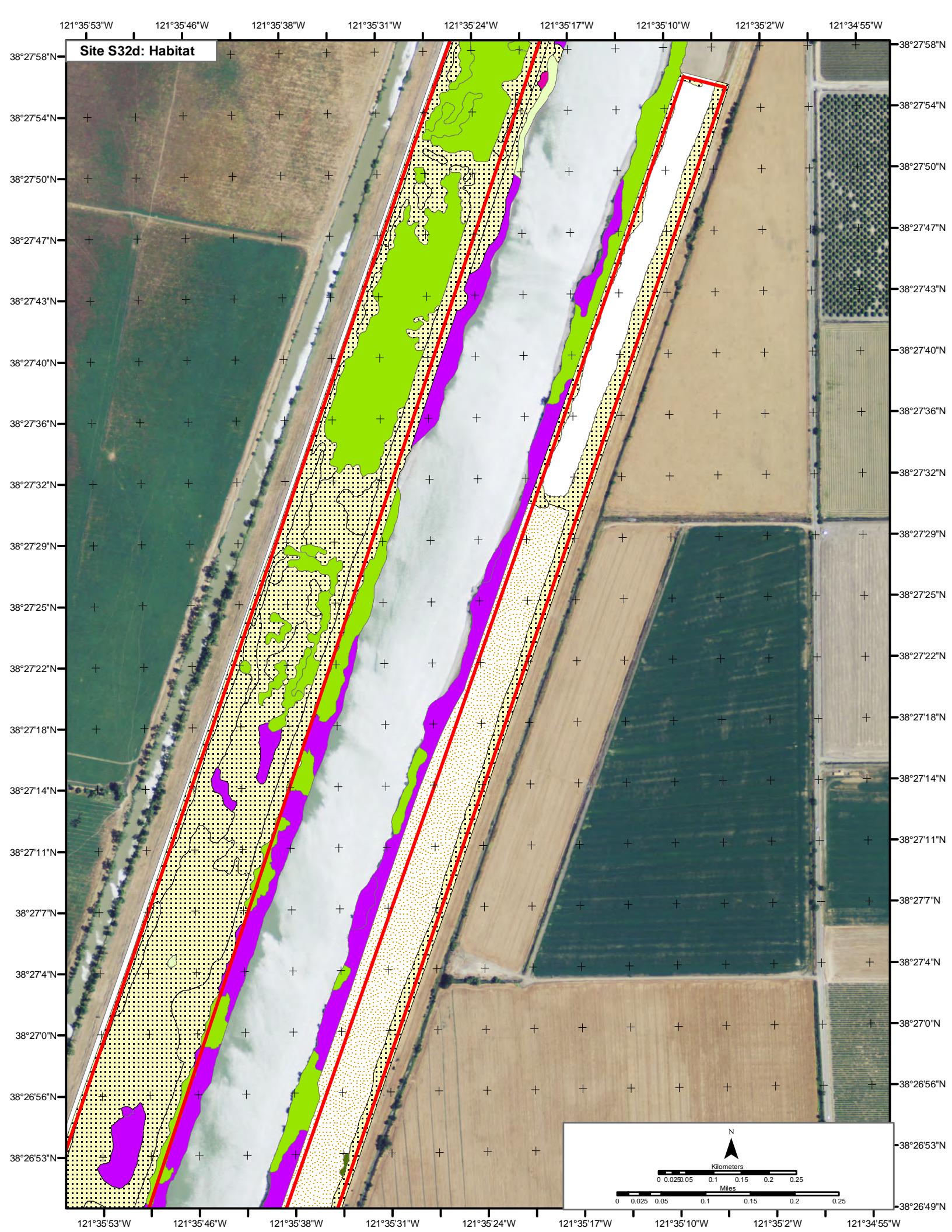
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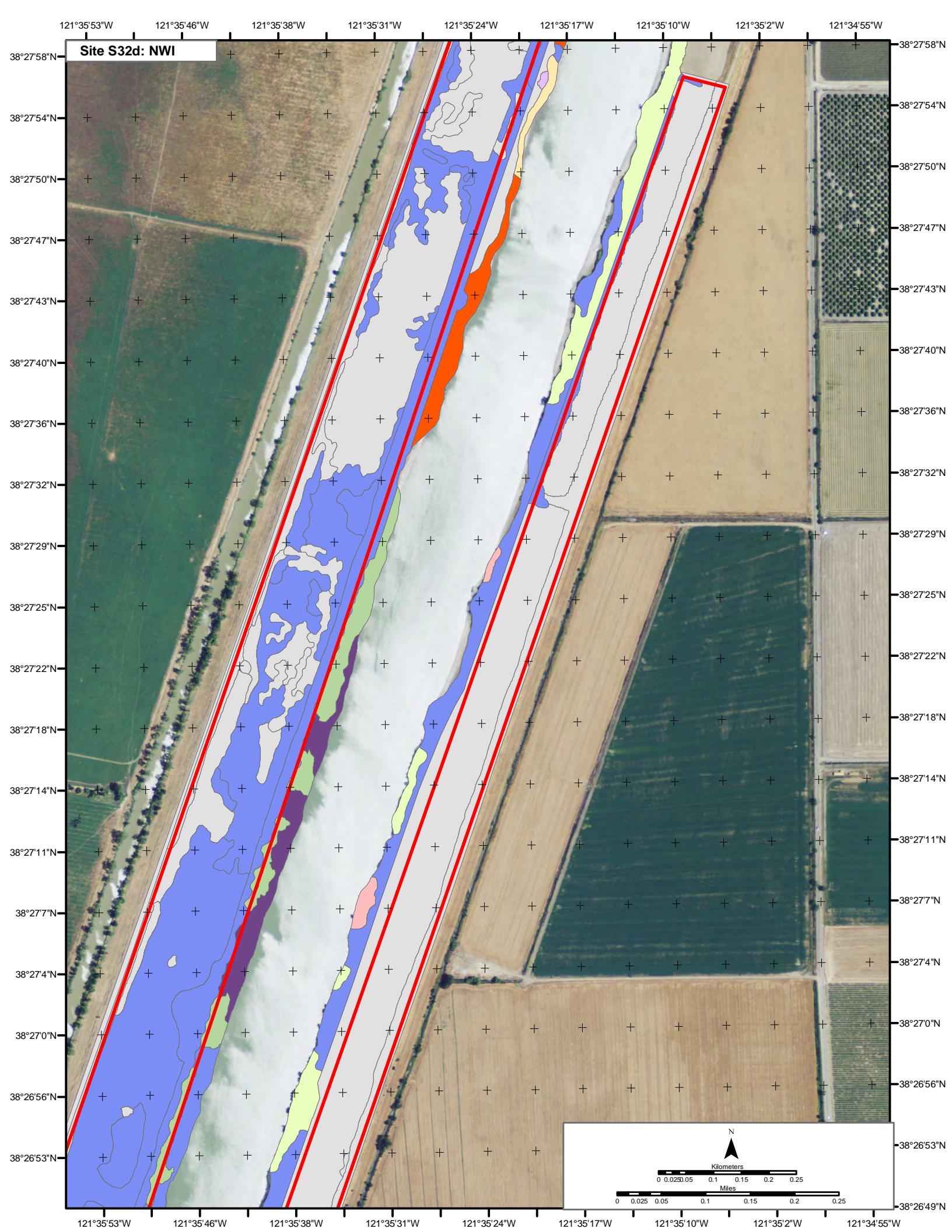
121°34'44"W

