DRAFT

North of the Delta
Offstream Storage Investigation

Progress Report

Appendix B:

Wetland Delineation Field Studies Report

April 2000

Integrated
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Investigations

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Appendix B:

Wetland Delineation Field Studies Report

Report prepared by:
Joyce Lacey Rickert
Environmental Specialist IV

Graphics prepared by:
Mark Dombrowski
Junior Engineering Technician

California Department of Water Resources
Division of Planning and Local Assistance, Northern District

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Introduction

Section 404 of the Clean Water Act requires the U.S. Army Corps of Engineers' authorization for projects involving the placement of "fill" material into any "waters of the United States." The decision to grant such a permit is based on a review of the project's impacts to a number of economic and environmental factors, including the quantity and types of wetlands. The Corps defines wetlands as "areas that are periodically or permanently inundated by surface or groundwater and support vegetation adapted for life in saturated soil."

This report summarizes the two-year survey of wetlands and other waters of the U.S. within the footprint of the four potential offstream storage reservoir locations: Sites Reservoir, Colusa Cell, Thomes-Newville Reservoir, and the Red Bank Project (Figure 1).

Methods

Stereo pairs of 1:12,000 and 1:6,000 scale color aerial photos were reviewed for wetland types prior to field studies. All aerial photography used in the wetland identifications were taken in late spring to differentiate seasonal wetlands from annual grassland cover. Wetland types were identified on the photographs, and representative types were selected throughout each reservoir for field verification. Selection of representative types was based on soil types and aerial photo wetland vegetation "signatures." Field visits were conducted during and after rainfall events in order to observe hydrology conditions. These representative sites and additional sites were revisited later in the season when wetland vegetation was identifiable to the species level. Wetland delineations were made using the "routine method," as described in the 1987 *Corps of Engineers Wetland Delineation Manual*. This method involves a field review of the hydrology conditions, plant species' composition, and hydric soil indicators. The Corps' regulatory specialists were also consulted for guidance on field sampling and data presentation.

Results of the wetland delineations and field verifications were used to produce a draft map of jurisdictional wetlands. Stereo pairs of aerial photos for the inundation areas of each reservoir were studied, and all areas that matched signatures of field-verified wetland types were mapped as jurisdictional wetlands. Questionable areas were also identified as wetlands and marked for future field verification. All wetland polygons were mapped and acreage was calculated.

Other waters of the U.S. were also identified on the aerial photos. These included stock ponds, small reservoirs, and tributaries. All drainages were identified as either main tributaries (i.e., width of streambed equal to or wider

than 15 feet and generally perennial) or tributaries (i.e., width of streambed less than 15 feet and drainages usually ephemeral, possibly perennial). Stream width measurements were made throughout the project sites. Drainages with wetlands or jurisdictional riparian areas were classified as wetlands.

All waters of the U.S. were mapped using the procedure outlined above. The acreages for all waters of the U.S. and linear distances (miles) of all drainages were then calculated. Attachment A shows the stream width measurement data for drainages within the proposed reservoir sites.

The Corps' regulatory specialists have not verified these maps. Field verification of these maps will involve site visits to each wetland delineation site by the Corps' regulatory specialist.

Results

Areas identified as jurisdictional wetlands represent approximately 2 percent of the surface area of each reservoir footprint. The acreage and wetland types within each reservoir area are presented in Tables 1 through 4. Information on other waters of the U.S. is also included in these tables. The waters of the U.S. acreage for all reservoir locations are summarized in Table 5. Throughout this report, all data are presented with the most southern reservoir location first (i.e., Sites Reservoir) and the northern reservoir last (i.e., Red Bank Project).

Discussion

The wetland type, quality, and quantity within a given location are dependent on a number of factors, including soil types, site geology (evidence of faulting and springs), and land management. The three southern reservoir locations were similar in dominant wetland types and distribution patterns. The Red Bank Project is dominated by steep, well-drained slopes, which supported few seasonal or emergent wetland areas. Wetland types will be addressed in general terms and site-specific information given for each reservoir area.

