

APPENDIX C

PARSONS

**RECONNAISSANCE LEVEL
BIOLOGICAL SURVEY REPORT
DUPONT OAKLEY SITE
OAKLEY, CALIFORNIA**

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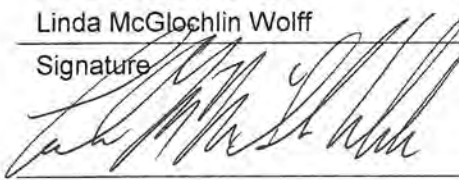
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ACRONYMS

Acronym	Definition / Description
CDFG	California Department of Fish and Game
CNDDDB	California Natural Diversity Database
CNPS	California Native Plant Society
DuPont	E. I. du Pont de Nemours and Company
ESA	Endangered Species Act
HASP	Health and Safety Plan
m	Meter
MSL	Mean sea level
NWR	National Wildlife Refuge
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

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1.0 INTRODUCTION

This report summarizes the results of a reconnaissance-level survey for federal- or state-listed special-status plant and animal species that may inhabit upland or wetland areas of the former E. I. du Pont de Nemours and Company (DuPont) manufacturing facilities in Oakley, California (DuPont Oakley Site). The purpose of the reconnaissance-level survey and this report is to provide DuPont with additional information about the special-status plant and animal species that can be factored into decisions regarding site remediation, future land use and potential conservation strategies. This information supplements previous site surveys for rare plants, birds and wetlands that have been conducted at the site (URS 2000a, 2000b, and 2002, and DuPont Corporate Remediation Group [CRG], 2006). The previous surveys were reviewed prior to conducting the reconnaissance-level survey. In addition, the California Natural Diversity Database (CNDDDB) was reviewed prior to the survey to identify special-status plant and animal species with previously recorded occurrences in the project vicinity.

Previous reports and the CNDDDB database indicated six special-status plant and animal species might occur on the DuPont Oakley Site given their historic range, their known occurrences, and site-specific conditions that potentially foster suitable habitat. The site affords three general types of ecological settings: dry, upland terrain; freshwater marsh; and open water. The six target species include:

- Antioch Dunes evening primrose (*Oenothera deltoides* ssp. *howellii*)
- Lange's metalmark butterfly (*Apodemia mormo langei*)
- California silvery legless lizard (*Anniella pulchra pulchra*)
- Giant garter snake (*Thamnophis gigas*)
- California black rail (*Laterallus jamaicensis*)
- Swainson's hawk (*Buteo swainsoni*)

The reconnaissance-level biological survey that was conducted from 26 to 29 April 2010 therefore focused on habitats within which these six species might occur on the site.

Of these six species, one was observed on site during the survey. Solitary Swainson's hawks were observed on two occasions in flight over the DuPont Oakley Site. However, the hawks did not exhibit foraging behavior during their fly-over and no nests or evidence of roosting were observed on site. In addition, four bird species designated by California Department of Fish and Game (CDFG) as 'species of special concern' – loggerhead shrike (*Lanius ludovicianus*), yellow warbler (*Dendroica petechia brewsteri*), northern harrier (*Circus cyaneus*), and salt marsh common yellowthroat warbler (*Geothlypis trichas sinuosa*) – were observed during the survey (although identification of the subspecies of warblers is not definitive).

This report describes the methods used to conduct the survey and the observations made during the survey. It includes an assessment of the likelihood that the six species would occur on the site based on whether or not each species and the presence or absence of suitable habitat each species requires were observed.

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2.0 SITE DESCRIPTION AND CONDITIONS

2.1 Physical Setting

The DuPont Oakley Site is located in the city of Oakley approximately 55 miles east of San Francisco and 60 miles southwest of Sacramento. The site is within the San Joaquin Delta area of Contra Costa County and is immediately adjacent to freshwater tidal portions of the San Joaquin River. The property is located within the United States Geological Survey (USGS) Antioch North and Jersey Island Quadrangles in Section 15, Township 2 North, Range 2 East. The site encompasses 378 acres and extends to the San Joaquin River and Lauritzen Yacht Harbor property on the north, Bridgehead Road on the west, a Southern Pacific railway line to the south, and the Big Break Marina, levee and marsh complex to the east (Figure 1).