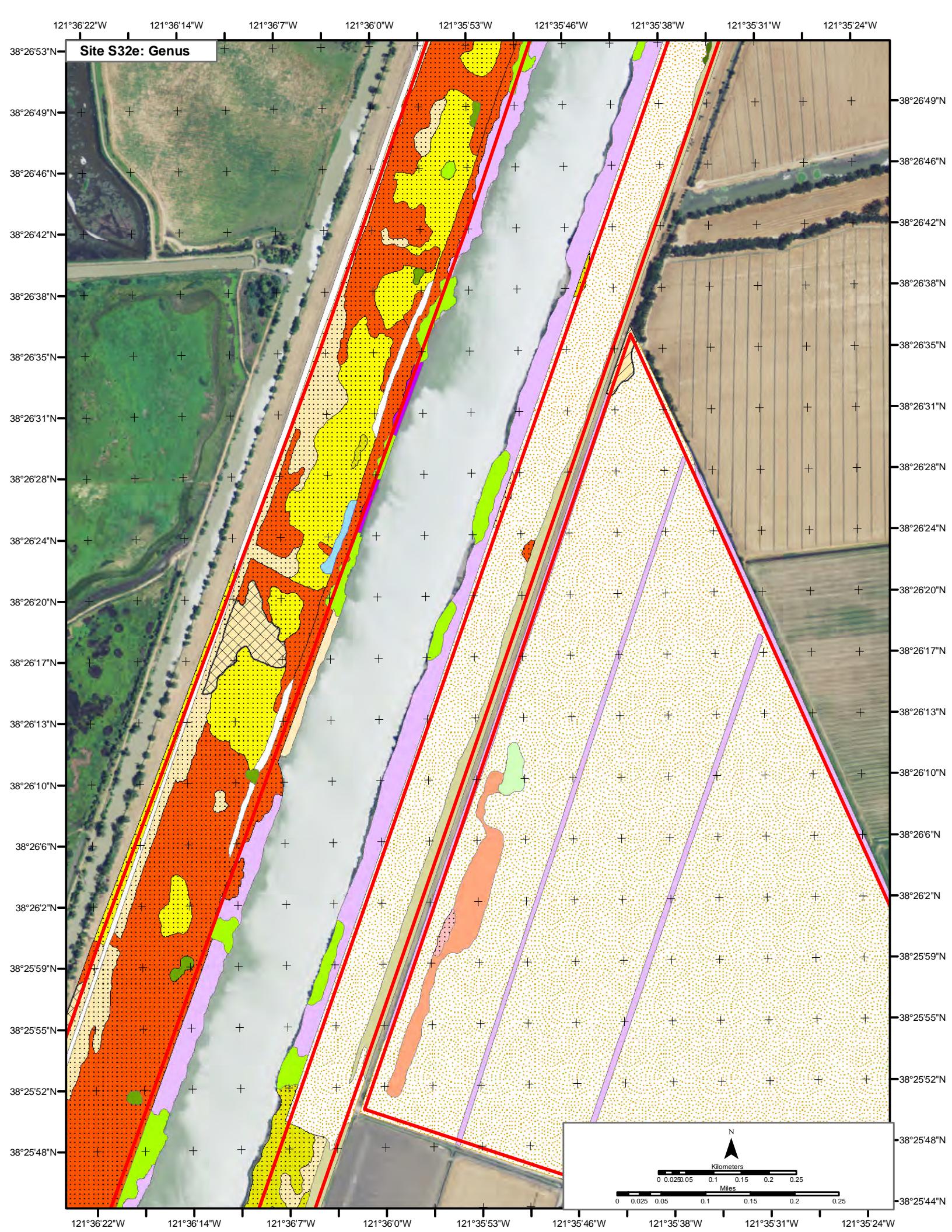


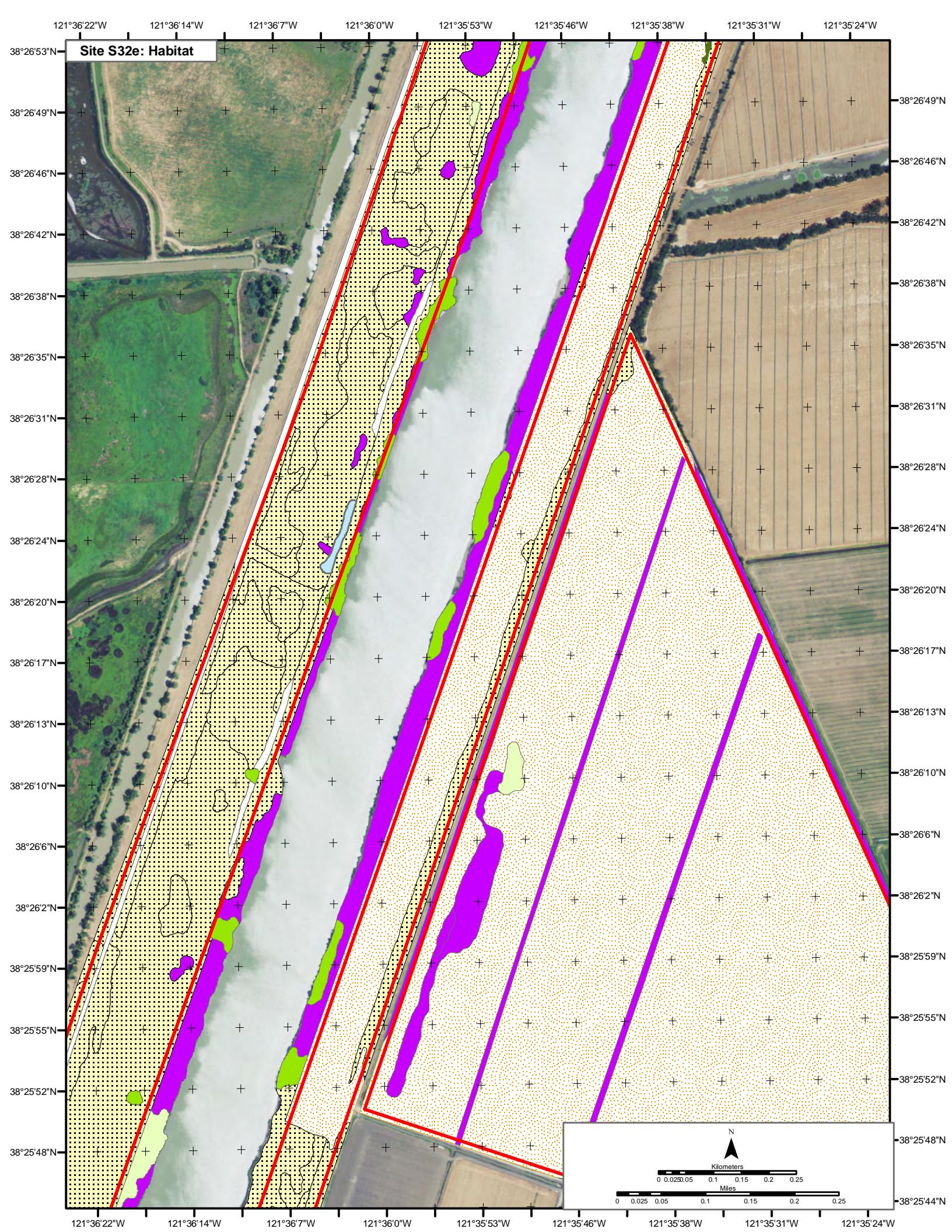


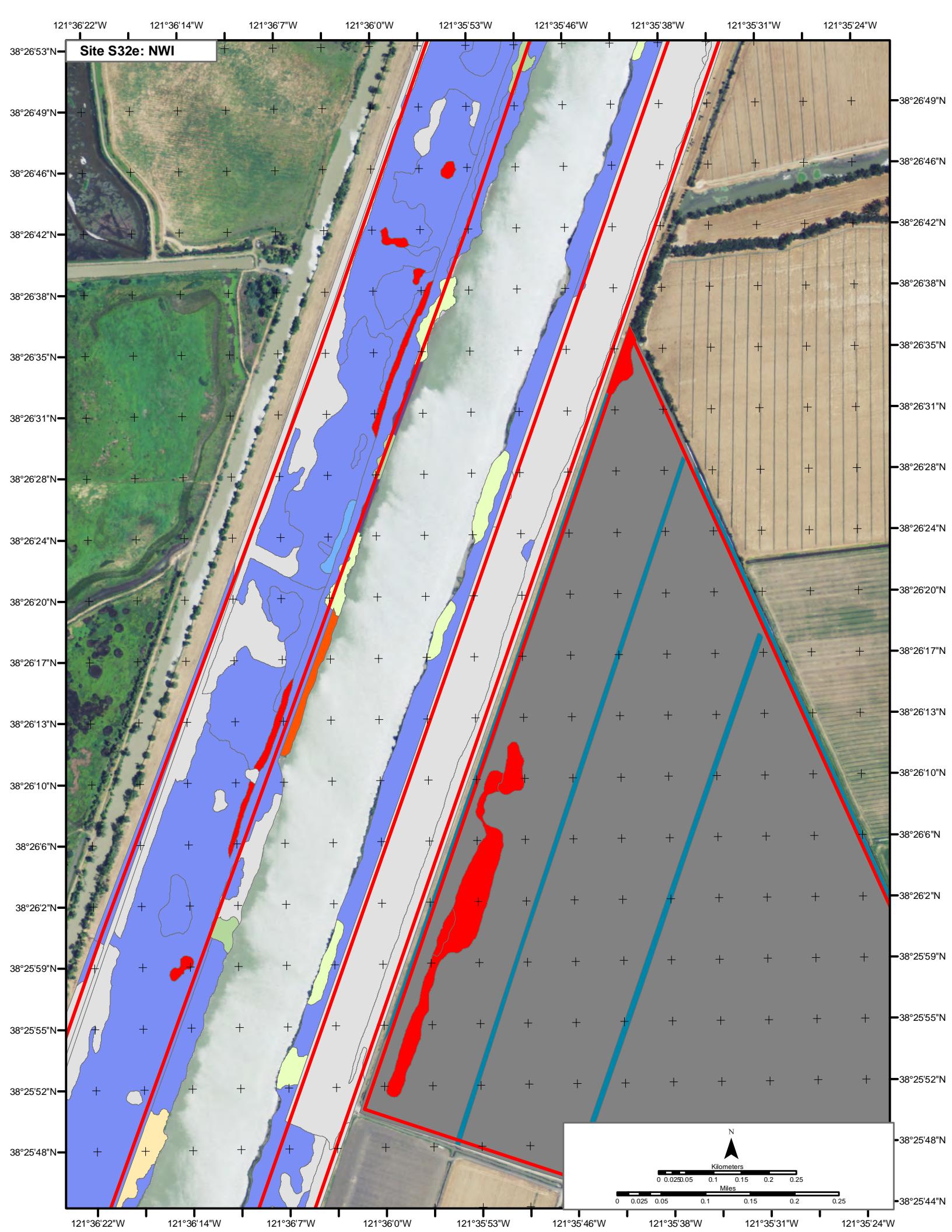


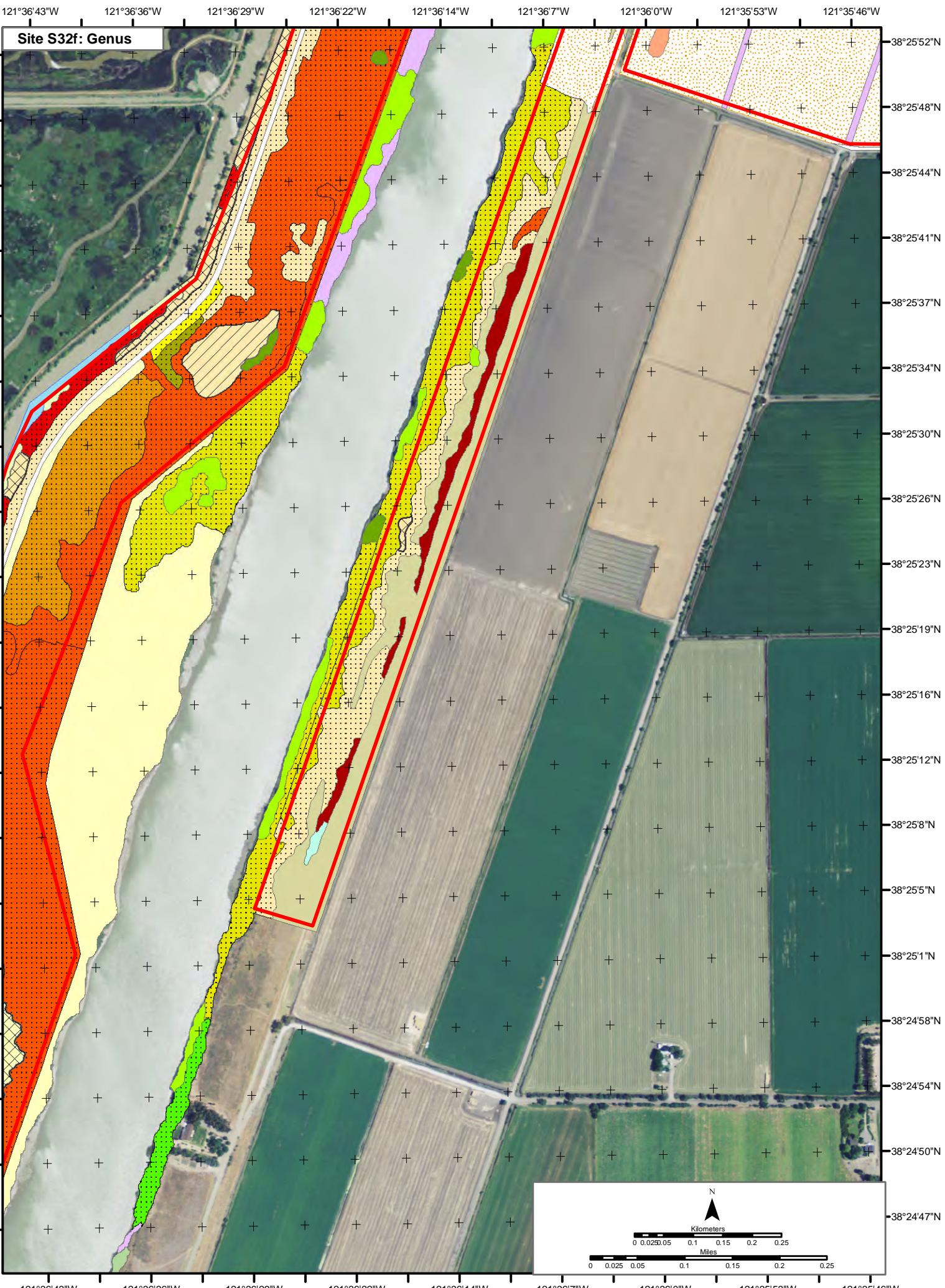


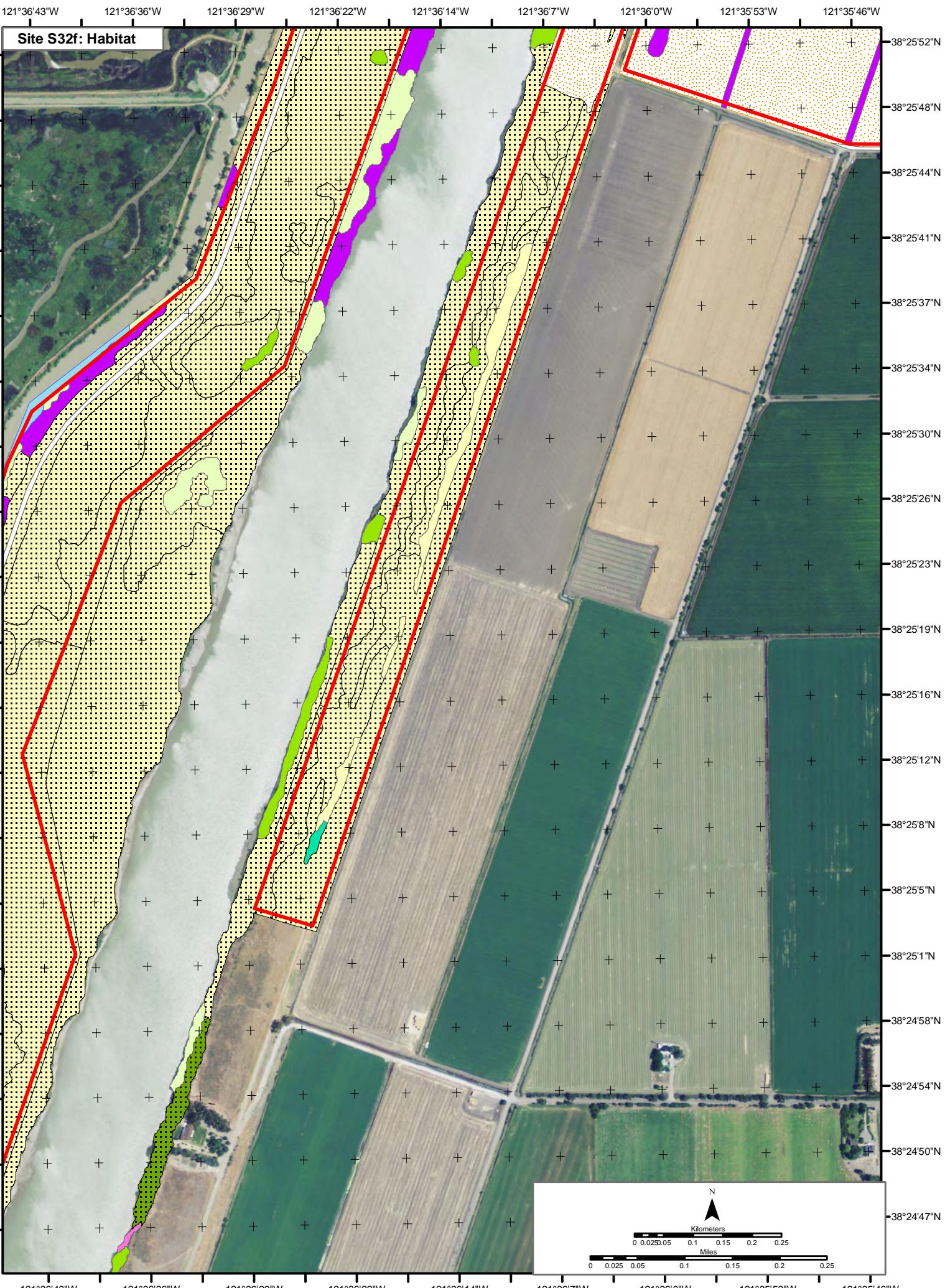


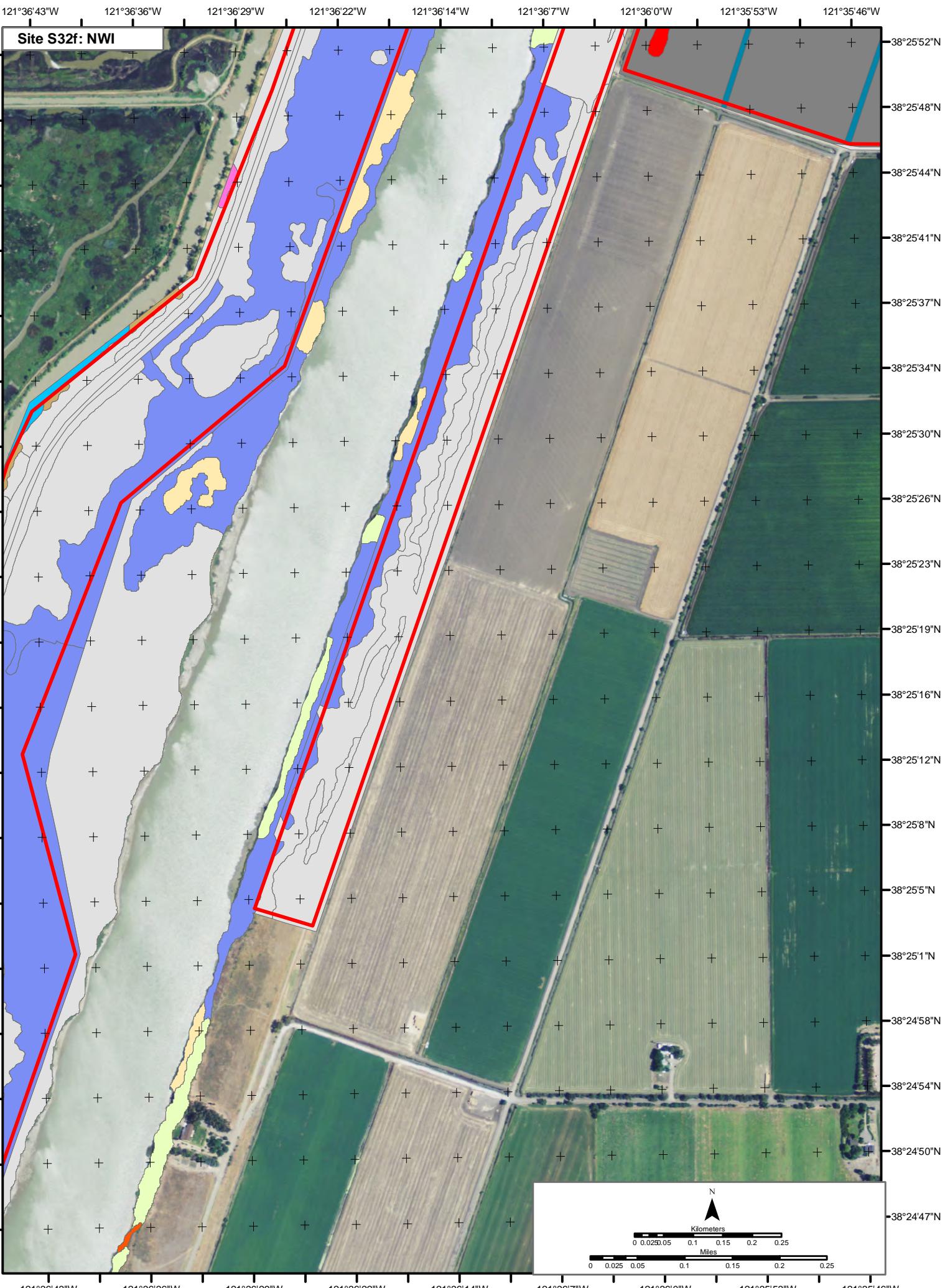






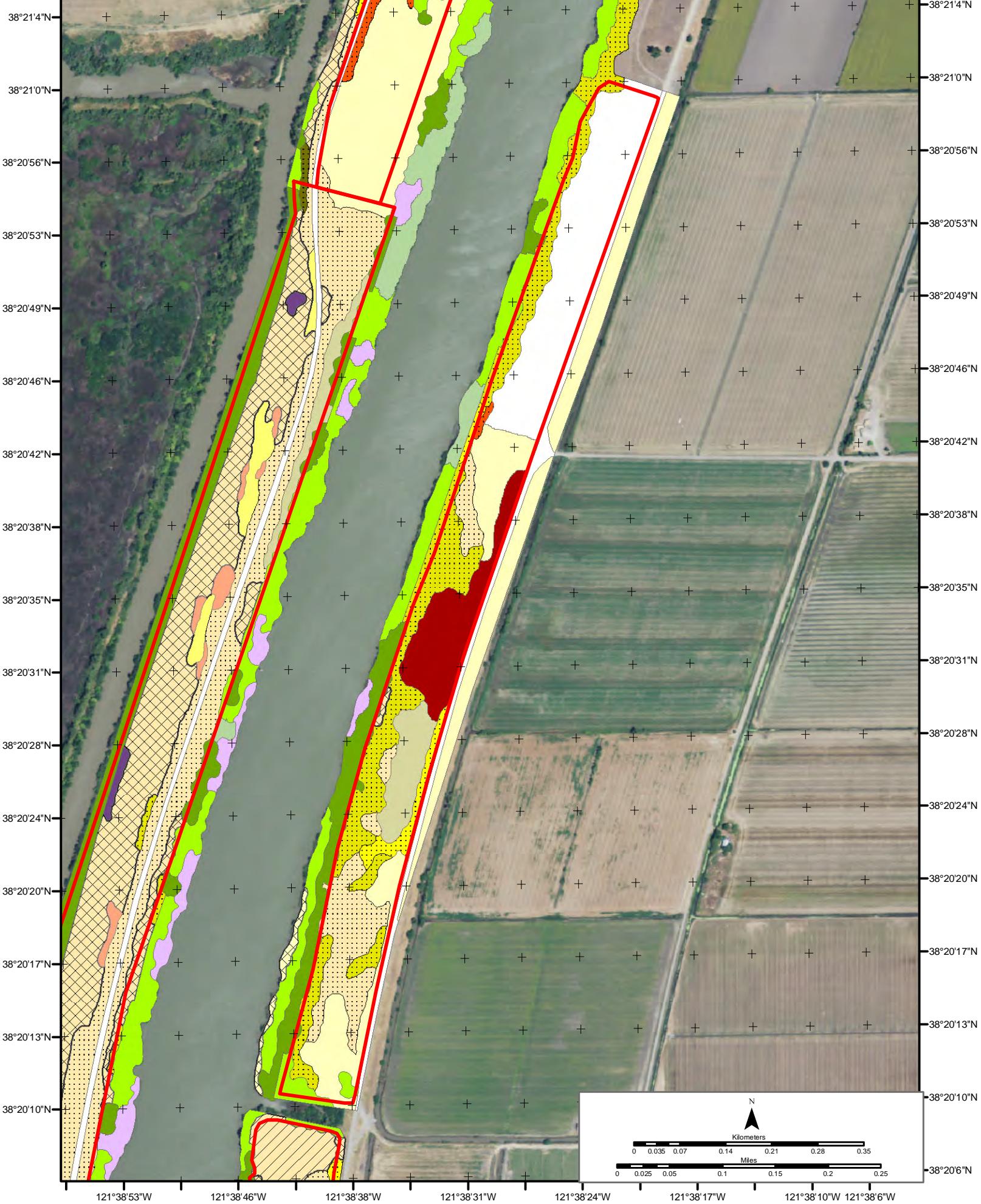




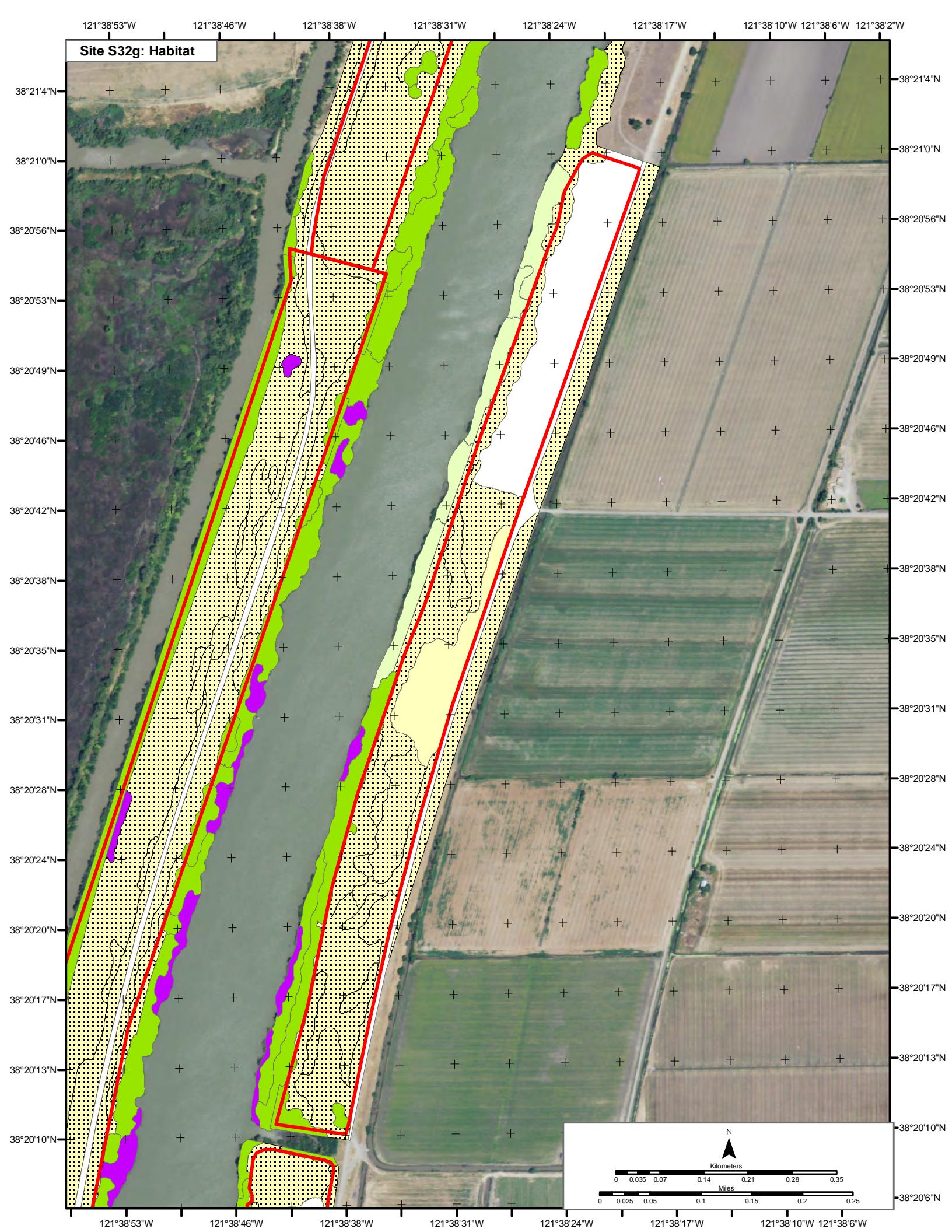


121°38'53"W 121°38'46"W 121°38'38"W 121°38'31"W 121°38'24"W 121°38'17"W 121°38'10"W 121°38'6"W 121°38'2"W

Site S32g: Genus

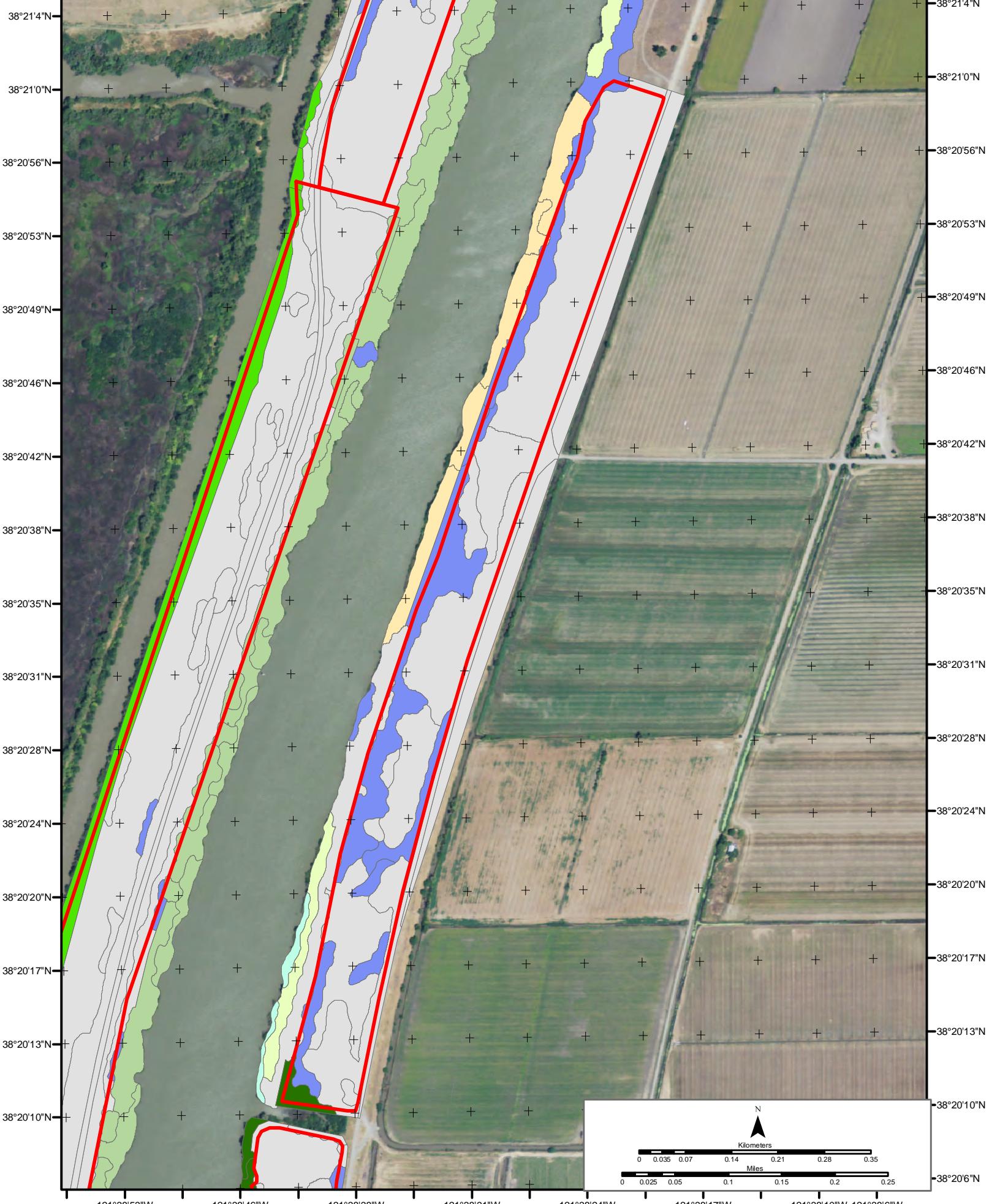


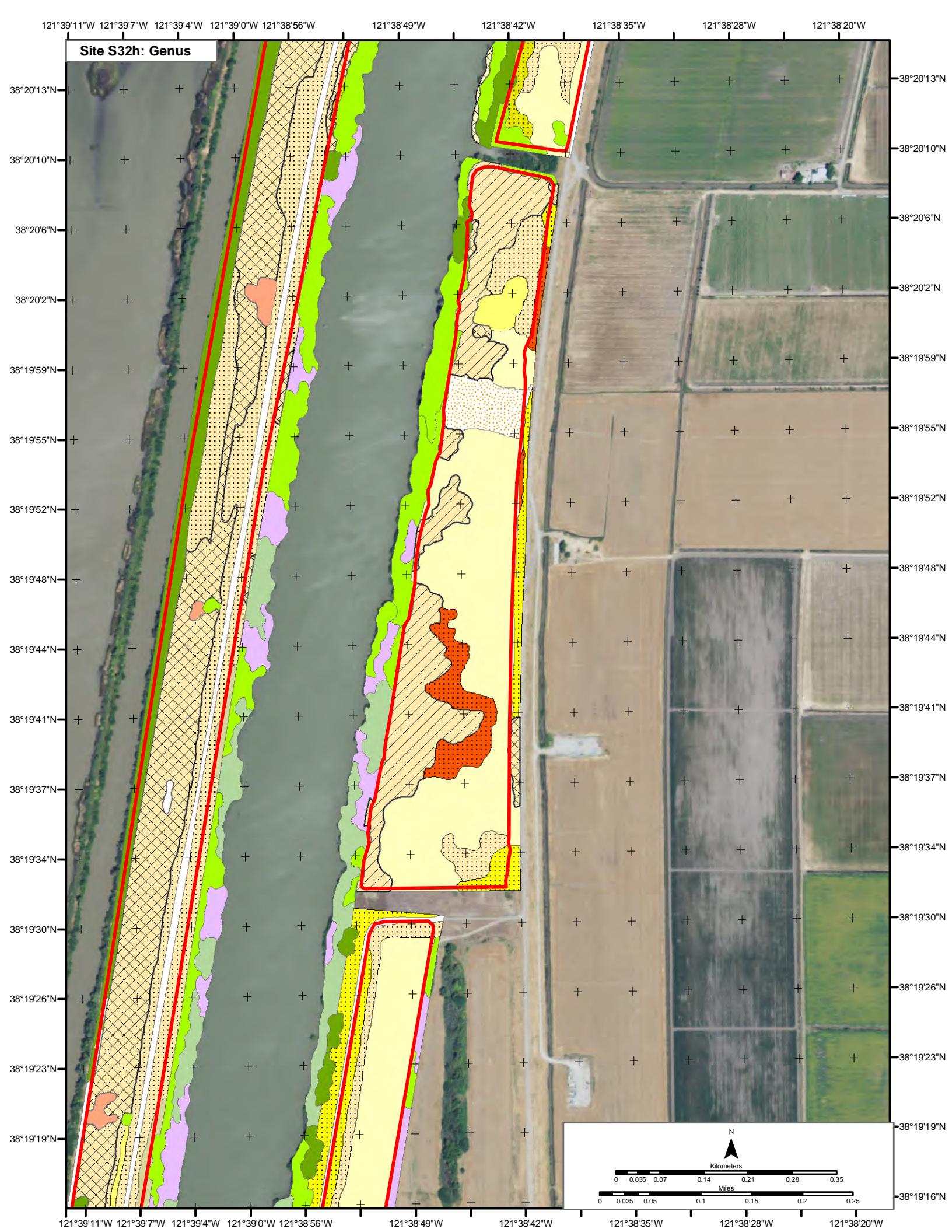
Site S32g: Habitat



121°38'53"W 121°38'46"W 121°38'38"W 121°38'31"W 121°38'24"W 121°38'17"W 121°38'10"W 121°38'6"W 121°38'2"W

Site S32g: NWI





121°39'11"W 121°39'7"W 121°39'4"W 121°39'0"W 121°38'56"W

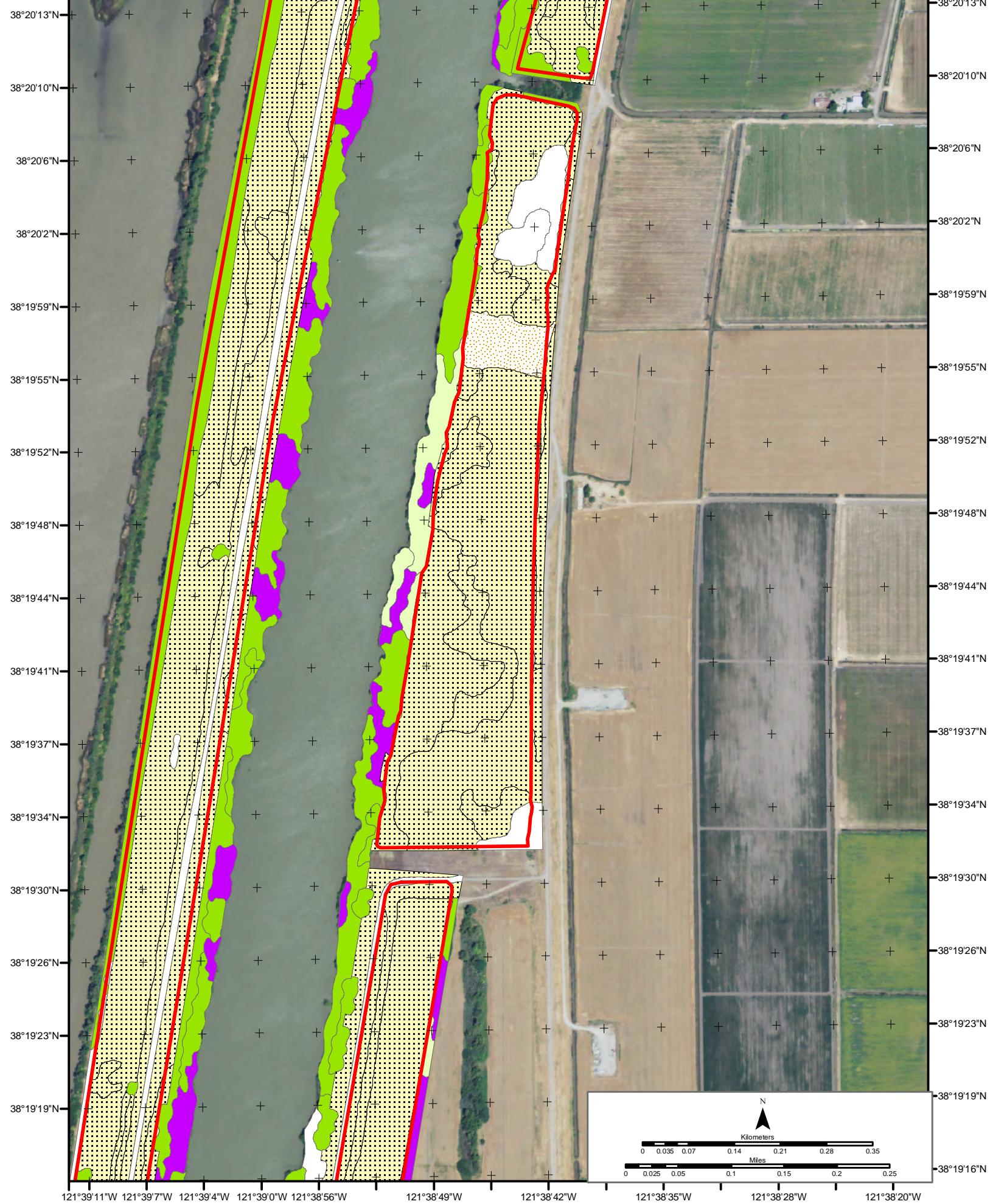
121°38'49"W

121°38'42"W

121°38'35"W

121°38'28"W

