Biological Evaluation of Oxford Basin Marina del Rey, Los Angeles County, California

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EXECUTIVE SUMMARY

Completed in the early 1960s in conjunction with the creation of Marina del Rey, the Oxford Storm Water Retention Basin (hereafter "Oxford Basin" or the "Basin") was designed to receive storm runoff from the surrounding urban landscape and to release that water into Marina del Rey, thereby avoiding inundation of low-lying neighborhoods in the Venice area. During the past decade, various species of herons and egrets have become increasingly common as breeders in Marina del Rey's non-native landscaping, and a recent marina-wide review of biological resources (Hamilton and Cooper 2010) identified Oxford Basin as the most important foraging and roosting habitat in the local area for Great Egrets (*Ardea alba*), Snowy Egrets (*Egretta thula*), and Black-crowned Night-Herons (*Nycticorax nycticorax*).

The current biological evaluation is being undertaken as part of ongoing planning by the County Department of Public Works to increase the Basin's effectiveness as a flood control facility, to improve its ecological functions and values, and to increase the area's aesthetic and recreational values. This is the first in-depth investigation of Oxford Basin since 1980, and the first such effort undertaken by a multidisciplinary team of specialists:

- David E. Bramlet: Botany, Plant Community Descriptions and Mapping; Wetland Delineation.
- Emile Fiesler: Entomology.
- Camm C. Swift and Joel Mulder: Ichthyology/Estuarine Biology.
- Daniel S. Cooper and Robert A. Hamilton: Ornithology/Terrestrial Vertebrates.

As Oxford Basin serves a critical flood protection role for the surrounding community, all proposed enhancements and policies for the Basin must be consistent with the operation and maintenance needs of the Los Angeles County Flood Control District (LACFCD). Although the flood-control imperative imposes certain constraints upon any effort to increase the Basin's ecological values, this report identifies numerous conservation strategies that could potentially be undertaken within those constraints that would be expected to improve the Basin's ecological functions and values.

1.0 INTRODUCTION & PURPOSE

1.1 Introduction

The County of Los Angeles (County) commissioned Robert A. Hamilton, president of Hamilton Biological, Inc., to prepare this biological evaluation of the Oxford Storm Water Retention Basin (hereafter "Oxford Basin" or the "Basin"; Figures 1-1, 1-2). The Basin was built during the late 1950s and early 1960s. It was designed to receive storm runoff from the surrounding urban landscape and to release that water into Marina del Rey, thereby avoiding inundation of low-lying neighborhoods in the Venice area. In June 1973, the Board adopted an agreement providing for the Los Angeles County Flood Control District (LACFCD) to assume the responsibility for the operation and maintenance of Oxford Basin as a flood control facility.

Historical information on Oxford Basin (also known as "Parcel P") was provided in a Draft Environmental Impact Report prepared for a then-proposed Japanese garden at the Basin (County of Los Angeles 1976:2; see Attachment D, appendix):

> At the time the Oxford Drainage Basin was constructed, various naturalist organizations requested that the Board of Supervisors set aside this parcel as a wildlife sanctuary, particularly for birds. In January, 1963, the Board designated Parcel P as the Bird Conservation Area. Plant materials were selected and planted to afford nesting, roosting and feeding capabilities. A band of dense shrubbery was planted along the periphery fence to afford privacy and minimize the impact of nearby streets and activity areas. A few years later, about 1965, fill was imported to construct a mound along the northeasterly property line and the area replanted and irrigated in an effort to further improve the habitat.

The "Bird Conservation Area" designation was not based on any study or plan, or in conformance to an existing land-use policy, and was unaccompanied by a formal management plan or other guidelines for ecological restoration (such plans generally did not exist for these types of "urban habitat areas" during that era). The above-described efforts toward creating bird habitat are not consistent with modern understandings of conservation biology principles.

The most thorough study of Oxford Basin's ecology prior to the current study was completed in 1980 by D. W. Schreiber and C. F. Dock, and their report is reproduced here in the appendix to Attachment D. Those authors concluded:

> . . . this area is not important as habitat for wild birds in the Los Angeles basin. While it serves as "green belt" space and as an area for a limited but important number of people to enjoy seeing and enjoying domestic ducks, the area serves little or no purpose as a conservation area for a viable population of migratory or resident wild species. Because of its limited size and relative isolation, we believe that any efforts at habitat modification would have little or no effect at increasing the wild avian populations in the region.

> Certain modifications could make it more conducive for the domestic animals and as green space (Schreiber and Dock 1980:2).

They recommended two potential options for management of the Basin. Option 1, "Leave the area essentially unchanged," reflects a common line of thinking among biologists and land managers 30 years ago, when small parks and other wildlife habitat areas surrounded by urbanization were routinely considered to have little potential conservation value (unlike today, when such areas are more highly valued for the habitat values they can provide to adaptable native species in a region where nearly all natural habitats are developed or highly disturbed). Schreiber and Dock noted:

> The domestic waterfowl currently present in the area are of interest to many people who live in the surrounding community. These birds subsist largely on "handouts" from interested citizens who regularly visit the site. In this regard, the Bird Conservation Area is of some recreational value to the human community. A regular schedule of maintenance which would improve the aesthetic appeal of the area would undoubtedly be appreciated. This has been suggested by some of the local citizenry encountered during the study. In addition, stations might be created that would allow more efficient feeding of the birds and would allow better observation of the birds (Schreiber and Dock (1980:25).

It is impossible to know the exact circumstances that led these biologists to recommend the establishment of feeding stations for domestic waterfowl, but it may be that they were attempting to make the best of a situation in which a more costly, ambitious, and controversial habitat restoration alternative was unlikely to be pursued. Nevertheless, their report did include Option 2, which was recommended "if a substantial effort is to be made to improve the current Bird Conservation Area in terms of its use by wild birds . . ." Option 2 involved the following:

> 1) Clear the area of introduced vegetation and replant with native species. This would mean an attempt to essentially reestablish a coastal scrub community on the grounds of the Bird Conservation Area. Such a program would improve the aesthetic appeal of the conservation area and could have an important educational value to the human community if information concerning the vegetation were made available to the public. Signs could be erected providing the names of the plants and historical and ecological facts pertaining to the species and coastal scrub communities in general. Such restoration measures concerning the vegetation would be likely to attract larger numbers of migrating and wintering songbirds.
>
> 2) Remove the resident domestic waterfowl and gallinaceous birds that currently inhabit the area in large numbers. Such a move might lessen the competition for space and food resources and lead to an increase in the number of wild birds. Removing domestics would also decrease the degradation of ground cover currently seen at the area. Benefits of such action must, however, be weighed against potential costs. As previously mentioned, there is considerable interest in the resident waterfowl populations among local people, many of whom would be displeased by any efforts to eliminate these "pets." Removal of the chickens and other domestic fowl would probably not be opposed and should lead to an

> increase in ground cover which could improve the habitat for terrestrial migrants.
>
> 3) Increase the extent of available mudflat habitat. This would have the potential of increasing the number of shorebirds, gulls and terns using the Bird Conservation Area. Such change could be accomplished by grading the intertidal zone to create a more gradual shoreline around the pond. Any such effort would probably have to be accompanied by dredging of the deeper regions of the pond to maintain the potential water volume of the area for flood control purposes. An alternative, or additional step, would be to create a series of small mudflat islands within the pond itself. This could be preferable to the aforementioned approach, as it would provide greater isolation from human disturbance for any birds using this habitat, and might actually make them easier to observe by interested bird watchers.
>
> 4) Regulate water quality within the pond. Pollution levels within the pond should be monitored and controlled, and the variability of salinity should be regulated to permit further development of the invertebrate community of the mudflats. The invertebrates provide food for most of the shorebirds and some of the duck species found on the area.
>
> We must emphasize that the suggestions given above are a brief outline, and we are more than willing to discuss these factors further. However, we firmly believe that it is a real gamble whether or not this "Bird Conservation Area" can actually be improved as a wild bird habitat, no matter how much funds are expanded [*sic*]. No question exists that it can be improved as a "green belt" and as an area for people to enjoy the presence of and feeding of domestic ducks, but schemes to attract a large wild bird population probably will be fruitless.

Ultimately, the County chose to eliminate the domestic waterfowl and chickens, and to continue operating Oxford Basin as a flood control facility (without attempting to improve the area for human recreational use or as a habitat for native birds or other wildlife). As discussed herein, use of Oxford Basin by wild birds has shifted considerably during the past 30 years, with some species dropping out entirely and others becoming newly established. Although it is still fair to conclude, as Schreiber and Dock did, that the Basin does not provide wildlife habitat of regional importance, it is one of very few areas with open water, mudflat, and brackish marsh in the west Los Angeles area, and Oxford Basin has come to serve as an important foraging area for herons and egrets that now maintain sizable nesting colonies along Admiralty Way (Hamilton and Cooper 2010). In this respect, the Basin provides habitat of much greater value to native bird populations than had been envisioned by Schreiber and Dock three decades ago.

This is the first in-depth biological investigation of Oxford Basin since 1980, and the first such effort undertaken by a multidisciplinary team of specialists:

- David E. Bramlet: Botany, Plant Community Descriptions and Mapping; Wetland Delineation.
- Emile Fiesler: Entomology.

- Camm C. Swift and Joel Mulder: Ichthyology/Estuarine Biology.
- Daniel S. Cooper and Robert A. Hamilton: Ornithology/Terrestrial Vertebrates.

Attachments A–E to this report provide stand-alone technical reports representing each of these disciplines. Please refer to these reports for more detailed discussions of the biological resources present, or potentially present, at Oxford Basin. Attachment F provides Curricula Vitae for each of the specialists named above.

1.2 Purpose

This biological evaluation is being undertaken as part of ongoing planning by the County Department of Public Works to increase the Basin's effectiveness as a flood control facility, to improve its ecological functions and values, and to increase the area's aesthetic and recreational values. Oxford Basin serves a critical flood protection role for the surrounding community, and so all proposed enhancements and policies must be consistent with the operation and maintenance needs of the LACFCD. The primary purpose of this study was to develop a baseline inventory of the plant and wildlife resources present at Oxford Basin prior to developing final plans for the area's renovation. The surveys were therefore designed to sample at different times of year, as necessary to capture seasonal variation in plant and wildlife detectability.

The surveys were also designed to detect any listed or otherwise "special status" species that might be present. This summary report includes a section on the special status species observed at Oxford Basin, or that have moderate or high potential to occur there; the technical reports cover some additional special status species that are deemed absent from the site, or that have only low potential to occur there.

Finally, the specialists in each discipline identified restoration and conservation strategies that may be pursued (within the constraints posed by flood-control imperatives) to improve Oxford Basin's ecological functions and values.

