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SUMMARY

This report summarizes a botanical resource assessment of the Sites, Colusa cell, Newville, and Red Bank reservoir sites in 1998 and 1999. The assessment included rare plant field surveys, mapping and analysis of vegetation communities, and an inventory of vascular plants in the reservoir inundation zone.

There were no State or federally threatened or endangered plants found in the reservoir areas during the course of the study. Populations of federal Species of Concern were identified in the Newville and Red Bank alternatives. Several rare and limited distribution species were also found in all of the alternatives. The Newville and Red Bank sites yielded the greatest number of populations of sensitive plant species.

Vegetation communities which may be affected by the proposed reservoirs include California annual grassland, valley and blue oak woodland, willow riparian scrub, cottonwood riparian woodland, foothill pine woodland, chaparral, vegetated wetlands, and vernal pools. More than 80 percent of the Sites, Colusa cell, and Newville reservoir areas support annual grassland, in contrast with Red Bank which is more than 80 percent oak and foothill pine woodland. Among the reservoir alternatives, the maximum oak woodland loss may be 1,800 acres. Vernal pool impacts vary between the sites from 0 to 23 acres.

A vascular plant inventory was prepared for each site, showing that species diversity is highest at the Newville site and lowest in the Colusa cell. Non-native species representation was also greatest at Newville. The annual grassland is dominated by non-native species such as yellow star thistle (*Centaurea solstitialis),* brome grasses (*Bromus* sp.), and medusa head (*Taeniatherum caput-medusae).* Non-native species density or cover was not quantified.

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INTRODUCTION

This report is a summary of a two year botanical resource assessment for four proposed Offstream Storage Reservoir alternatives: Sites, Colusa cell, Newville, and Red Bank. Colusa cell is defined for this study as the northern half of the Colusa Reservoir. Studies included a comprehensive literature background search, rare plant surveys and inventory of the inundation zones, and analysis of the vegetative communities in the proposed project areas. These studies were conducted in compliance with statutes and guidelines set forth in the California Environmental Quality Act, the California Endangered Species Act, and the Federal Endangered Species Act to determine the extent to which sensitive botanical resources would be affected by the proposed project.

1 METHODOLOGY

1.1. General Vegetation

The California Native Plant Society and the California Department of Fish and Game have classified natural plant communities in California for broad scale resource inventory and assessment. This classification system provides parameter definition for general vegetation types and of rare communities, as set forth in the CNPS Manual of California Vegetation (Sawyer and Keeler-Wolf 1995). The manuals classifications were used to define the natural communities which may be affected by the Offstream Storage Reservoirs. Plant communities were delineated on aerial photos (1:6,000; 1:12,000). The photos were field verified and digitized, with computer mapping software, to obtain acreage estimates of the existing vegetation communities. These data were used to prepare a plant community profile illustrating the percent cover of

dominant vegetation types within each reservoir.

1.2. Sensitive Plants

The CNPS, CDFG, and U.S. Fish and Wildlife Service have all developed standard classification systems for sensitive plants. To simplify these standards for the purpose of this report, sensitive plant species are defined by DWR as high priority, priority, and low priority. High priority species are either State or federally threatened, endangered, proposed threatened, or candidate species (State). Priority species are either federal Species of Concern, or CNPS List 1A, 1B, 2, or 3 species. The CNPS categories include species that are either believed to be extinct, may become listed, or are rare throughout their California range. Low priority species are defined as plants of limited distribution: CNPS List 4 (CDFG 1997, 1998, 1999; Harlow 1998; Skinner and Pavlik 1994; White 1997; USFWS 1996, 1997).

High priority plant species either are, or will soon be designated “threatened” or “endangered” under the CESA of 1985, or “rare” or “endangered” under the National Plant Protection Act of 1977 (CDFG code 1904, 2074.2, 2075.5). High priority species may also be protected under Section 7(c) of the FESA of 1973 (50 CFR). Since 1985, “threatened” plants are protected pursuant to CESA; “endangered” plants may be protected by CESA and NPPA. However, consideration of plants listed as “rare” are directed primarily by NPPA (CDFG code 1900, 1913(c).) and by guidelines set forth in the CEQA (1970,Cal. Pub. Res. Code 21000(a), 21151(a).) (Skinner and Pavlik 1994). Protection under State and federal law requires that a full environmental impact assessment will identify means to avoid impacts to the greatest extent possible and, where a significant impact would occur, acceptable measures will be identified to minimize or mitigate the impacts to below the level of significance.

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References and regional specialists were consulted to identify documented occurrences of prioritized species and rare communities within the project area and adjacent USGS 7.5 minute quadrangles (Abrams 1923,1944,1951; Abrams and Ferris 1960; Griggs 1997; Isle 1998, 1999; Hickman 1993; Horenstein 1998, 1999; Lis 1998, 1999; Munz and Keck 1973; USDA Forest Service 1994):

CDFG, California Natural Diversity Data Base, 1998, 1999

A Manual of California Vegetation

CDFG List of Endangered and Threatened Species, April 1999

CNPS Electronic Inventory, 1999

United States Fish and Wildlife Service list of federally endangered, threatened, proposed and candidate species, December 1998

CDFG Region I, Redding, California

CDFG, Region 2, Sacramento, California

1.2.1. <u>High Priority Species Background</u>

Ten high priority plant species were identified from the literature search as previously documented within 30 miles of the proposed reservoirs (Table I.2.1). The probability for finding these species in the project was predicted by using known habitat parameters and proximity of the nearest occurrence (Table 1.2.2.).

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Table 1.2.1. High Priority Plant Species with Potential to Occur in the Vicinity of the Offstream Storage Reservoir Projects, Tehama, Glenn, and Colusa Counties, California.

Species Common Name[1]	State Status[2]	USFWS listing[3]	CNPS status[4]	Distribution by County	Habitat Type (typical elevation)
Brodiaea coronaria ssp. *rosea* Indian Valley broadiaea	CE	SC	List 1B	COL GLE LAK TEH	chaparral, cismontane woodland, valley & foothill grassland/ serpentinite (0-100 m)
Chamaesyce hooveri Hoover's spurge	none	FT	List 1B	BUT GLE MER STA TEH TUL	vernal pools (25-250 m)
Cordylanthus palmatus palmate-bracted bird's-beak	CE	FE	List 1B	ALA COL FRE GLE MAD SJQ YOL	chenopod scrub, valley & foothill grassland/alkaline (5-155 m)
Gratiola heterosepala Bogg's Lake hedge-hyssop	CE	none	List 1B	FRE LAK LAS MAD MOD PLA SAC SHA SJQ SOL TEH OR	marshes, swamps (lake margins), vernal pools (0-1,200 m)
Lupinus milo-bakeri Milo Baker's lupine	CT	SC	List 1B	COL MEN	cismontane woodland, valley & foothill grassland (395-430 m)
Neostaphia Colusana Colusa grass	CE	FT	List 1B	COL GLE MER SOL STA YOL	vernal pools/adobe (5-200 m)
Orcuttia pilosa hairy Orcutt grass	CE	FE	List 1B	BUT GLE MAD MER STA TEH	vernal pools (55-200 m)
Orcuttia tenuis slender Orcutt grass	CE	FT	List 1B	LAK LAS PLU SAC SHA SIS TEH	vernal pools (200-1,100 m)
Silene campanulata ssp. *campanulata* Red Mtn. catchfly	CE	FC	List 1B	COL MEN	chaparral, lower montane coniferous forest/serpentinite rocky (425-1,230 m)
Tuctoria greenei Greene's tuctoria	CR	FE	List 1B	BUT FRE MAD MER SHA SJQ STA THE TUL	vernal pools (<200 m)

Notes:[1] Nomenclature corresponds to Skinner and Pavlik 1994;[2] CE State Listed as endangered; CR State Listed as rare (Section 1904, DFG code,1994);[3] SC federal Species of Concern; FC federal candidate; FE Listed as endangered by federal government; FP federally proposed threatened; FT Listed as threatened by federal government (USFWS, December 1998); [4] Listed 1B plants rare, threatened, or endangered in California and elsewhere (California Native Plant Society).

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The following information includes the most current literature and resource knowledge of known populations, ecological requirements, range and distribution, and potential or existing threats to high priority species.

Indian valley brodiaea (*Brodiaea coronaria* ssp. *rosea*) is listed as California Endangered and a Federal Species of Special Concern. This perennial herb in the Liliaceae family flowers from May to June. Its habitat includes closed-cone coniferous forest, chaparral, cismontane woodland, and valley and foothill grasslands with serpentinite soils at elevations ranging from 0 to 100 meters.

Range CNDDB information indicates that 14 occurrences of this species have been reported in Colusa, Glenn, Lake, and Tehama counties (one of which is possibly extirpated). These sites are on Bureau of Land Management, U.S. Forest Service, private, and unknown ownership properties. Potential habitat exists at all the reservoir sites and known populations occur within 6 miles of Sites, within about 8 miles of Colusa cell, within about 10 miles of Red Bank, and within 2 miles of Newville.