121°38'20"W

Site S32h: Habitat

121°39'11"W 121°39'7"W 121°39'4"W 121°39'0"W 121°38'56"W

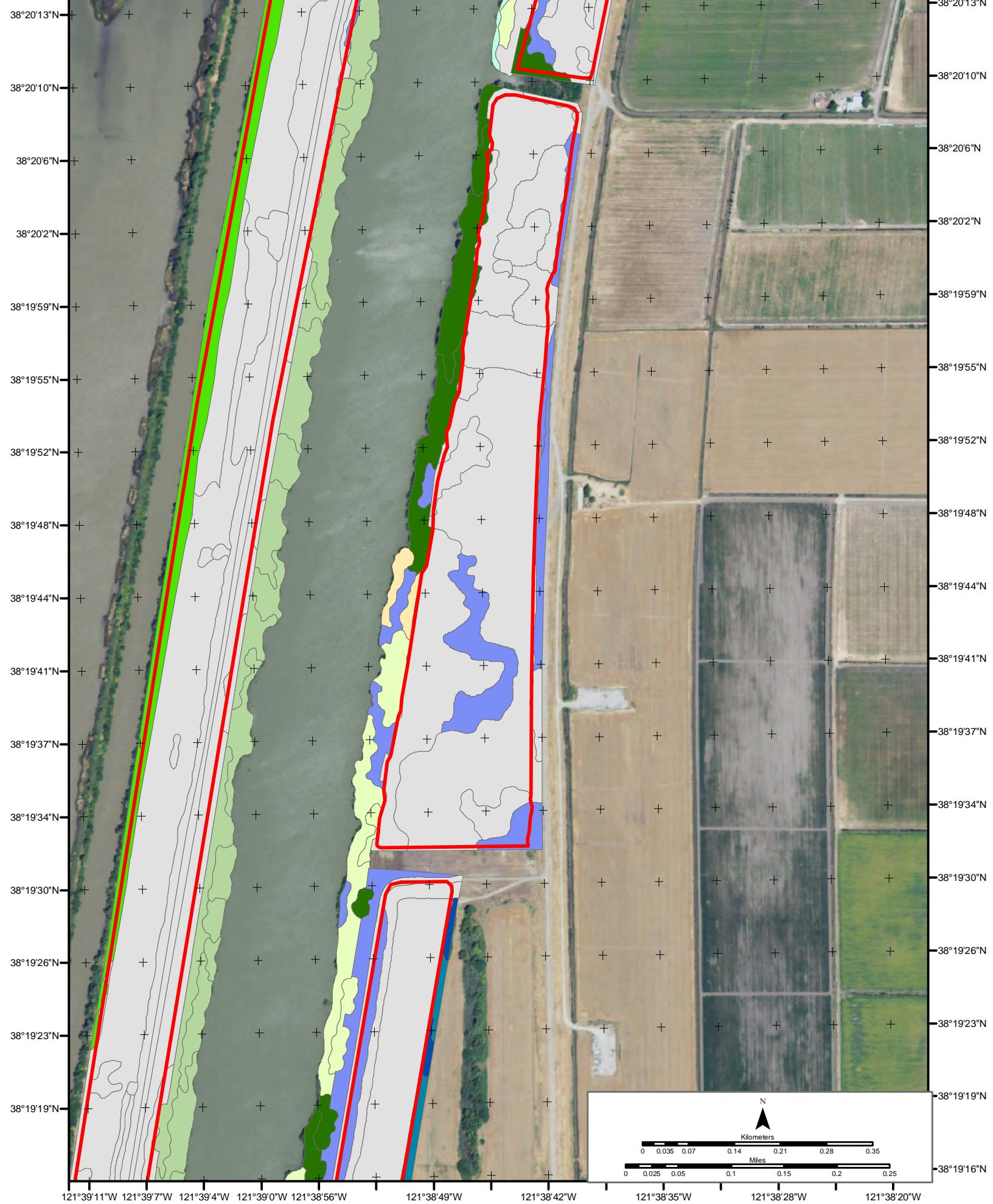
121°38'49"W

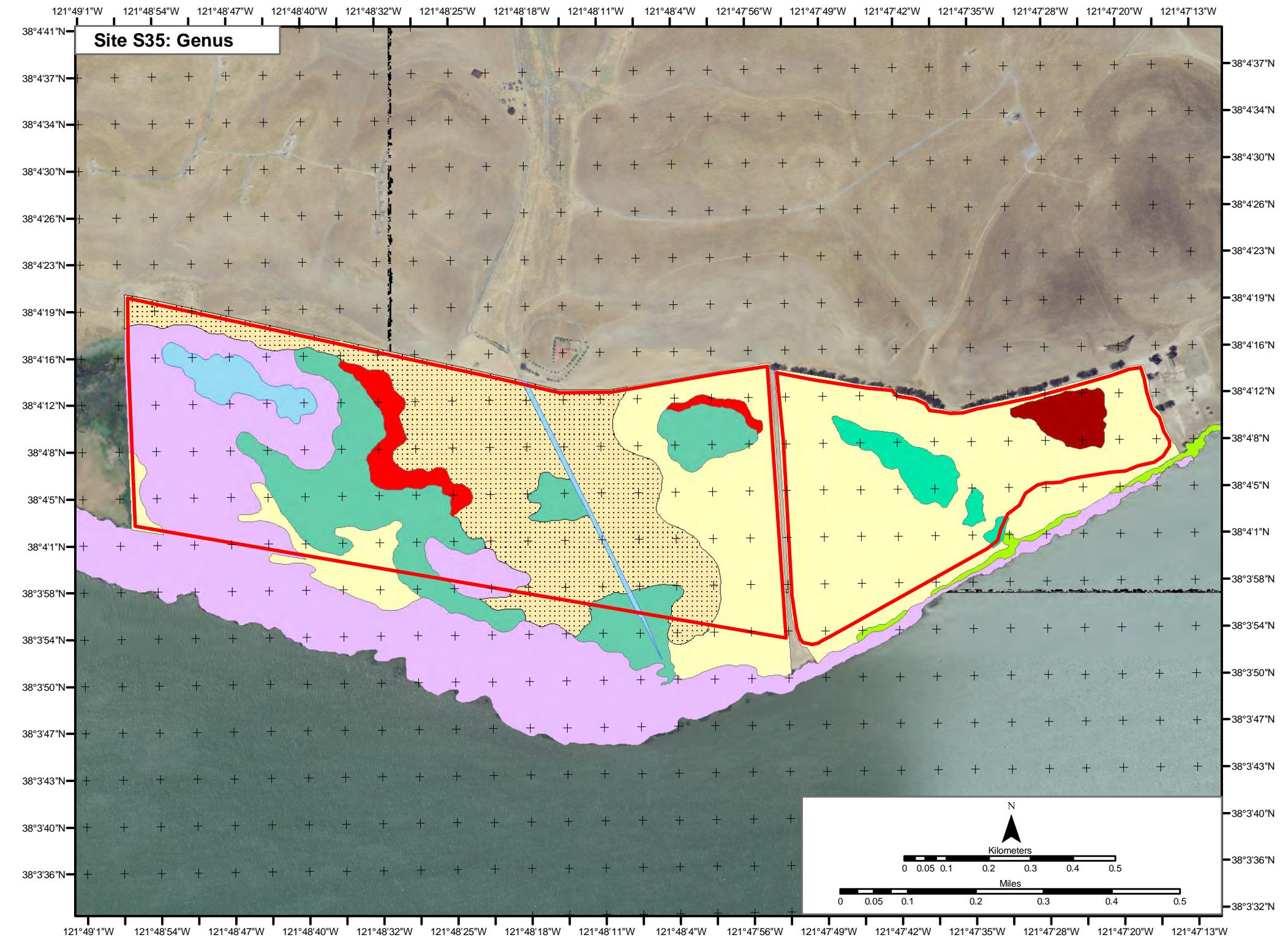
121°38'42"W

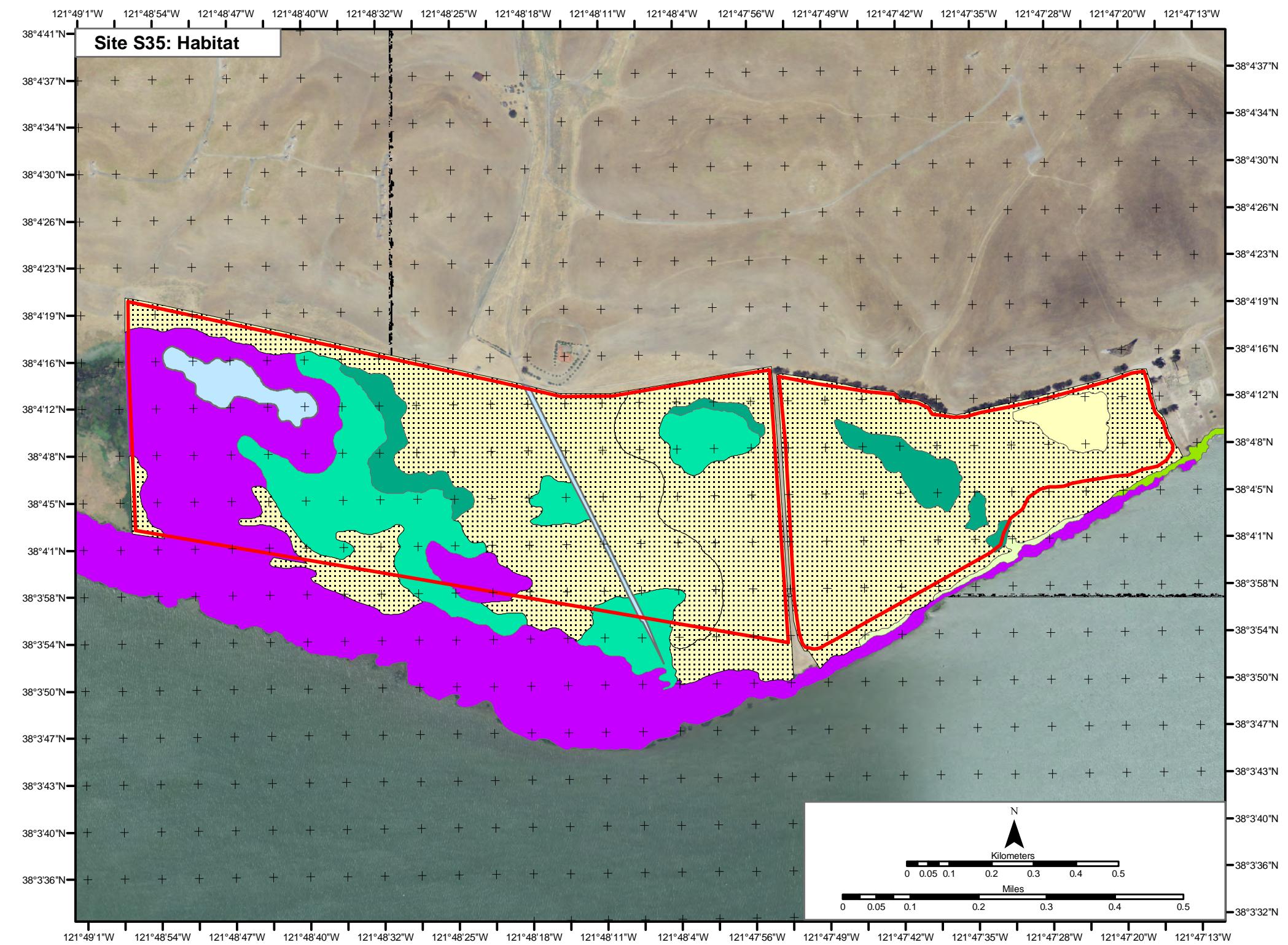
121°38'35"W

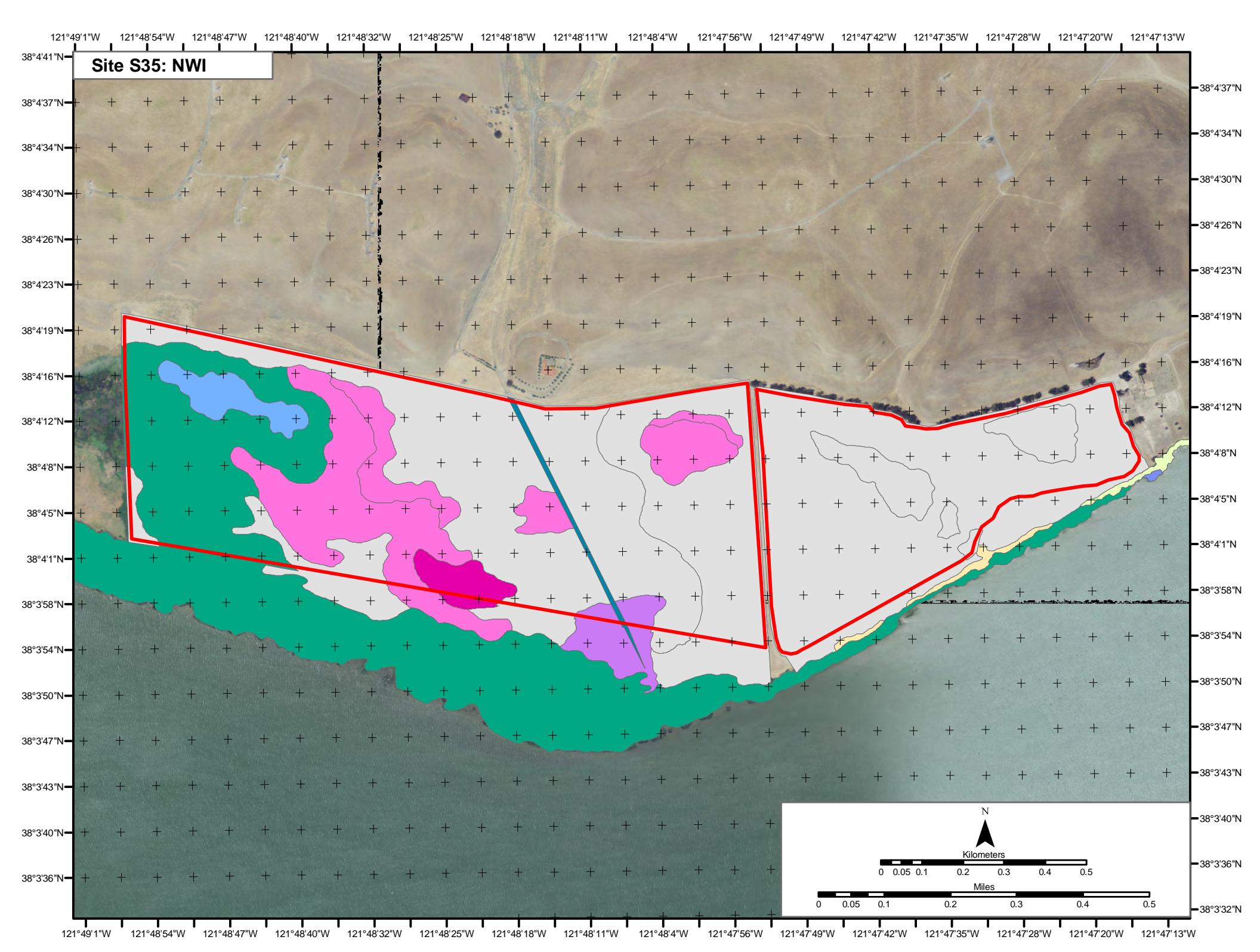
121°38'28"W

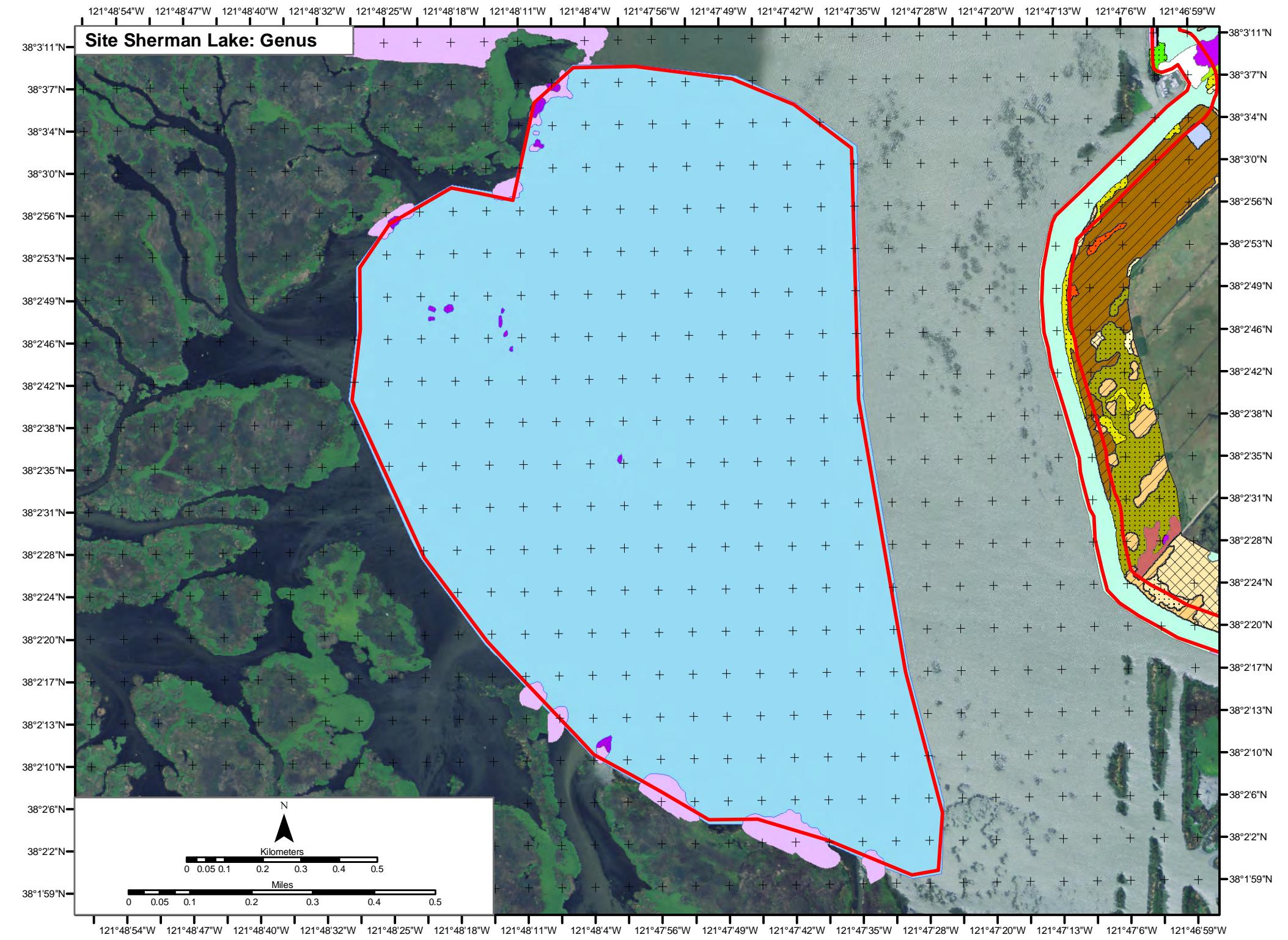
121°38'20"W

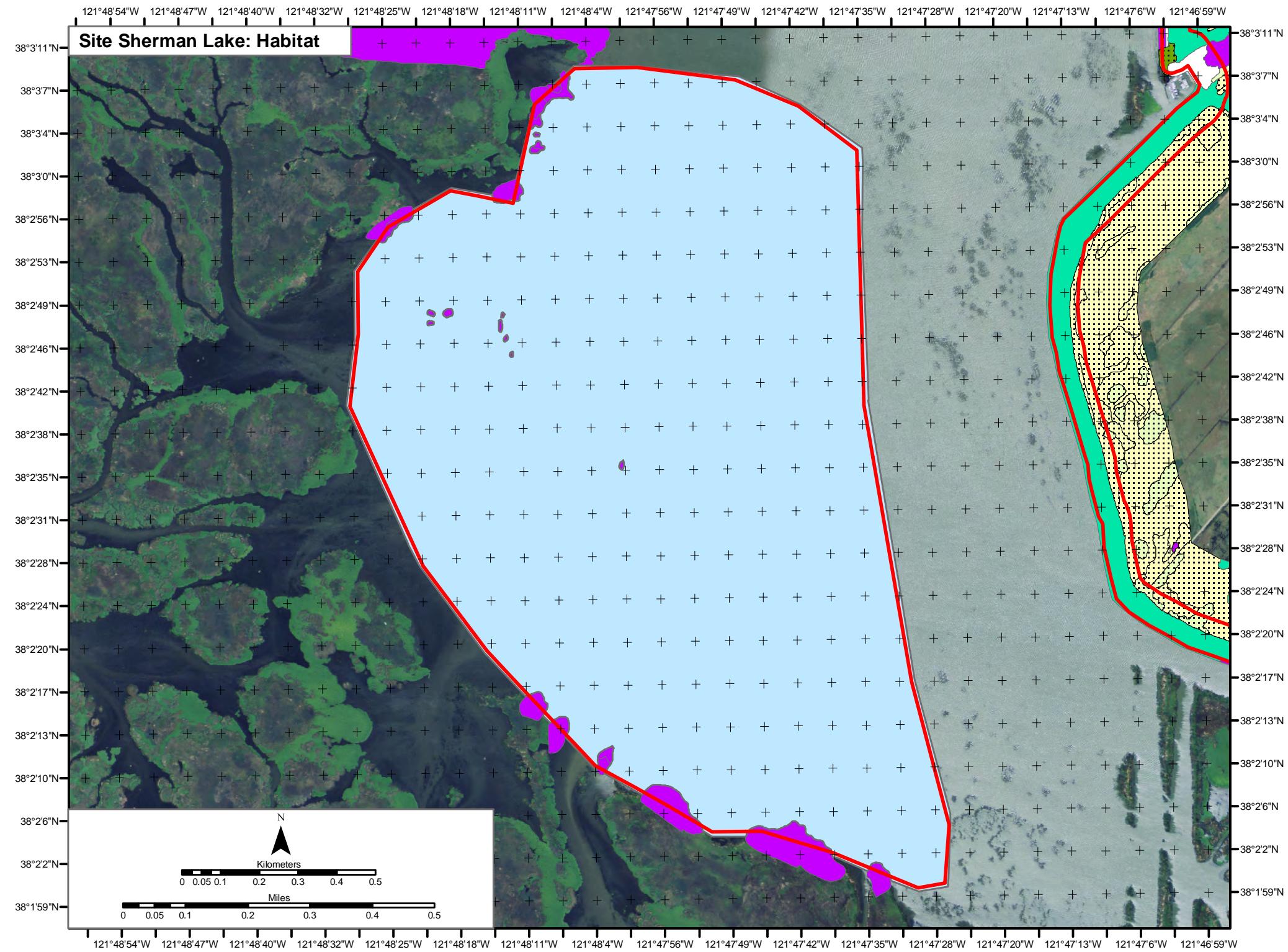
Site S32h: NWI





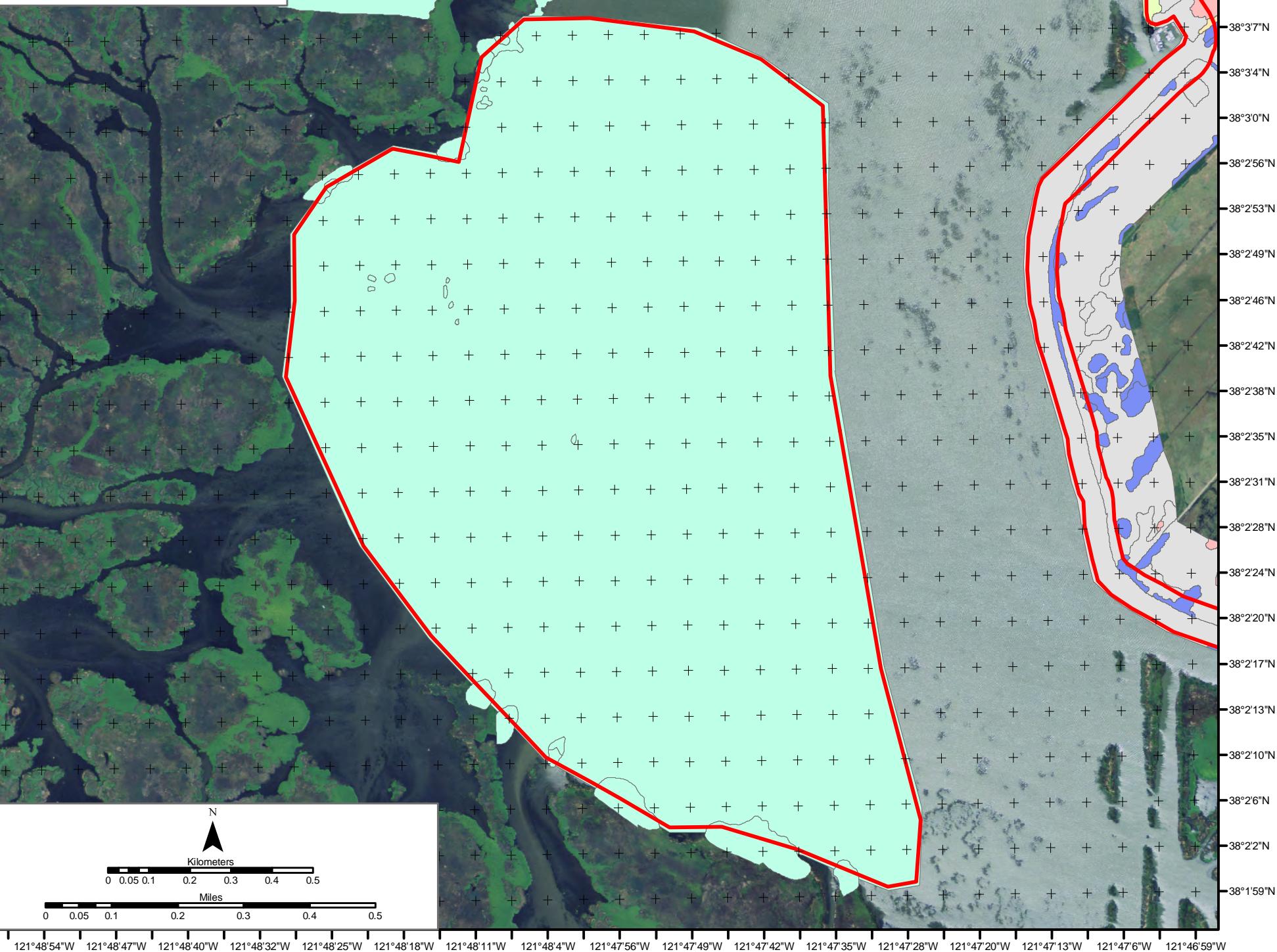


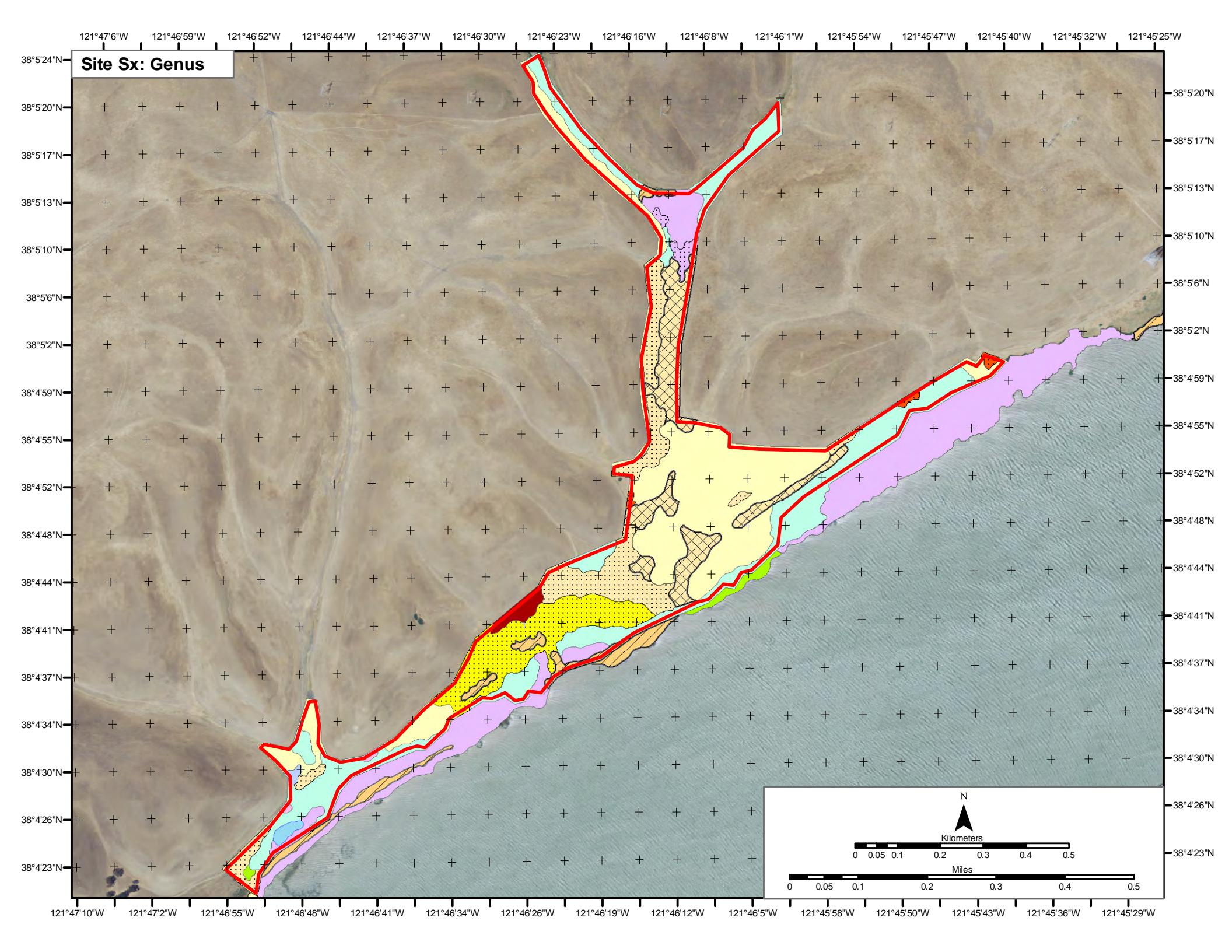


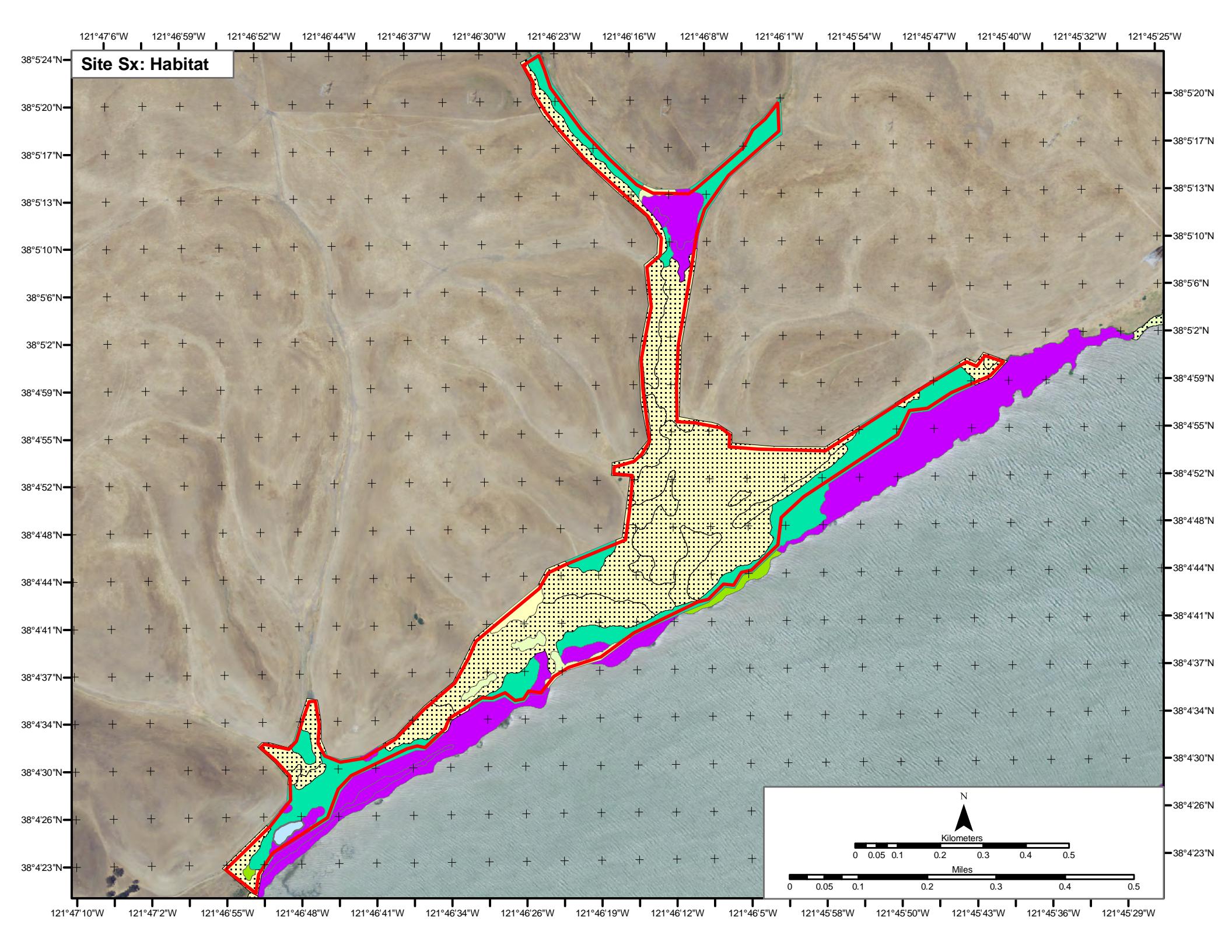


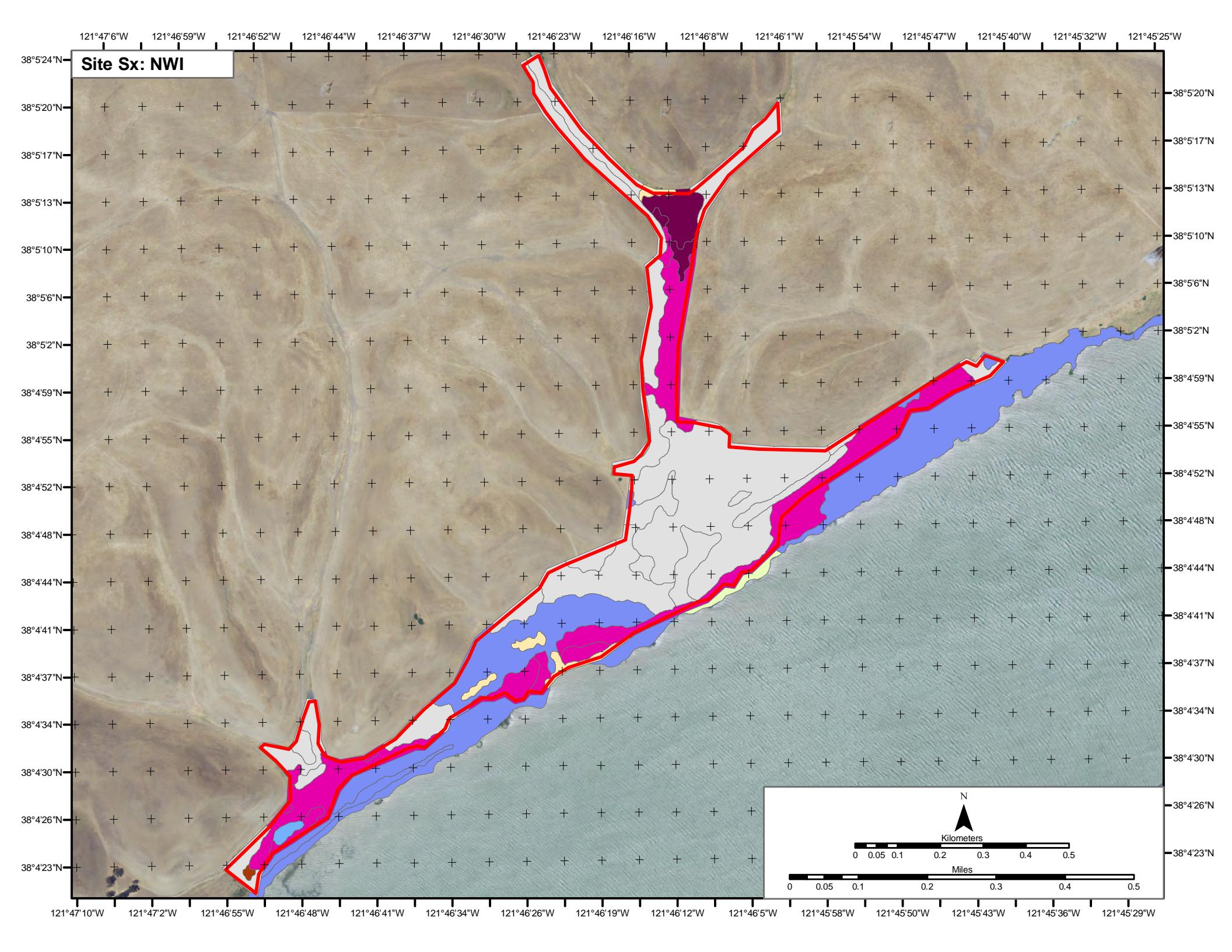
121°48'54"W 121°48'47"W 121°48'40"W 121°48'32"W 121°48'25"W 121°48'18"W 121°48'11"W 121°48'4"W 121°47'56"W 121°47'49"W 121°47'42"W 121°47'35"W 121°47'28"W 121°47'20"W 121°47'13"W 121°47'6"W 121°46'59"W

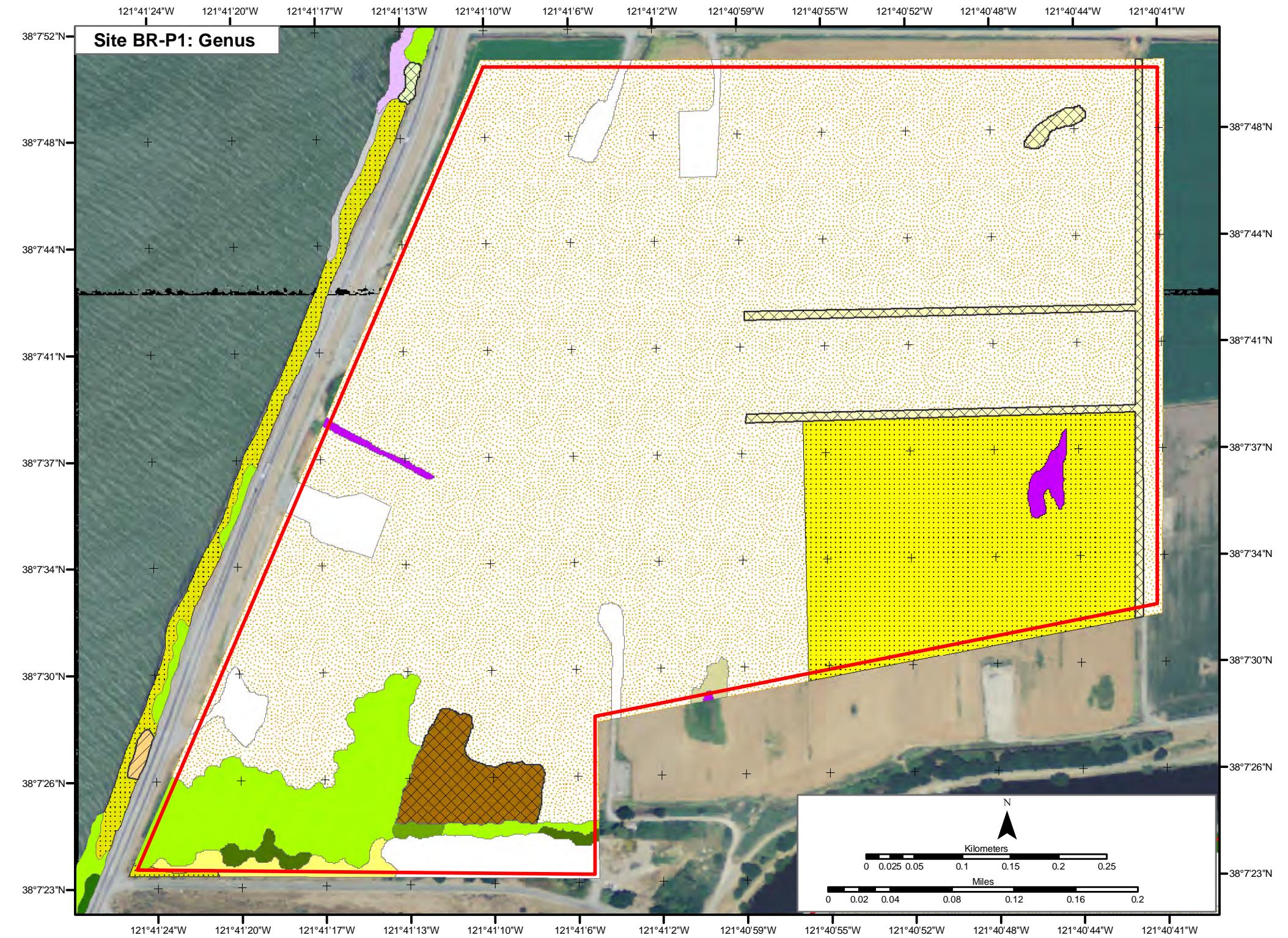
Site Sherman Lake: NWI