The southwestern portion of the site is upland habitat that until recently was occupied by DuPont manufacturing facilities (now demolished). Prior to the property's purchase by DuPont in the 1950s, this area was farmed. The northeastern portion of the site is occupied by submerged, freshwater tidal wetlands – an area known as Little Break – that are part of the San Joaquin River Delta complex. In the early 1900s a levee separated Little Break from the San Joaquin River, but the levee was breached and the area reclaimed by the river prior to DuPont's purchase of the property in the 1950s. Remnants of the north and east levees remain and define the boundaries of Little Break.

USGS digital models place the water surface elevation of the San Joaquin River at the site effectively at mean sea level (MSL). Southward from the river's bank, the upland area of the DuPont Oakley Site rises to an elevation of approximately 5 meters above MSL. Due to the low water surface elevation at the site, the river is subject to tidal bore, and thus the water surface elevation rises and falls daily in Little Break. Water flows into and out of the Little Break wetlands through a large opening in the levee that defines the northern boundary of Little Break; the east levee that defines Little Break has no opening.

A man-made channel historically connected Little Break with the Central Slough, which is located in the northeastern portion of the upland area of the property. Tidal fluctuations were historically sufficient to push water up the channel and into Central Slough. The water's return flow outward was controlled by a one-way flapper valve, which is now nonfunctional. Beaver activity and siltation have permanently closed the flapper valve, and no tidal flows currently reach Central Slough. Little Break, Central Slough, and the channel connecting them are considered waters of the United States by the United States Army Corps of Engineers (USACE). They are therefore regulated under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. The jurisdictional wetlands encompass approximately 176 acres of the site (USACE, 2008). Several small (approximately 1.5 acres or less), non-jurisdictional wetlands are also present within portions of the upland area.

Most accessible upland areas of the site, except roadways, parking lots, former building foundations, and areas where hedgerow and trees occur, are regularly disked and mowed for fire prevention and weed control. During the site survey, a small tractor was observed dragging a gang disk in four separate parts of the site.

2.2 Historical Site Use

After DuPont acquired the property in the early 1950s, roadways, parking areas, manufacturing units, warehouse and trans-shipment buildings, and a short-line rail spur were constructed. All buildings and other facilities were placed on higher ground where soils are essentially sandy depositions from historical flow patterns of the San Joaquin River. Historical use of most of the site as farmland (orchards and field crops) prior to DuPont's purchase of the property and subsequent development of the site as an industrial facility resulted in the removal of virtually all native vegetation and plant communities from upland areas. The ecological community adapted to sandy river bank settings was thus entirely removed.

3.0 HEALTH AND SAFETY

Parsons used the existing site- and project-specific Health and Safety Plan (HASP) for this biological survey; the health and safety requirements of the HASP were implemented during fieldwork.

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4.0 METHODS

4.1 Previous Biological Surveys

A bird survey, a rare plant survey and two wetlands delineations have been conducted at the DuPont Oakley Site during the past 10 years (URS, 2000a, 2000b, 2002, and DuPont CRG, 2006). This subsection summarizes the information that was gathered during these surveys as it pertains to special-status plant and animal species and their habitats that may occur on the DuPont Oakley Site.

2000 Bird Survey

The 2000 bird survey was conducted on three days, largely after the fall migratory season (12 October, 9 and 17 November 2000). The survey covered three general locations: the tidal areas of Little Break and levees; Central Slough; and upland areas (URS, 2000b). At least one of the surveys was conducted at low tide (12 October). The memorandum written to report survey findings noted that, during this survey, intertidal mud or sand flats, if present, were not revealed. A copy of the bird survey memorandum is included in Appendix A.

A total of 44 bird species were observed as using the DuPont Oakley Site during the survey period. Among the observed bird species, 33 were present in Little Break, 10 were at Central Slough, and 17 were present in the grasslands and eucalyptus groves of upland areas. Two species noted during this survey are considered by CDFG as species of special concern: northern harrier (*Circus cyaneus*) and loggerhead shrike. While the survey results list loggerhead shrike among the common names of observed species, the report creates an ambiguity by identifying the shrike as *Lanius excubiter*, the scientific name for northern shrike – a species that very rarely appears anywhere in central California.