Threats Various threats to these populations have been identified, including inundation by reservoir construction, mining, off-road recreational vehicle activity, road or trail construction, horticultural collecting, vandalism, and dumping. Populations are protected in part at a BLM Area of Critical Environmental Concern in Lake County.

Hoover's spurge (*Chamaesyce hooveri*) is listed as Federally Threatened with no State status. This annual herb in the Euphorbiaceae family flowers in July and August. Its habitat is vernal pools at elevations ranging from 25 to 250 meters.

Range According to CNDDB records Hoover's spurge has been reported

from 30 occurrences in Butte, Glenn, Stanislaus, Merced, Tehama, and Tulare counties. These plants are on CDFG, The Nature Conservancy, USFWS, private, and unknown ownership properties. Potential habitat exists at Sites and Colusa cell and known populations occur within 7 miles of these reservoirs.

Threats Threats include agriculture, altered hydrology, competition from non-native plants, erosion or runoff, trampling, and grazing. Populations are protected in part at the CDFG Stone Corral Ecological Reserve, USFWS Sacramento National Wildlife Refuge, and TNC Vina Plains Preserve.

Palmate-bracted bird's beak (*Cordylanthus palmatus*) is listed as California Endangered and Federally Endangered. This annual herb in the Scrophulariaceae family flowers from May through October. Its habitat is chenopod scrub and alkaline areas in valley and foothill grassland at elevations ranging from 5 to 155 meters.

Range CNDDB information indicates that 21 occurrences of this plant are known from Alameda, Colusa, Fresno, San Joaquin, and Yolo counties. This species is thought to be extirpated from Madera and Glenn counties. These populations occur on land owned by the City of Woodland, CDFG, City of Livermore, USFWS, and private entities. Known sites occur within 5 miles of Colusa cell and 7 miles of Sites reservoirs.

Threats Threats include agriculture, altered hydrology, competition from exotic plants, biocides, grazing, off road vehicle use, vandalism/dumping, and road and trail construction. Populations are protected at the CDFG Alkali Sink Ecological Reserve and Mendota Wildlife Area and at the Sacramento National Wildlife Refuge.

Bogg's Lake hedge-hyssop (*Gratiola heterosepala*) is listed as California Endangered with no Federal status. This annual herb in the Scrophulariaceae family flowers from

April to June. Its habitat includes shallow water in marshes, swamps (lake margins), and vernal pools at elevations ranging from 0 to 1,200 meters.

Range CNDDB information indicates that 77 occurrences of this species (one of which is possibly extirpated) have been reported in Fresno, Lake, Lassen, Madera, Modoc, Placer, Sacramento, San Joaquin, Shasta, Solano, and Tehama counties. These sites are on land owned by the BLM, CDFG, TNC, Sacramento County, Solano County Farmlands and Open Space, The Trust for Wildland Communities, US Forest Service, private, and unknown entities. Potential habitat exists at all the reservoir sites. However, the closest known location is 12 miles northeast of the Newville Reservoir alternative.

Threats Threats include agriculture, altered flood regime, development, herbicide use, feral pigs, grazing, foot traffic, recreational use, road and trail construction, and landfill construction. Populations are protected in private preserves, BLM Research Areas, a USFWS Botanical Special Interest Area, and CDFG Ecological Reserves.

Milo Baker's lupine (*Lupinus milo-bakeri*) is listed as California Threatened and Federal Species of Special Concern. This annual herb in the Fabaceae family flowers from June through September. Its habitat includes cismontane woodland (often along roads) and foothill and valley grasslands at elevations from 395 to 430 meters.

Range According to CNDDB records Milo Baker's lupine has been reported from 17 occurrences in Colusa and Mendocino counties. Four Mendocino County sites may have been extirpated. These sites are on land under Bureau of Indian Affairs, CALTRANS, and private ownership.

Threats This species is threatened by biocides, grazing, and road and trail construction.

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Colusa grass (*Neostapfia Colusana*) is listed as California Endangered and Federally Threatened. This annual grass flowers from May to August. Its habitat is vernal pools, alkali playas, or adobe soils at elevations ranging from 5 to 200 meters.

Range According to CNDDB records, this species is reported from 56 occurrences in Merced, Solano, Stanislaus, and Yolo counties. It has been extirpated from Colusa County and from some sites in Stanislaus, Merced, and Glenn counties. Colusa grass occurs on land owned by TNC, Solano County Farmlands and Open Space, Stanislaus County, the US Department of Defense, and private and unknown entities. Potential habitat occurs at Sites and Colusa cell reservoirs and known populations occur approximately 10 miles to the east.

Threats Various threats to these populations include agricultural practices and grazing, altered flood regime and surface water diversion, biocides, competition from exotics, inundation, foot traffic, off-road vehicle activity, and road construction. Some populations are protected by TNC and Solano County Farmlands and Open Space.

Hairy Orcutt grass (*Orcuttia pilosa*) is listed as California Endangered and Federally Endangered. This annual grass flowers from May to September. Its habitat is vernal pools ranging in elevation from 55 to 200 meters.

Range CNDDB information indicates that 39 occurrences of this species have been reported in Butte, Glenn, Madera, Merced, Stanislaus, and Tehama counties (11 of these occurrences have been extirpated). These populations occur on land owned by the USBR, CALTRANS, TNC, USFWS, and private parties. Potential habitat exists at Sites and Colusa cell reservoirs and known populations occur within 9 miles.

Threats Threats include agriculture, competition from exotic plants, development, grazing, off-road vehicle use, and road and trail construction. Some populations are protected at Vina Plains Nature Conservancy Preserve and at the Sacramento National Wildlife Refuge.

Slender Orcutt grass (*Orcuttia tenuis*) is listed as California Endangered and Federally Threatened. This annual grass flowers from May to July. Its habitat is vernal pools ranging in elevation from 200 to 1,100 meters.

Range CNDDB information indicates that 76 occurrences of this species have been found in Lake, Lassen, Plumas, Sacramento, Shasta, Siskiyou, and Tehama counties. Four of the sites in Shasta County have been extirpated. These plants occur on land under BLM, City of Redding, CDFG, USFS, TNC, Trust for Wildland Communities, and private and unknown ownership. Potential habitat occurs at all the reservoirs, but no known populations occur within 20 miles.

Threats Threats include altered hydrology and surface water, competition from exotics, development, trampling, grazing, landfills, logging, off-road vehicle activity, vandalism, and dumping. Populations are protected in part at TNC Vina Plains Preserve, CDFG's Dales Lake Ecological Reserve, BLM Alturas RA, and Redding RA.

Red Mountain catchfly (*Silene campanulata* ssp. *campanulata*) is listed as California Endangered and a federal candidate. This perennial herb in the Caryophyllaceae family flowers from May to June. Its habitat includes chaparral and lower montane coniferous forest with serpentinite or rocky soils at elevations ranging from 425 to 1,230 meters.

Range CNDDB information indicates that seven occurrences of this plant have been found in Colusa and Mendocino counties. These populations occur on land under BLM and private ownership. A known population of this species grows

within 5 miles of Sites reservoir. However, the proposed reservoir maximum pool is well below the observed elevation range of the species.

Threats Threats include erosion or runoff and mining. One population may have been extirpated by logging activities.

Greene's tuctoria (*Tuctoria greenei*) is listed as California Rare and Federally Endangered. This annual grass flowers from May to July. Its habitat is vernal pools at elevations less than 200 meters.

Range CNDDB information indicates that 38 occurrences of this species have been found. Nineteen of those populations occur in Butte, Merced, Shasta, and Tehama counties. Other occurrences are thought to be extirpated from Fresno, Madera, Stanislaus, Tulare, and San Joaquin counties. These plants occur on private land, TNC, and unknown ownership properties. Potential habitat occurs at all of the north of the Delta offstream storage reservoir alternatives. However, the nearest known population is more than 20 miles from any of the reservoir sites.

Threats Threats include agriculture, altered hydrology and surface water diversions, and competition from exotic plants, grazing, and exotics. Populations are protected in part at TNC Vina Plains Preserve.

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Table 1.2.2. Probability Estimates for Occurrence of High Priority Plant Species in the Four Offstream Storage Reservoirs (Probabilities are based on existing habitat and known occurrences).

Species Common Name[1]	**Probability for occurrence** [2]			
	Sites	**Colusa cell**	**Newville**	**Red Bank**
Brodiaea coronaria ssp. *rosea* Indian Valley broadiaea	low	low	low	low
Chamaesyce hooveri Hoover's spurge	low	low	low	none
Cordylanthus palmatus palmate-bracted bird's-beak	low	low	low	none
Gratiola heterosepala Bogg's Lake hedge-hyssop	med	med	med	med
Lupinus milo-bakeri Milo Baker's lupine	low	low	low	low
Neostaphia Colusalna Colusa grass	low	low	low	none
Orcuttia pilosa hairy Orcutt grass	low	low	low	none
Orcuttia tenuis slender Orcutt grass	low	low	low	none
Silene campanulata ssp. *campanulata* Red Mtn. catchfly	none	none	low	low
Tuctoria greenei Greene's tuctoria	low	low	low	none

Notes: [1] Nomenclature corresponds to Skinner and Pavlik 1994. [2] Probability based on closest known occurrence records and potential habitat within the reservoirs in 1998-99.