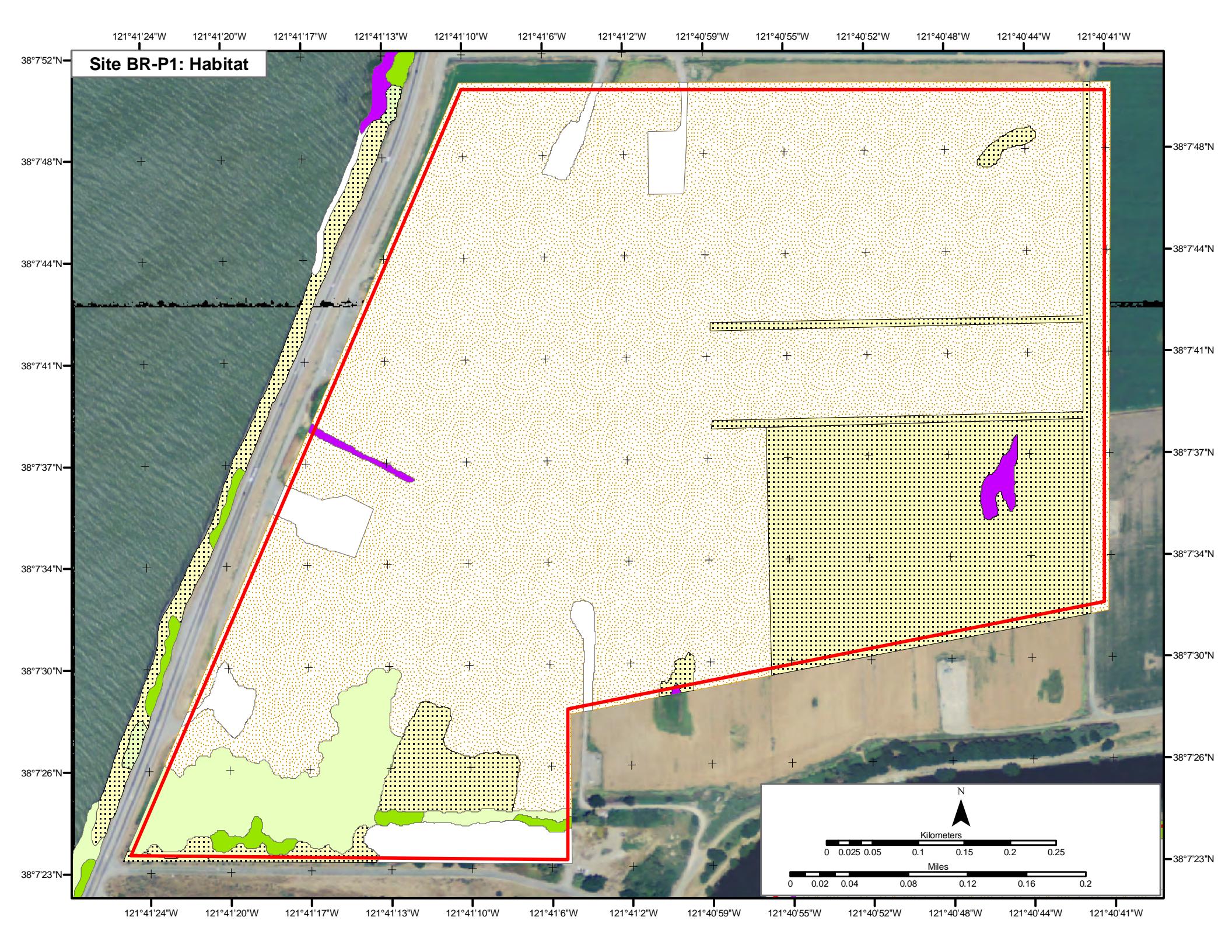


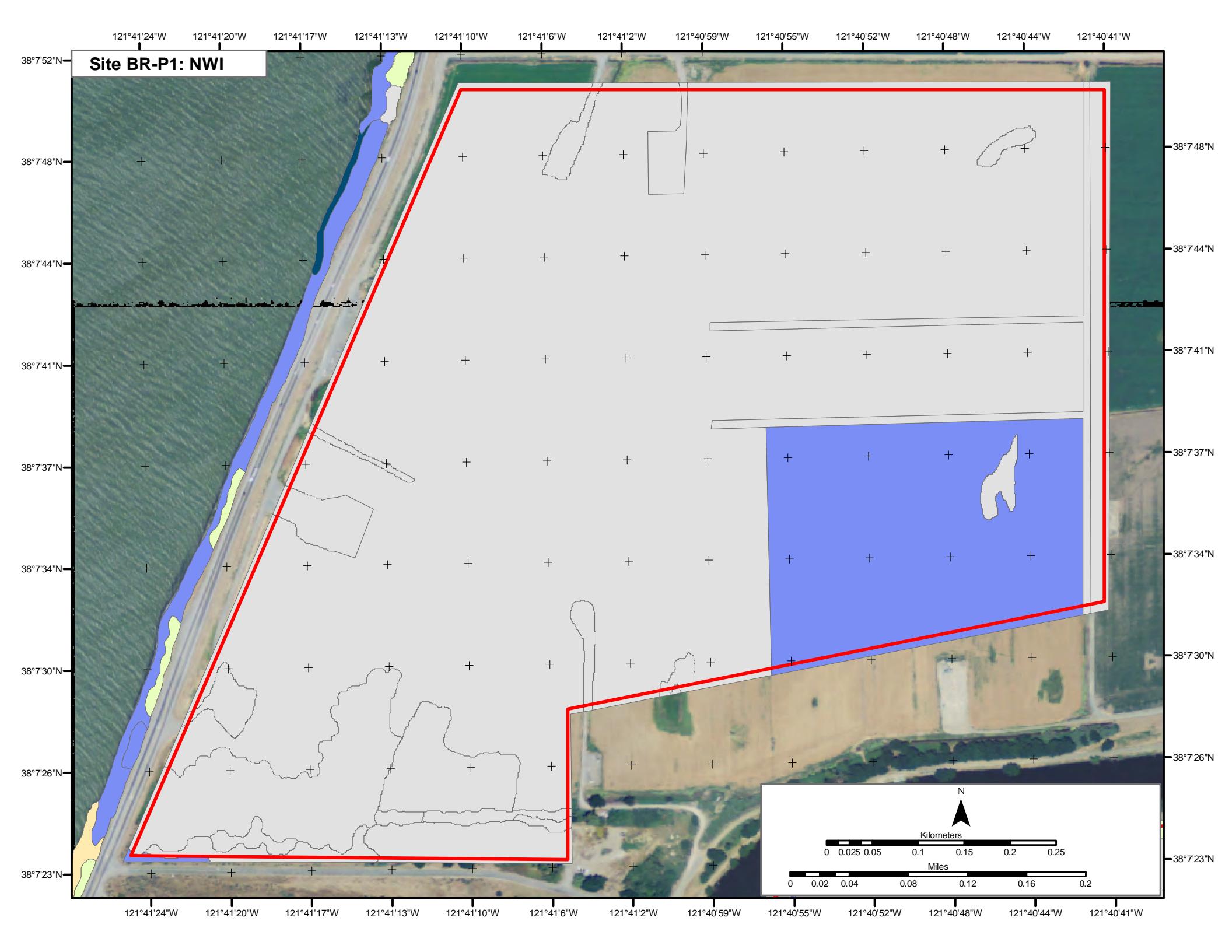












121°38'35"W 121°38'31"W 121°38'28"W 121°38'24"W 121°38'20"W 121°38'17"W 121°38'13"W 121°38'10"W 121°38'6"W 121°38'2"W 121°37'59"W

Site BR-P2: Genus

38°8'10"N

+

38°8'10"N

38°8'6"N

+

38°8'6"N

38°8'2"N

+

38°8'2"N

38°7'59"N

+

38°7'59"N

38°7'55"N

+

38°7'55"N

38°7'52"N

+

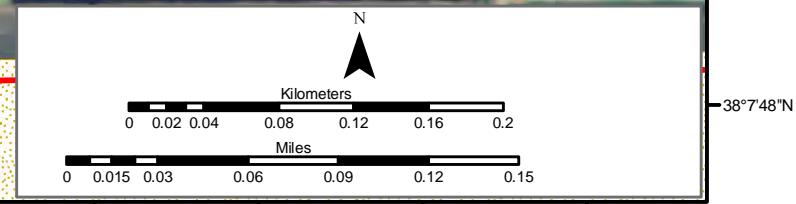
38°7'52"N

38°7'48"N

+

38°7'48"N

121°38'35"W 121°38'31"W 121°38'28"W 121°38'24"W 121°38'20"W 121°38'17"W 121°38'13"W 121°38'10"W 121°38'6"W 121°38'2"W 121°37'59"W



121°38'35"W 121°38'31"W 121°38'28"W 121°38'24"W 121°38'20"W 121°38'17"W 121°38'13"W 121°38'10"W 121°38'6"W 121°38'2"W 121°37'59"W

Site BR-P2: Habitat

38°8'10"N

+

38°8'10"N

38°8'6"N

+

38°8'6"N

38°8'2"N

+

38°8'2"N

38°7'59"N

+

38°7'59"N