Sites Reservoir and Colusa Cell

Seasonal wetlands account for over 75 percent of the jurisdictional wetlands identified within the Sites Reservoir footprint and 84 percent of the Colusa Cell jurisdictional wetlands (Tables 1 and 2). This very common wetland type is inundated by surface water or saturated by groundwater during the winter and spring months. Most of these seasonal wetlands were dry by early summer and are strongly associated with low-lying areas of clay or clay loam soils (Tables 6 and 7). Many of the plants found in these wetlands are dry and brown during the summer months, making the wetlands almost indistinguishable from the surrounding annual grasslands. Dominant plant species include *Eleocharis*

macrostachya (spike rush), *Hordeum marinum* ssp, *Gussoneanum* (Mediterranean baryle), and *Rumes* spp (dock).

Table 1. Sites Reservoir Waters of the U.S.

Wetlands and Other Waters	Acres	Linear Distance (Miles)
Wetlands	201	
Other Waters	175	
Total Waters of the U.S.	**376**	
Total Reservoir Area	**14,162**	
Wetland Types		
Alkaline	19	
Emergent	2	
Riparian	22	
Seasonal	153	
Vernal Pools	5	
Total	**201**	
Other Waters		
Major Tributaries	82	25
Tributaries	77	123
Ponds/Small Reservoirs	16	
Total	**175**	**148**

Table 2. Colusa Cell Waters of the U.S.

Wetlands and Other Waters	Acres	Linear Distance (Miles)
Wetlands	312	
Other Waters	135	
Total Waters of the U.S.	**447**	
Total Reservoir Area	**13,664**	
Wetland Types		
Alkaline	35	
Emergent	0	
Riparian	11	
Seasonal	263	
Vernal Pools	3	
Total	**312**	
Other Waters		
Major Tributaries	30	15
Tributaries	81	143
Ponds/Small Reservoirs	24	
Total	**135**	**158**

Table 3. Newville Reservoir Waters of the U.S.

Wetlands and Other Waters	Acres	Linear Distance (Miles)
Wetlands	413	
Other Waters	231	
Total Waters of the U.S.	**644**	
Total Reservoir Area	**17,073**	
Wetland Types		
Alkaline	3	
Emergent	6	
Riparian	77	
Seasonal	304	
Vernal Pools	23	
Total	**413**	
Other Waters		
Major Tributaries	59	17
Tributaries	106	223
Ponds/Small Reservoirs	66	
Total	**231**	**148**

Table 4. Red Bank Project Waters of the U.S.

Wetlands and Other Waters	Acres	Linear Distance (Miles)
Wetlands	83	
Other Waters	152	
Total Waters of the U.S.	**235**	
Total Reservoir Area	**4,905**	
Wetland Types		
Emergent/Seasonal	7	
Riparian	76	
Total	**83**	
Other Waters		
Major Tributaries	71	17
Tributaries	47	110
Ponds/Small Reservoirs	34	
Total	**152**	**127**

Table 5. Offstream Storage Waters of the U.S.

Reservoir Site	Reservoir Size (Acres)	Waters of the U.S. (Acres)	Wetlands (Acres)
Sites	14,162	376	201
Colusa Cell	13,664	447	312
Newville	17,073	644	413
Red Bank Project	4,905	235	83