1.2.2. Priority and Low Priority Species

The literature and regional references identified 42 priority and 30 low priority species within 30 miles of the proposed reservoirs (Table 1.2.3; Table 1.2.4).

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Table 1.2.3. Priority Plant Species with Potential to Occur in the Vicinity of the Offstream Storage Reservoir Projects, Tehama, Glenn and Colusa Counties, California.

Species Common Name[1]	State Status	USFWS listing[2]	CNPS status[3]	Distribution by County	Habitat type
Antirrhinum subcordatum dimorphic snapdragon	none	none	List 1B	COL GLE LAK THE	chaparral/sometimes serpentinite (85-800m)
Astragalus rattanii var. *jepsonianus* Jepson's milk-vetch	none	none	List 1B	COL GLE LAK NAP TEH YOL	woodland, grassland/often serpentiinte (320-700m)
Astragalus tener var. *ferrisiae* Ferris's milk-vetch	none	SC	List 1B	BUT COL GLE SOL SUT YOL	meadows, grassland, subalkaline flats (5-75m)
Atriplex cordulata heartscale	none	SC	List 1B	ALA BUT CCA FRE GLE KNG KRN MAD MER SJQ SOL STA TUL YOL	meadows, grassland, saline/alkaline (1-275m)
Atriplex depressa brittlescale	none	none	List 1B	ALA BUT CCA COL FRE GLE KRN MAD MER SOL STA TUL YOL	Chenopod scrub, meadows, playas, grassland, vernal pools/alkaline, clay (1-320m)
Atriplex joaquiniana San Joaquin spearscale	none	SC	List 1B	ALA CCA COL GLE MER NAP SAC SBT SCL SJQ SOL TUL YOL	Chenopod scrub, meadows, playas, grassland, vernal pools/alkaline (1-320m)
Atriplex persistens vernal pool saltbush	none	none	List 1B	GLE MER STA TUL	vernal pools/alkaline (10-115m)
Balsamorhiza macrolepis ssp *macrolepis* big-scale balsamroot	none	none	List 1B	ALA BUT MPA NAP PLA SCL TEH	woodland, grassland/sometimes serpentinite (< 1,400m)
Chlorogalum pomeridianum var. *minus* dwarf soaproot	none	none	List 1B	COL LAK SLO SON THE	chaparral/serpentinite (305-750m)
Cryptantha crinita silky cryptantha	none	SC	List 1B	SHA THE	woodland, riparian, grasslands/gravelly streambeds (150-300m)

(continued)

Species *(Table* 1.2.3. *page 2 of 4)* Common Name[1]	State Status	USFWS listing[2]	CNPS status[3]	Distribution by County	Habitat type
Delphinium recurvatum recurved larkspur	none	SC	List 1B	ALA CCA COL FRE KNG KRN MER SLO SOL TUL	chenopod scrub, woodland, grassland, vernal pools/alkaline (3-750m)
Downingia pusilla dwarf downingia	none	none	List 1B	MER MPA NAP PLA SAC SOL SON STA TEH SA	mesic grassland, vernal pools (± 150m)
Eleocharis quadrangulata four-angled spikerush	none	none	List 2	BUT MER THE	freshwater marsh (<500m)
Eriastrum brandegeae Brandegee's eriastrum	none	SC	List 1B	COL GLE LAK SCL TEH TRI	chaparral, woodland/volcanic (315-1,030m)
Eriogonum luteolum var. *caninum* Tiburon buckwheat	none	none	List 3	ALA CCA COL LAK MRN NAP SCL SMT	chaparral, grassland, serpentinite (< 500m)
Eriogonum nervulosum Snow Mtn. Buckwheat	none	SC	List 1B	COL GLE LAK NAP SON YOL	chaparral, serpentinite (300-2,105m)
Eschscholzia rhombipetala diamond-petaled California poppy	none	SC	List 1A	ALA CCA COL SLO STA	grassland/alkaline (0-975m)
Fritillaria pluriflora adobe lily	none	SC	List 1B	BUT COL GLE LAK NAP PLU SOL TEH YOL	chaparral, woodland, grassland/often adobe (60-705m)
Hesperevax acaulis var. *acaulis* *dwarf evax*	none	none	List 1B	AMA BUT COL ELD FRE MAD MNT SAC SCL SLO STA TEH TUL	woodland, grassland, vernal pools (30-1,000m)
Hesperolinon drymarioides drymaria-like western flax	none	SC	List 1B	COL GLE LAK NAP YOL	chaparral, woodland, grassland/often serpentinite (100-1,130m)
Hesperolinon tehamense Tehama Co. western flax	none	SC	List 1B	GLE THE	chaparral, woodland/often serpentinite (100-1,000m)

(continued)

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Species *(Table* 1.2.3. *page 3 of 4)* Common Name[1]	State Status	USFWS listing[2]	CNPS status[3]	Distribution by County	Habitat type
Hibiscus lasiocarpus California hibiscus	none	none	List 2	COL GLE THE	freshwater marsh ((0-120m)
Juglans californica var *hindsii* Northern California black walnut	none	SC	List 1B	CCA NAP SAC SOL YOL	riparian forest and woodland (50-200 m)
Juncus leiospermus var. *leiospermus* Red Bluff dwarf rush	none	none	List 1B	BUT SHA THE	chaparral, woodland, grassland, vernal pools (35-1,020m)
Layia septentrionalis Colusayia	none	none	List 1B	COL GLE LAK MEN NPA SON SUT TEH YOL	chaparral, woodland grassland/sandy, serpentinite (100-1,095m)
Legenere limosa Legenere	none	SC	List 1B	LAK NAP PLA SAC SMT SOL SON STA TEH	vernal pools (<150)
Lepidium latipes var. *heckardii* Heckard's pepper-grass	none	none	List 1B	GLE SOL YOL	grassland/alkaline falts (10-200m)
Limnanthes floccosa ssp. *floccosa* woolly meadowfoam	none	none	List 2	BUT LAK SHA SIS THE TRI OR	vernally mesic woodland, grassland (<400m)
Lotus rubriflorus Red-flowered lotus	none	SC	List 1B	COL STA THE	woodland, grassland (+/-200m)
Lupinus sericatus Cobb Mtn. Lupine	none	none	List 1B	COL LAK NAP SON	chaparral, woodland (500-1,500m)
Madia hallii Hall's madia	none	SC	List 1B	COL LAK NAP YOL	chaparral/serpentinite (50-670m)
Madia stebbinsii Stebbin's madia	none	none	List 1B	SHA TEH TRI	chaparral,/serpentinite (400-1,580m)

(continued)

Species *(Table* 1.2.3. *page 4 of 4)* Common Name[1]	State Status	USFWS listing[2]	CNPS status[3]	Distribution by County	Habitat type
Microseris sylvatica woodland microseris	none	none	List 3	BUT GLE LAX SBT	chaparral, woodland, grassland (60-1,500m)
Myosurus minimus ssp. *apus* little mousetail	none	SC	List 3	BUT COL KRN SOL STA OR	vernal pools/alkaline (>1,500m)
Myosurus sessilis sessile mousetail	none	none	List 3	CCA COL FRE GLE MER SBT DJQ SOL STA YOL OR	grassland, vernal pools (<150m)
Navarretia leucocephala ssp. *bakeri* Baker's navarretia	none	none	List 1B	COL LAK MEN MRN NAP SOL SON TEH	woodland, meadows (mesic), grassland, vernal pools (<1,700m)
Paronychia ahartii Ahart's paronychia	none	SC	List 1B	BUT SHA THE	woodland, grassland, vernal pools (<500m)
Sagittaria sanfordii Sandford's arrowhead	none	SC	List 1B	BUT DNT FRE KRN MER MRN ORA SAC SHA SJQ TEH VEN	marsh & swamp (assorted shallow freshwater) (<300m)
Sanicula tracyi Tracy's sanicle	none	SC	List 1B	BUT DNT HUM TEH TRI	woodland (100-1,000m)
Trichocoronis wrightii var. *wrightii* Wright's trichocoronis	none	none	List 2	COL MER RIV SJQ SUT TX	meadows, freshwater marsh, riparian, vernal pools/alkaline
Tropidocarpum capparideum caper-fruited tropidocarpum	none	SC	List 1A	ALA CCA GLE MNT SCL SJQ	grassland/alkaline hills (1-455m)
Viburnum ellipticum Western viburnum	none	none	List 3	CCA FRE ELD GLE HUM MEN NAP SHA SON	chaparral, woodland (300-1,400m)

Notes: 1. Nomenclature corresponds to Skinner and Pavlik 1994. 2. SC-federal Species of Concern 3. California Native Plant Society; List 1A-plants presumed to be extinct in California List 1B-plants rare, Threatened, or endangered in California and elsewhere; List 2-plants rare, threatened, or endangered in California but more common elsewhere; List 3-plants about which more information is needed.