38°7'55"N

+

38°7'55"N

38°7'52"N

+

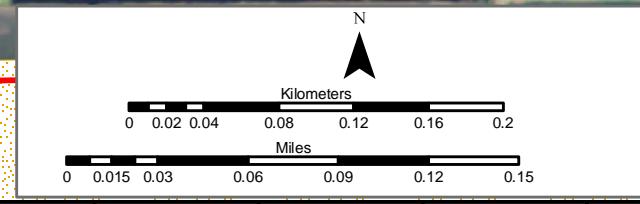
38°7'52"N

38°7'48"N

+

38°7'48"N

121°38'35"W 121°38'31"W 121°38'28"W 121°38'24"W 121°38'20"W 121°38'17"W 121°38'13"W 121°38'10"W 121°38'6"W 121°38'2"W 121°37'59"W



121°38'35"W 121°38'31"W 121°38'28"W 121°38'24"W 121°38'20"W 121°38'17"W 121°38'13"W 121°38'10"W 121°38'6"W 121°38'2"W 121°37'59"W

Site BR-P2: NWI

38°8'10"N 38°8'10"N

38°8'6"N 38°8'6"N

38°8'2"N 38°8'2"N

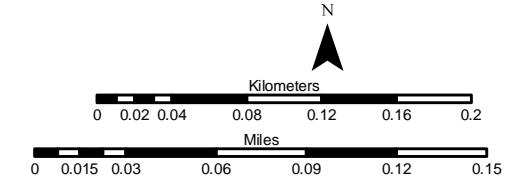
38°7'59"N 38°7'59"N

38°7'55"N 38°7'55"N

38°7'52"N 38°7'52"N

38°7'48"N 38°7'48"N

121°38'35"W 121°38'31"W 121°38'28"W 121°38'24"W 121°38'20"W 121°38'17"W 121°38'13"W 121°38'10"W 121°38'6"W 121°38'2"W 121°37'59"W



121°38'35"W 121°38'28"W 121°38'20"W 121°38'13"W 121°38'6"W 121°37'59"W 121°37'52"W 121°37'44"W 121°37'37"W 121°37'30"W 121°37'23"W 121°37'16"W