2002 Rare Plant Survey

Rare plant surveys of the Central Slough and Little Break areas were conducted on 8 and 23 May, 7 June, and 28 through 29 August 2001 (URS, 2002). U.S. Fish and Wildlife Service (USFWS) records and the CNDDDB were reviewed prior to the surveys to gather a list of potential federal- and state-listed species and special-status species. The surveys were conducted to coincide with the flowering period of most target species. Areas adjacent to the San Joaquin River and its sloughs were reportedly surveyed during low tide to facilitate observation of species that might be otherwise submerged in this intertidal zone. A copy of the rare plant survey memorandum is included in Appendix B.

Five special-status plant species were found during the survey, including the Suisun Marsh aster (*Symphotrichum lentum*)¹, northern California black walnut (*Juglans hindsii*)², Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*), Mason's lilaeopsis (*Lilaeopsis masonii*), and Delta mudwort (*Limosella subulata*). The identification of the species was confirmed by comparing specimens from the DuPont Oakley Site with known site occurrences of specimens at the Antioch Dunes National Wildlife Refuge (NWR), which is located along the San Joaquin River approximately two miles downstream of the

¹ The 2000 plant survey memorandum identifies the Suisun Marsh aster as *Aster lentus*; the currently accepted name for the species is *Symphotrichum lentum*.

² The 2000 plant survey memorandum identifies the northern California black walnut as *Juglans californica* var. *hindsii*; the currently accepted name for the species is *Juglans hindsii*.

DuPont Oakley Site. While the Suisun Marsh aster, Delta tule pea, Mason's lilaepsis and Delta mudwort are relatively common in the Sacramento-San Joaquin Delta, their limited distribution outside of the Delta has warranted their listing as special-status plant species. The current status of the four species is as follows:

- Mason's lilaepsis – California Native Plant Society (CNPS) 1B.1;³ state-listed as rare
- Suisun Marsh aster – CNPS 1B.2
- Delta tule pea – CNPS 1B.2
- Delta mudwort – CNPS 2.1

Within the San Joaquin-Sacramento Rivers Delta, these four species occur in the specific tide zones between the bulrushes (*Scirpus californicus*) and the mud flats below MSL. Mason's lilaepsis and Delta mudwort grow in the intertidal zone that becomes submerged during high tide. Suisun Marsh aster and Delta tule pea inhabit the middle and upper marsh zones. The remaining species, northern California black walnut, grows on upland soils. The memorandum notes that black walnut is often associated with former homesteads and that the observed specimen is unlikely to be a native occurrence because the site is not one of the few known native occurrences. Northern California black walnut is categorized as a CNPS 1B.1 species.

2000 Wetlands Delineation Technical Report

A survey of potential jurisdictional waters of the United States and wetlands was conducted in July and August 2000 (URS, 2000a). The wetland delineation report for the survey identifies plant species observed and summarizes the types of vegetation communities over the entire site. A total of approximately 80 plant species are identified in 15 vegetative communities. No special-status plant species, including any of those listed in the 2002 rare plant survey, are identified in the 2000 wetland delineation report. Antioch Dunes evening primrose, the only federal-listed plant species in the surrounding site areas, was not observed during this wetland survey (see Section 4.2).

2006 Wetlands Delineation Report

The 2006 wetlands delineation report presents the results of surveys for potential jurisdictional waters of the United States and wetlands conducted in June 2006 in accordance with standard procedures developed by the USACE (1987). Like the earlier 2000 wetland delineation report, the 2006 report identifies plant species observed during the survey and summarizes the types of vegetation communities over the entire site (DuPont CRG, 2006). A total of approximately 80 plant species are identified in 19 vegetative communities. No special-status plant species, including those listed in the 2002 rare plant survey, are identified in the 2006 wetland delineation report. Antioch Dunes evening primrose, the only federal-listed plant species in the surrounding site areas, was not observed during this wetland survey.

4.2 Literature Review

Prior to the on-site survey that is the subject of this report, Parsons conducted a search of the CNDDDB to determine if any sensitive species have been found within 7 kilometers

³ CNPS 1B.1 and 1B.2, rare, threatened, or endangered in California and elsewhere; CNPS 2.1, rare, threatened, or endangered in California but common elsewhere.