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Table 1.2.4. Low Priority Plant Species with Potential to Occur in the Vicinity of the Offstream Storage Reservoir Project, Tehama, Glenn and Colusa Counties, California (all are CNPS "Limited distribution" List 4).

Scientific Name	Common Name
Allium fimbriatum var. *purdyi*	Purdy's onion
Allium sanbornii var. *sanbornii*	Sanborn's onion
Androsace elongata ssp. *acuta*	rock jasmine
Antirrhinum cornutum	spurred snapdragon
Asclepias solanoana	serpentine milkweed
Astragalus breweri	Brewer's milk-vetch
Astragalus clevelandii	Cleveland's milk-vetch
Astragalus pauperculus	depauperate milk-vetch
Astragalus rattanii var. *rattanii*	Rattan's milk-vetch
Ceanothus jepsonii var. *albiflorus*	musk brush
Chamaesyce ocellata ssp. *rattanii*	Stony Creek spurge
Collinsia sparsiflora var. *arvensis*	few-flowered collinsia
Collomia diversifolia	serpentine collomia
Cryptantha excavata	deep-scarred cryptantha
Eriogonum luteolum var. *caninum*	Tiberon buckwheat
Eriogonum tripodum	tripod eriogonum
Erodium macrophyllum	large-leaved filaree
Helianthus exilis	serpentine sunflower
Hesperevax caulescens	hogwallow evax
Juncus articulatus	jointed rush
Linanthus latisectus	linanthus
Lomatium ciliolatum var. *hooveri*	ciliate biscuitroot
Mimulus glaucescens	shield-bracted monkeyflower
Navarretia eriocephala	hoary navarrettia
Navarretia heterandra	Tehama navarretia
Navarretia jepsonii	Jepson's navarretia
Navarretia subuligera	awl-leaved navarretia
Orobanche valida ssp. *howellii*	Howell's broom-rape
Polygonum bidwelliae	Bidwell's knotweed
Streptanthus drepanoides	sickle-fruited jewel-flower

Nomenclature corresponds to Skinner and Pavlik 1994.

Field personnel examined preserved specimens of prioritized species at the California Academy of Sciences, University of California Berkeley, U.C. Davis, and California State University Chico herbaria. The Jepson Manual (Hickman 1993) and A California Flora and Supplement (Munz and Keck 1973) were checked for species

habitat descriptions and flowering periods. Regional botanists were consulted about local occurrences of sensitive species. For species with known soil associations, United States Department of Agriculture Natural Resource Conservation Service data were used to generate maps of Lodo shale and clay soils to assist in narrowing the focus of the surveys (Table 1.2.5.; Attachment I.a-d.) (Harradine 1948; USDA 1965).

Table 1.2.5. Acreage estimates of Lodo shale and clay soil which are associated with several prioritized plant species in the Offstream Storage Reservoirs.

Soils	Number Of Acres Of Mapped Soil Units			
	Sites	Colusa Cell	Newville	Red Bank
Lodo Shales	0	0	7,182	3,101
Clay	8,916	4,950	2,074	305

1.3. Field Survey Methods

Within the reservoir inundation elevations, field surveys were conducted for prioritized species according to established guidelines and protocols (CDFG 1984; USFWS 1996; Nelson 1985, 1987). Under these guidelines, focused habitat-specific surveys were conducted, using wandering transect methodology, between February and October 1998 and 1999. These months coincided with the appropriate phenological stages (flowering and fruiting) necessary for the identification of most plant species occurring in the area, including all prioritized species (Table 1.2.1 through 1.2.4). Transects were spaced 5 to 10 meters apart except in microhabitats, such as riparian areas, where they were 1 meter apart. Dense valley stands of star thistle (*Centaurea solstitialis*), ridge tops, vertical shale slopes, and impenetrable chaparral and woodland stands were perimeter surveyed only due to the lack of potential habitat. Where access and topography allowed, potential habitat was surveyed completely. Relatively minor areas at each reservoir could not be surveyed due to lack of authorized private property access.

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Field survey coverage areas were estimated for each reservoir based on the level of coverage accomplished. Survey coverage was divided into three effort classes: 0 percent, less than 50 percent, and 50-100 percent coverage. Land that was not surveyed (0 percent) included: areas that do not support suitable habitat for the prioritized species, unauthorized access properties, private residences and yards, cemeteries, bedrock stream channels, vertical slopes, ridge tops above reservoir elevation, 100 percent vegetated chaparral or scrub areas, and large solid stands of yellow star thistle (*Centaurea solstitialis*). Areas which were surveyed less than 50 percent included two types of effort. These areas were surveyed during less than half of the phenological time period for the prioritized species, or half of the area was actually surveyed. These areas consisted of marginal habitat, land lacking sensitive species habitat, or land in a degraded condition which would not warrant further surveys. In areas which were surveyed greater than 50 percent and up to 100 percent, both phenological and transect surveys were done.

Areas with high quality potential habitat were prioritized and surveyed throughout the phenological time period with more complete transect coverage. Habitat parameters, including mapped soils, aspect, and plant associates, defined the number of return visits and the level of coverage. One hundred percent coverage was accomplished only in potential habitat known to support the prioritized plant species.

Plant species were identified and recorded in the field whenever possible, or preserved in a voucher collection for identification at a later date. The voucher collection consists of plant specimens which were collected and preserved as proof for species on the plant inventory lists. A plant voucher database was prepared for collections. Previously undocumented populations of prioritized species were recorded in a DWR botanical inventory database. Data were collected about each sensitive plant population including habitat parameters, approximate number of individuals, phenological state, full location description, plant community associates, existing site conditions, and present or possible threats to the population. Population definitions in

this report follow the CNDDB occurrence reporting standard of at least one-quarter of a mile separation between stands or colonies of a prioritized species. Surveys, inventories, and plant identification were conducted by DWR staff botanists (Attachment 2). Field survey activities were documented throughout the two year study, including dates, location, authorized property access, and assigned personnel (Attachment 3).

Annual precipitation totals, which significantly influence annual plant species germination, were noted for the 1998 and 1999 water years (Table I.2.6.).

Table 1.2.6. Total Precipitation and Percent of Average for Water Year 1998 and 1999 in Red Bluff, Orland, and East Park Reservoir, California.

	WATER YEAR[1] Total Precipitation (inches) / Percent of Annual Average	
STATION	**October 1997-September 1998**	**October 1998-May 1999**
Red Bluff (Red Bank)	21.51 / 213	17.02 / 83
Orland (Newville)	20.36 / 232	15.93 / 82
East Park Reservoir (Sites/Colusa cell)	18.98 / 232	16.46 / 90

Notes:1 California Department of Water Resources, Division of Flood Management, 1999.

2. RESULTS

2.1. General Vegetation: Summary of Findings

The following natural communities and vegetation types occur within the reservoir sites. These classifications or series are based on the dominant vegetation of a given area. These series are recognized in the literature as occurring in portions of the inner North Coast Range and Central Valley of California including Glenn, Colusa, and Tehama counties (Keeler-Wolf 1995).

Grassland *California annual (includes vernal pools and swales)*

This upland plant community of herbaceous annual grasses and herbs is characteristically composed of many non-native and native species. Species composition is highly variable among stands and throughout the growing season. Vernal pools and swales, within the annual grassland, support unique assemblages of native annuals. Annual grassland occurs at all the reservoir alternatives. Red Bank reservoir is the only site that did not have vernal pools.

nodding needlegrass (*Nassella cernua*)

This upland series is dominated by herbaceous plants with nodding needlegrass the sole or dominant grass in the ground layer. Other native and non-native perennial grasses and emergent shrubs and trees are present but the grass layer is less than 1 meter tall. Numerous small stands (less than 5 square meters) were observed on clay soil in blue oak woodland in all reservoirs although these were not large enough to be mapped from the aerial photographs.

purple needlegrass (*Nassella pulchra)*

Purple needlegrass, a perennial bunchgrass, is the sole or dominant grass in this upland series which may include other native or non-native perennial and annual grasses less than 1 meter tall. It was observed in all of the reservoir sites on clay soils, generally in openings in blue oak woodland, in small unmapped units.

Chaparral

chamise (Adenostoma fasciculatum)

Chamise is the sole or dominant shrub (greater than 60 percent) in continuous upland canopy in this series. Emergent trees may be

present but native shrubs such as poison oak and manzanita form a mosaic with the chamise and the ground layer is sparse. Chamise chaparral was found on the western edges of the Red Bank and Newville sites.

wedgeleaf ceanothus (*Ceanothus cuneatus*)
Wedgeleaf ceanothus is the dominant canopy in this upland woody series. Other native shrub species form a mosaic with *Ceanothus* which can form a continuous or intermittent canopy with a very sparsely vegetated ground layer. This series occurs sporadically in the Red Bank, Newville, and Sites reservoirs.