Table 6. Sites Reservoir Seasonal Wetlands Soil Type

Pool Number	Date Pool Visited	Soil Name	Soil Sample Color
S-1	4/14/98	Altamont-Contra Costa clay loam	
S-2	5/8/98	Altamont-Contra Costa clay loam, slightly eroded, hilly, 16-30% slopes	5Y 3/1
S-3	5/8/98	Altamont clay loam, slightly eroded; hilly	5Y 4/1
S-3	5/8/98	Altamont clay loam, slightly eroded; hilly	5Y 3/1
S-4	5/26/98	Contra Costa clay loam, slightly eroded, very steep	
S-5	5/26/98	Forgeus clay, undulating	5Y 3/1
S-5	5/26/98	Forgeus clay, undulating	5Y 4/1
S-6	6/5/98	Myers clay, 0-3% slopes	5Y 4/1
S-6	6/5/98	Myers clay, 0-3% slopes	10YR 3/3
S-6	6/5/98	Myers clay, 0-3% slopes	10YR 6/6
S-6	6/5/98	Myers clay, 0-3% slopes	5Y 4/1
S-6	6/5/98	Myers clay, 0-3% slopes	5Y 4/1
S-7	6/5/98	Antone clay loam, strong alkali	2.5Y 4/0
S-7	6/5/98	Antone clay loam, strong alkali	5Y 4/1
S-7	6/5/98	Antone clay loam, strong alkali	10YR 5/8
S-8	6/5/98	Antone clay loam, strong alkali	10YR 5/8
S-8	6/5/98	Antone clay loam, strong alkali	10YR 4/1
S-8	6/5/98	Antone clay loam, strong alkali	10YR 3/3
S-9	6/9/98	Myers clay loam, 0-3% slopes	
S-10	6/9/98	Altamont-Contra Costa clays, 15-30% slopes	
S-11	6/9/98	Zamora silty clay loam, 0-2% slopes	10 YR 4/2
S-11	6/9/98	Zamora silty clay loam, 0-2% slopes	10 YR 3/2
S-11	6/9/98	Zamora silty clay loam, 0-2% slopes	10 YR 5/6
S-12	10/15/98	Altamont clay loam, slightly eroded; undulating to rolling	10 YR 3/2+3
S-13	10/15/98	Altamont clay loam, slightly eroded; undulating to rolling	10 YR 3/2
S-13	10/15/98	Altamont clay loam, slightly eroded; undulating to rolling	10 YR 2/2
S-13	10/15/98	Altamont clay loam, slightly eroded; undulating to rolling	5 YR 5/8
S-14	10/15/98	Altamont-Contra Costa clay loam, slightly eroded, hilly, 16-30% slopes	5 Y 4/2
S-14	10/15/98	Altamont-Contra Costa clay loam, slightly eroded, hilly, 16-30% slopes	5 YR 5/8
S-15	10/15/98	Myers clay loam, gently undulating, 0-2% slopes	10 YR 3/2
S-15	10/15/98	Myers clay loam, gently undulating, 0-2% slopes	10 Y 5/8
S-16	3/4/99	Altamont clay loam, slightly eroded; undulating to rolling	2.5 Y 4/2
S-17	3/4/99	Contra Costa clay loam, slightly eroded, steep	2.5 YR 4/2
S-18	3/5/99	Altamont clay loam, slightly eroded; hilly	10 YR 3/2
S-18	3/5/99	Altamont clay loam, slightly eroded; hilly	10 YR 6/8
S-18	3/5/99	Altamont clay loam, slightly eroded; hilly	10 YR 4/2
S-18	3/5/99	Altamont clay loam, slightly eroded; hilly	5 YR 5/8
S-18	3/5/99	Altamont clay loam, slightly eroded; hilly	10 YR 3/2
S-19	3/5/99	Contra Costa clay loam, slightly eroded, steep	10 YR 3/1
S-20	3/25/99	Myers clay, gently undulating, 0-2% slopes	10 YR 4/1
S-20	3/25/99	Myers clay, gently undulating, 0-2% slopes	10 YR 4/2
S-20	3/25/99	Myers clay, gently undulating, 0-2% slopes	10 YR 7/6