Figure 1-1. Oxford Basin is located along the northern boundary of Marina del Rey, on the central coast of Los Angeles County. The Basin is surrounded by urban areas, but has relative proximity to a few natural areas. The site is approximately 1.5 miles northwest of the Ballona Wetlands, three miles northwest of the El Segundo Dunes remnant, west of Los Angeles International Airport, six miles southeast of the Santa Monica Mountains, and 13 miles north of the Palos Verdes Peninsula.

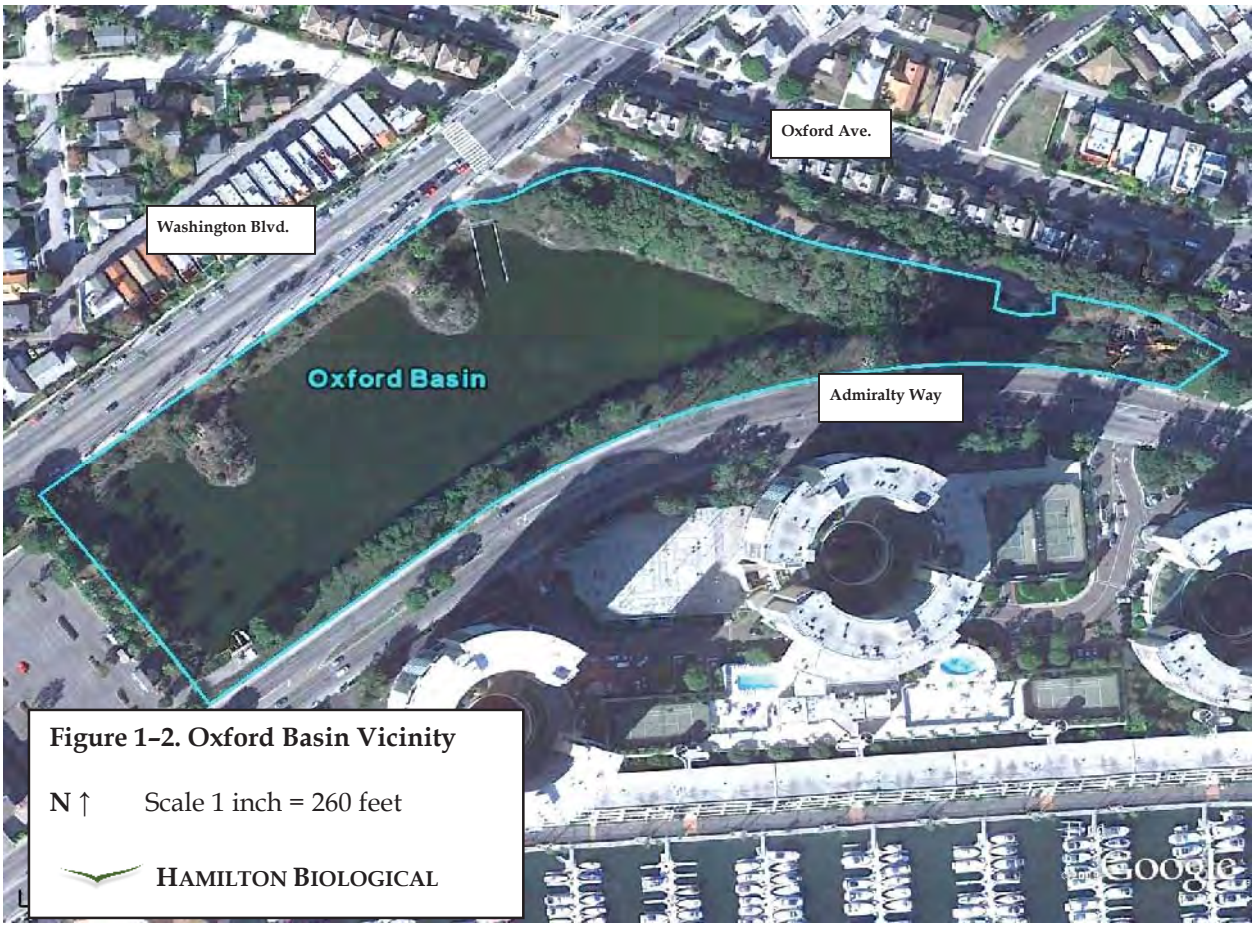


Figure 1–2. Oxford Basin Vicinity. The study area for this project, including the Basin and surrounding uplands within the blue line, covers approximately 9.0 acres. This area is bounded on the north by Washington Boulevard and Oxford Avenue and on the south by Admiralty Way. A County parking lot borders on the west and Yvonne B. Burke Park lies to the east.

2.0 METHODS

Each specialist was tasked with developing a scope of work necessary to adequately characterize the biological resources of Oxford Basin within their respective fields of study, and to search for any "special status" with potential to occur in the habitats present at the Basin. Another goal of the studies was to develop recommendations for ways to increase the Basin's ecological values (as feasible, given flood control requirements). As summarized in Table A, below, field work was completed between September 23, 2009, and June 12, 2010.

TABLE 2–1: SUMMARY OF FIELD SURVEYS

	Survey Type				
Date	Wetland Delineation	Botanical; Vegetation Mapping	Insects	Fish and Estuarine	Birds and Terrestrial Vertebrates
September 23, 2009			√		√
September 24, 2009			√		
October 23, 2009					√
November 20, 2009					√
December 23, 2009					√
January 12, 2010		√	√	√	√
February 24, 2010					√
March 25, 2010					√
March 29, 2010		√			
April 22, 2010		√			
April 27, 2010				√	√
May 7, 2010			√		
May 13, 2010		√			
May 24, 2010			√		
June 12, 2010	√				

For the study of birds and terrestrial vertebrates, Daniel S. Cooper developed the scope of work, served as lead investigator, and authored the technical report, with assistance from Robert A. Hamilton. During 2009 and 2010, Hamilton and Cooper collaborated on preparation of a Conservation and Management Plan for Marina del Rey (current draft dated September 16, 2010), a project that involved 19 visits to Oxford Basin during spring and summer 2009, primarily to document use of the Basin by foraging herons and egrets.

Please refer to the individual technical reports (Attachments A–E) for details of the dates, times, and methods used to conduct each survey undertaken by the different specialists.

3.0 SETTING

Figures 3–1 and 3–2, below, are representative views of Oxford Basin during periods of low and high water levels.

Figure 3–1. Photo showing Oxford Basin during a draw-down period on May 28, 2010. The view is to the southwest, from the northern shore, with the tide-gate visible on the far side of the open water. *Daniel S. Cooper.*

Figure 3–2. Photo showing Oxford Basin during a period of high water on September 23, 2009. The view is to the west, from the northern shore of the Basin. *Robert A. Hamilton*.

3.1 Overview

Oxford Basin, a relict of the larger Ballona/Venice marshes, was constructed in the late 1950s and early 1960s. The Basin is surrounded by elevated roadways, a parking lot, and trees along the roadway edges. Together, these extend upward to 10-15 m above the water level and shield the water's surface from wind action. Surrounding high rise

buildings and apartments along the northeast border also shelter the area from wind. Oxford Basin's purpose is to "receive storm runoff at such times as the state of the tide within the [Marina del Rey] harbor precluded its discharge causing inundation of the low-lying lands adjacent to the north section of the harbor" (County of Los Angeles 1976). The Basin's slopes were landscaped extensively with non-native trees and shrubs, and the area has never been formally managed for wildlife. By the early 1970s Oxford Basin had become a popular dumping ground for unwanted pets, including rabbits and chickens. This situation was partially remedied in the 1990s by the construction of a taller fence surrounding the site, making it more difficult to toss pets inside. Public access has since been restricted, and the area has been managed strictly for flood-control and water quality purposes.

3.2 Hydrology

Oxford Basin is fed by two (freshwater) storm drain inlets along the northeastern and southeastern ends, as well as a tidal gate at the western end that provides limited flushing. The Basin was not designed to drain completely. Water depths within the Basin fluctuate with natural tidal fluctuations in Marina del Rey, but the inflow and outflow to the Basin is controlled by a set of tide-gates at the southwestern corner of the Basin. The elevation of high tide is currently allowed to rise by no more than approximately 1.5 m (4.8 feet) above mean low water (Mike Stephenson, Los Angeles Department of Public Works, January 12, 2010, pers. comm. to Camm Swift). As a result, water depths in the Basin during 2009 and 2010 were greatest at or shortly after high tide, with a maximum depth of approximately 2 m (6.6 feet) in a localized area near the tide-gate. Depths are generally shallower throughout the remainder of the Basin. Approximately one-half of the Basin bottom substrate became exposed at low tide. The tide-gates are occasionally shut to prevent any tidal fluctuation, such as following low tides before predicted rain storms, in order to increase the Basin's capacity for storm runoff.

As of April 27, 2010, a low flow diversion structure had been installed at the north-eastern inlet. This structure consists of a concrete box that collects street runoff and periodically pumps it into the sewer system rather than allowing the potentially contaminated water to flow into the Basin. The structure includes overflow inlets to allow high storm flows to pass in the Basin.

Camm Swift and Joel Mulder (Entrix 2010; see Attachment C) described patterns of water movement in the Basin during their two field surveys:

> At high and low tides, very little flow was present in most of the Basin although some surge was observed coming through the mouth of the tide-gates. This caused a slow back and forth flow near the mouth and within about 30 m of either side of the gates, as well as some small wave action against the opposite shore. When the gates were opened with a strong difference in tidal levels between Oxford Basin and the Basin E of Marina del Rey, stronger flows occurred. During strong incoming flows on April 27, a circular

> current existed in the western portion of the Basin which caused masses of green algae to float in a broad circular track across the water surface. This current, however, is likely an infrequent event and typically the tidal flow would be much slower over the 4–6 hour duration between high and low tides. These observed currents were with one tide-gate open and possibly even stronger flows can occur under certain circumstances with both tide-gates open.

3.3 Soils

The Natural Resources Conservation Service did not prepare a published soil survey for this area of Los Angeles County, and no information on the soils in the study area was located in the literature review for this study. A study by Glenn Lukos Associates (2006) mentioned a published soil map for the region, but this could not be located in the material examined for this project.