Riparian

Riparian vegetation is associated with intermittently or seasonally flooded or saturated intermittent drainages, stream corridors or floodplain terraces. Dominant stands of Fremont's cottonwood (*Populus fremontii*), mixed willow (*Salix spp.*), and narrowleaf willow (*Salix exigua*) series were observed in the reservoir sites. Mexican elderberry (*Sambucus mexicanus*) series occurs in stands which were not large enough to be mapped as distinct vegetation units.

Woodland

Valley oak (*Quercus lobata*)
Valley oak woodland is the sole or dominant tree in a continuous, intermittent, or open canopy which may include other native tree and shrub species. Associated with intermittently flooded or seasonally saturated wetlands and uplands, openings are characteristically grassy. This series occurs along the major tributaries in the reservoir sites.

Blue oak (*Quercus douglasii*)

Blue oak is the sole or dominant tree in this woody upland series. Canopy density may be variable and the understory may include shrubs and a grassy ground layer. This series occurs in the reservoir sites in the valleys, on slopes, and in moderately rocky to well-drained areas.

Mixed oak (*Quercus* spp.)

Several species of oak may be present in this upland woody series, including blue oak (*Q. douglasii)*, interior live oak *(Q. wislizenii)*, and/or valley oak (*Q. lobata)*. Other native tree species including foothill pine (*Pinus sabiniana*) may be present in addition to native shrubs and a grassy ground layer. This series occurs in the Red Bank and Newville reservoir sites.

Foothill Pine **(***Pinus sabiniana*)

Foothill pine is the sole or dominant canopy species, or may be an emergent tree over a continuous to intermittent shrub canopy.Other native tree and shrub species may also form a mosaic with a grassy to sparse ground layer. This series may occur in intermittent freshwater wetlands and rocky to well-drained uplands. This is the dominant vegetation community at the Red Bank site. Foothill pine community does not occur in the Sites, Colusa cell, or Newville reservoir areas.

Ruderal

This category refers to weedy or disturbed conditions including areas surrounding residences, out-buildings, and stockyards. These areas may also include non-native, ornamental varieties of

plants.

Cultivated grains/crop

Orchards, grain crops, and vineyards were observed in all the reservoirs. These include cultivar varieties of non-native plants.

Wetlands

Spikerush (*Eleocharis* sp.), and vernal pools are discussed here as mapped vegetated wetland series. Spikerush wetland was observed in the Sites, Colusa cell, and Newville sites. Vernal pools occur in all the reservoirs except Red Bank. Other wetlands and water, which occur in the reservoirs, but are not discussed here, include intermittent drainages, streams, and ponds.

Acreage estimates of mapped vegetation types were calculated in each reservoir (Table 2.1.; Figure 2.2).

Table 2.1. Acreage Estimates for the Dominant Vegetation Communities Mapped Within the Offstream Storage Reservoir Alternatives, 1999.

Vegetation[1]	**Acreage By Reservoir**				
	Sites	**Colusa Cell**	**Colusa Reservoir**[2]	**Thomes/ Newville**	**Red Bank**
Grassland	12,602	13,540	26,142	14,492	565
Woodland (oak)	923	20	943	1,839	899
Woodland (foothill pine)	0	0	0	0	2826
Chaparral	5	0	5	363	98
Riparian	52	37	89	64	73
Vegetated wetland	23	15	38	0	1
Cultivated grain	277	0	277	0	0
Vegetation Subtotal	13,882	13,612	27,494	16,758	4,462
Other	280	51	331	315	142
Total reservoir acreage	14,162	13,663	27,825	17,073	4,604

Notes: [1] Other classification refers to disturbed/developed acreage within the inundation elevations.
[2].Colusa Reservoir is a northward extention of the Sites reservoir which expands to include the Colusa cell acreage.

2.2. Sensitive Plants: Summary of Findings

There were no high priority plant species found in the Offstream Storage Reservoir alternatives during 1998-1999 field surveys. Six priority and 8 low priority species were found within the project inundation areas, with a collective total of 143 populations (Table 2.2.1).

2.2.1. Sites and Colusa Cell Reservoirs There were no high priority or priority species found in the Sites or Colusa cell alternatives. Ten total occurrences of four low priority plant species were identified at Sites reservoir compared with six total occurrences of the same four species in Colusa cell (Table 2.2.1.). Thirty percent of the species identified from Sites are non-native, compared to 27 percent in Colusa cell (Table 2.2.2). Although only approximately one-third of all the species identified for these sites are non-native, qualitatively these non-natives make up the dominant vegetative cover in the annual grassland.

2.2.2. Newville Reservoir Thirty-one total occurrences of 4 low priority species and 23 total occurrences of 5 priority species were identified in the Newville reservoir (Table 2.2.1.). North and south-facing shale slopes and heavy clay deposits are associated with several prioritized species in this reservoir. In comparison with Sites and the Colusa cell reservoir sites, only 24 percent of the Newville species are non-native, however; they constitute the dominant cover at this site also. Newville has the greatest vascular plant diversity and the greatest number of plant families (85), genera (259), and species (522) represented (Table 2.2.2.).

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Red Bank Reservoir Ten prioritized plant species and 73 total populations were found in this location; 39 priority species populations and 34 populations of low priority species (Table 2.2.1.). Although 21 percent of all species identified in Red Bank are non-native, at this site non-natives are not the dominant vegetation relative to cover. Native woodland species constitute the dominant vegetative cover (78 percent) at this site (Table 2.1.).

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Table 2.2.1. Summary of Prioritized Plant Species found in the Offstream Storage Reservoir project, 1998-1999.

Reservoir	Common Name (scientific name)[1]	Number of Occurrences[2]	Status[3] State/USFWS/ CNPS
RED BANK	fairy candelabra (*Androsace elongata* ssp.acuta)	1	– / – / List 4
	dimorphic snapdragon (*Antirrhinum subcordatum)*	23*	– / -- / 1B
	Jepson's milkvetch (*Astragalus rattanii* var. *jepsonianus*)	*8**	– / -- / 1B
	Stony Creek spurge (*Chamaesyce ocellata* ssp *rattanii)*	9	– / -- / List 4
	Brandegee's eriastrum (*Eriastrum brandegeae)*	3*	– / SC / 1B
	adobe lily (*Fritillaria pluriflora)*	5*	– / SC / 1B
	woolly meadowfoam *(Limnanthes floccosa* ssp. *floccosa*)	1	– / --/ List 4
	Jepson's navarretia (*Navarretia jepsonii)*	8	– / – / List 4
	Tehama navarretia (*Navarretia heterandra)*	11	– / -- / List 4
	sickle-fruit jewel-flower *(Streptanthus drepanoides*)	4	--/ – / List 4
THOMES-NEWVILLE	fairy candelabra (*Androsace elongata* ssp. acuta)	13	– / – / List 4
	dimorphic snapdragon *(Antirrhinum subcordatum*)	7*	– / -- / 1B
	Jepson's milk-vetch *(Astragalus rattanii* var. *jepsonianus)*	1*	– / -- / 1B
	Stony Creek spurge (*Chamaesyce ocellata* ssp *rattanii)*	7	– / -- / List 4
	adobe lily (*Fritillaria pluriflora)*	12*	– / SC / 1B
	hogwallow evax (*Hesperevax caulescens*)	4	– / -- / List 4
	Tehama dwarf flax (*Hesperolinon tehamense)*	2*	– / SC / 1B
	N.California black walnut (Juglans californica var. hindsii)	1*	– / SC / 1B
	Tehama navarretia (Navarretia heterandra)	7	– / -- / List 4
SITES	fairy candelabra (*Androsace elongata* ssp. acuta)	3	– / – / List 4
	hogwallow evax (*Hesperevax caulescens*)	3	– / -- / List 4
	hoary navarretia (*Navarretia eriocephala*)	1	– / -- / List 4
	Tehama navarretia (*Navarretia heterandra)*	3	– / -- / List 4
COLUSA CELL	fairy candelabra (*Androsace elongata* ssp. acuta)	2	– / – / List 4
	hogwallow evax (*Hesperevax caulescens*)	2	– / -- / List 4
	hoary navarretia (*Navarretia eriocephala*)	1	– / -- / List 4
	Tehama navarretia (*Navarretia heterandra)*	1	– / -- / List 4

Notes: [1] Nomenclature corresponds to Skinner and Pavlik 1994. [2] Occurrences are defined under CNPS 1999 guidelines as population findings separated by at least 0.25 miles;* = DWR Priority species. [3] USFWS 1998:SC (Species of Concern); Skinner and Pavlik 1994; CNPS IB; (Plants rare, threatened, or endangered in California and elsewhere); CNPS List 4 (Plants of limited distribution).

Table 2.2.2. Diversity of Vascular Plant Families, Genera, and Species by Reservoir, and Native and Non-native Species.

