

Appendix E. Habitat Suitability Criteria and Maps

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Methods

A computerized geographic information systems (GIS) program was developed and used to identify suitable locations for restoration of native habitats in the study area. The GIS database integrated five different resource map layers: soil types and soil parameters, native vegetation, crop types, urban and industrial lands, and prime farmland.

The GIS program was used to identify locations suitable for restoration of wetland, riparian forest, valley oak, saline-alkali wetland, and grassland habitats. Potential restoration sites were initially identified on the basis of the capability of study area soils to support each of the evaluation habitats. The GIS program was then used to determine restoration suitability of compatible soil types based on several other factors. Table E-1 presents the analysis matrix that was used to further identify habitat type suitability.

Table E-1. Yolo Basin Habitat Restoration Suitability Matrix

Land Suitability Criteria	Habitat Type ^a									
	Wetland ^b		Riparian Forest ^b		Valley Oak Savanna ^b		Saline-Alkali ^b		Native Grassland ^b	
	H	M	H	M	H	M	H	M	H	M
1. High-capability soils	+	-	+	-	+	-	+	-	+	-
2. Moderate-capability soils	-	+	-	+	-	+	-	+	-	+
3. Existing native habitats	-	-	-	-	-	-	-	-	-	-
4. Orchards	-	-	-	-	-	-	-	-	-	-
5. Urban and industrial areas	-	-	-	-	-	-	-	-	-	-
6. Prime farmland	-	+	+	+	+	+	-	+	-	+
7. Rice fields	-	+	+	+	+	+	-	+	-	+
8. Lands within Yolo Bypass	+	+	-	-	-	+	+	+	+	+
9. Lands within 100 feet of creeks	-	-	+	+	+	+	-	-	+	+
10. Lands within 50 feet of canals	-	-	+	+	+	+	+	+	+	+

^a + = criterion supports habitat suitability.
 - = criterion does not support habitat at this suitability level.

^b H = soils highly suitable for restoration.
 M = soils moderately suitable for restoration.

Soil Types

Soil types within the study area were analyzed to identify sites that would be highly or moderately suitable for restoration of each habitat type. The tables in Appendix A detail the criteria used to identify soils as having high or moderate capability for restoration of each habitat type and the results of the analysis. The soils analysis formed the basis for further refining the list of potential habitat restoration areas using other selection criteria shown in Table E-1. Figure E-1 shows soils having low or moderate permeability to water. This is an important criterion for permanent wetlands to reduce water loss from soil percolation. Seasonal wetlands, however, may be less constrained by soil permeability in flooded or high water table areas.

Existing Native Habitats

All areas mapped as existing native vegetation and other existing native habitats were eliminated from consideration as potential habitat restoration sites because they currently provide appreciable values to wildlife. Native habitats excluded from consideration include permanent freshwater marshes, seasonal wetlands, saline-alkali wetlands, open water areas, riparian forest, and valley oak woodland.

Lands supporting native habitats, though not considered potential restoration areas, would be considered as potential sites for habitat enhancement projects or conservation easement programs. Some sites supporting native habitats are idle land that has reverted to a condition supporting wildlife, such as the abandoned sewage ponds owned by the City of Woodland north of Highway 16.

Orchards and Urban and Industrial Areas

Lands classified by DWR in 1989 as orchards or as urban or industrial areas were not considered for restoration. Because orchards are long-term, high-investment perennial crops, it is unlikely that orchard lands would be offered as habitat restoration sites. Urban and industrial lands are also unlikely candidates for habitat restoration projects because current land uses are long term, land costs are high, and current uses would probably render the sites unsuitable for restoration (e.g., compaction or contamination of soils) if they were to become available.

Prime Farmland

Soils with high or moderate restoration suitability for wetland, saline-alkali sink, or native grassland were considered to be only moderately suitable for restoration on lands designated by CDC as prime farmland because these lands have high agricultural values.

Prime farmland was not excluded from consideration of restoration for riparian forest and valley oak savanna because most soils which historically support these habitats are designated as prime farmland and there is limited restoration potential on soils without this designation.

Rice Fields

Soils with high or moderate wetland, saline-alkali sink, or native grassland restoration capability were considered to be only moderately suitable for restoration on lands currently in rice production because these agricultural lands currently provide some of the wildlife values associated with these natural habitat types.

Rice fields were not excluded from consideration as potential riparian forest and valley oak savanna restoration sites because rice fields do not provide the same type of habitat values associated with tree-dominated habitats. Soils suitable for rice cultivation, however, do not support riparian forest or valley oak savanna habitats in many areas because they typically have high clay contents and poor drainage characteristics.

Lands Adjacent to Creeks and Canals

Lands within 100 feet of creeks were considered suitable for restoration of riparian forest, valley oak savanna, and native grassland habitats regardless of soil capability because portions of study area creeks currently support these habitats and soils were not mapped at a level that could distinguish between soil types adjacent to stream courses.

Lands within 50 feet of canals were considered suitable for restoration of saline-alkali sink, riparian forest, valley oak savanna, and native grassland habitats regardless of soil capability for the same reasons stated for creeks above.

Lands within the Yolo Bypass

Lands with floodway hydraulic restrictions include the Yolo Bypass and the Sacramento Bypass. Soils with high or moderate valley oak savanna restoration capability were only considered to be moderately suitable for restoration on lands within the two bypass areas because current floodway easements may restrict the types of habitats that can be restored or the configurations of restored habitats in these areas.