Swift and Mulder (Entrix 2010; see Attachment C) described the soils in the inundated portion of the Basin as follows:

> Substrate within the Basin on both survey dates was predominately comprised of firm to soft mud/silt. Some small areas of fine sand existed near the tide gates where the strength of the inflowing and outflowing tidal currents presumably prevents deposition of finer substrate. The majority of the Basin banks were steep to gentle earthen slopes . . . At lower tides, bare, firm to soft mud/silt was exposed between the water's edge and the [lower edge of marsh vegetation]. The steeper south side of the Basin and eastern one third or so of the north side had approximately 1-3 m of bottom substrate exposed at low tide. The western two-thirds of the north side became much more exposed at low tide, with 5 to 20 m of gently sloping mudflats becoming exposed. Near the tide-gates and the eastern inlet, patches of concrete debris and boulders were present. A few logs were also observed floating in the water. These hard substrates supported barnacles and a small number of mussels existed near and on the tide-gate structures.

David Bramlet (2010b; see Attachment E) described the soils higher up, on the slopes above the Basin:

> Overall, the soils in the areas above the Basin tend to be sandy loams, commonly observed in southern California. The Basin itself has been filled with a silty clay and areas of loamy sands.
>
> The observations from the soil pits, conducted at each sample point, noted strong indicators of hydric soils within the tidal zone. These included extensive mottling, low chroma, stratified layers, and gleyed matrix within these soils. Depleted matrix conditions with oxidized rhizospheres or less extensive mottling, along with some low chroma soils, were observed in the soils found near the margin of the mean high tide elevation. Hydric soils were not found in areas that apparently are inundated by occasional very high tides or winter flooding events, as evidenced by drift deposits.

3.4 Plant Communities

As described by Bramlet (2010a; see Attachment A), Oxford Basin is generally characterized by open water, with wetland and upland communities occurring along the margins of this Basin. Plant communities/mapping units include open water, mud flats, saltmarsh, annual grassland, ornamental plantings and ruderal areas (Figures 3–3a, 3–3b). Plant species observed on the project site are specified in Attachment A.

OPEN WATER

Oxford Basin is characterized by open water that generally has a high salinity. This open water characteristically has blooms of dense mats of algae, but no vascular plants occur in the fluctuating waters of the Basin.

MUD FLATS

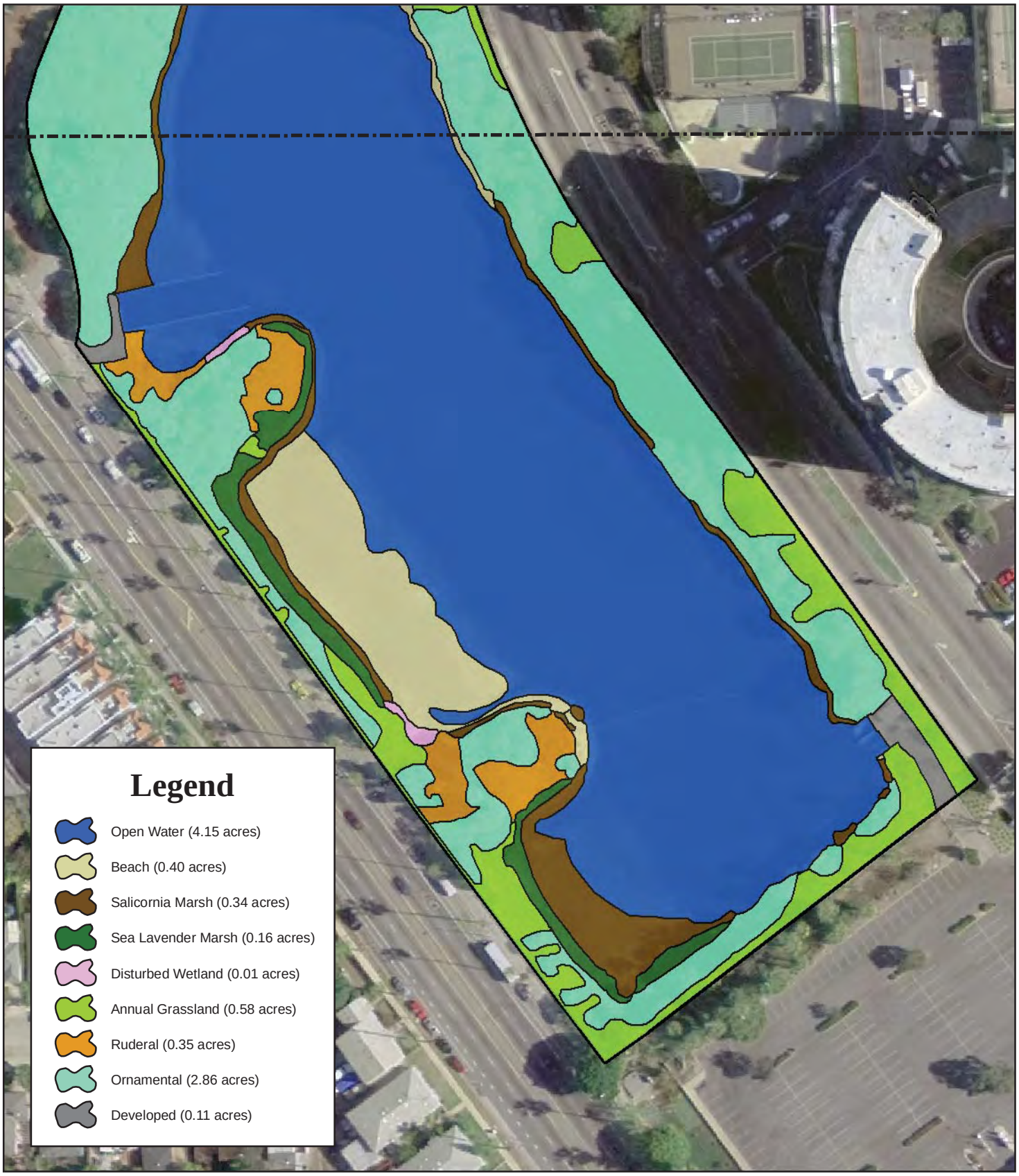
Mud flats are exposed during normal tidal fluctuations, and are generally unvegetated, although some of the higher areas do support common woody pickleweed (*Salicornia virginica*) during the summer months. The total area of exposed mud flats can fluctuate greatly depending on management actions. In particular, Oxford Basin can be pumped out in anticipation of winter storms, exposing additional areas within the Basin, and the Basin can be allowed to fill with storm waters when the tidal gates are closed, leaving no mud flats exposed.

BEACH

These unvegetated areas of Oxford Basin have a similar substrate to the mud flats but are dry and generally unvegetated, as they are inundated only by the highest tides or during heavy rainfall. However, some beach areas may develop stands of common woody pickleweed during the summer months.

SALICORNIA MARSH

Except near the inlet area at the east end, Oxford Basin supports a "ring" of saltmarsh-like vegetation along the upper tidal edge. This vegetation generally consists of a lower stratum dominated by common woody pickleweed; other commonly found species consisted of spearscale (*Atriplex prostrata*), rabbit's foot grass (*Polypogon monspeliensis*), saltmarsh sand spurry (*Spergularia marina*), toad rush (*Juncus bufonius*), alkali heliotrope (*Heliotropium curassavicum*), scarlet pimpernel (*Anagallis arvensis*), alkali weed (*Cressa truxillensis*), slender-leaved cat-tail (*Typha domingensis*), and lesser wart-cress (*Lepidium didymum*). This marsh area also included some localities with dense stands of spearscale, along with some scattered common woody pickleweed.



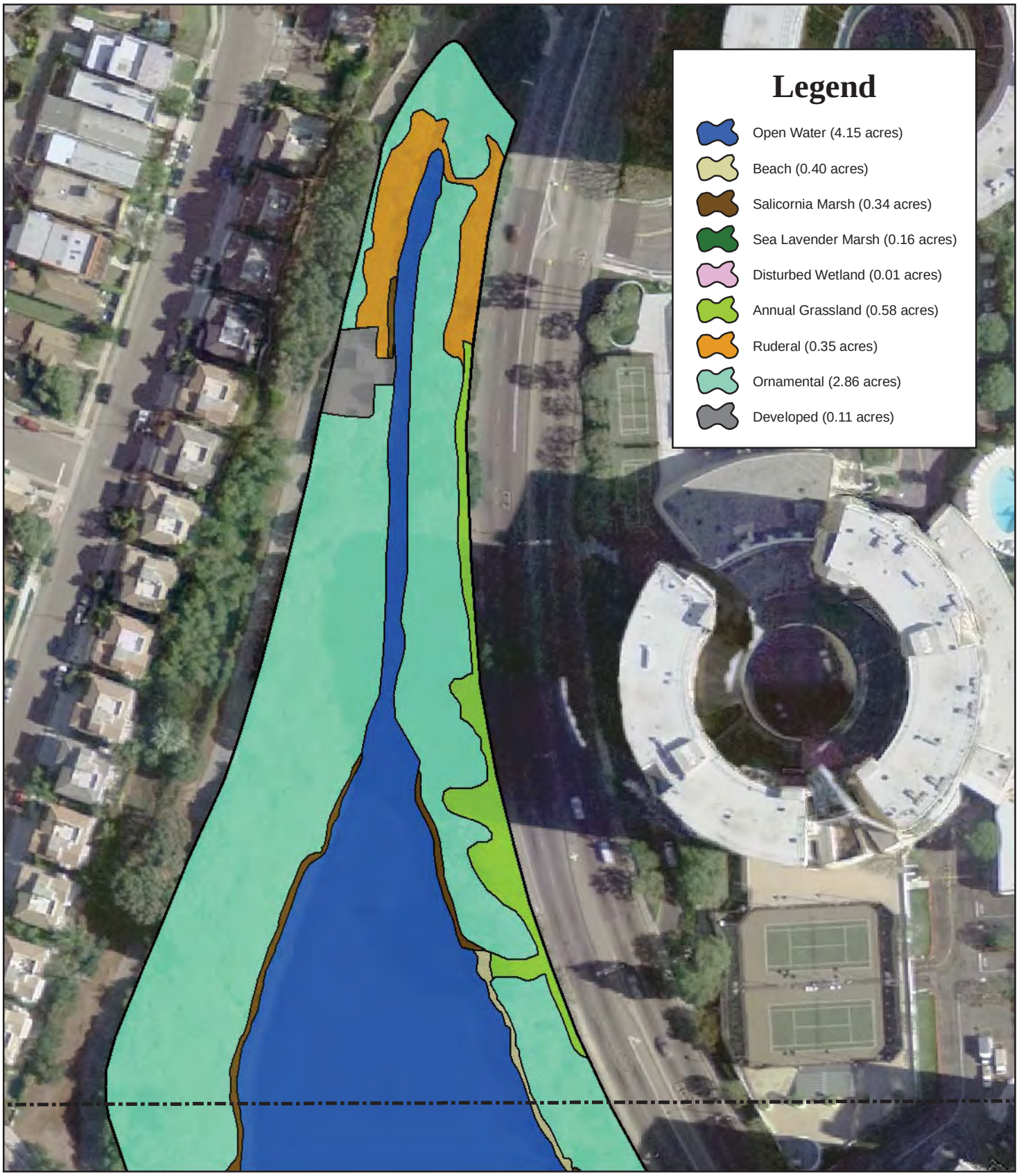
Site area: 8.94 acres

0 100 200 Feet

Figure 3-3a

Plant Communities

of the Oxford Basin



Site area: 8.94 acres

0 100 200 Feet

Figure 3-3b

Plant Communities

of the Oxford Basin

SEA LAVENDER MARSH

At Oxford Basin, this community occurs at a slightly higher elevation than does Salicornia Marsh. Sea Lavender Marsh is characterized by dense mounds of Perez's sea lavender (*Limonium perezii*), and on the south side of the Basin this species occurs together with tall limonium (*Limonium arborescens*). Other species found in this community include saltmarsh sand spurry, alkali heliotrope, curly dock (*Rumex crispus*), yellow sweet clover (*Melilotus indicus*), garden beet (*Beta vulgaris*), kikuyu grass (*Pennisetum clandestinum*), prickly lettuce (*Lactuca serriola*), and Australian saltbush (*Atriplex semibaccata*).