Table 7. Colusa Reservoir Seasonal Wetlands Soil Type

Pool Number	Date Pool Visited	Soil Name	Soil Sample Color
C-1	4/22/98	Myers clay, 0-3% slopes	
C-2	4/22/98	Kimball gravelly loam, 2-10% slopes	10YR 5/2
C-2	4/22/98	Kimball gravelly loam, 2-10% slopes	10YR 4/1
C-3	6/9/98	Altamont soils, 30-65% slopes	
C-4	6/9/98	Capay clay, 0-2% slopes	2.5 Y 4/2
C-4	6/9/98	Capay clay, 0-2% slopes	2.5Y 6/4
C-4	6/9/98	Capay clay, 0-2% slopes	5Y 4/1
C-4	6/9/98	Capay clay, 0-2% slopes	2.5 Y 3/2
C-5	6/15/98	Yolo clay loam, shallow over clay	5 YR 2.5/1
C-5	6/15/98	Yolo clay loam, shallow over clay	10 YR 6/8
C-5	6/15/98	Yolo clay loam, shallow over clay	10 YR 3/2
C-5	6/15/98	Yolo clay loam, shallow over clay	10 YR 6/8
C-6	6/15/98	Zamora silty clay loam, 2-8% slopes	10 YR 3/3
C-6	6/15/98	Zamora silty clay loam, 2-8% slopes	10 YR 3/1
C-6	6/15/98	Zamora silty clay loam, 2-8% slopes	10 YR 3/1
C-6	6/15/98	Zamora silty clay loam, 2-8% slopes	10 YR 3/3
C-7	6/23/98	Myers clay, 0-3% slopes	5Y 4/1
C-7	6/23/98	Myers clay, 0-3% slopes	5Y 4/2
C-8	4/1/99	Nacimiento soils, 30-50% slopes	
C-9	4/1/99	Nacimiento soils, 30-50% slopes	
C-10	4/1/99	Nacimiento-Contra Costa association, 15-30% slopes	

Most of the alkaline wetlands are also seasonal but are vastly different in plant species composition. The annual and perennial species in these areas are tolerant of alkali conditions. The majority of these wetlands are dominated by *Distichlis spicata* (salt grass), with a varity of other species including *Parapholis incurva* (sickle grass), *Frankenia salina* (alkali heath), *Cressa truxillensis* (alkali weed), and *Scirpus martimus* (slat marsh bulrush). The alkaline wetlands within the Sites Reservoir and Colusa Cell are along a linear zone of deformation potentially associated with the Salt Lake fault.

Impacts to the alkaline wetlands may be considered significant by regulatory agencies during the environmental review of these projects. These alkaline areas could provide habitat for a number of sensitive plant and animal species, although no sensitive species were identified during the current field studies. The Colusa Cell alkaline wetlands could serve as potential mitigation for the alkaline wetlands inundated by the Sites Reservoir. These wetlands could be enhanced using various land management methods.

A very small quantity (2 acres) of emergent wetlands was identified within the Sites Reservoir; this wetland type was present within the Colusa Cell in several small areas, but these were not measurable using aerial photo

interpretation. Emergent wetlands have typical wetland species, such as *Scirpus acutus* (hard-stemmed tule), *Scirpus californicus* (California bulrush) and *Typha angustifolia* (cattails), and are associated with existing reservoir shorelines and drainages. Drainages with emergent wetlands were often protected from grazing animals by fences.

The riparian areas found within these two reservoir alternatives are rarely well developed or large in size. Many of the drainages are downcut and do not support wetland species along the banks. Small strands of *Populus fremintii* (cottonwood), *Quercus lobata* (valley oak), and *Salix* spp (willows) occur as isolated units throughout the area. The largest concentration of riparian habitat is within the southern portion of the Sites Reservoir. Potential riparian creation sites occur throughout the surrounding area.

Many of the vernal pools found within these reservoir alternatives are "manmade" (e.g., drainages blocked by roads or disturbed areas within heavy clay soils) and have very low plant species diversities. Pools occurring along the northeastern edge of the Sites Reservoir tended to be larger in size and higher in plant species diversity. One similar area also occurs within the Colusa Cell. Typical species include *Eryngium castrense* (coyote thistle), *Plagiobothrys* ssp (popcorn flower), and *Lythrum hussopifolium* (loosestrife).