Results

Figures E-2 through E-6 present the distribution of suitable wetland, riparian forest, valley oak savanna, saline-alkali sink, and native grassland restoration sites. Acreages of lands with high and moderate restoration suitability are summarized in Table E-2.

Table E-2. Acres of Study Area Habitats Suitable for Restoration

Restoration Habitat	Total in Study Area	Total in Yolo Bypass	Percent Acres in Yolo Bypass	Total Outside Yolo Bypass	Percent Acres Outside Yolo Bypass
Wetlands					
High suitability	40,281	33,492	83	6,789	17
Moderate suitability	<u>43,408</u>	<u>11,597</u>	27	<u>31,811</u>	73
Subtotal	83,689	45,089		38,600	
Average			54		46
Riparian Forest					
High suitability	17,861	0	0	17,861	100
Moderate suitability	<u>10,889</u>	<u>9,180</u>	84	<u>1,709</u>	16
Subtotal	28,750	9,180		19,570	
Average			32		68
Valley Oak Savanna					
High suitability	2,266	0	0	2,266	100
Moderate suitability	<u>26,935</u>	<u>7,833</u>	29	<u>19,102</u>	71
Subtotal	29,201	7,833		21,368	
Average			27		73
Saline-Alkali					
High suitability	8,155	3,691	45	4,464	55
Moderate suitability	<u>3,171</u>	<u>836</u>	26	<u>2,335</u>	74
Subtotal	11,326	4,527		6,799	
Average			40		60
Native Grassland					
High suitability	10,822	10,044	93	778	7
Moderate suitability	<u>79,640</u>	<u>38,096</u>	48	<u>41,544</u>	52
Subtotal	90,462	48,140		42,322	
Average			53		47

Wetlands

A total of 83,689 acres are moderately or highly suitable for restoration of open water, permanent wetland, or seasonal wetland habitats (Table E-2). Approximately 83% of lands that are highly suited to restoration are located in the Yolo Bypass; these are primarily south of I-80 (Figure E-2).

Most lands operated as duck clubs in the south Yolo Bypass that are not currently managed as wetlands are highly suitable for wetlands restoration. In addition, there are opportunities to enhance existing duck club wetlands. Enhancement projects could include improving water delivery systems;

repairing dikes, levees, and other structures associated with managed wetlands; securing reliable water sources; and extending the period during which wetlands are flooded to benefit a greater diversity of wetland-dependent wildlife species.

Riparian Forest

A total of 28,750 acres are moderately or highly suitable for restoration of valley oak riparian forest, mixed riparian forest, and willow scrub habitats (Figure E-3, Table E-2). Riparian habitat soils located within the Yolo and Sacramento Bypasses are considered only moderately suitable for restoration because of current floodway restrictions that would prevent or restrict the establishment of woody vegetation.

Valley Oak Savanna

Approximately 29,200 acres are suitable for restoration of valley oak woodland and savanna habitats (Figure E-4, Table E-2). Sites suitable for valley oak restoration generally correspond to sites suitable for riparian forest restoration; however, most sites considered highly suitable for riparian forest are only moderately suitable for valley oak restoration, primarily because their soils developed under hydrologic conditions that are not as favorable as less flooded sites for supporting valley oaks, such as alluvial fans and high terraces.

Soils suitable for valley oak restoration are present in the Yolo Bypass; however, restoration of oak woodlands may be limited under current floodway easement restrictions. Restoration of valley oak savanna habitat, which consists of a low density of single-trunked trees dispersed within grassland, may be practicable in the bypass because planting at low densities may not inhibit floodflows.

Saline-Alkali Habitat

Approximately 11,326 acres in the study area appear to be suitable for restoration to saline-alkali sink habitat (Table E-2). Saline-alkali sinks represent a unique type of saline seasonal wetland that supports many rare plants (e.g., palmate-bracted bird's-beak) and invertebrate biota, as well as providing general winter wetland habitat for migratory water birds. The number of saline-alkali sinks remaining in Yolo County is miniscule compared with their former distribution. These habitats are restricted to shallow basins and swales on saline-alkali clay soils, primarily Merrit, Pescadero, Riz, and Willows saline or sodic clay soil types. Typically, undisturbed sites will also support an important complement of native perennial and annual grasses, such as alkali sacaton and native salt grass.

These soil types, shown on the suitability map (Figure E-5), may no longer retain the requisite salinity and pH conditions if the land has been laser-leveled for agricultural irrigation and the zone of clay and salt accumulation has been removed. In addition, sites that are deep-flooded frequently may not support many of the rare annual herbaceous plant species characteristic of saline-alkali sink

plant communities. However, restoration of relatively small suitable sites (e.g., 50-100 acres) may be adequate to sustain a significant remnant ecosystem, although more than one site should be protected or restored to lessen the risk of population extirpation and to improve genetic diversity.

Native Perennial Grassland

Approximately 90,500 acres in the study area are suitable for restoration of native perennial grassland (Figure E-6, Table E-2), representing all lands within the study area that currently do not support native habitats, orchards, or urban or industrial uses.

Restoration of grasslands would be most feasible if implemented in conjunction with restoration of other habitat types. Development of grasslands adjacent to wetlands, for example, would provide nesting cover for waterfowl and other ground-nesting species and foraging habitat for raptors. Grassland restoration would also be a component of valley oak savanna restoration projects.