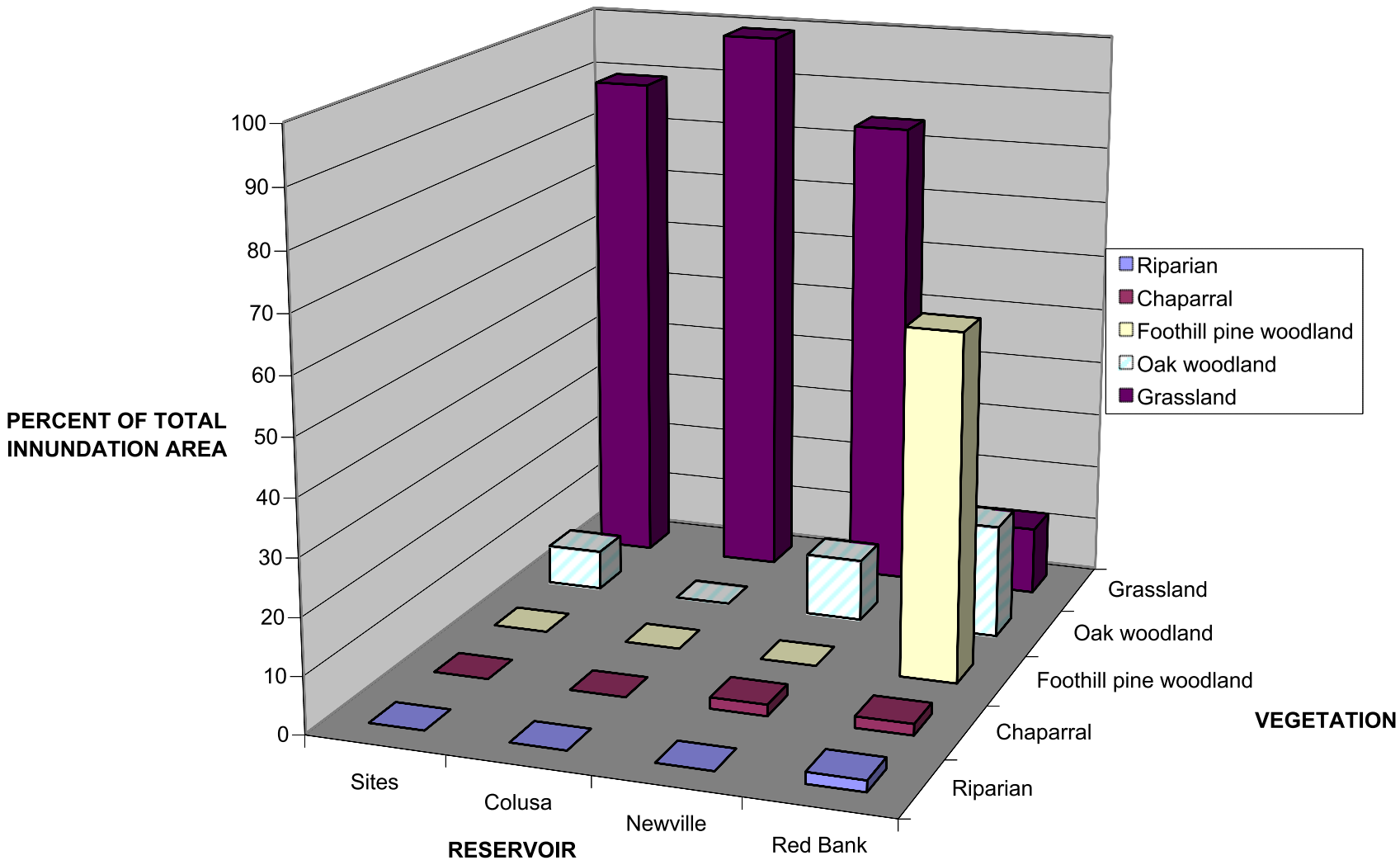
VASCULAR PLANT DIVERSITY	Sites	Colusa Cell	Thomes/ Newville	Red Bank
Number of families	62	58	85	76
Number of genera	219	193	259	229
Number of species	363	287	522	456
Native species	254	210	398	358
Nonnative species	109	77	124	98

2.2.4. Documentation Maps were prepared of the estimated survey coverage area and the level of survey effort (Figure 2.2.a-d). An inventory of identified vascular plants, including prioritized species, was compiled (Attachment 5). In addition, a plant voucher collection list was compiled for plants which were identified from preserved specimens (Attachment 6). Vouchers were placed in a preserved DWR collection. One hundred and fourty-three prioritized species population records were documented in the project areas (Attachment 7). Color photographs were taken of prioritized species, their habitat, and plant communities in the reservoir sites (Attachment 8).

2.3. DISCUSSION

Percent cover calculations from the aerial photographs and the plant community profile show that annual grassland is the dominant plant community in the Sites, Colusa cell, and Newville reservoir areas (Figure 2.1; attachment 4.a-e). Grassland vegetation at these sites is 89, 99, and 84 percent of the total cover, respectively. Microhabitats within these annual grasslands support unique native annual plant species; these are northern clay hardpan vernal pools, swales, and seasonal wetlands. While the annual grasslands are highly variable with respect to species composition, the dominant species are European forage grasses,

Figure II.1 OFFSTREAM STORAGE RESERVOIR INVESTIGATION:
Percent Dominant Vegetation by Reservoir Site