(km) or 4.3 miles of the DuPont facility. Six plant and animal species were identified in the CNDDDB search whose known ranges are near the DuPont Oakley Site and within about 5 meters (m) above the elevation of the San Joaquin River, including:

- Antioch Dunes evening primrose (*Oenothera deltoides* ssp. *howellii*)
- Lange's metalmark butterfly (*Apodemia mormo langei*)
- California silvery legless lizard (*Anniella pulchra pulchra*)
- Giant garter snake (*Thamnophis gigas*)
- California black rail (*Laterallus jamaicensis*)
- Swainson's hawk (*Buteo swainsoni*)

Records and maps showing the locations of species identified by the CNDDDB near the DuPont Oakley Site are provided in Appendices C and D. Summary information about these species was also gathered from nearby biological reserves. These include the Antioch Dunes NWR species and biological communities (two miles west of the site) on this part of the San Joaquin River bank. Two site visits were made to Antioch Dunes to see if known populations of Antioch Dunes evening primrose were in bloom at this reference population; the species was in full bloom. Additional information about waterfowl species and biotic communities was amassed from three other nearby natural reserves in the Delta: Sherman Island Waterfowl Management Area, Dow Wetlands Preserve, and Brown's Island Regional Shoreline preserve of species and communities.

4.3 Survey Methods

The reconnaissance-level biological survey was conducted from 26 to 29 April 2010 by the author, a qualified biologist and terrestrial ecologist. The purpose of the biological survey was to garner qualitative data about the presence or absence of the six target species and the overall suitability of habitat for each as may remain on the DuPont Oakley Site. The survey was not designed to yield quantitative data about each species nor to lead to a taxonomically complete inventory of species that occupy the former industrial facility.

The survey was made largely on foot (except for the levees of Little Break where a boat was necessary for access) and is, therefore, somewhat restricted to parts of the site accessible by walking. A garden rake with flexible metal tines served as the fundamental survey tool. The method involved raking out leaf litter, raking aside annual plants under the low branches of willow trees, under and behind palm fronds, and other similar possible cover, then watching for several seconds to see what moved away from the spot just raked. The rake and watch technique was applied roughly every 100 feet, depending on the immediate terrain and plant cover. The methods were used throughout the upland part of the site (Figure 2).

The outer sides of the levees that enclose the embayment known as Little Break were reached by a boat hired from the Lauritzen Yacht Harbor. Throughout, the author relied on careful examination of inaccessible areas by binoculars (10x). Survey methods differed for different species, and to an extent areas overlap because methods used are not mutually exclusive.

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5.0 SURVEY RESULTS

Survey results for each of the six species from the CNDDDB are summarized below. Other protected species that were observed during the surveys are also discussed.

5.1 Antioch Dunes Evening Primrose

The Antioch Dunes evening primrose is protected as endangered by both the federal Endangered Species Act (ESA) and the California ESA. As a reference comparison, the author observed this species in bloom on both 26 and 29 April 2010 at the Antioch Dunes NWR, approximately two miles west of the DuPont Oakley Site.

The Antioch Dunes evening primrose favors active dynamic sand dunes, and the survey therefore focused on areas of the site where such riverine soils historically accumulated and might still occur in isolated pockets. The evening primrose was not found anywhere in the upland portion of the DuPont Oakley Site. Agricultural and industrial uses have removed all traces of sand dune habitat from the uplands (Figure 2). A search for possible remnant habitat was conducted from a boat along the levees raised historically to hold back the river. Boat access occurred at four places along the levees of Little Break (Figure 3). At one of these four landings facing the San Joaquin River, there was very little soil present and no opening amongst other dense plant species where evening primroses could take root. Three accessible sites on the levee facing Big Break did lead to high solid ground that could be searched on foot. Antioch Dunes evening primrose discovered was not discovered anywhere in any of these three areas. Sand dunes were not evident anywhere on the levees.

While motoring close along the levee looking for openings in otherwise very thick emergent vegetation, the author scanned everything visible from the boat with 10x binoculars. While the primrose's growth habit, size of flowers, and their conspicuously bright white color would have been visible from the boat's vantage point, the species was not located along the levees. Therefore, the biological survey indicates that Antioch Dunes evening primrose does not now grow on the DuPont Oakley Site.