DISTURBED WETLAND

Some small areas along the margins of Oxford Basin that did not appear to be part of the saltmarsh community were classified as "disturbed wetland." These small areas consisted of stands of rabbit's foot grass, spearscale, Mexican tea (*Dysphania ambrosioides*), crab grass (*Digitaria sanguinalis*), Boccone's sand spurry (*Spergularia bocconei*), Mexican fan palm (*Washingtonia robusta*) seedlings, annual blue grass (*Poa annua*), common purslane (*Portulaca oleracea*), goose grass (*Eleusine indica*), lesser wart cress, and common stink grass (*Eragrostis cilianensis*).

ANNUAL GRASSLAND

Much of the upland areas around Oxford Basin consist of an annual grassland, often interspersed with ornamental shrubs and trees planted on the site. Commonly found grasses in this community consisted of ripgut brome (*Bromus diandrus*), slender wild oat (*Avena barbata*), red brome (*Bromus madritensis* ssp. *rubens*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), and panic veldt grass (*Ehrharta erecta*). Moist sites contained Bermuda grass (*Cynodon dactylon*), smilo grass (*Piptatherum miliaceum*), rabbit's foot grass, water bentgrass (*Agrostis viridis*), rescue grass (*Bromus catharticus*), and Dallis grass (*Paspalum dilatatum*). Commonly found forb species included summer mustard (*Hirschfeldia incana*), common horseweed (*Conyza canadensis*), London rocket (*Sisymbrium irio*), scarlet pimpernel, Mexican tea, lesser wart cress, Australian saltbush, cheese weed (*Malva parviflora*), white-stemmed filaree (*Erodium moschatum*), common sow thistle (*Sonchus oleraceus*), yellow sweet clover, nettle-leaved goosefoot (*Chenopodium murale*), red-stemmed filaree (*Erodium cicutarium*), and dwarf nettle (*Urtica urens*).

RUDERAL

Some parts of the study area contain plant species consistent with disturbed localities. Common species in the ruderal habitat consisted of foxtail barley, panic veldt grass, red brome, ripgut brome, Russian thistle (*Salsola tragus*), bull mallow (*Malva nicaeensis*),

London rocket, serrate-leaved saltbush (*Atriplex suberecta*), garden beet, summer mustard, bristly ox-tongue (*Picris echioides*), redscale (*Atriplex rosea*), puncture vine (*Tribulus terrestris*), petty spurge (*Euphorbia peplus*), dwarf nettle, four-leaved polycarp (*Polycarpon tetraphyllum*), kikuyu grass, black mustard (*Brassica nigra*), prickly lettuce, common purslane, castor bean (*Ricinus communis*), tree tobacco (*Nicotiana glauca*), pampas grass (*Cortaderia selloana*), and sweet fennel (*Foeniculum vulgare*).

ORNAMENTAL

Ornamental tree, shrub and vine plantings generally dominate the upland areas of the Oxford Basin study area. In the eastern part of the property a myoporum "woodland" is found, characterized by dense stands of myoporum (*Myoporum laetum*), along with some planted pines (*Pinus* sp.). Other areas of the site contained scattered stands of myoporum, with Mexican fan palm, melaleuca (*Melaleuca* sp.), Brazilian pepper tree (*Schinus terebinthifolius*), crimson bottle bush (*Melaleuca citrina*), Peruvian pepper tree (*Schinus molle*), Indian laurel fig (*Ficus microcarpa*), oleander (*Nerium oleander*), and grape vines (*Vitis* sp.). The south side of the Basin has a more open cover of myoporum and a greater diversity of ornamental plantings. Planted trees and shrubs in this locality included, pines, lemon gum (*Eucalyptus citriodora*), Catalina cherry (*Prunus lyonii*), creeping fig (*Ficus pumila*), Brazilian pepper tree, red gum (*Eucalyptus camaldulensis*), Canary Island palm (*Phoenix canariensis*). Shrubs consisted of crimson bottle bush, oleander, melaleuca, firethorn (*Pyracantha coccinea*), and dwarf myoporum (*Myoporum parvifolium*).

DEVELOPED

The pump stations, low flow diversion structure, paved roads and concrete inflow structures were mapped as developed.

3.5 Invertebrates

As described by Fiesler (2010; see Attachment B), a high-level baseline invertebrate survey was conducted that covered both upland and aquatic habitats at Oxford Basin.

The terrestrial fauna is dominated by non-native species, in particular the Argentine ant (*Linepithema humile*), which is discussed below. Another important non-native is the European paper wasp (*Polistes dominula*), which often outcompetes and then replaces native paper wasp species. Two out of three adult hemipteran species encountered are non-native to the United States. They are bagrada bug, also known as the painted bug (*Bagrada hilaris*), native to Africa, Southern Asia, and Southern Europe, and the torpedo bug (*Siphanta acuta*), native to Australia. The third adult hemipteran encountered was one exemplar of a plant bug (*Phytocoris* sp.), which is not commonly found in metropolitan Los Angeles. Some native species were also found in relative abundance, like the brine fly (*Ephydra niveiceps*), which is associated with aquatic habitats, and the

sinuous bee fly (*Hemipenthes sinuosa*), as well as the Jumping Spider (*Habronattus pyrithrix*) and the margined spurthroated grasshopper (*Melanoplus marginatus*). The latter two are discussed in the next section.

Aquatic invertebrates found in the Basin itself included the California mud snail (*Cerithidea californica*; Phylum Mollusca), found in large quantities below the high-tide line, some straight horsemussels (*Modiolus rectus*), and a few other small-to-microscopic bivalves in the benthos. In the Phylum Arthropoda, sampling revealed large numbers of gammarid amphipod (Suborder Gammaridae; Order Amphipoda) adults and immatures, as well as some copepods (Class Maxillopoda) and the remains of one shrimp, which is apparently an ocean (smooth) pink, also known as pink Shrimp (*Pandalus jorani*; Order Decapoda; Class Malacostraca). Dr. Fiesler also recorded relatively large numbers of nematodes (Phylum Nematoda), some flatworms (Phylum Platyhelminthes), rotifers (Phylum Rotifera), and seed shrimp (Phylum Ostracoda), and various microscopic protozoans (Phylum Protozoa), including some collared flagellates. Within each taxon, relatively little diversity was seen. The relatively low quantity of protozoa and other micro-invertebrates is due to the relatively large (1-mm) mesh size of the sieve that was used for sampling, and, to a lesser extent, the 500-micron mesh size of the net. The smaller organisms were still collected, however, as they were trapped in the algae collected by the net.

The surveys by Swift and Mulder (Entrix 2010; see Attachment C) also included some sampling for aquatic invertebrates. They found these organisms to be uncommon in January, except for the broken-backed shrimp (*Palaemon macrodatylus*), a non-native species from Asia. This species was very common in January but fewer than 10 were captured in April, when they were much less abundant. *P. macrodatylus* is well adapted for brackish or low salinity environments (Kuris et al. 2007). Possibly this species becomes abundant in Oxford Basin during the winter with the increase in freshwater influence that provides lower salinities and decreases the number of predatory fish present as well. The California horn shell (*Cerithidia californica*), a typical invertebrate in southern California estuaries, was uncommon; only a few were observed during both surveys despite the presence of considerable amounts of green algae, their primary food source, in April. Barnacles were present on hard substrates around most of the Basin while mussels seemed restricted to the area around the tide gates. Other than an abundance of amphipods observed under the intertidal rocks, the only other aquatic invertebrate noted was the bubble shell (*Bulla gouldiana*). Several of these were observed near the mouth of the tide gate among the algae being dislodged by the strong incoming tidal currents and several were also captured by seining. Surprisingly, no crabs were encountered during the surveys. Seining and baited traps frequently take species of marsh crabs when sampling coastal salt marshes and estuaries. These crabs also have long pelagic larval stages which should enable them to colonize Oxford Basin.

NARRATIVES FOR SELECTED INVERTEBRATE SPECIES

This section discusses certain species present at Oxford Basin considered to be of special interest.

The most unexpected species found at the site was a signal fly (Family Platystomatidae), which is a beetle-like insect with a long, aardvark like snout. This appears to represent a first state record for California. Robert Hamilton found one exemplar of this Signal Fly that apparently belongs in genus *Amphicnephes*. There are only three species of *Amphicnephes* described in the world, all from America, and the specimen is likely *Amphicnephes fasciola*, given (a) that its distribution range, which includes Arizona, is the closest to southern California of the three described species, and (b) the original description of *A. fasciola* (Coquillett 1900) matches reasonably well. On subsequent visits Dr. Fiesler surveyed the area where the specimen was seen but did not find another exemplar as potential voucher specimen. It is likely that the restricted public access has contributed to the survival of this rarity at Oxford Basin. Signal flies have no state or federal listing status, or other "special status," and the occurrence of one of these flies at Oxford Basin does not appear to represent a potential regulatory constraint to the proposed renovation project.

The only species of grasshopper found during the survey is the short-winged form of the margined spurthroated grasshopper (*Melanoplus marginatus*), which was fairly common at the site. This species is endemic to California. The southern edge of its range includes part of the Santa Monica Mountains (Capinera et al. 2005). The Oxford Basin population may therefore represent its southernmost recorded occurrence. It is not clear if it is found in the Ballona Region, as only "*Melanopus species?*" is listed in the 1980-1981 entomology survey report (Schreiber 1981), and there are a number of other *Melanoplus* species present in the Los Angeles Basin. These grasshoppers have difficulty dispersing to colonize new areas due to their short wings, which render them incapable of sustained flight. Their local gene pool is therefore in danger of becoming impoverished.