Site BR-P3: Genus

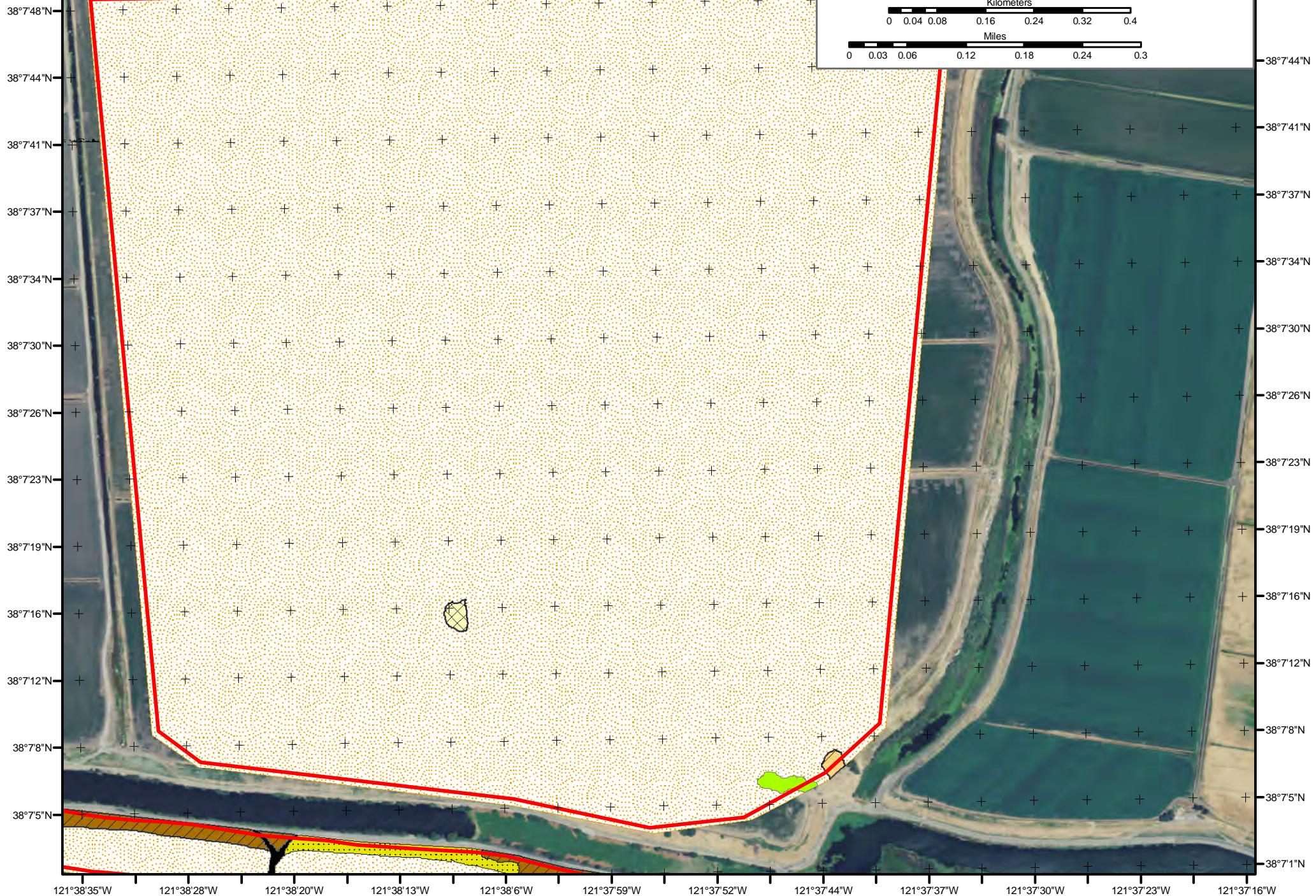
N

Kilometers

0 0.04 0.08 0.16 0.24 0.32 0.4

Miles

0 0.03 0.06 0.12 0.18 0.24 0.3



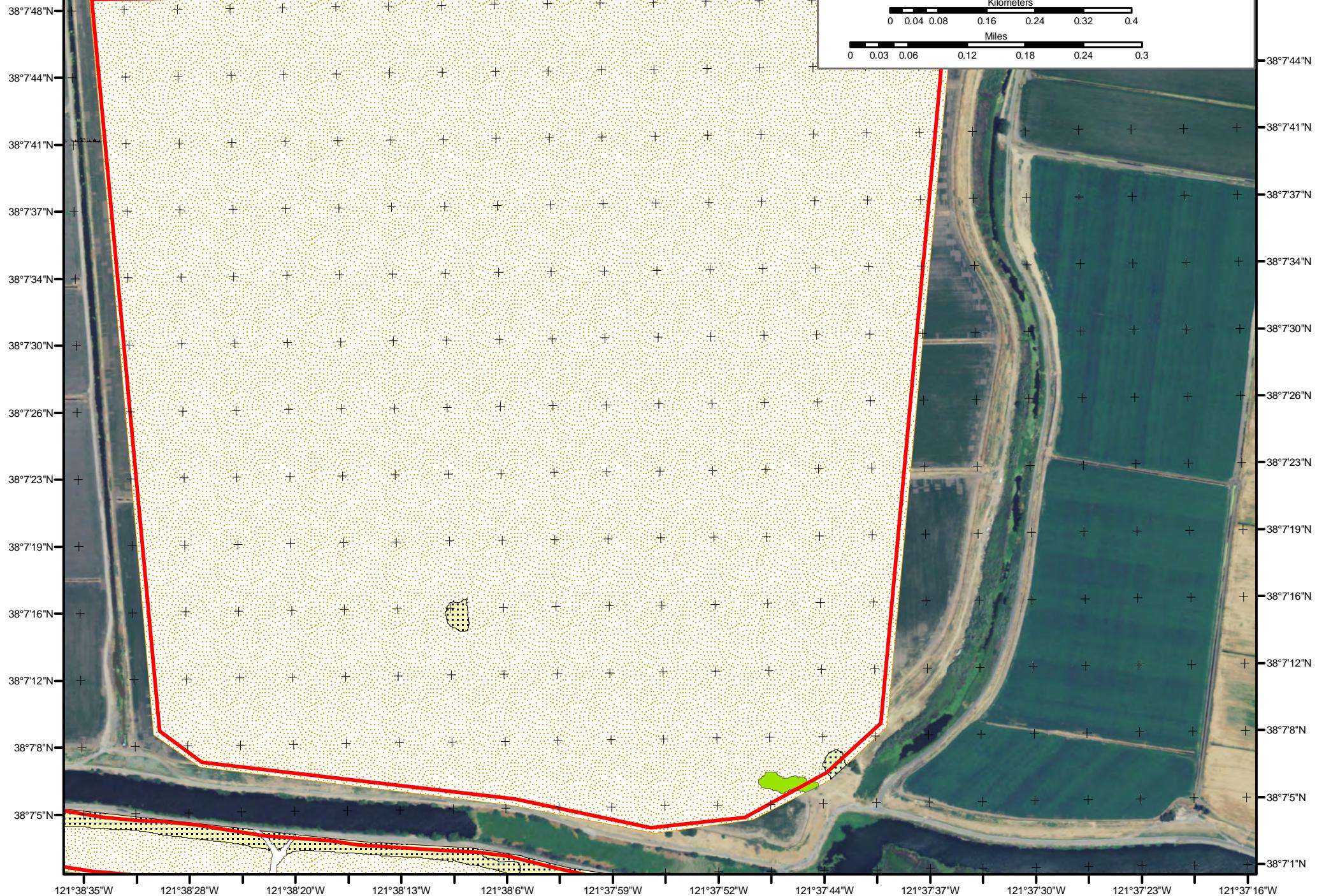
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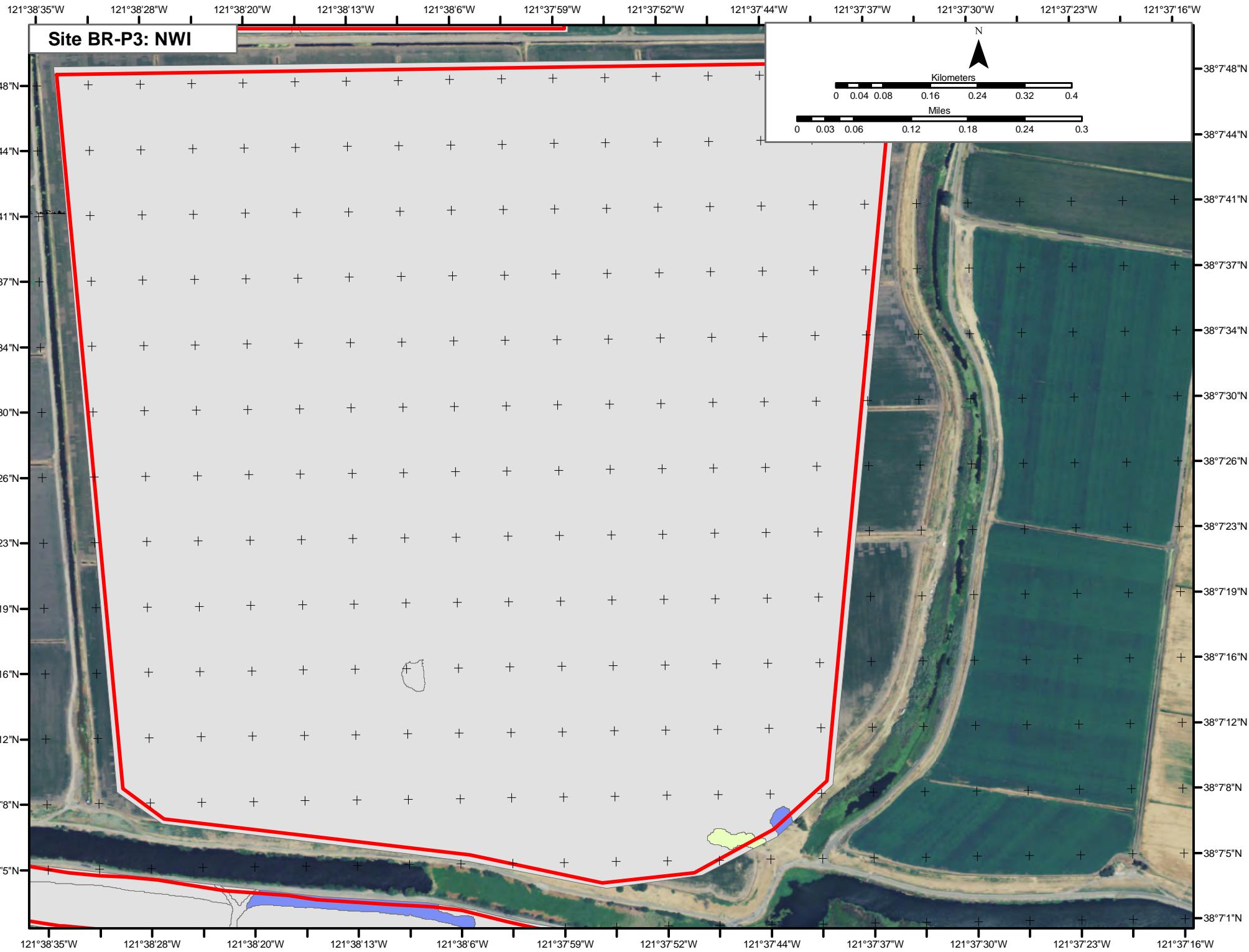
Site BR-P3: Habitat



Kilometers
0 0.04 0.08 0.16 0.24 0.32 0.4

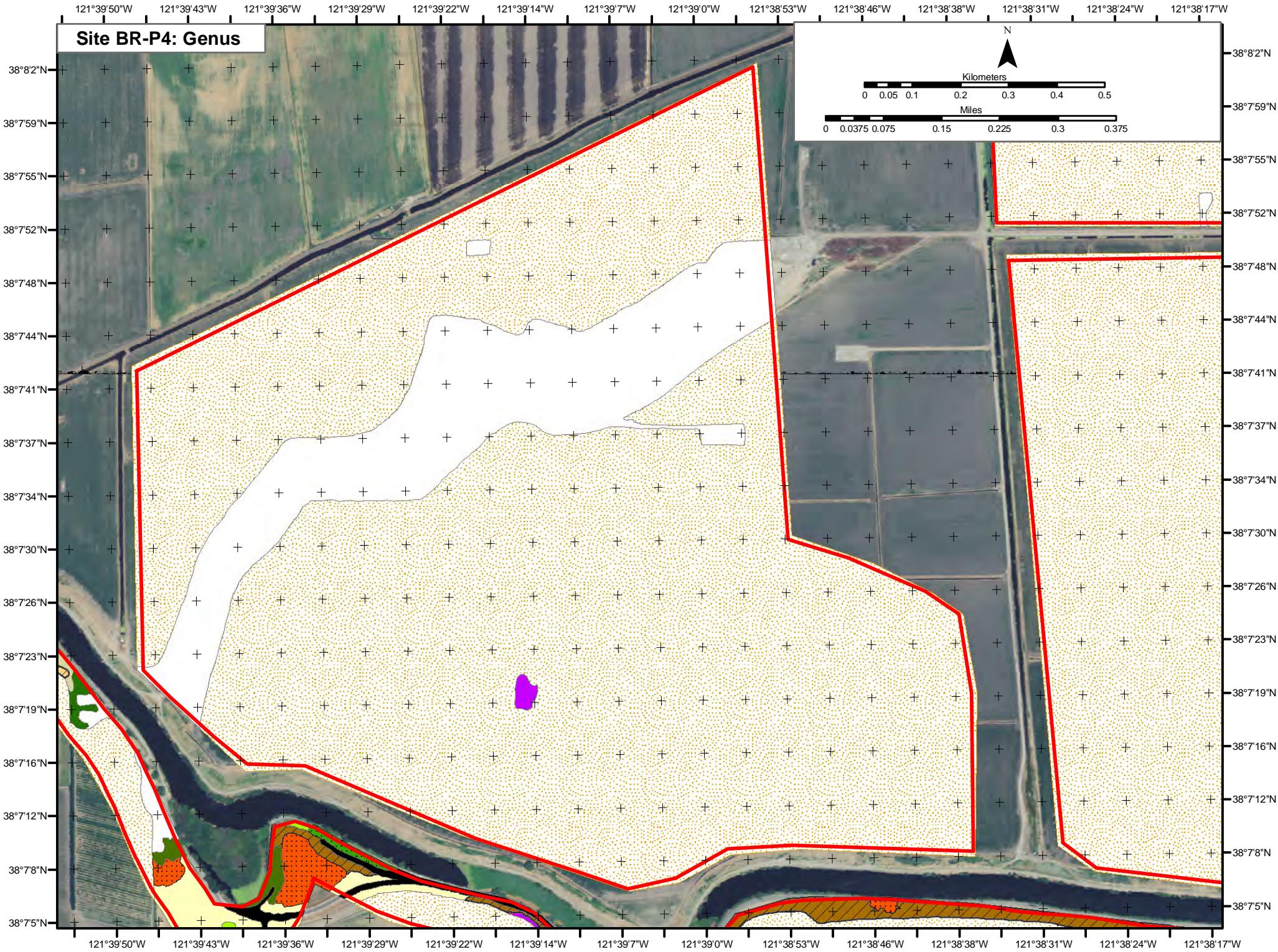
Miles
0 0.03 0.06 0.12 0.18 0.24 0.3





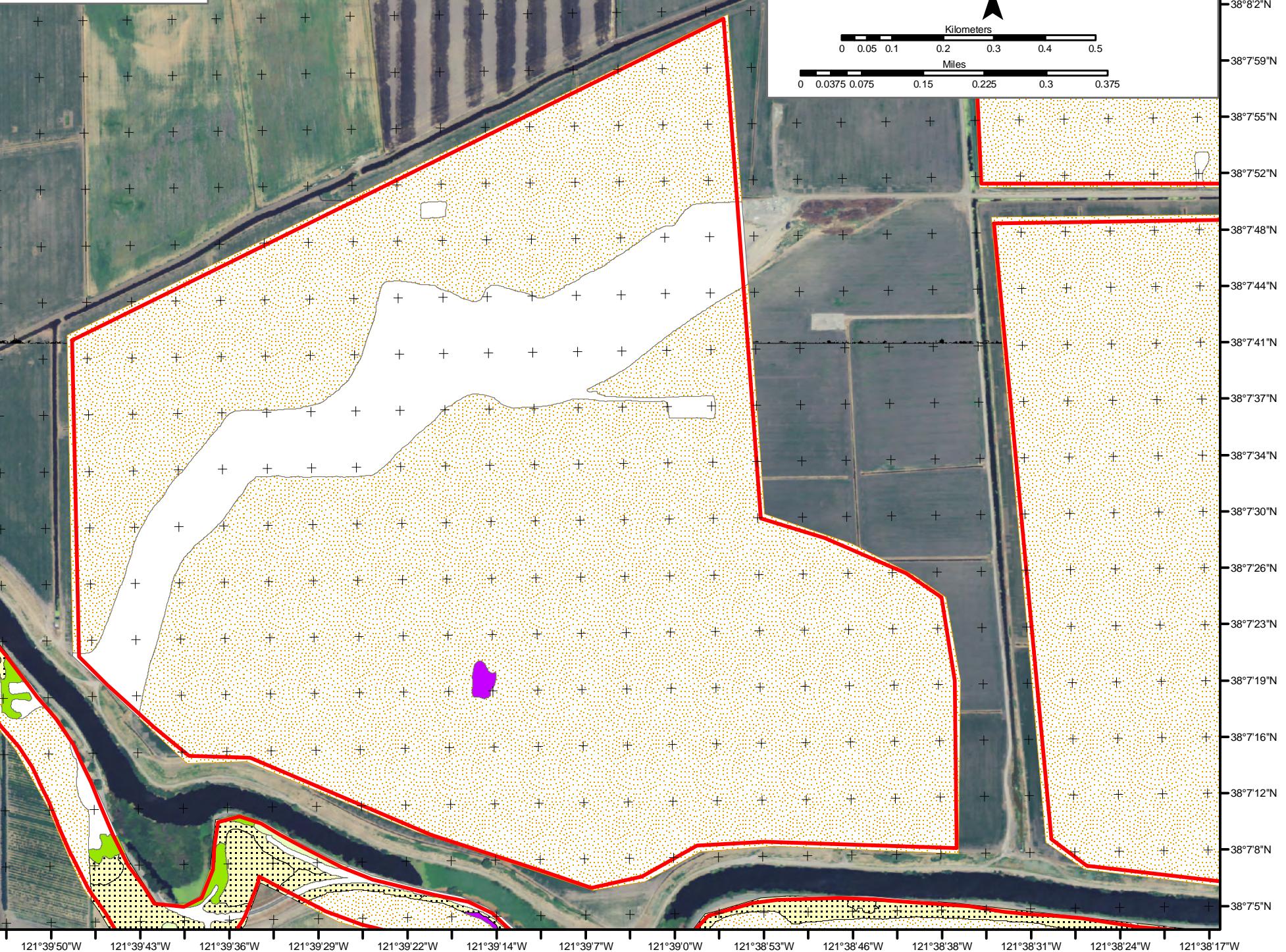
121°39'50"W 121°39'43"W 121°39'36"W 121°39'29"W 121°39'22"W 121°39'14"W 121°39'7"W 121°39'0"W 121°38'53"W 121°38'46"W 121°38'38"W 121°38'31"W 121°38'24"W 121°38'17"W