5.2 Lange's Metalmark Butterfly

Lange's metalmark butterfly is a federal-listed endangered species. The state of California does not accord it formal protected status. The butterfly occurs only where active dunes persist, with minimal growth of grasses and shrubby species which overcrowd the open spaces. The butterfly depends critically on buckwheats (*Eriogonum nudum* and *E. fasciculatum*) as host plants for caterpillars. Antioch Dunes NWR retains the essential habitat features, though the author did not see Lange's metalmark butterfly during either reference visit to the refuge.

While surveying by intermittent raking and walking, the author traversed all perceived kinds of terrain in the uplands, looking for butterflies disturbed by movement. Very few butterflies of any species were seen during the Parsons 2010 survey. Butterflies that were seen were all common species. No buckwheat plants were found anywhere during the 2010 survey probably because upland areas of the site are highly disturbed due to historical agricultural and industrial uses and contain no remnant dunes. Lack of those habitat features critical in the life cycle of Lange's metalmark butterfly therefore indicate it does not occur on the DuPont Oakley Site.

5.3 California Silvery Legless Lizard

The California silvery legless lizard has no formal protective status by either federal or state statute. However, the CDFG considers it a species of special concern. Legless lizards usually inhabit sandy or rocky areas with open space and native perennial shrubs, often frequenting the duff around such shrubs or small trees. To investigate these areas, the author raked away duff to search for legless lizards and also overturned all manner of site debris to see underneath. Most of the upland areas were being disked as part of site maintenance at the time of the survey, so greatest emphasis was given to transitional edges not subject to periodic disturbance as part of the maintenance activities. These areas were deemed as the most likely locations for silvery legless lizards to occupy should they be present on site.

No silvery legless lizards were encountered anywhere in the upland areas (Figure 2). At one location, a single lizard scat, consisting mostly of beetle exoskeletons was found. It did not resemble the scat of western fence lizards (*Sceloporus occidentalis*) or alligator lizards (*Elgaria coerulea*), which were both seen on site. The scat was too large to have been made by side-blotched lizards (*Uta stansburiana*), also found on site. It was not dissimilar from droppings left by western whiptail lizards (*Aspidoscelus tigris*). The author saw none of this species however, and cannot say with certainty which lizard species passed it.

Restoration of loose riverine sands and native perennials have helped promote a population of silvery legless lizards within the limits established as the Antioch Dunes NWR, but those conditions no longer exist on the DuPont Oakley Site. On-going site maintenance practices and the virtual absence from upland areas of shrubs indigenous to the lower part of the San Joaquin River Delta due to historical agricultural practices and industrial use both contribute to the absence of suitable habitat for the silvery legless lizard. In addition to a general lack of appropriate habitat, the presence of house cats (*Felis catus*) around the Administration Building and at the Lauritzen Yacht Harbor marina make it unlikely that legless lizards persist on site because the lizards move rather slowly in a snake-like manner and are thus easy prey for house cats. Therefore, it is highly unlikely that silvery legless lizards now inhabit any part of the DuPont Oakley Site.

5.4 Giant Garter Snake

The giant garter snake is a federal- and state-listed threatened species. It is an exceptionally aquatic garter snake, usually encountered in water-filled channels, ditches, and wet swales. Areas containing this type of habitat were surveyed for the snake.

The margins of Central Slough were searched by foot and raked and were scanned from several different vantages with 10x binoculars. Attempts to detect the snake were made both by listening for any nearby movements and by watching for snakes basking in sunlight. Where it was accessible, the Central Slough channel by which high-tide water from Little Break once flowed into Central Slough also was searched. Armenian blackberry (*Rubus armeniacus*; a.k.a Himalyan blackberry, *R. discolor* [Ceska, 1999]) has overgrown nearly all the lower parts of any channel on the site, including the Central Slough channel, making it virtually impossible to see into, let alone walk in, any water-filled channels or ditches. No species of snake was encountered around Central Slough.

The wetlands southwest of the Administration Building and immediately east of Bridgehead Road were searched by foot and raked. No evidence of any snakes was found around the margins of the small pond with emergent vegetation located in this area.

The margins around two rectangular ponds (West Basin ponds) near the northwest edge of the upland areas just east of the Lauritzen Yacht Harbor marina (Figure 2), were searched by the raking method. No sign of any snake species was found around these ponds.