The jumping spider (Family Salticidae) most often encountered during the survey is *Habronattus pyrrithrix*. This a common spider of the Los Angeles area, whose prime habitat includes wetlands. There seems to be a healthy population of these small jumping spiders at the site.

A good-sized population of small, gray-and-black spider wasps (*Aporinellus* sp.) was present at the Basin. Despite a cosmopolitan distribution across the United States and beyond, they are uncommonly found in the Los Angeles metropolitan area. Their main prey is Jumping Spiders (see previous species account), which are food for their offspring. This renders these spider wasps secondary predators in the Oxford Basin ecosystem.

The non-native Argentine ant (*Linepithema humile*) is abundant on the site, across much of Los Angeles County, and far beyond. It is a non-native species that outcompetes native ant species and other invertebrates. In Los Angeles County, Argentine Ants have decimated the native California harvester ant (*Pogonomyrmex californicus*) and hence, indirectly their predator, the coast horned lizard (*Phrynosoma blainvillii*), which primarily feeds on native ant species like the California harvester ant. No native ants were found at the site.

DISCUSSION

The predominantly non-native vegetation at the Basin constitutes a degraded fundament for terrestrial faunal ecosystem, and the native and non-native terrestrial invertebrate fauna consists, for the most part, of species typically found in urban environments. Despite the relative abundance of non-native plant and invertebrate species, the ecosystem is functional for terrestrial invertebrates, and includes primary consumers as well as primary predators (e.g., spiders) and secondary predators (e.g., spider wasps).

The broad variety of aquatic invertebrates found at Oxford Basin, as well as the overall abundance of amphipods, indicate the relative health of the Basin's water, which provides ample feeding grounds for various wildlife. In specific, gammarid amphipods are a prime food source for fish and birds (McCurdy et al. 2005, Schneider 1981). They also have a high sensitivity to environmental changes (Conlan 1994, Zajac et al. 2003), and monitoring their abundance can provide one useful measure of the quality of the ecosystem.

3.6 Fish and Estuarine Biology

Camm C. Swift and Joel Mulder of Entrix (2010; see Attachment C) evaluated this aspect of the Basin's biology, as summarized here.

SALINITY MEASUREMENTS AND TURBIDITY

On January 12, 2010 the salinity at the surface at two sites in the lower Basin ranged between 15–18 parts per thousand (‰), and salinity at the inflow at the east inlet was 3 ‰. The water temperature ranged from 15-18° Celsius (C) at several locations in the Basin.

On April 27, 2010 several salinity measurements throughout the Basin, including at the eastern inlet, ranged from 33–34 ‰. Water temperatures were 17-18° C. During both surveys the water was moderately turbid; estimated visibility was approximately 1 m.

ALGAE

During the first survey on January 12, 2010, no aquatic vegetation was observed in the Basin. During the second survey, on April 27, 2010, filamentous green algae (possibly *Enteromorpha* sp.) were present along 50–80% of the wetted margins at low tide. Approximately 10% of the Basin's surface had floating mats of this same algae present.

FISH

Attachment C provides a table showing the numbers of each species trapped, seined, and observed during each survey. A total of 14 seine hauls around the perimeter of the Basin on January 12, 2010 captured hundreds of mosquitofish (*Gambusia affinis*) and one or two small juvenile shadow gobies (*Quietula y-cauda*) just west of the tide gates. In addition one large longjaw mudsucker (*Gillichthys mirabilis*) was observed in the rocks near the upper end but was not captured. The seining (5 hauls) and trapping on April 27, 2010 captured large numbers of native gobies, such as arrow gobies (*Clevelandia ios*) and cheekspot gobies (*Ilypnus gilberti*). Also captured were a small number of native shadow gobies and longjaw mudsuckers. Topsmelt (*Atherinops affinis*) were abundant and hundreds were observed and captured ranging in size from small juveniles to adults (up to about 15 centimeters total length). In addition a few small, juvenile, non-native, yellowfin gobies (*Acanthogobius flavimanus*) were taken. The majority of fish were captured by seining rather than in the traps. Fish were found to be relatively scarce as distance form the tide-gates increased, with the exception of mosquitofish. For this reason, seining during the second survey was focused around the tide-gate. During both surveys, the majority of the Basin was observed 1–10 m from shore and fishes were rarely detected with the exception of the abundant mosquitofish in January.

The species captured during the surveys are typical of coastal estuaries of southern California and indicate that Oxford Basin contains habitat that can support estuarine species for at least part of the year. The results of the January survey suggest the Basin supported very few estuarine fish in January. Mosquitofish were present in the tens of thousands while only two or three larval or small juvenile shadow gobies were captured near the tide-gate where they had apparently recently arrived and one large mudsucker was observed. By the April 27, 2010 survey, large numbers of gobies were detected. These were comprised of four native and one non-native species, all of which are typical of coastal estuaries in southern California. In addition, large numbers of topsmelt were present and only a few mosquitofish were captured. Fish were encountered both in seine hauls near the mouth and in traps set around the perimeter of the Basin indicating fish were dispersed throughout the Basin in late April. However, fish were most abundant near the tide gates. It is likely that the difference in fish abundance between the two surveys was due to the changes in freshwater influence and salinity in the Basin. In January, when freshwater input from numerous winter storm events had presumably repeatedly washed out the Basin, salinity in the Basin ranged from almost fresh to approximately half that of seawater. The salinity was

considerably higher and at near seawater salinities in April, allowing colonization of the Basin by estuarine species dependent on higher salinity.

Also of interest are the species not encountered in the Basin during the surveys, but which would be expected to occur in southern California estuarine systems at this time of year. Because these species are typically very abundant following the springtime breeding periods, they are frequently easy to detect and would likely have been encountered if present in Oxford Basin. These species include staghorn sculpin (*Leptocottus armatus*), California killifish (*Fundulus parvipinnis*), diamond turbot (*Pleuronichthys guttatus*), bay anchovy (*Anchoa delicatissima*), deepbody anchovy (*A. compressa*), bay pipefish (*Syngnathus leptorhynchus*), barred pipefish (*S. auliscus*), California halibut (*Paralichthys californicus*), striped mullet (*Mugil cephalus*), and shiner perch (*Cymatogaster aggregata*). A few other species that are less common or are more prevalent in larger estuaries but which might be expected to occur in the Basin include bay blenny (*Hypsoblennius gentilis*), spotted sand bass (*Paralabrax maculofasciatus*), and several species of elasmobranchs (sharks and rays). Many of these are species are known to occur in adjacent Marina del Rey.

Most of the estuarine species detected during the two surveys in Oxford Basin are pelagic midwater species (such as topsmelt) or have larvae that are pelagic in the water column for a few weeks (such as the goby species encountered). Other species that could be expected in Oxford Basin that produce pelagic larvae include anchovies, staghorn sculpin, diamond turbot, striped mullet, and California halibut. The larvae of these species typically arrive in estuaries in late winter and spring. Because these larvae colonize estuaries by being swept in by water currents, Oxford Basin should have the potential to be colonized by these species.

Fish species that do not have a pelagic larval phase, as well as adult fish of any estuarine species, would only be able to colonize Oxford Basin by swimming in through the subterranean passageway and tide-gate system that connects Oxford Basin to Basin E in Marina del Rey. This connection is at least 100 m long and is unlit. It is unknown if this connection would present a barrier or deterrent to passage of fish into the Basin. County workers present at Oxford Basin on January 12 mentioned having observed "sting rays" in Oxford Basin in the past, and several other species known from Marina del Rey (Allen et al. 2006) certainly have the potential to invade. The available composition of fish species available to colonize Oxford Basin is probably largely determined by the community present in Basin E of Marina del Rey. The fauna of Marina del Rey has been studied for over 30 years and is well known to fluctuate considerably due to periodic fish kills in the summer when the lack of circulation and excess nutrients combines to lower oxygen concentrations. These effects are most extreme in the uppermost reaches of the harbor, such as at Oxford Basin or Basin E (Aquatic BioAssay and Consulting 2009). Thus, the marina may not consistently be a reliable source of fish colonization into Oxford Basin.

One species of fish not encountered in the Basin but which is extremely common in other parts of the Ballona Wetlands and Marina del Rey is the California killifish. California killifish lay large eggs on hard substrates or vegetation and the young hatch out at an advanced stage as small juveniles with little or no pelagic or drifting dispersal phase. Therefore, California killifish may be limited in their ability to colonize Oxford Basin since it does not have a pelagic phase and may not occur close enough for adults to disperse into the Basin. It is possible that the habitat between the nearest known population at Mother's Beach in the marina may be in inhospitable to killifish thereby limiting their dispersal. The long, dark passage from the tide-gates to Basin E may also deter them. In addition, Basin E has deep water (2 or more meters deep) with vertical concrete walls which may not be conducive to movement of the California killifish. The presence of larger predators in deep-water areas might also prevent significant migration through the marina and Basin E. It is possible that if California killifish were introduced into Oxford Basin they would succeed in the area since the habitat appears appropriate for them. California killifish typically inhabit gently sloping, sandy, beaches and tidal sloughs. They often inhabit vegetated margins of salt marshes and adjoining shallow marine waters and are tolerant of fresh water (Moyle 2002). They are a prevalent part of the fish fauna of most southern California tidal salt marshes, bays and estuaries and would be a valuable addition to Oxford Basin.

Two other species which lack pelagic life stages, which were not encountered in Oxford Basin, and which are common in other parts of Ballona Wetlands are pipefish and shiner perch. Pipefish reproduce through male brooding of large eggs and the young juveniles are released directly into the habitat without a distinct dispersal stage. However, pipefish are often associated with drifting seaweed and other sea grasses and may disperse via this mechanism. Shiner perch are live bearing and young are born throughout most of the summer. It is uncertain how readily the young or adults would disperse into Oxford Basin. If water quality conditions were improved in the Basin, artificial introduction of these species may be possible since appropriate habitat is present in the Basin.

The California halibut is an important commercial and sport fish species and is reliant on coastal bays and estuaries as nurseries for the first two or three years of life. Any increase is such habitat would be valuable for this species. Its preferred diet early in life, estuarine gobies, is already common in the Basin as identified in our surveys.