Site BR-P4: Genus



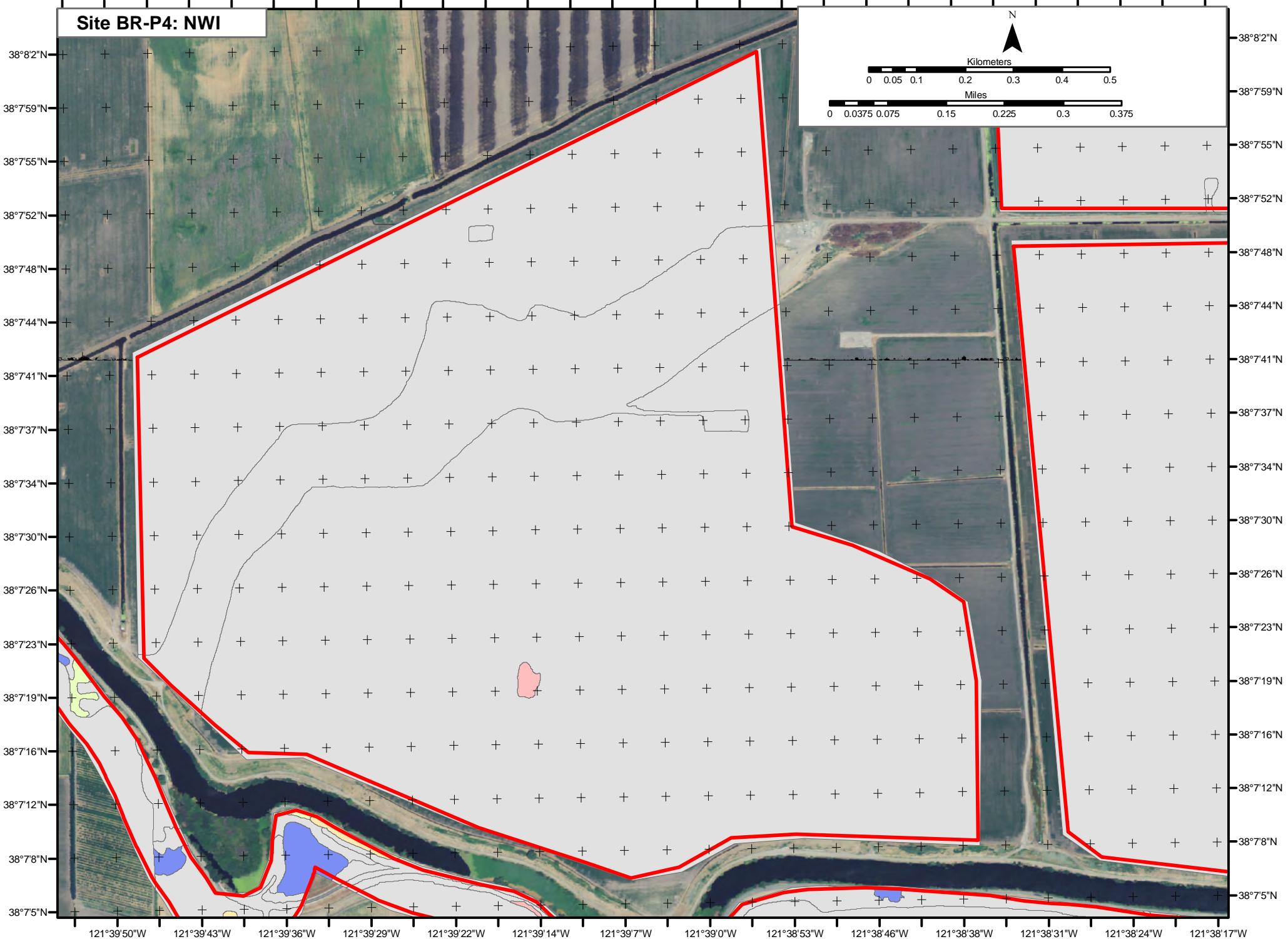
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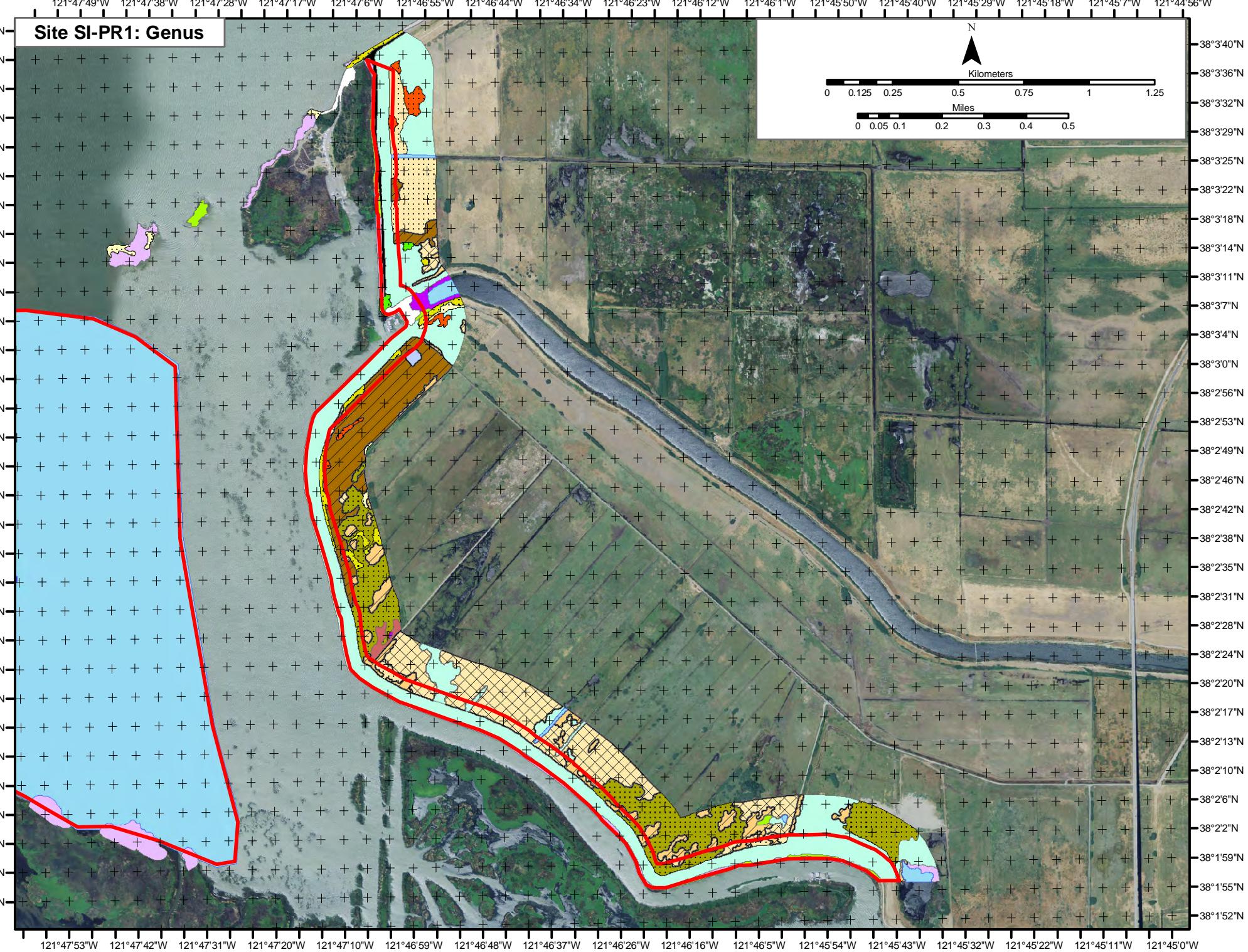
Site BR-P4: Habitat

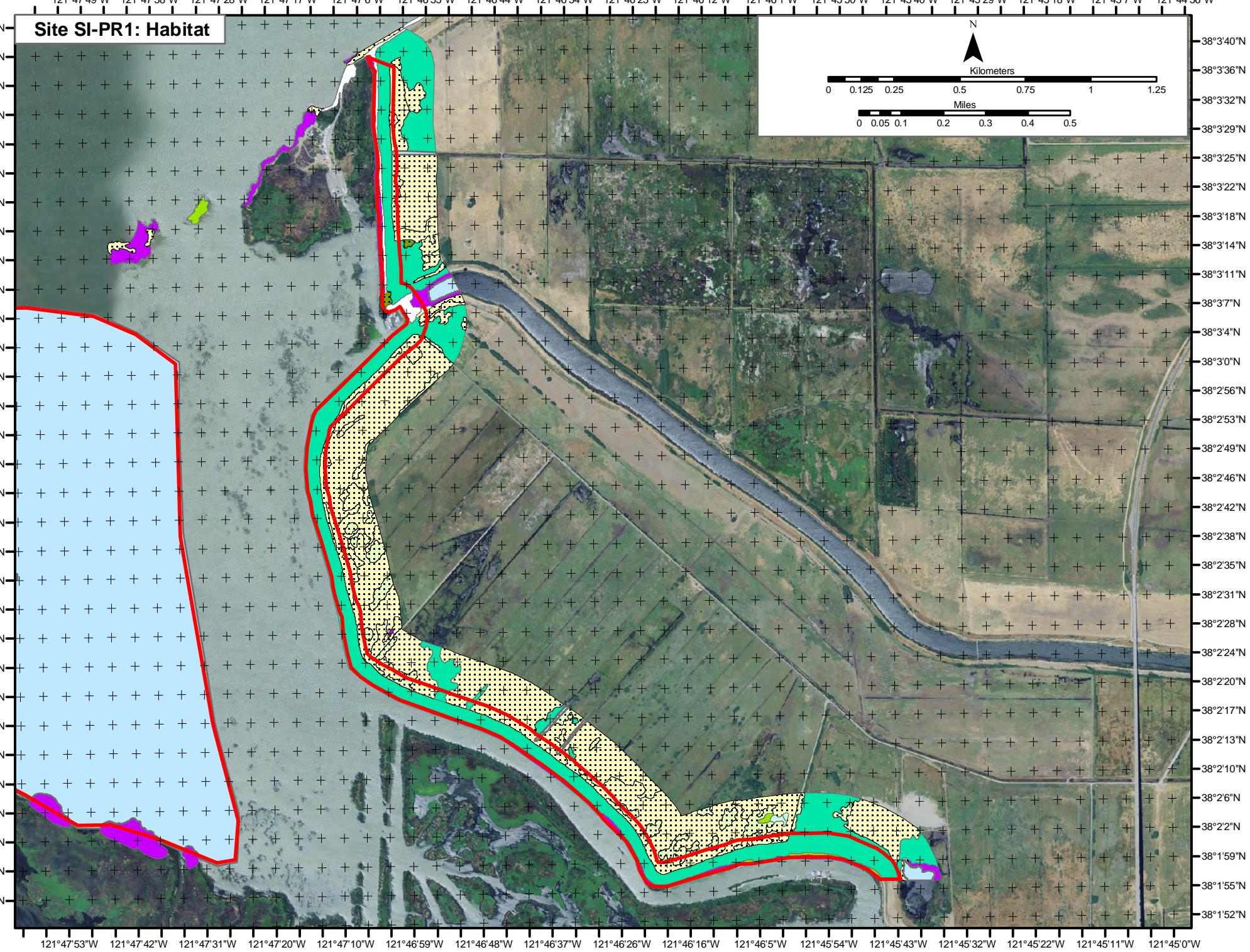


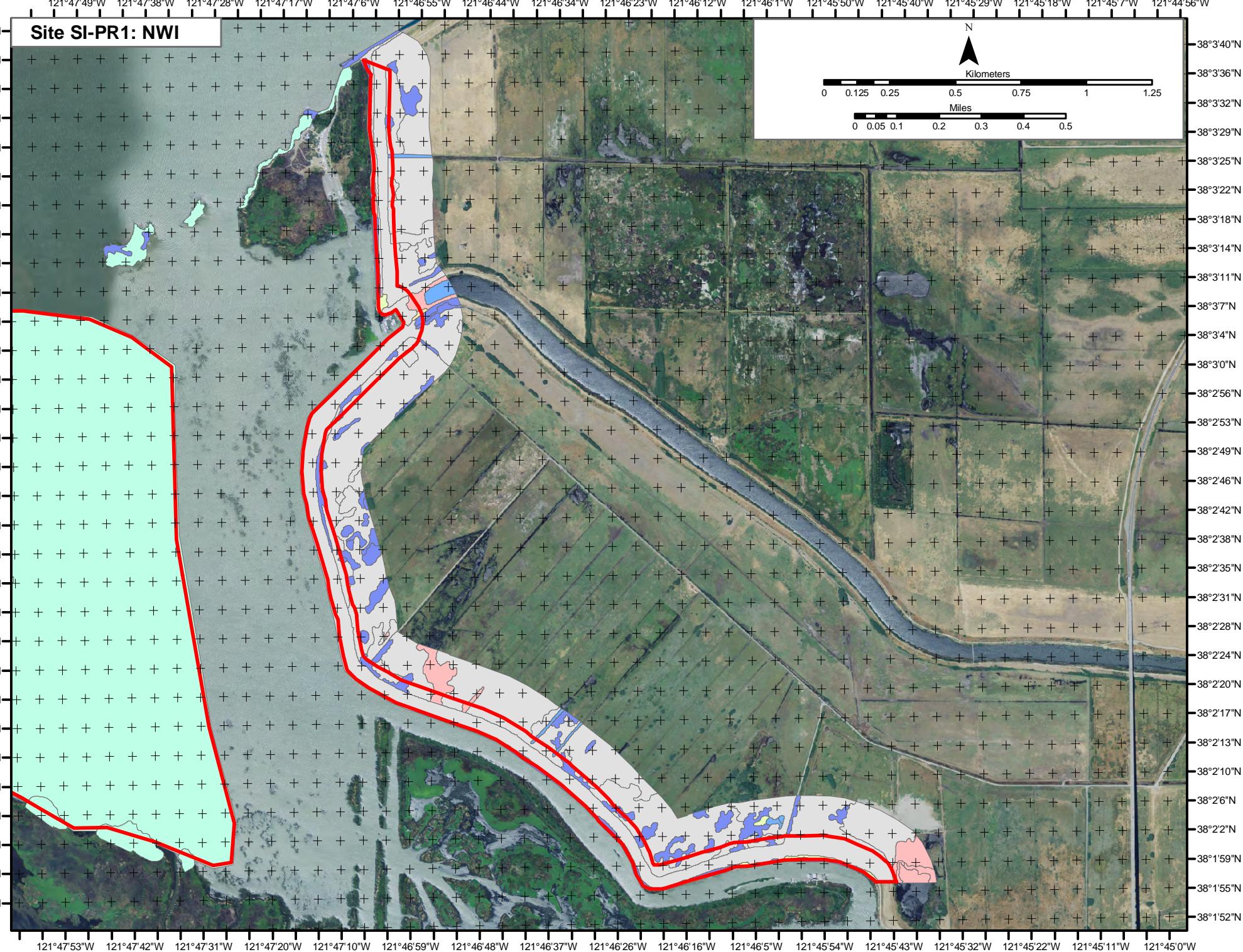
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Site BR-P4: NWI



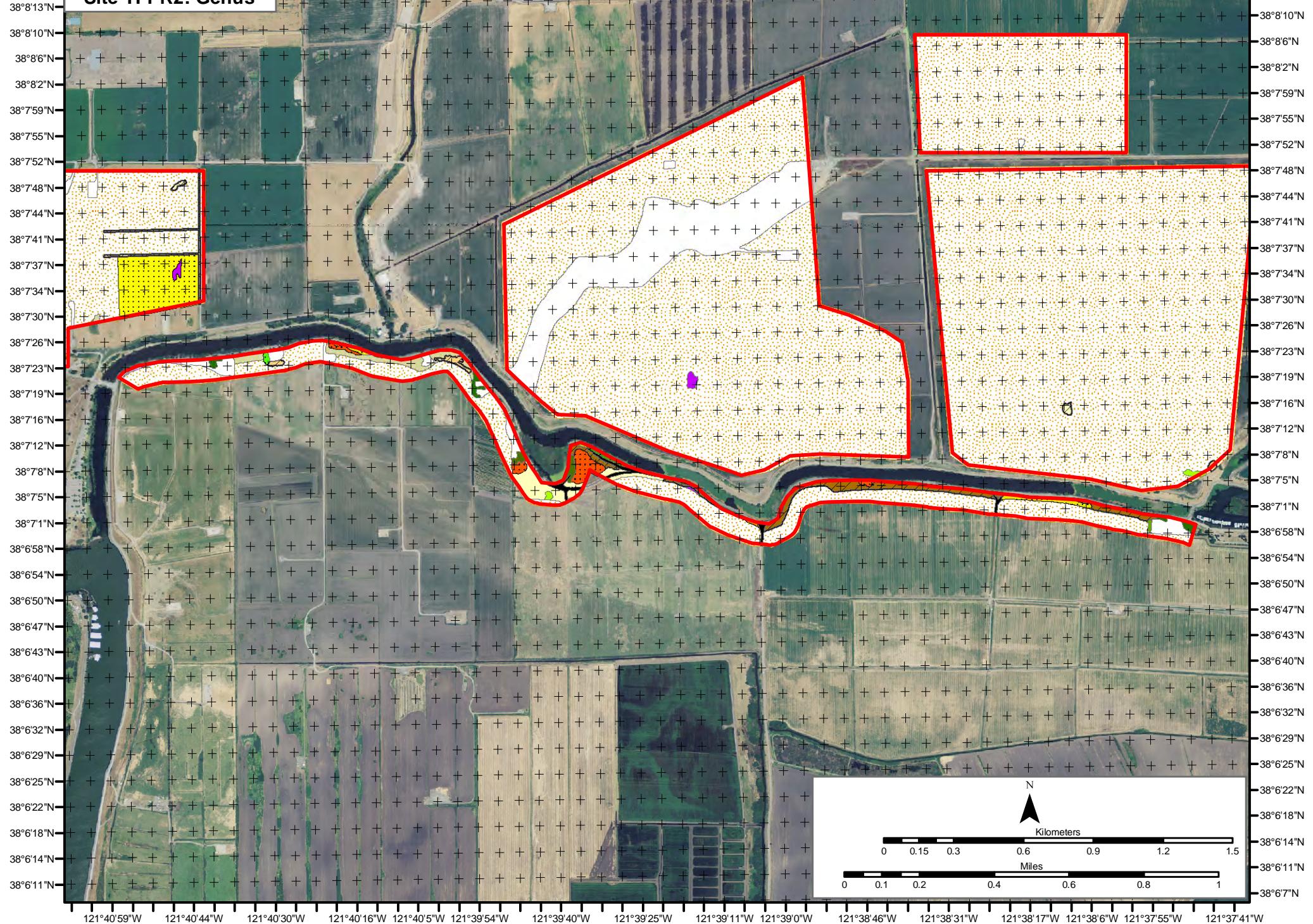






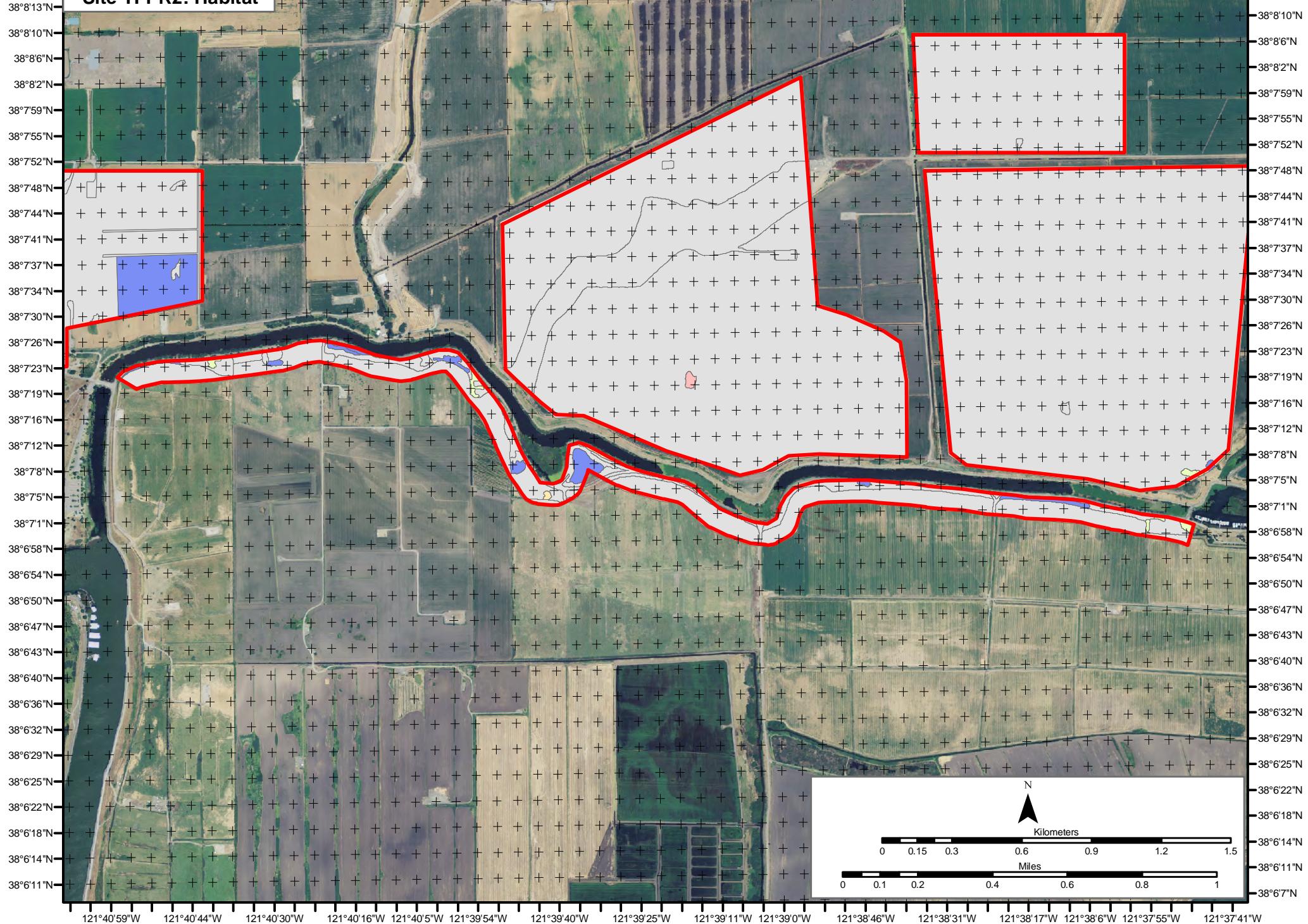
121°40'55"W 121°40'41"W 121°40'26"W 121°40'12"W 121°40'1"W 121°39'47"W 121°39'32"W 121°39'18"W 121°39'7"W 121°38'56"W 121°38'42"W 121°38'28"W 121°38'13"W 121°38'2"W 121°37'52"W 121°37'37"W