No snakes of any species were seen at suitable wet features (Figure 2) on the site during the survey. The author observed no shed snake skins, none of the distinctive tracks made by snakes when they cross loose dirt or damp soil, and no scat indicative of snakes. However, given the large area encompassed by the open water and wetlands within Little Break, the survey could not yield meaningful information about the extensive freshwater marsh between the upland and the levees in this area. Survey data for giant garter snakes at the site are therefore not definitive. While suitable habitat for giant garter snake does not exist in the upland areas of the site, the upper edges of freshwater marsh at Little Break could be habitable.

Giant garter snakes have been found across the San Joaquin River on Sherman Island. The San Joaquin River would pose an insurmountable barrier to natural dispersal of giant garter snakes, and thus the chances of the species getting to the DuPont Oakley Site are very slight, in the author's opinion.

5.5 California Black Rail

The California black rail is a state-listed threatened bird species. Black rails nest in freshwater marshes on ground that is above the water line but still very damp and in wet grassy places adjacent to such marshlands. Nesting begins in February and continues through June.

The survey for rails consisted primarily of listening closely for rail-like calls audible from the small access roads leading to monitoring wells at the edges of the freshwater marsh at Little Break (Figure 2). In addition, the few areas where wet grassy places exist above the marsh lands west of Little Break were visually surveyed with 10x binoculars.

On one occasion on 27 April 2010, a call was heard from the road leading to monitoring wells MW-98, MW-115, and MW-99 and repeated once. The call came from southeast of the road. Comparisons later that evening of rail and heron calls available on various web sites lead the author to conclude the call more nearly resembled that of a green heron (*Butorides virescens*), muffled at a distance and heard through dense emergent vegetation, than a black rail. Green herons were later seen on at least three occasions flying over the freshwater marshlands of Little Break.

All margins of Central Slough were examined from many vantage points (Figure 2) using 10x binoculars. No rails were seen (or heard) in emergent vegetation growing around the slough.

Suitable habitat for California black rails exists at the DuPont Oakley Site where grassy areas gradually shift to the upper part of freshwater marsh. However, no black rails were seen or heard at the site during the April 2010 survey.

Records from refuges and wildlife sanctuaries in the Delta indicate that California black rails nest in these areas in the appropriate season and are present throughout the year

(USFWS, 1987). The conditions at Little Break would seem opportune for colonization by California black rail.

5.6 Swainson's Hawk

Swainson's hawk is a state-listed threatened species. It hunts over open grassy areas in the Delta region. Swainson's hawk will nest in large trees that afford an expansive view of surrounding lands.

All large trees were scrutinized with 10x binoculars from many different vantage points and from different distances. Gum trees (*Eucalyptus* sp.) compose nearly all large trees on the site. The author looked for evidence of large, shaggy nests high in the trees. Such hawk nests are distinctive in their size and, at this time of year, likely would have chicks in them.

No hawk nests were found in any trees on the DuPont Oakley Site. No areas under any particular group of trees showed extensive whitewash in one particular spot, as is usually the habit of large hawks. Once each on two separate days, solitary Swainson's hawks were seen at a considerable distance. Each was merely crossing over the site; neither showed any predilection to forage on the upland areas of the site.

5.7 Other Species Seen During Survey

Loggerhead shrike⁴ (*Lanius ludovicianus*) may have been observed during the 2000 bird survey but was not among the species identified by CNDDDB in the area. A nesting pair of loggerhead shrikes was observed on the site during the 2010 survey. The CDFG considers the loggerhead shrike a species of special concern. Two active loggerhead shrikes made their presence known near the south border of the site. While most bird species largely ignore people, bird behaviors change during nesting season when humans venture near a nest. The parents actively scold, probably in hopes of driving the human away. The shrikes observed during the survey were exhibiting this behavior. From a distance of about 130 feet, the distinctive sounds of baby birds could be heard above the parents' irritated scolding. The nest is located in a large coyote brush (*Baccharis pilularis*) growing immediately adjacent to the fence line on the south side of the site (Figure 4). It is unknown how many chicks the nest contained, as the author went no closer than within hearing range of baby bird sounds.