Additionally, there are several species of brackish, freshwater, or anadromous fish that undoubtedly occurred in the Ballona Lagoon and Ballona Wetlands historically but which have been extirpated from the area for at least 70 years or more. These species still occur to the north and south of the area and have special conservation status. The federally endangered tidewater goby (*Eucyclogobius newberryi*) occurs in Malibu and Topanga creeks to the north and in San Diego County to the south and there are historical records for artesian springs in Santa Monica (U. S. Fish and Wildlife Service

2005). The federally endangered southern California steelhead (*Oncorhynchus mykiss*) also still migrates from the ocean into Malibu and Topanga Creeks and was observed in San Mateo Creek in northern San Diego County in 1998-99 (NMFS 2009). After the adult steelhead spawned upstream in freshwater, the juveniles would have used the Basin as a nursery area for a year or so before the juveniles left for the ocean (Swift et al. 1993; Moyle 2002). Finally the federally endangered unarmored threespine stickleback (*Gasterosteus aculeatur williamsoni*) occurred in the Los Angeles River and presumably occurred in or near the Ballona wetlands. The tidewater goby and stickleback would have been permanent residents of the estuarine area of the wider Ballona Marsh. All of these species rely on relatively stable, low salinity or brackish conditions and such conditions are unlikely to develop for any extended length of time in Oxford Basin, particularly since there appears to be an effort to divert freshwater street runoff into the sewer system, as was observed at the eastern inlet, rather than allowing it to flow into the Basin. Thus it would take exceptional effort to re-establish these species. In addition steelhead and stickleback require relatively cool and well oxygenated water which will also be difficult to maintain in Oxford Basin under current conditions. If these species are ever to be seriously considered for return to this area, it would probably be best to utilize other areas of Ballona Wetlands where the appropriate habitat conditions can be developed more easily.

WATER QUALITY, WATER TEMPERATURE, DISSOLVED OXYGEN

A study conducted by Aquatic BioAssay and Consulting (2009) noted that Basin E and Oxford Basin have some of the highest levels of pollutants and lowest oxygen values in the Marina del Rey area. The study found that the number and diversity of invertebrate species dropped from the mouth of the Marina inland towards the most inland sites such as Oxford Basin. These water quality issues may explain some of the absence of species in Oxford Basin. In addition, Oxford Basin has only minimal circulation of water with the marina and is therefore more likely to suffer longer spans of poor water conditions that may arise. A good starting point for a restoration effort for fauna would be to improve the water circulation through the Basin, to reduce the level of pollutants, and to increase the dissolved oxygen levels in the Basin water in order to establish the water quality conditions necessary for successful colonization of estuarine aquatic species.

Dissolved oxygen concentration in water is related to water temperature such that the warmer the water the lower the amount of oxygen the water is able to hold in solution. Thus, excessive warming of the water will contribute to lower the availability of oxygen in the water. Other conditions such as the lack of circulation, excessive enrichment of the water, or the overnight lack of photosynthesis by aquatic plants to supply oxygen to the system can result in low dissolved oxygen levels. Excess plant material such as large algal blooms can supply oxygen in the day time but also use up the available oxygen rapidly at night as the plants respire resulting in low oxygen levels for the other organisms.

During the surveys by Entrix, water temperatures were below 20° C which is within the preferred range for most estuarine fish and is cool enough to maintain adequate dissolved oxygen concentrations. Often, areas near the coast stay cooler because the summer fog coverage can insulate coastal marshes and wetlands from the usual summer warming more prevalent farther inland (Swift and Frantz 1981). However, it is possible that the water temperature gets considerably higher in Oxford Basin during the late summer and fall due to the lack of water circulation, relatively shallow depths in the Basin, and as the cooler marine layer is less prevalent. If the water temperature increases beyond the mid-twenties Celsius then temperatures and dissolved oxygen concentrations may become intolerable to many fish species. Estuarine fish species can generally be divided into two categories relative to oxygen tolerance. Gobies, killifish, and mosquitofish are relatively tolerant of low oxygen conditions and can utilize aerial oxygen and other strategies to survive periods of low oxygen in the water. Other fishes are relatively intolerant of low oxygen conditions and include anchovies, topsmelt, flatfishes (diamond turbot, California halibut), and shiner perch. These fish are unable to tolerate lower oxygen levels for any period of time and are the fish frequently seen during morning fish kills in coastal estuaries. Any attempt to restore habitat conditions that would support these species would have to include provisions for maintenance of relatively high oxygen concentrations (above approximately 4 milligrams per liter). Dissolved oxygen levels in the waters of Basin E and Oxford Basin often fall below this value according to the study by Aquatic BioAssay and Consulting (2009). It is less well known how these fish species are affected by the other pollutants noted by Aquatic BioAssay and Consulting (2009) such as DDT and heavy metals.

DISCUSSION

It appears that the current state of Oxford Basin is of a system whose habitat and health is compromised by its distance from the ocean mouth and restricted access to Marina del Rey. It has been documented to have relatively poor values of several indicators of aquatic health, most recently by the study of Aquatic BioAssay and Consulting (2009). These factors make the development and sustainability of typical estuarine or bay fish fauna populations difficult. The Entrix study indicates that several typical species can and do colonize and inhabit the area but have difficulty maintaining a year-round population. In addition, several species that would be expected to be present are absent, and in some cases the reasons for their absence are not readily apparent.

Some uncertainty exists in the sampling results regarding the presence of fish in the Basin throughout the year since the sampling by Entrix was limited to two visits. More sampling throughout the season could better define the extent of fish population variation in the area. However, the faunal composition of nearby Marina del Rey is well understood and aquatic species composition in Oxford Basin is likely closely tied to conditions in the marina, as well.

Increasing the diversity and abundance of fish species living in Oxford Basin on a permanent basis would require management of water quality issues and the identification and removal of colonization barriers. Monitoring the fish populations in the Basin as such restoration actions are implemented would be beneficial in assessing the success of these actions as related to creating favorable habitat for estuarine fish.

3.7 Birds and Terrestrial Vertebrates

Daniel S. Cooper of Cooper Ecological Monitoring (2010; see Attachment D) evaluated the Basin's avian and terrestrial vertebrate communities, as summarized here. This included consideration of previous biological reports that were completed on the Basin during the 1970s and in 1980 (Schleicher 1974, Schreiber and Dock 1980). As noted by Cooper, these early reports were not peer-reviewed and both included some questionable information. His current study focuses upon current uses of the Basin by reptiles, birds, and mammals, but includes some comparisons with the species reliably observed during the older survey efforts completed (see Attachment D).

AMPHIBIANS, REPTILES, AND MAMMALS

Non-avian terrestrial vertebrates were scarce during the 2009/10 surveys. No lizards or amphibians were observed during the 2009/10 survey, although Schleicher (1974) recorded the southern alligator lizard (*Elgaria multicarinata*), and this species likely still occurs.

On May 28, 2010 at least ten California ground-squirrels (*Spermophilus beecheyi*) were detected, with presumed burrows scattered across the entire site; one squirrel was seen on May 7, 2010, but they were not detected during the preceding fall/winter. Two non-native eastern fox squirrels (*Sciurus niger*) were observed in the myoporum grove on February 24, 2010 and evidence of their presence (including pine cone "shavings") was easily observed.

Numerous large burrows present toward the far eastern end of the site, within the myoporum grove, likely belong to striped skunk (*Mephitis mephitis*). This evaluation is based on their size and the habitat (this mammal is now common and highly urban-adapted in the region). Tracks in mud seen on several visits were made by skunk or raccoon (*Procyon lotor*), another ubiquitous, urban-adapted animal in Los Angeles.

The earlier studies noted the presence of feral dogs, chickens, and domestic ducks, but these are no longer present, although several hybrid/feral Mallard × domestic ducks were present on most visits. Native rabbits (*Sylvilagus* sp.) that were present in the 1970s have apparently been extirpated from the site.

BIRDS

As of July 2010, 84 species of birds have been credibly recorded at Oxford Basin. Of these species, 33 were not detected during our recent monthly visits since September 2009, which suggests that approximately 50 species may be expected to occur regularly at the site each year. Table A in Attachment D provides results for 2009/2010 and compares them with results obtained in the earlier studies, mainly Schreiber and Dock (1980). Attachment D includes the scientific names of bird species recorded during the current study, or previous studies.

Three species have been observed nesting at Oxford Basin in 2010: the Mallard, Anna's hummingbird, and American crow. Several other species were observed using the site during the breeding season, but were breeding off-site in the surrounding residential area and ornamental landscaping, notably several species of herons and egrets.

The rest of this section focuses on birds, because (a) birds are, by far, the most numerous and diverse terrestrial vertebrates at Oxford Basin, and (b) several species of special interest occur, or have potential to occur, at the Basin.

Patterns of Bird Usage

The patterns of usage documented in this report provide baseline data against which the effects of future habitat enhancements may be compared. The fact that native birds are using non-native vegetation at the site does not imply that these exotic plants are especially "important" for birds at Oxford Basin. All of the birds recorded in the myoporum and other landscaping at the site are commonly encountered in urban habitats throughout Los Angeles. Nearby areas with native vegetation, either naturally-occurring or restored, such as Ballona Freshwater Marsh and the Playa Vista Riparian Corridor, see much higher usage by native bird species, including regular, successful breeding by more than a dozen species.

Seasonal Patterns

As found in previous studies, bird usage of Oxford Basin is highly seasonal. Overall numbers are lowest in late summer and fall (July to October), before wintering waterfowl have arrived, and after the locally-nesting herons have raised young and dispersed. By November, small rafts of waterfowl are present that include American wigeon, lesser scaup, and American coot, joined by lower numbers of other species of ducks and grebes. Migrant songbirds, typically in limited numbers, can occur from late July through the fall months. Wintering songbirds, such as ruby-crowned kinglets, yellow-rumped and Townsend's warblers, generally arrive by late October and remain into April. Bird activity dips in spring, after wintering waterfowl and wintering songbirds have departed (April). Only a small number of ubiquitous resident species, such as the American crow and bushtit, remain to nest in the dense myoporum grove at the far eastern edge of the site. However, on certain days in April and May, a diversity

of spring transient songbirds (e.g., Wilson's warbler) may occur, typically forming small foraging flocks in the myoporum grove (but generally using any tree or shrub habitat available throughout the Marina). During summer, waterfowl are mostly absent (aside from a handful of locally-breeding mallards and hybrids), but herons and egrets from local colonies forage in the Basin, their numbers augmented by locally-raised young that remain into July and August.

By Area

Though data on usage by area of Oxford Basin was not collected during our study in 2009/10, a few broad patterns are clear. Most waterfowl were observed either resting on open water or near overhanging vegetation along the shoreline, or foraging on the wet mud exposed during a drawdown. Fish-eating species, such as the pied-billed grebe, were observed actively feeding in open water. Herons and egrets foraged around the entire shoreline, but seemed concentrated at either inflow (especially the inflow emerging from under Washington Boulevard) or at the outflow to the Marina, where they would catch fish. Several species of large waders were observed roosting in the trees surrounding the open water, particularly black-crowned night-herons in myoporum and other landscaping trees at the far eastern end. Songbirds (tree-dwelling) were found throughout the site, but were most consistently found in and around the myoporum grove at the eastern end, especially in the area where dense vegetation approached the freshwater at the eastern inlet.