Site TI-PR2: Genus



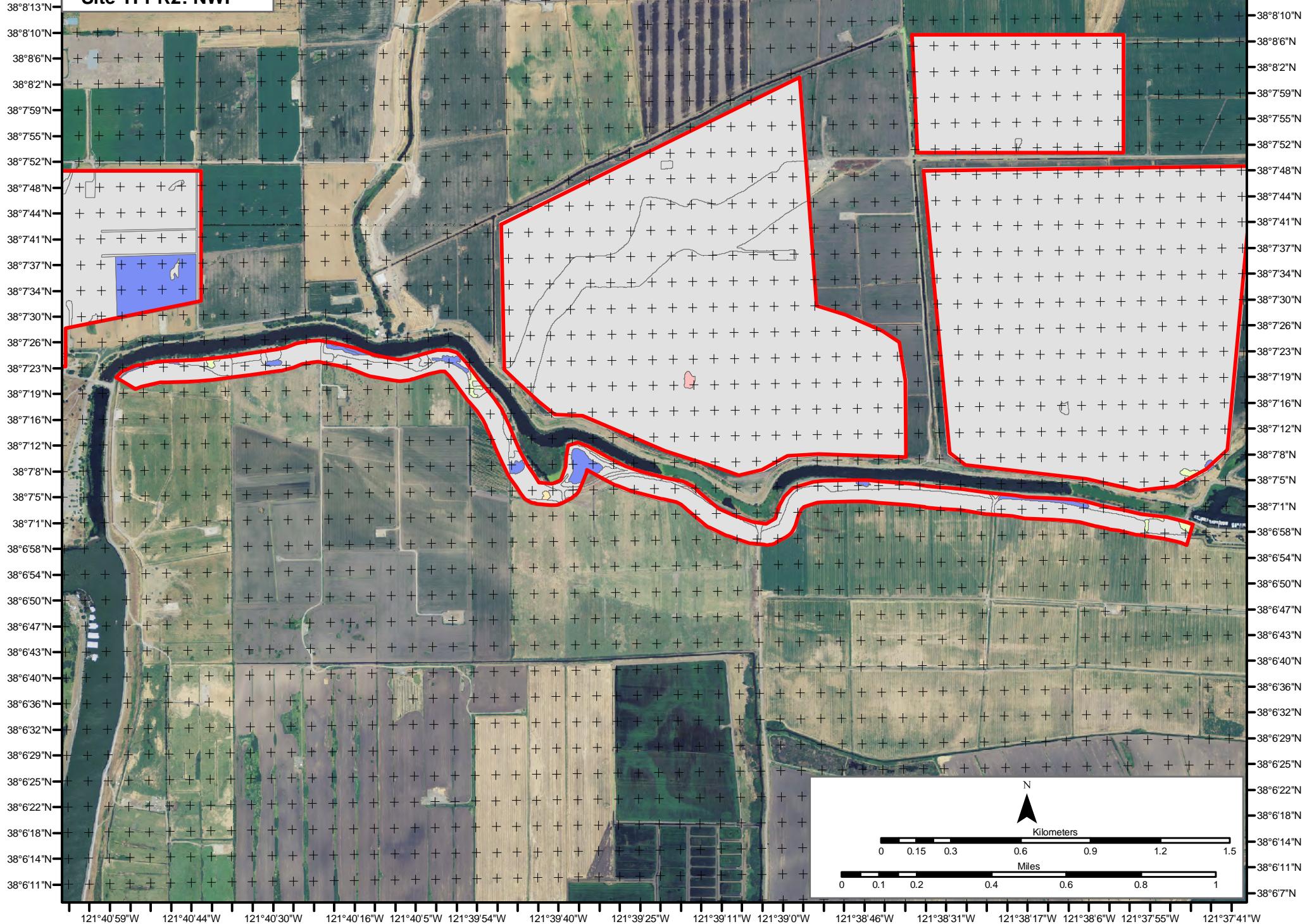
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Site TI-PR2: Habitat



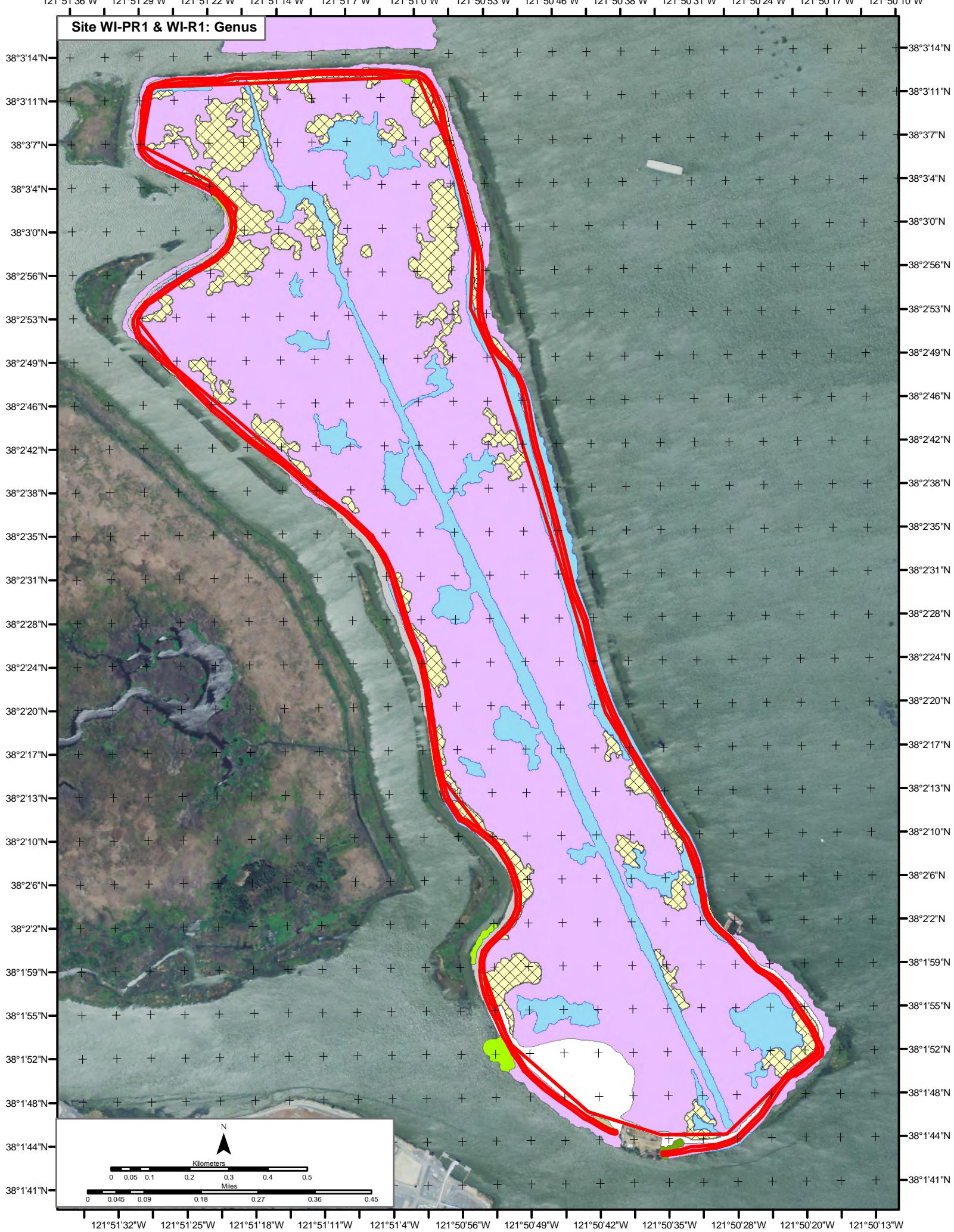
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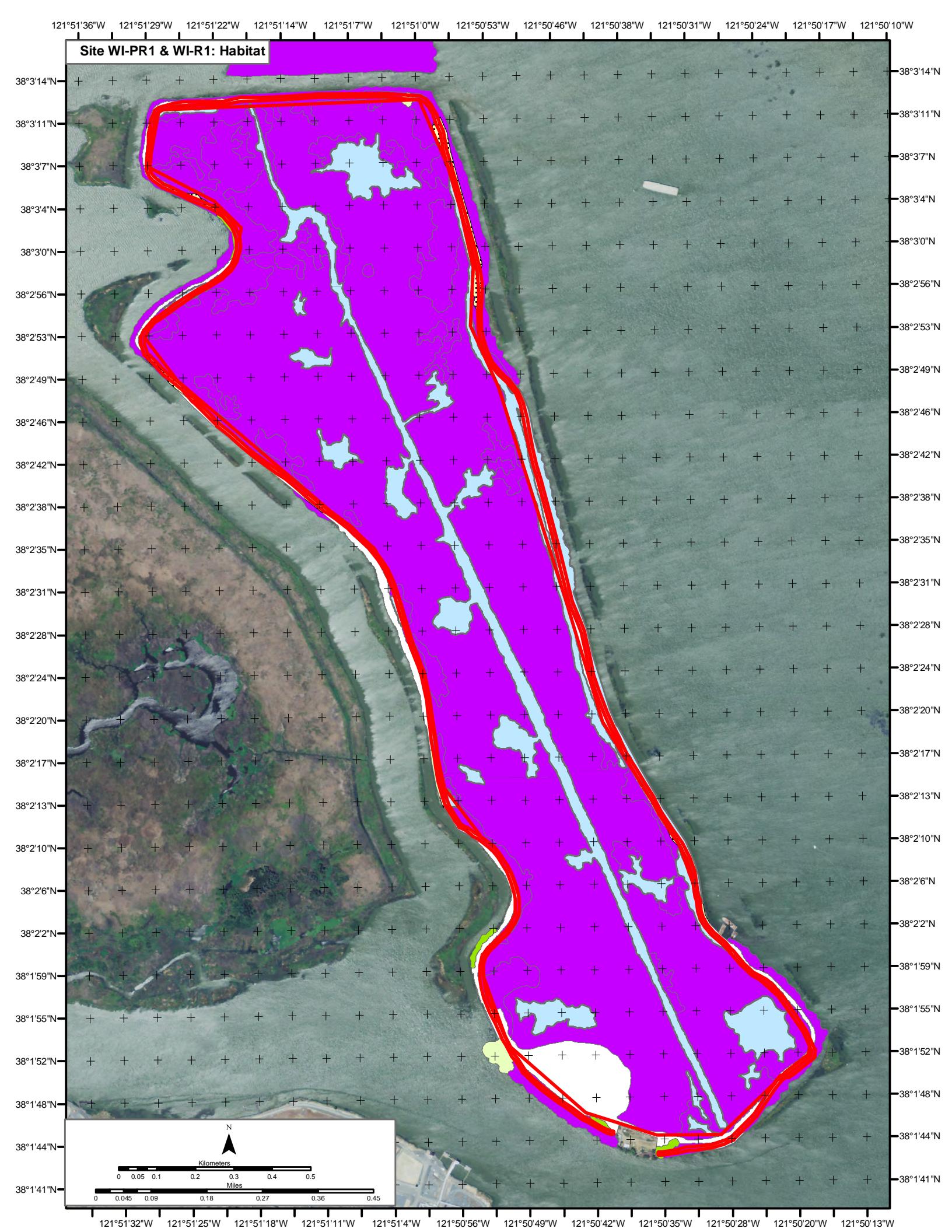
Site TI-PR2: NWI

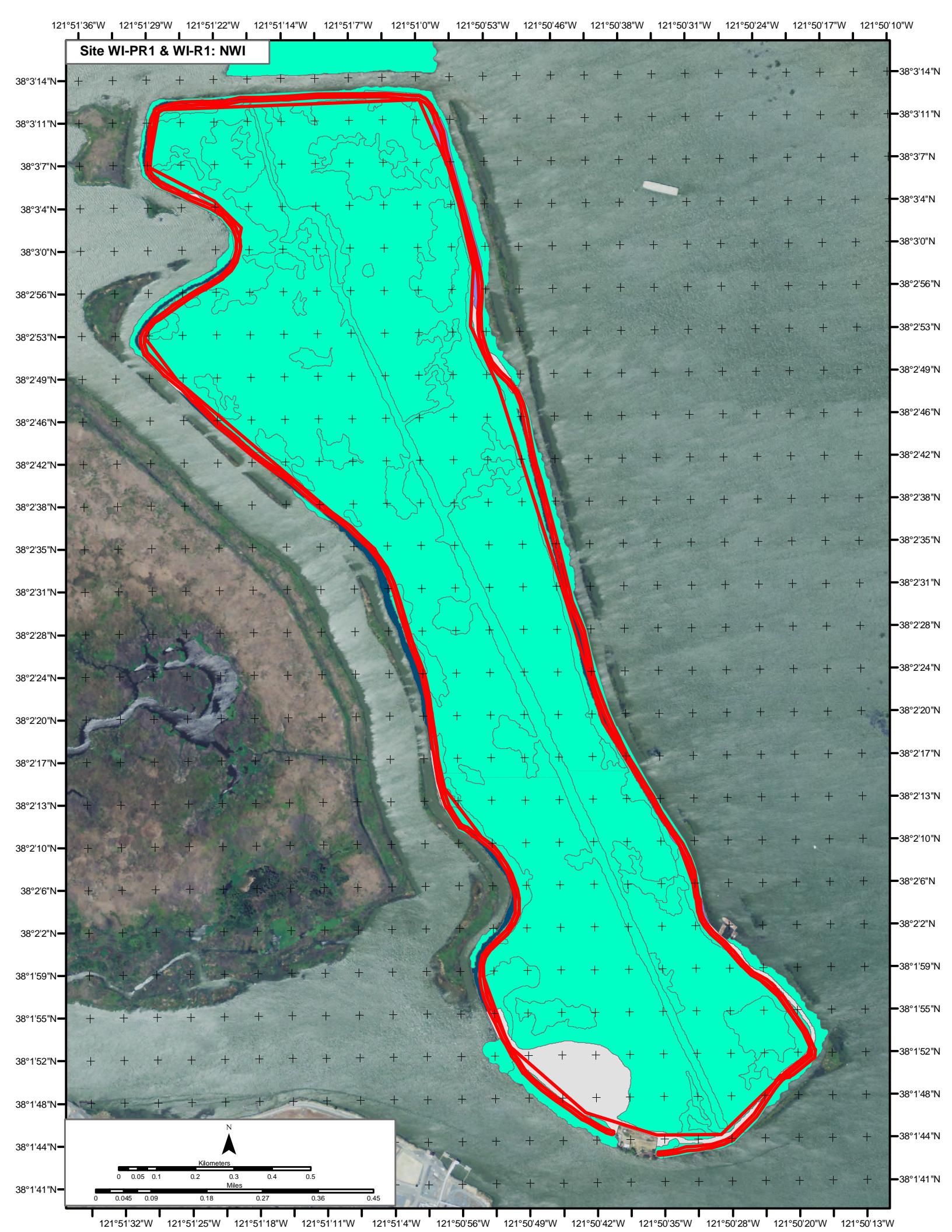


121°51'36"W 121°51'29"W 121°51'22"W 121°51'14"W 121°51'7"W 121°51'0"W 121°50'53"W 121°50'46"W 121°50'38"W 121°50'31"W 121°50'24"W 121°50'17"W 121°50'10"W

Site WI-PR1 & WI-R1: Genus







Appendix C. Summary of all vegetation types mapped

Habitat	Freq	Hectares	Acres
Ag crop	20	672.4	1661.6
<i>Alnus</i>	74	22.2	55.0
<i>Ambrosia</i>	2	0.4	1.0
<i>Arundo</i>	67	23.0	56.8
<i>Atriplex</i>	3	3.0	7.4
<i>Avena</i>	22	16.9	41.8
<i>Baccharis</i>	5	2.3	5.8
<i>Brassica</i>	51	81.8	202.1
<i>Bromus</i>	52	366.8	906.3
Burn	1	3.0	7.4
<i>Carex</i>	1	0.8	2.0
<i>Centaurea</i>	84	152.1	375.9
<i>Cichorium</i>	15	2.4	5.9
<i>Conium</i>	1	1.1	2.8
<i>Cortaderia</i>	36	23.2	57.3
<i>Cyperus</i>	1	0.8	1.9
<i>Daucus</i>	5	17.9	44.2
<i>Distichlis</i>	33	77.1	190.5
<i>Erodium</i>	8	17.9	44.2
<i>Eucalyptus</i>	17	6.7	16.7
<i>Euthamia</i>	1	0.7	1.7
Federal Facility	1	10.5	25.9
<i>Festuca</i>	1	0.4	0.9
<i>Foeniculum</i>	88	50.3	124.3
<i>Frankenia</i>	2	3.2	7.9
<i>Fraxinus</i>	14	1.5	3.8
<i>Grindelia</i>	8	8.4	20.9
<i>Helianthus</i>	2	0.2	0.5
<i>Hordeum</i>	1	3.4	8.4
Industrial	2	24.1	59.6
<i>Juglans</i>	25	4.5	11.0
<i>Juncus</i>	5	6.4	15.8
<i>Lactuca</i>	17	27.2	67.3
<i>Lepidium</i>	83	186.1	459.9
<i>Lepidospartum</i>	8	6.8	16.8
<i>Ludwigia</i>	14	0.7	1.6
Marina	1	2.8	7.0
<i>Melilotus</i>	15	3.6	9.0
Park	1	6.6	16.4
<i>Paspalum</i>	1	0.2	0.4
<i>Phalaris</i>	2	0.3	0.7
<i>Plantago</i>	1	0.0	0.1
<i>Platanus</i>	2	0.3	0.7

<i>Poa</i>	28	47.7	117.9
<i>Polypogon</i>	2	1.6	3.9
<i>Populus</i>	166	35.0	86.4
<i>Quercus</i>	14	2.4	6.0
<i>Raphanus</i>	5	3.4	8.5
Residential	2	13.0	32.0
Riprap	38	15.5	38.3
Road	12	6.5	16.0
<i>Rosa</i>	8	1.7	4.3
<i>Rubus</i>	51	11.7	28.8
<i>Rumex</i>	4	8.4	20.7
<i>Salicornia</i>	4	18.3	45.3
<i>Salix</i>	345	225.0	556.0
<i>Sambucus</i>	1	0.3	0.8
<i>Scirpus</i>	229	556.2	1374.4
<i>Silybum</i>	86	122.1	301.7
<i>Sonchus</i>	3	4.5	11.1
<i>Sorghum</i>	5	2.6	6.4
<i>Tamarix</i>	7	14.1	34.7
<i>Typha</i>	19	6.3	15.5
Unvegetated	62	142.5	352.1
Water	64	261.1	645.2
<i>Xanthium</i>	2	0.4	0.9
Totals	1950	3340.3	8254.1

Appendix D. Summary of all habitat types mapped

Habitat	Freq	Hectares	Acres
Alkali meadow	34	93.5	231.0
Cultivated field	20	672.4	1661.6
Developed	6	55.0	135.9
Freshwater marsh	11	7.7	18.9
Freshwater seep	3	1.0	2.4
Marsh and swamp	365	635.7	1570.9
Meadows and seeps	1	0.0	0.1
Non-native grassland	609	1105.8	2732.5
Non-native riparian scrub	42	9.0	22.4
Non-native woodland	17	6.7	16.7
Riparian forest	5	4.8	11.9
Riparian scrub	172	122.1	301.8
Riparian woodland	452	165.7	409.3
River	16	7.3	18.1
Tamarisk scrub	7	14.1	34.7
Unvegetated	121	171.7	424.3
Valley and foothill grasslands	8	6.8	16.8
Valley oak woodland	6	0.6	1.6
Valley saltbush scrub	5	6.2	15.3
Vernal pool	2	0.2	0.4
Water	48	253.8	627.3
Totals	1950	3340.3	8254.1

Appendix E. Summary of all wetland types mapped

Wetlands	Freq	Hectares	Acres
E2EM1	39	310.4	767.0
E2EM1h	70	191.8	474.1
E2US	5	72.6	179.4
PEM	1	0.0	0.1
PEM1H	3	0.4	0.9
PEM1R	11	51.4	126.9
PEM2Khsx	6	2.7	6.8
PEMA	15	26.1	64.4
PEMC	23	69.4	171.6
PEMF	3	1.5	3.7
PEMS	1	3.2	7.9
PEMV	7	2.3	5.8
PFO	211	81.3	201.0
PFO1A	4	1.1	2.6
PFO1F	16	9.3	23.0
PFO1R	3	0.8	2.0
PFOC	1	0.1	0.3
PFOF	37	10.2	25.2
PFOR	11	4.3	10.7
PFOV	71	26.9	66.4
PSS	108	46.2	114.1
PSS1F	6	16.7	41.3
PSS1R	2	30.8	76.2
PSS5H	1	0.4	0.9
PSS5R	3	3.2	8.0
PSSA	3	1.5	3.8
PSSC	5	0.7	1.6
PSSE	8	12.6	31.1
PSSF	15	2.2	5.4
PSSR	41	8.9	22.1
PSSV	6	1.5	3.8
PUB	17	6.4	15.9
PUBA	18	20.9	51.5
PUBC	15	29.5	73.0
PUBCx	6	5.0	12.4
PUBHx	1	0.5	1.3
PUBJ	1	0.1	0.2
PUBK	5	16.3	40.4
PUS	9	7.2	17.9

Pf	3	128.7	318.1
R1UBV	3	0.4	1.1
R1UBVx	9	6.1	15.1
R2EMx	16	14.1	34.8
R2RS2	38	15.5	38.3
R2UB	24	9.6	23.7
R2UBHx	1	0.4	1.1
R2UBx	7	1.1	2.7
R2US	462	414.2	1023.5
UPL	579	1673.5	4135.2
Totals	1950	3340.3	8254.1