While listening for black rails from different spots on the three short dirt roads that lead from the upland to separate clusters of monitoring wells between the upland and bulrush marsh, many common yellowthroat warblers (*Geothlypis trichas*) were seen and heard. The warbler was abundant in the bulrushes west of Little Break. The subspecies named salt marsh common yellowthroat (*G. trichas sinuosa*) is regarded as a species of special concern by CDFG, and is known to occur in the lower part of the Delta and upper reaches of San Francisco Bay. However, this subspecies is indistinguishable from the more common species when in flight through bulrush stands, and its definitive identification requires measurements of body parts for comparison with museum specimens. In lieu of such morphological data, it is prudent to assume these birds at Little Break are in fact the salt marsh subspecies. The author did not see or hear them amongst bulrushes at Central Slough. In addition to common yellowthroats, yellow warblers (*Dendroica petechia*) were seen and heard in willow thickets adjacent to the central and eastern access roads (MWs 94-97, and 114; MWs 90-93, and 112,

⁴ The species list for the 2000 bird survey contained the common name "loggerhead shrike," but listed the scientific name for the northern shrike (*Lanius excubitor*).

respectively). In the author's experience, these willow stands appear well suited for nesting by yellow warblers, although no attempt to locate nests was made. As with salt marsh yellowthroat warblers, a subspecies of yellow warbler (*D. petechia brewsteri*) is also a species of special concern to CDFG. Morphometric data are required for certain identification of this subspecies, as well. As the subspecies of concern inhabits wide areas of California, including the region around the Delta, these yellow warblers could likely be the subspecies of concern, but the author can offer no definitive evidence one way or the other.

A female northern harrier (*Circus cyaneus*) was seen one time foraging over taller grasses on mesic soils southwest of Little Break. CDFG considers northern harriers a species of special concern.

Incidental survey data indicate that the DuPont Oakley Site affords nesting opportunities for several species of common birds. For example, while listening for black rail from near MW-90 MW-93, and MW-112, a spotted towhee (*Pipilo maculatus*) scolded for more than 10 minutes before the author shifted auditory focus and quickly heard towhee chicks in a nest concealed in willows not more than 33 feet away. An active mourning dove nest (*Zenaida macroura*), placed deliberately on the ground amongst annual, non-native grasses beneath gum trees in the south part of the site, was discovered while walking and raking. This location is on a raised berm largely inaccessible by the maintenance tractor and gang disk. The Migratory Bird Treaty Act of 1918 prohibits activities that would jeopardize eggs or chicks in nests. Therefore, a survey specifically for nesting bird species is recommended before any construction activities occur in the spring months to comply with the provisions of this biological conservation statute.

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6.0 DISCUSSION

6.1 Site-Specific Features

The upland portions of the DuPont Oakley Site contain a few isolated wetlands, open water bodies and other features (e.g., large trees) that could provide habitat for Swainson's hawk and California black rail. Two hawks were seen in flight over the DuPont Oakley Site on successive days during the survey. Selected areas along the levees above the San Joaquin River in Little Break were surveyed to the extent that they were accessible primarily for the Antioch Dunes evening primrose. It was not observed. There is some possibility that both giant garter snake and California black rail may be present at the site because it was not possible to thoroughly survey the entire area of suitable habitat (Little Break) for these two species. The following species were observed:

- Two CDFG avian species of special concern, yellow warbler and salt marsh common yellowthroat warbler, observed in the freshwater bulrush and willows marsh margin of Little Break (although identification of the subspecies of warblers is not definitive)
- Northern harrier seen foraging over taller grasses on mesic soils southwest of Little Break
- Loggerhead shrike found nesting close to the south edge of the site

6.2 Site Upkeep, Including Disking and Mowing

The biotic community that was historically present on the sandy riverine soils of the DuPont Oakley Site and which still exists in a small undeveloped pocket at the Antioch Dunes NWR were likely eliminated when the land at the site was converted to farmland in the early 1900s. The ongoing semi-annual turning of soil with a tractor-pulled disk and semi-annual mowing of land surfaces (for fire control purposes) together maintain the disturbed quality of the upland areas of the site and preclude re-establishment of a native plant community. In the absence of appropriate native plant species, most wildlife species would not successfully re-establish themselves on the upland areas.

6.3 Housecats

At least four house cats were observed during the survey in the vicinity of the Administration Building and West Basin ponds. These opportunistic predators would effectively eliminate most slow-moving reptiles, such as silvery legless lizards, from any portion of the western side of the site.