Songbirds (other than the ubiquitous, non-native European starling) were almost never seen on the ground during the surveys in 2009/2010, suggesting that foraging opportunities for birds like sparrows and towhees are limited, and have become even more degraded over time (see the next discussion).

Faunal Change at Oxford Basin

Birds

The historical avifauna of the Oxford Basin area *per se* is not known, since it was part of a much larger wetland system and its current configuration dates back only to the 1960s. Historically, the inland mudflats and tidal channels of the "Venice Marshes" would have supported flocks of shorebirds nearly year-round, and rafts of waterfowl in winter ("Lake Los Angeles," situated near present-day Oxford Basin, was a popular duck-hunting spot through the 1950s; see, e.g., Cooper 2005). Species found in extensive, often wet grassland, such as the northern harrier (*Circus cyaneus*) and the long-billed curlew (*Numenius americanus*) were common in the Venice/Ballona area into the mid-1900s, as were dune and coastal strand specialists such as the horned lark (*Eremophila alpestris*) and large-billed savannah sparrow (*Passerculus sandwichensis rostratus*). Many of these coastal marsh, dune, and open-country species were effectively extirpated by the construction of Marina del Rey, though some – notably Belding's

savannah sparrow (*P. s. beldingi*) and a variety of waterfowl and shorebirds – maintain remnant populations at the nearby Ballona Wetlands/Ballona Creek.

As Marina del Rey has lost certain species, others have colonized novel habitats, nesting in trees near water (herons/egrets, Family: Ardeidae), or on built structures such as culverts (swallows, Family: Hirundinidae), or have simply "invaded" from the surrounding residential area. These population changes are discussed below.

Of the species that are known only from 1970s surveys, several were apparently common then and are best considered extirpated from the site at this time, a determination that is supported by recent research on bird status and distribution in the Ballona area (Cooper 2006b). Recent years have seen the apparent extirpation of three resident or year-round species from Oxford Basin: two raptors/predators (American kestrel and loggerhead shrike) and a woodpecker (northern flicker). Two species, the green heron and western scrub-jay, might be considered a part of this extirpated group, as well, although only 1–3 birds each were detected during the 1970s and both species remain fairly common in the greater Marina/Ballona area year-round. Two species of sparrow, the white-crowned (formerly a winter resident) and the song (formerly occurred in fall migration), have apparently been extirpated in their local roles at the Basin.

Shorebirds, apparently present, if irregular, during the 1970s, seem to have essentially abandoned the site. Schreiber and Dock (1980) wrote, "most of the shorebirds recorded here are dependent on the mudflats for their occurrence, both to feed and rest." Only one or two individual killdeer were seen during the recent surveys. Other species that have apparently declined or stopped using the site include gulls and terns (gulls were apparently common at Oxford Basin in winter 30 years ago and are now rare) and possibly the northern mockingbird and the non-native rock pigeon. These species remain common along lower Ballona Creek and/or in Marina del Rey, so it is likely that local changes in vegetation, food supply, and/or water regime are to blame.

With declines have come inevitable increases; several species have apparently established new populations at Oxford Basin that weren't present during the 1970s. Most importantly, large waders have increased dramatically. The great egret, snowy egret, and black-crowned night-heron now breed at various locations along Admiralty Way and forage at the Basin year-round, whereas during the 1970s they were only sporadic visitors to the Basin. Two species of waterfowl should be considered new "colonists," the American wigeon (high double-digits in winter) and the gadwall; interestingly, no species of waterfowl has dramatically declined at the Basin. The black phoebe, a resident and possible breeder, appears to have recently colonized the Basin. Three species were confirmed as breeders in 2009/2010, whereas before they occurred only in the non-breeding season: Mallard, Anna's hummingbird and American crow. The ruby-crowned kinglet, black-throated gray warbler, and Townsend's warbler, all regionally

common during both migration and winter, were first recorded at the Basin during 2009/2010.

Finally, the non-native spotted dove was considered common in residential areas near Oxford Basin in the 1970s, but this species has declined greatly locally and across the Los Angeles Basin. The Eurasian collared-dove, a recent arrival to California that is starting to fill a similar niche today, was detected in the neighborhood north of Oxford Basin during this study.

The avifauna of Oxford Basin is constrained by several factors, including the area's small size (9.0 acres in the study area for this enhancement project; 10.7 acres for the entire parcel), isolation from other wetland habitats by urban development (including numerous tall trees and two high-rise towers just to the south), current lack of regular tidal flushing, and dominance of invasive, non-native vegetation. Other factors such as litter and water quality were emphasized in earlier studies but are probably only minimally impacting the birdlife of the Basin; Ballona Creek, for example, easily as polluted a water body as Oxford, sees very high usage from a much greater variety of waterbirds than does Oxford. Also, it is worth noting that the nearby (restored) Ballona Lagoon just west of Marina del Rey is also small in extent (and linear in configuration), but nonetheless supports an exceptionally high species diversity of shorebirds compared with present-day Oxford Basin (records of 10+ species per year. C. Almdale, unpubl. data; vs. 1 species at Oxford during the 2009/10 survey).

DISCUSSION

Relatively simple steps could be taken to enhance Oxford Basin for birds that have been extirpated since the 1970s, and possibly even for species that existed in the pre-Marina del Rey wetlands. Replacing the thicket of myoporum with low-profile, native vegetation would likely result in the re-colonization of the site by the white-crowned sparrow, which no longer winters there. The American kestrel might use the site with such vegetation restored, as could (migrant) northern flickers and song sparrows. These species remain common in their respective roles in the larger Ballona ecosystem where native vegetation persists or has been restored. Other migrant songbirds recorded regularly at Ballona Lagoon that could use a restored Oxford Basin could include the house wren, blue-gray gnatcatcher (*Polioptila caerulea*), common yellowthroat (*Geothlypis trichas*), and Lincoln's sparrow (*Melospiza lincolnii*). None of these currently occur at the site or in typical urban/residential vegetation, and all have responded positively to restoration at Ballona Lagoon and other nearby natural areas.

With increased tidal flushing, the mudflats of Oxford Basin could once again support numbers and a diversity of shorebirds, and possibly a wider variety of waterfowl than is currently represented (just four duck species and one shorebird species were detected during surveys in 2009/2010, contrasting with five species of waterfowl and at least nine species of shorebirds in 1980). With most of the historical tidal mudflat habitat lost

permanently in the Marina/Ballona area (and essentially absent from the rest of the Santa Monica Bay/Los Angeles Basin south of Malibu), restoration of this habitat could have a positive impact on waterbirds in the region. It is also possible that such sensitive species as the California least tern could once again use Oxford Basin as an alternate foraging site during its breeding season.

4.0 SPECIES AND COMMUNITIES OF SPECIAL INTEREST

Biological resources of special interest include species and natural communities that are of limited distribution, or that are potentially regulated under federal, state, or local laws or ordinances. The investigators conducting this study identified those special status plant and wildlife species that have at least some potential to occur at Oxford Basin, and additional species that are worthy of concern in the local area or wider region. David Bramlet completed a jurisdictional delineation that identifies those portions of the site that are under the jurisdiction of the U. S. Army Corps of Engineers, California Department of Fish and Game, and California Coastal Commission.

4.1 Species of Special Interest

Species of special interest, or "special status" species, are plants and animals occurring or potentially occurring in the Project Area that are endangered or rare, as those terms are used in CEQA and its Guidelines, or that are otherwise of concern in the local area or wider region. Legal protection for special status species varies widely, from the relatively comprehensive protection extended to listed threatened/endangered species to no legal status at present. The California Department of Fish & Game's Natural Diversity Data Base (CNDDB) periodically publishes its lists of "Special Vascular Plants, Bryophytes, and Lichens" (CNDDB 2010) and "Special Animals" (CNDDB 2009). The Special Plants list incorporates continually updated information from the California Native Plant Society (CNPS), an independent organization that maintains an online inventory of taxa that its botanists regard as rare, declining, or insufficiently known.

Table 4–1 lists each special-status species known to occur at Oxford Basin, or that has at least moderate potential to occur there (either at present, or with the Basin in a modestly "restored" state). Attachments A–D discuss these species in greater detail, and also identify and discuss some additional species that have no or low potential to occur at the Basin.

TABLE 4–1: SPECIAL STATUS SPECIES

Species	Status (Federal/State)	Known or Potential Status at Oxford Basin
Listed Species		
Birds		
California brown pelican *Pelecanus occidentalis californicus*	FE/–	One record of a bird photographed as it foraged at Oxford Basin on October 13, 2009 (Cooper 2010; see Attachment D, Figure 6). Although a rarity at Oxford Basin, hundreds of brown pelicans roost on the Marina del Rey breakwater daily, and birds regularly forage and roost in the marina, often near bait tanks. Given the small size of Oxford Basin, it is unlikely that this area would ever provide important foraging or roosting habitat for the California brown pelican.

Species	Status (Federal/State)	Known or Potential Status at Oxford Basin
California least tern *Sternula antillarum browni*	FE/SE	This tern maintains a large nesting colony at south Venice Beach, a few hundred meters from Oxford Basin. Schreiber and Dock (1980) recorded this species at the Basin, but provided only sparse details about the nature of its occurrence: "Of particular interest are California Least Terns, an endangered species that nests on nearby Venice Beach and the Ballona Wetlands, and occasionally forages on small fish in the Bird Conservation Area." Also, "Observed foraging in the pond at the Bird Conservation Area in Spring and Summer, 1980." The number of individuals observed is illegible in the table of the report. The California least tern could possibly use Oxford Basin, at least irregularly, as a foraging site for birds nesting in the Venice Beach colony, as birds are regularly seen foraging for mosquitofish at Ballona Freshwater Marsh and elsewhere in the Ballona area (Cooper 2006b). Having been fenced for decades, Oxford Basin receives very little coverage by birders, and since the least tern is present locally for only a brief time window (May to early July), any foraging here – particularly the occasional brief visit by a bird bringing food to young – could go unobserved. It is not likely that the California least tern would ever nest at Oxford Basin, as the site does not support the broad, sandy beach and sandbar habitat favored by this species. Oxford Basin could possibly serve as an alternative foraging site for the species during its late spring/early summer nesting season.
Non-Listed Species		
Invertebrates		
monarch butterfly *Danaus plexippus*	–/CSA	Species is of concern due to its limited number of remaining overwintering sites, which are covered by statues of the California Public Resources Code and the California Fish and Game Code. Numbers have been fluctuating over the years, with a downward trend during the recent past (Xerces Society 2010). Species is migratory and frequently seen in coastal Los Angeles County; occurs at Oxford Basin only as a migrant. Recorded during all invertebrate sampling visits, passing by the site in an approximately east to west direction. Each specimen stayed only briefly near the site and visited a few flowers before continuing in westerly direction. In southern California, Monarchs usually overwinter in groves of *Eucalyptus*, in a zone between a half mile and one mile from the coast. Although Oxford Basin is on the migratory path of the Monarchs, is located approximately one mile from the coast, and has both blue gum and red gum *Eucalyptus* trees, it does not feature a grove of mixed height and diameter, with an understory of brush and sapling trees. It also lacks food plants for adult Monarchs. For these reasons, Monarchs are unlikely to choose the site in its present condition for overwintering.