OFFSTREAM STORAGE RESERVOIR INVESTIGATION

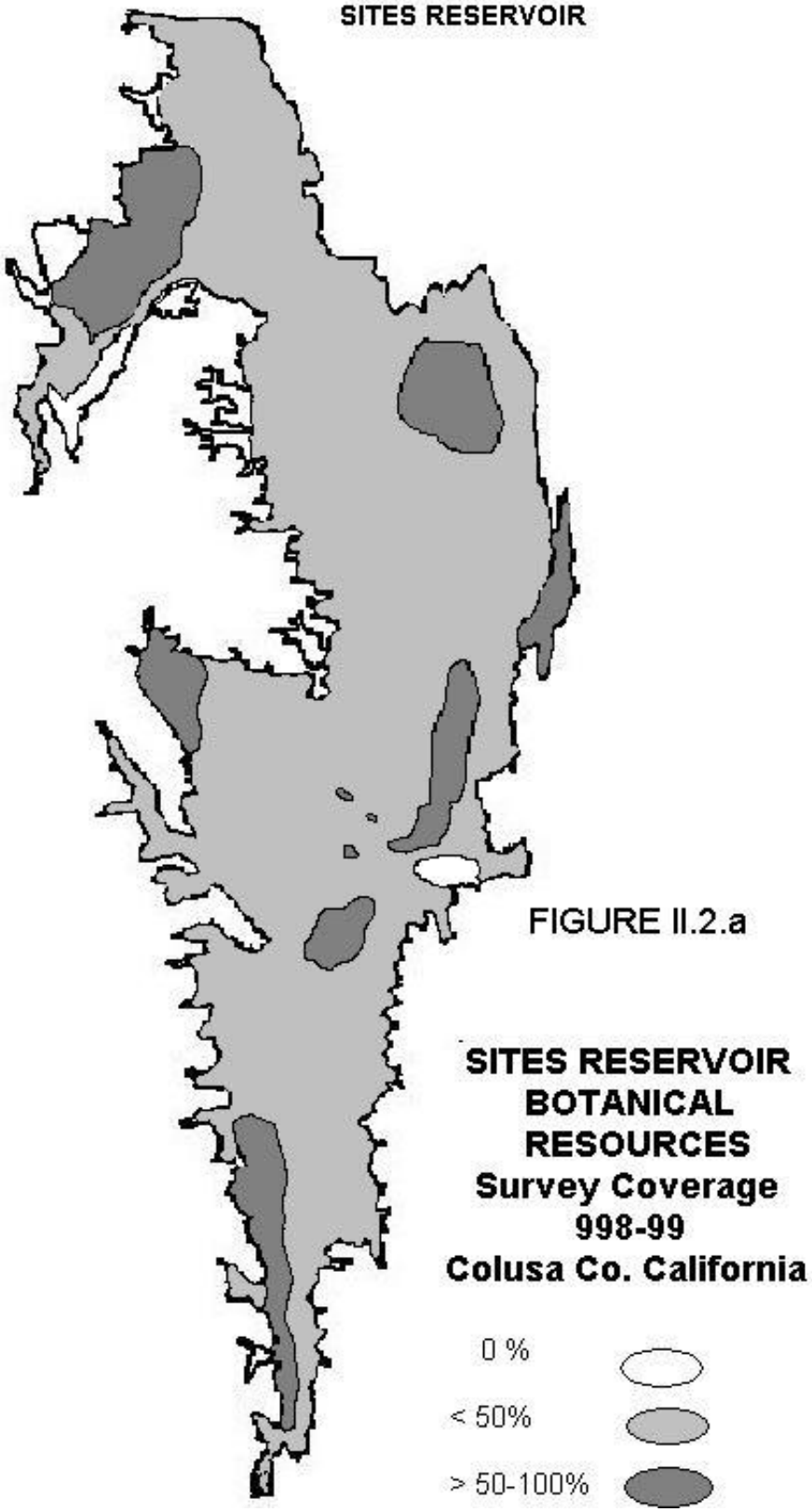


FIGURE II.2.a

OFFSTREAM STORAGE RESERVOIR INVESTIGATION
COLUSA CELL RESERVOIR

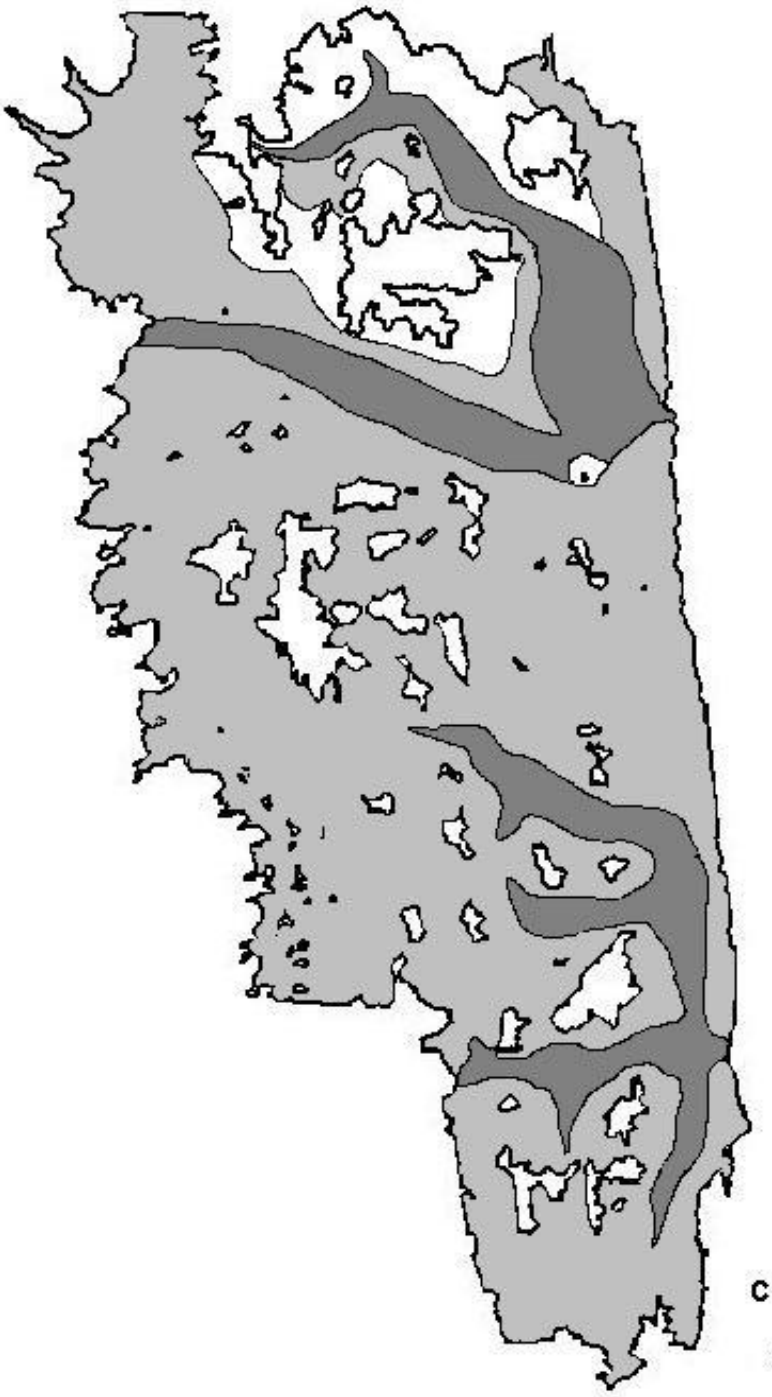


FIGURE II.2.b

BOTANICAL RESOURCES
SURVEY COVERAGE
1998-99
Colusa & Glenn Co. California

0%

<50%

50-100%

OFFSTREAM STORAGE RESERVOIR INVESTIGATION

NEWVILLE RESERVOIR

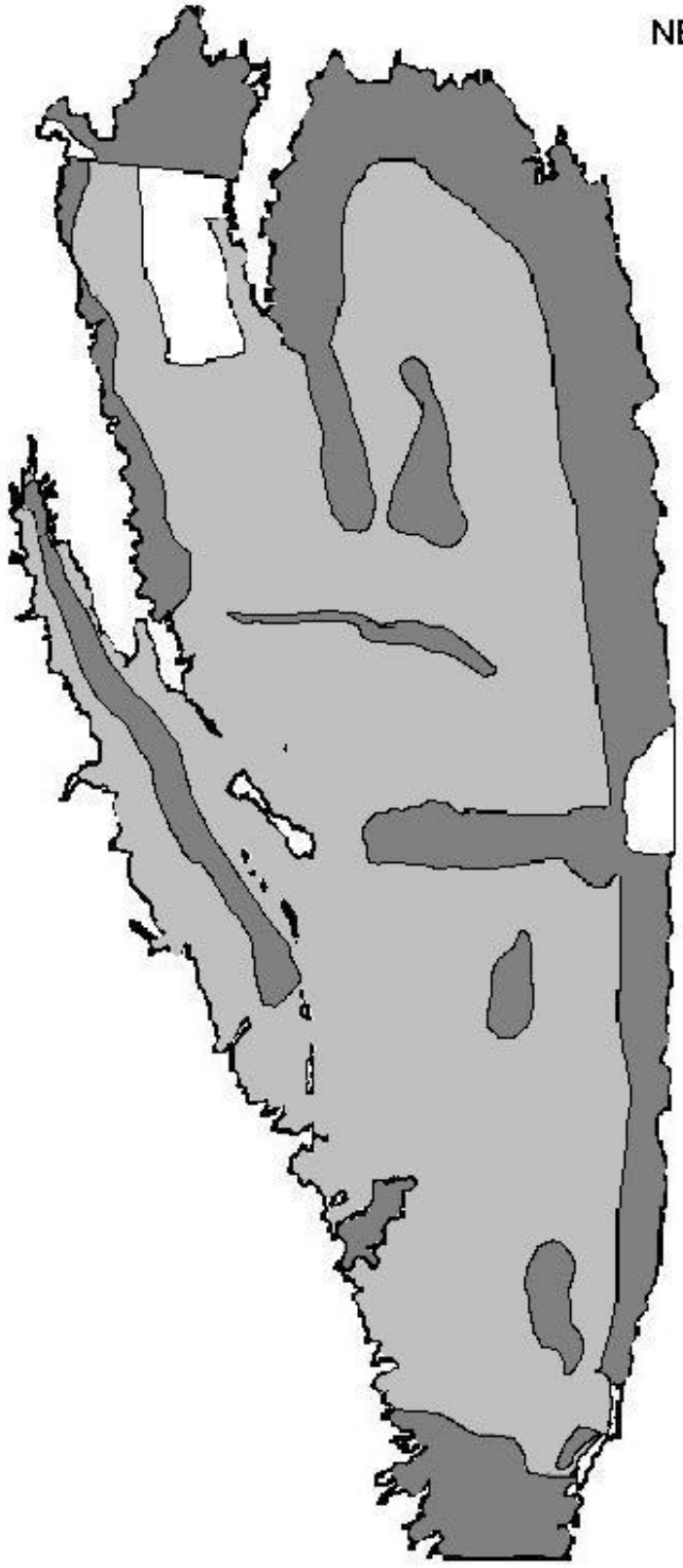


FIGURE II.2.c

BOTANICAL RESOURCES SURVEY COVERAGE 1998-99 Glenn & Tehama Co.