6.4 Ecotonal Areas on Site

The survey of upland parts of the site was largely restricted to the narrow boundaries between disked tracts and the edges of wetlands because an unmaintained vegetated buffer occurs in these areas between the upland and wetlands. This vegetated buffer contains native plants at progressively lower elevations that are closer to damp or wet soil. Habitat for sensitive reptiles does occur in these narrow strips surrounding the wetlands. These edges where upland areas give way to willow thickets were searched carefully, as this type of transitional community appears to be the only possible refuge for silvery legless lizards and giant garter snake on the site. Only reptiles (or their sign) without special status were observed in these areas.

6.5 Freshwater Marsh

Freshwater marsh occurs at Little Break and to a limited extent at Central Slough. The reconnaissance-level survey did not incorporate extensive observations from the marshlands of Little Break (beyond the survey for Antioch Dunes evening primrose) because time and limitations of available equipment and lack of direct access made a more thorough survey of that area infeasible. The author did observe the freshwater marsh along the banks and flats of Central Slough. Based on observations made with binoculars from many vantage points during the survey, the freshwater emergent plants of Central Slough appeared healthy. By late summer and early fall, however, Central Slough becomes less attractive to wildlife when the open water evaporates and the vegetation along the slough's banks begins to senesce. It is expected that this area would be largely uninhabited by freshwater wildlife during the late summer because most freshwater marsh species would shift to the mudflats and edges of marsh conditions around Little Break and other areas of the San Joaquin River Delta.

7.0 CONCLUSION

Six special-status plant and animal species were identified as having some potential to occur on the site given their historic range, their known occurrences and site-specific conditions, which include three general types of ecological settings: dry, upland terrain; freshwater marsh; and open water. The six target species include:

- Antioch Dunes evening primrose (*Oenothera deltoides* ssp. *howellii*)
- Lange's metalmark butterfly (*Apodemia mormo langei*)
- California silvery legless lizard (*Anniella pulchra pulchra*)
- Giant garter snake (*Thamnophis gigas*)
- California black rail (*Laterallus jamaicensis*)
- Swainson's hawk (*Buteo swainsoni*)

Of these six species, one was observed during the survey. Solitary Swainson's hawks were observed on two occasions in flight over the DuPont Oakley Site. However, the hawks did not exhibit foraging behavior during their fly-over and no nests or evidence of roosting were observed on site. In addition, four bird species designated by CDFG as species of special concern – the loggerhead shrike, yellow warbler, northern harrier, and salt marsh common yellowthroat warbler – were observed during the survey (although identification of the subspecies of warblers is not definitive).

Although the Antioch Dunes evening primrose was observed in bloom at the nearby Antioch Dunes NWR during the survey period, the plant was not observed on the DuPont Oakley Site and its favored soil substrate (active dynamic sand dunes) has been removed by past agricultural and industrial activities on the site. This species is unlikely to occur on site.

No specimens of Lange's metalmark butterfly were observed during the survey. Obligate host plants for its caterpillars (buckwheats) do not grow anywhere on the DuPont Oakley Site. This species is unlikely to occur on site.

No specimens or sign of silvery legless lizard were observed during the survey. Frequent disturbance of potential habitat and predation by house cats make it unlikely that this species is present on site.

No snakes of any species were seen at suitable wet features on the site during the survey. No shed snake skins, none of the distinctive tracks made by snakes when they cross loose dirt or damp soil, and no scat indicative of snakes were observed in the areas adjacent to wetlands in the upland areas of the site. Small, narrow stretches of unmaintained fringe around the Central Slough wetlands and the artificial channel between it and Little Break afford very marginal habitat for giant garter snake. Both marshy features are nearly completely isolated from Little Break, and nearly entirely surrounded by the disked and mowed upland. The disturbed nature of the land that encircles Central Slough and the channel provides for very low quality habitat overall, and the likelihood of giant garter snake inhabiting either of these places is very small. The upper edges of freshwater marsh at Little Break could provide habitat for giant garter snake but were not surveyed due to time and access constraints.

While no California black rails were seen or heard at the site during the 2010 survey, suitable habitat for rails exists at the site where grassy areas gradually shift to the upper part of freshwater marsh.

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