Newville Reservoir

Seasonal wetlands also dominate the wetlands of the Newville Reservoir inundation area (Table 3). Some of the wetland areas are very large in size and may form complexes with other types of wetlands, including riparian. This area also has significant quantities of other wetland types. The seasonal wetlands are closely associated with clay soils (Table 8). The seasonal wetlands within this area tended to be more diverse in both subtypes and plant species composition. Common species included those listed under the Sites/Colusa discussion, as well as *Trifolium* ssp (clovers), *Juncus* ssp (rushes), *Mimulus guttatus* (monkeyflower), and *Rorippa nasturium-aquaticum* (watercress).

Riparian areas account for over 18 percent of the reservoir area's wetlands. Well-developed riparian habitat occurs along a number of the main tributaries, although patches of the invasive non-native *Ailanthus altissima* (tree of heaven) occur within some of these strands. Riparian wetlands in this reservoir area cover about 77 acres, which may be considered significant by regulatory agencies.

One small area of alkaline wetland was identified within the Salt Creek drainage. Other areas adjacent to Salt Creek and some of its tributaries supported alkaline species, but were too narrow to map. The areas identified as alkaline are within a zone, which was identified as an inferred fault area during a 1980 geological study of the area *(Seismic and Fault Activity Study, Proposed Glenn Reservoir Complex*. Prepared for DWR by Earth Sciences Associates). The alkaline wetlands of this area have not been site checked.

Table 8. Newville Reservoir Seasonal Wetlands Soil Type

Pool Number	Date Pool Visited	Soil Name	Soil Sample Color
N-1	3/4/98	Altamont clay, 3-15% slopes	
N-2	3/17/98	Altamont clay, 3-15% slopes	
N-3	3/19/98	Lodo-Millsholm complex, 30-50% slopes	
N-4	3/19/98	Zamora loam, 0-3% slopes	
N-5	3/19/98	Lodo-Millsholm complex, 10-30% slopes	
N-6	3/20/98	Lodo-Gullied land complex, 10-30% slopes	
N-7	3/20/98	Tehama clay loam, 2-10% slopes	
N-8	3/26/98	Terrace escarpments	
N-9	4/7/99	Zamora loam, 0-3% slopes	
N-10	4/7/99	Hillgate loam, 0-3% slopes	
N-11	4/7/99	Hillgate loam, 0-3% slopes	
N-12	4/7/99	Lodo-Millsholm complex, 10-30% slopes	
N-13	4/20/98	Zamora loam, 0-3% slopes	5Y 4/1
N-14	4/20/98	Zamora loam, 0-3% slopes	5Y 4/1
N-15	4/20/98	Lodo-Millsholm complex, 10-30% slopes	
N-16	4/20/98	Lodo-Millsholm complex, 10-30% slopes	
N-17	4/20/98	Hillgate loam, 0-3% slopes	5Y 4/1, 5Y 3/2
N-18	4/20/98	Lodo-Millsholm complex, 10-30% slopes	5Y 4/1
N-19	4/20/98	Pleasanton gravelly loam, 1-10% slopes	5Y 4/1
N-20	4/20/98	Tehama loam, 3-8% slopes	
N-21	4/20/98	Pleasanton gravelly loam, 1-10% slopes	
N-22	4/28/98	Hillgate-Millsholm complex, 3-30% slopes	5Y 4/1
N-23	4/28/98	Lodo-Milsholm complex, 30-50% slopes	5Y 4/1
N-24	4/28/98	Clear Lake clay	N4/
N-25	4/28/98	Clear Lake clay	5Y 4/1
N-26	4/29/98	Hillgate-Gullied land complex, 2-10% slopes	
N-27	4/29/98	Corning gravelly loam, 0-2% slopes	
N-28	4/29/98	Clear Lake clay	5Y 4/1
N-29	4/29/98	Millsholm clay loam-Gullied land complex, 10-30% slopes	5Y 4/1
N-30	5/19/98	Hillgate-Millsholm complex, 3-30% slopes	
N-31	5/19/98	Hillgate-Millsholm complex, 3-30% slopes	
N-32	6/1/98	Zamora loam, 0-3% slopes	5Y 3/2
N-33	6/2/98	Zamora loam, 0-3% slopes	5Y 4/1
N-34	6/2/98	Zamora loam, 0-3% slopes	5Y 2.5/1-2
N-35	6/2/98	Zamora loam, 0-3% slopes	10YR 3/2
N-36	6/2/98	Zamora loam, 0-3% slopes	5Y 3/2
N-36	6/2/98	Zamora loam, 0-3% slopes	5Y 3/1
N-36	6/2/98	Zamora loam, 0-3% slopes	5Y 6/2-3
N-37	6/11/98	Lodo-Tehama-Gullied land complex, 10-30% slopes	5Y 4/1
N-38	6/12/98	Terrace escarpments	
N-39	6/12/98	Lodo-Tehama-Gullied land complex, 10-30% slopes	5Y 4/1
N-40	6/12/98	Lodo-Tehama-Gullied land complex, 30-50% slopes	5Y 4/1
N-40	6/12/98	Lodo-Tehama-Gullied land complex, 30-50% slopes	10YR 5/8