0 %

<50%

50-100%

OFFSTREAM STORAGE RESERVOIR INVESTIGATION
RED BANK RESERVOIR

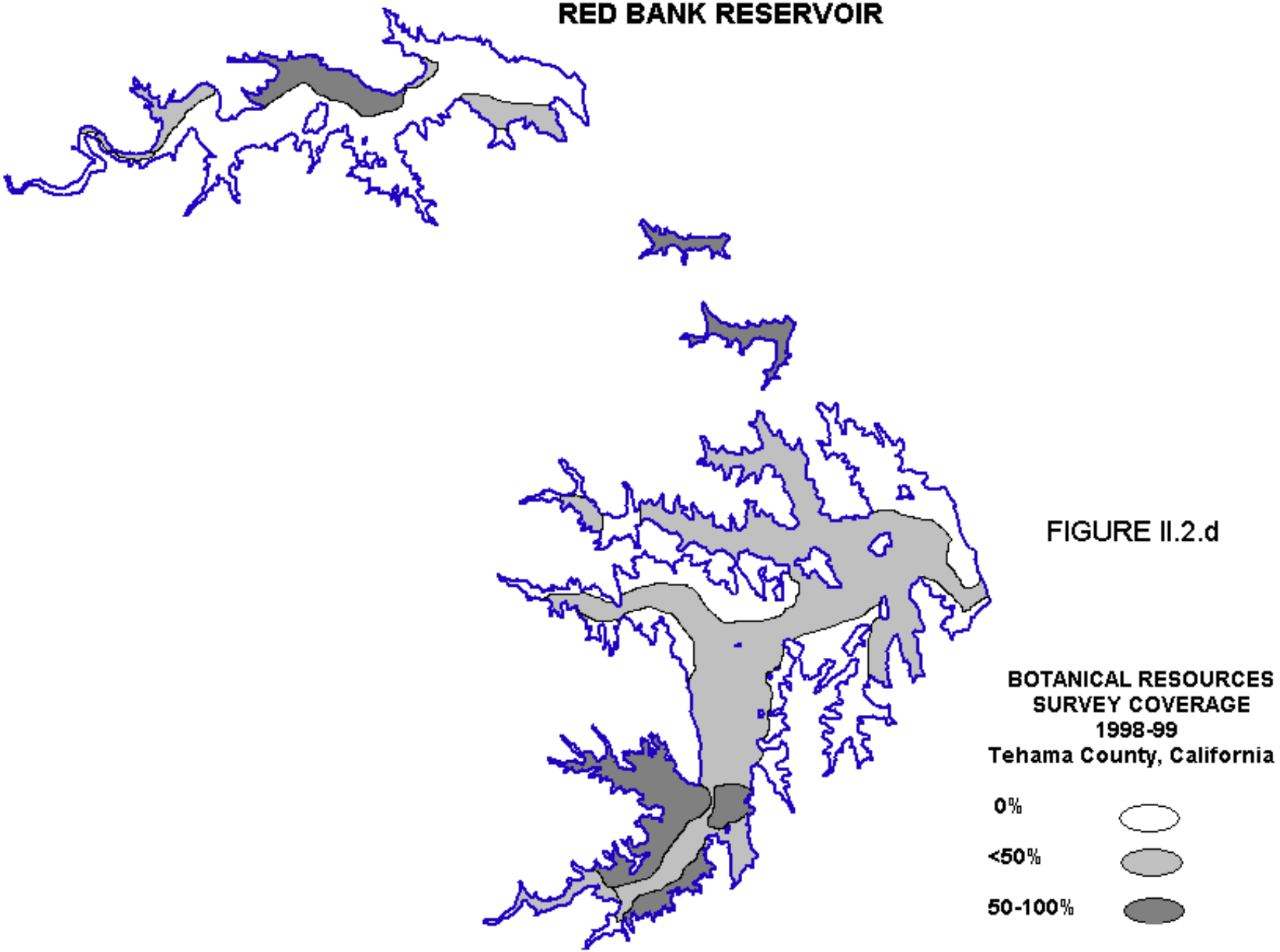


FIGURE II.2.d

such as Italian ryegrass (*Lolium* sp.), wild oats (*Avena* sp.), and the forb, yellow star thistle (*Centaurea solstitialis*).

2.3.1. Sites and Colusa Cell Reservoirs Sites and the Colusa cell receive less average annual rainfall than Newville and Red Bank, and have a predominance of annual grassland vegetation that is managed for high intensity cattle grazing. Less than 10 percent of the vegetation in these reservoirs is woodland (*Quercus* sp. or *Pinus sabiniana*), chaparral, riparian, or vegetated wetland (*Eleocharis* sp.). Only six percent (923 acres) of the total inundation area of the Sites Reservoir supports oak woodland. Some of the oak woodland includes scattered low density stands of valley oak (*Quercus lobata)* on high terrace floodplains adjacent to Funks, Grapevine, and Antelope Creeks. There are few seedlings and saplings in the existing valley oak stands, which consist of large mature and senescent trees. The blue oak stands, however, have a diverse age class representation. Oak age classes were not measured. Nine-hundred twenty-three acres of oak woodland would be lost at Sites, and 20 acres would be lost at the Colusa cell reservoir.

The Sites reservoir area and Colusa cell do not have shale soil or potential habitat for the plants associated with this soil type. However, approximately 65 percent (8,916 acres) of Sites inundation area is clay soils, and the Colusa cell is approximately 36 percent (4,950 acres) clay substrate. Three of the four prioritized plants species found in the reservoirs were on clay soil.

Approximately 5 acres of vernal pools occur in the Sites reservoir. Three acres of vernal pools occur in the Colusa cell. Although six of the potential high priority species are vernal pool endemics, the probability of finding them is low because of the existing land use conditions. Clay hardpan vernal pools and alkaline wetlands were variable in quality and species composition. Although several pools in the Sites reservoir support common vernal pool species, all of the vernal pools were grazed and no prioritized species were observed. The majority of the mapped clay substrates

support non-native annual vegetation.

Potential habitat for high priority and priority species exists in Sites and Colusa cell reservoirs, however, current management practices may not be compatible with supporting the prioritized species. Potential habitat includes vernal pools, swales and alkali wetlands, and valley and foothill grassland.

2.3.2. Newville Reservoir This site receives more average annual rainfall than the Sites and Colusa cell alternatives and has greater inherent topographic variability and soil conditions compatible with suitable habitat for priority and low priority species. The diversity of the vegetation communities, as well as clay and shale substrates at Newville, resulted in an increase in the total number of species and occurrences of prioritized species. Annual grassland, blue oak woodland (*Quercus douglasii*), valley oak woodland (*Quercus lobata*), mixed willow riparian (*Salix* spp.), and chaparral communities occur in the site.

Newville reservoir site supports valley and blue oak woodland vegetation over 11 percent (1,839 acres) of the inundation area. The valley oak stands are primarily along Upper Stony Creek at this site. The existing oak woodlands do not appear to be as heavily grazed as the Sites and Colusa cell woodlands. There are oak seedling and juvenile age classes in some areas, although this parameter was not quantified.

This reservoir supports more populations of priority and low priority species than Sites, Colusa cell, or Red Bank alternatives. It should be noted that the current land use practices are compatible with and sustain these prioritized plant populations. Roughly 7,000 acres of Lodo shale soil was mapped in this reservoir, but not all of this was potential habitat for the associated species. North and south-facing slopes, chaparral vegetation, and slopes with less than 50 percent vegetative cover were some of the other necessary parameters to support the shale-associated species. Although over 2,000 acres of clay soil were mapped, the observed prioritized species populations tended to occur only on the moderate north-facing slopes or flats. All clay and Lodo

shale soils were adequately surveyed.

Vernal pools and alkaline wetlands in the Newville reservoir area were variable in quality, ranging from 0 to 100 percent cover and moderate to extreme grazing effect. Twenty-three acres of vernal pools were mapped in the inundation zone. There were good quality vernal pools with representation of common vernal pool flora; however, all the pools were grazed. No high priority species were found in any of the vernal pool habitat.

2.3.3. Red Bank Reservoir The 4,600 acre Red Bank project area is dominated by native blue oak (*Quercus douglasii*), mixed oak (*Quercus* spp.), and foothill pine (*Pinus sabiniana*). Although oak woodlands represent approximately 20 percent (899 acres) of the project area, the total amount of woodland habitat including foothill pine woodland comprises 83 percent of vegetative cover. At this site, only 2 percent of the cover is chaparral scrub, and 12 percent (565 acres) is annual grassland. The grassland vegetation occurs on the high terrace floodplain of Red Bank Creek, and on several low hills (Attachment 4). Occasional native bunch grass (*Nassella* spp.) stands occur on moderate slopes under blue oak woodland.

The Red Bank alternative receives the most annual rainfall of the reservoir sites, has the most variable topography and vegetation, and moderate to light cattle grazing influence.

Several prioritized species were found on clay and Lodo shale soil. The 3,101 acres of mapped Lodo shale soil (67 percent) was not all potential habitat for the associated sensitive plant species. Prioritized species were found with additional microsite parameters, such as north- or south-facing aspect, moderate slope, less than 50 percent vegetative cover, or chaparral plant associates. Much of the Lodo shale soil was not suitable habitat for the prioritized species because these other microsite conditions were lacking.

Approximately 305 acres of clay soil was mapped but only three populations of a

clay-associated priority species were found. The Lodo shale and clay soil areas were adequately surveyed except where no access was allowed or where terrain or vegetation made it infeasible.

Potential habitat exists at this site for the chaparral, valley and foothill woodland, and valley and foothill grassland prioritized species. There was no vernal pool or alkaline wetland habitat observed in the Red Bank reservoir site.

2.3.4. Future Needs

Surveys will be needed in each reservoir alternative where property access was not allowed in 1998 and 1999. Secondary effect areas, or areas just around the reservoirs, which may experience environmental impacts related to the reservoir projects include power lines, road realignments, conveyance facilities, recreation areas, or mitigation lands. These areas will require rare plant and inventory surveys and vegetation community mapping. Continued surveys of vernal pools, swales, and alkaline wetlands in the reservoir inundation zones are recommended by CDFG if property access allows (Lis 1999; Horenstein 1999).

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