Vernal pool complexes, areas of concentrated pools and connecting swales, were found in several locations within the reservoir area. They were usually associated with terrace deposits occurring between streambeds. The pools of this reservoir alternative were of an overall higher quality than those of the Sites/ Colusa Cell location.

Red Bank Project

Seasonal and emergent wetlands make up less than 9 percent of the wetland total for the Red Bank Project (Table 4). Many of these wetlands are located within or adjacent to small stockponds or are associated with saturated spring-fed areas. Clay soils are relatively rare within the steep terrain that dominates both the Schoenfield and Dippingvat Reservoirs (Table 9).

Table 9. Red Bank Project Seasonal Wetlands Soil Type

Pool Number	Date Pool Visited	Soil Name	Soil Sample Color
R-1	4/1/98	Hillgate loam, shaly substrate, 0-8% slopes	Soil saturated
R-2	4/1/98	Hillgate loam, shaly substrate, 0-8% slopes	
R-3	5/21/98	Zamora clay loam, 0-3% slopes	
R-4	5/21/98	Riverwash	
R-5	5/21/98	Zamora clay loam, 0-3% slopes	
R-6	7/2/98	Lodo and Maymen shaly loams, 10-30% slopes, eroded	10 YR 3/2
R-7	7/2/98	Lodo and Maymen shaly loams, 10-30% slopes, eroded	
R-8	7/3/98	Cortina gravelly fine sandy loam	
R-9	7/3/98	Cortina gravelly fine sandy loam	

Riparian areas dominate the wetlands of this area. Riparian areas can be found throughout the larger reservoirs of the project but are best developed along the South Fork of Cottonwood and Red Bank Creeks. The typical species are similar to the species outlined in the Sites/Colusa discussion, except many of the riparian stands are dominated by *Alnus rhombifolia* (white alder).

State of California, Gray Davis, Governor

The Resources Agency, Mary D. Nichols, Secretary for Resources

Department of Water Resources, Thomas M. Hannigan, Director

Steve Macaulay, Chief Deputy Director

Raymond D. Hart, Deputy Director

Stephen L. Kashiwada, Deputy Director

L. Lucinda Chipponeri, Assistant Director for Legislation

Susan N. Weber, Chief Counsel

Division of Planning and Local Assistance, William J. Bennett, Chief

This bulletin was prepared under the direction of
Integrated Storage Investigation, Naser J. Bateni, Chief
Offstream Storage Investigation, Glen S. Pearson, Chief

by
David J. Bogener, Environmental Specialist IV

assisted by
Michael Serna, Senior Delineator
Mark Dombrowski, Junior Engineering Techician
Don Schroeder, Fish Wildlife Scientific Aide

State of California
The Resources Agency
Department of Water Resources
Division of Planning and Local Assistance