Species	Status (Federal/State)	Known or Potential Status at Oxford Basin
Birds		
great egret *Ardea alba*	—/CSA (rookery site)	Unrecorded by earlier surveyors (1970s), small numbers of this large wader were found during 2009/10, including young-of-the-year during summer 2009 surveys (Hamilton and Cooper 2010). Great egrets maintain a limited nesting colony adjacent to Oxford Basin at Yvonne B. Burke Park. Additional nesting sites documented at Marina del Rey in 2009, with an estimated Marina-wide breeding population of approximately five pairs. Great egrets could potentially breed in the taller trees at Oxford Basin, but the species does not appear to be limited in the local area by a shortage of suitable nesting trees.
snowy egret *Egretta thula*	—/CSA (rookery site)	Since around 2005 snowy egrets have nested in tall eucalyptus, ficus, and coral trees in and around the parking lot of Yvonne B. Burke Park, just east of Oxford Basin (Cooper 2006b). This area held an estimated 69 nests of snowy egrets and black-crowned night-herons in July 2009, and Oxford Basin provides important breeding-season foraging area for snowy egrets, particularly for young-of-the-year (Hamilton and Cooper 2010). Up to 19 individuals per day were recorded during July 2009, likely from nearby nests at Burke Park. Snowy egrets could potentially breed in the taller trees at Oxford Basin, but the species does not appear to be limited in the local area by a shortage of suitable nesting trees.
black-crowned night-heron *Nycticorax nycticorax*	—/CSA (rookery site)	Long recorded at Oxford Basin during the non-breeding season (see Cooper 2006a), this medium-sized wader initiated nesting at Marina del Rey during the late 1990s. Several dozen pairs currently breed at the Marina, with one of the largest colonies located just east of Oxford Basin, at Yvonne B. Burke Park, where it co-occurs with snowy egrets (see preceding account). Although black-crowned night-herons were found in relatively small numbers at Oxford Basin during fall-spring (<10 birds), up to 14 birds per day were found during July 2009, when young birds were regularly seen foraging there with adults in apparent family groups (Hamilton and Cooper 2010).
great egret *Ardea alba*	—/CSA (rookery site)	Unrecorded by earlier surveyors (1970s), small numbers of this large wader were found during 2009/10, including young-of-the-year during summer 2009 surveys (Hamilton and Cooper 2010). Great egrets maintain a limited nesting colony adjacent to Oxford Basin at Yvonne B. Burke Park. Additional nesting sites documented at Marina del Rey in 2009, with an estimated Marina-wide breeding population of approximately five pairs. The species could potentially breed in one of the taller trees at Oxford Basin, but the species does not appear to be limited in the local area by a shortage of suitable nesting trees.
American kestrel *Falco sparverius*	—/—	This small raptor was found to be resident at Oxford Basin during the 1970s, but we know of no modern (post-1980) records from the site. As of 2010, the American kestrel no longer breeds at the Ballona Wetlands, where it was once a common year-round resident. In coastal portions of the Los

Species	Status (Federal/State)	Known or Potential Status at Oxford Basin
		Angeles Basin, large vacant lots that formerly supported American Kestrels year-round have all but disappeared. At Oxford Basin, such habitat modifications as removal of myoporum and trees and maintenance of low-profile vegetation, with patches of bare ground, could possibly facilitate the kestrel's re-establishment, at least in fall and early winter.
loggerhead shrike *Lanius ludovicianus*	–/–	This species, like the American kestrel, was recorded at Oxford Basin during the 1970s, but it is now best considered totally extirpated. Up to three loggerhead shrikes have been recorded in winter at the nearby Ballona Wetlands (including at Area A adjacent to Marina del Rey), and it is possible that this species could occur at Oxford Basin during migration if the site included bare ground and the establishment of a population of small mammals and/or macro-invertebrates (e.g., large grasshoppers) to provide a prey base.
western meadowlark *Sturnella neglecta*	–/–	This species has declined sharply throughout the Los Angeles area and, as of 2010, no longer breeds in the Ballona area (D. S. Cooper, unpublished data), or possibly anywhere else in coastal Los Angeles County. Two birds were photographed on October 13, 2009 along the north end of Oxford Basin (Cooper 2010; see Attachment D, Figure 9). Although these were fall migrants, small numbers of wintering birds could possibly occur if several acres of low-profile forbs/grasses and open ground were maintained at the site, rather than the dense, non-native trees and shrubs currently present.

Definitions

Federal

FE Listed as endangered under the federal Endangered Species Act.

State

SE State-listed as endangered under the California Endangered Species Act.

CSA California Special Animal. A general term that refers to all of the taxa the CNDDB is interested in tracking, regardless of their legal or protection status. This list is also referred to as the list of "species at risk" or "special status species". The Department of Fish and Game considers the taxa on this list to be those of greatest conservation need.

4.2 Communities of Special Interest

As described in this section, field surveys by David Bramlet (2010b; see Attachment E), delineated jurisdictional areas (wetlands and of Waters of the U.S.) at Oxford Basin that fall under the jurisdiction of the U.S. Army Corps of Engineers (Corps), California Coastal Commission (CCC), and California Department of Fish and Game (CDFG). Figures 4–1a and 4–1b show the extent of these jurisdictional areas. Please refer to Attachment E for documentation of the historical wetland conditions at Oxford Basin and for current photos of some of the jurisdictional areas found there. The following standard terms describe the wetland/non-wetland indicator status of plant species (see Reed 1988):

- Obligate wetland plants (Obl) – Plants that occur almost always in wetlands (>99%), under natural conditions.
- Facultative wetland plants (FacW) – Plants that usually occur in wetlands (67-99%), but also occur in nonwetlands.
- Facultative plants (Fac) – plants with a similar likely hood of occurring (33-67%) in wetlands as nonwetlands.
- Facultative Upland plants (FacUp) – Plants that sometimes occur in wetlands (1-33%), but occur more often in uplands.
- Upland plants (Up) – Plants that occur almost never in wetlands (< 1%).

AREAS UNDER CORPS JURISDICTION

The Corps regulates discharges of dredged or fill material into Waters of the United States under the provisions of Section 404 of the Clean Water Act. Waters of the United States include wetlands and nonwetland habitats, including oceans, bays, ponds, lakes, rivers, and streams, which may be used for interstate commerce. It also includes tidal areas, mudflats, sandflats, tributaries of Waters, along with wetland and adjacent wetland areas.

Wetlands are a type of the Waters of the United States, and are defined as those areas that are inundated or saturated by surface or ground water at a frequency and duration to support, under normal circumstances, a prevalence of vegetation adapted to saturated soil conditions. The determination of those wetland sites under the Corps jurisdiction is determined by the presence of wetland vegetation, hydric soils, and suitable hydrology, using the methodology defined in the arid west region supplement to the 1987 Corps wetland delineation manual (Wetland Training Institute 1991, U. S. Army Corps of Engineers 2008).

The Corps also regulates any obstruction or alteration to Navigable Waters of the U.S. The jurisdiction for these Waters extends to the high tide line, including spring high

tides or other high tides that occur with regular frequency, and to the ordinary high water mark in non tidal waters. Navigable Waters are typically within the same boundaries as the Waters of the U.S., but wetlands are not typically found within Navigable Waters, with the exception of some tidal marshes.

A total of 5.18 acres of Waters of the United States were delineated at Oxford Basin, of which 0.48 acre satisfied the Corps' criteria for vegetation, soils, and hydrology.

AREAS UNDER CALIFORNIA COASTAL COMMISSION JURISDICTION

Wetlands meeting the California Coastal Commission's one-parameter wetland criteria extend to the mean high tide within the Basin. These wetland areas had hydric soils and wetland hydrology, but were generally dominated by Perez's sea lavender (*Limonium perezii*). Since this species was considered a FacUp species, these localities were not considered to have hydrophytic vegetation. Therefore these areas were not considered as jurisdictional wetlands under the Corps delineation procedures, but would be classified as wetlands under the Coastal Commission's one-parameter methodology. Other species found in these wetlands included rabbit's foot grass (FacW); salt marsh sand spurry (Obl); spearscale (FacW); alkali heliotrope (*Heliotropium curassavicum*) Obl; Boccone's sand spurry (Fac), Mexican tea (*Dysphania ambrosioides*) Fac; yellow sweet clover (Fac); garden beet (*Beta vulgaris*) FacUp; and myoporum (*Myoporum laetum*) FacUp. The CCC wetland areas would also included those poorly vegetation or non vegetated "beach" areas that are infrequently tidally inundated, and the tidal flat areas that are inundated on a daily basis.

Depending on the slope of the Basin, the CCC wetlands extended from zero to 16 feet above the delineated Corps wetland areas. Along much of the north shore of the Basin, CCC wetlands extended from 6 to 8 feet above the Corps delineated wetland areas. A total of 5.18 acres was determined to meet CCC wetlands criteria at Oxford Basin.

AREAS UNDER CALIFORNIA DEPARTMENT OF FISH & GAME JURISDICTION

As with the CCC wetlands, the area under California Department of Fish & Game (CDFG) jurisdiction extends to the mean high tide line. No other riparian or isolated wetland habitat occurs within the Basin and the inlet channels are all developed storm drains. Therefore, it is determined that any CDFG jurisdiction is limited to the area in the Basin up to and including the high tide boundary. A total of 5.18 acres was determined to be under the jurisdiction of CDFG at Oxford Basin.

Site area: 8.94 acres

0 100 200 Feet

Figure 4-1a

Jurisdictional Wetlands

in the Oxford Basin

Site area: 8.94 acres

0 100 200 Feet

Figure 4-1b

Jurisdictional Wetlands

in the Oxford Basin

5.0 RECOMMENDATIONS FOR CONSERVATION

Opportunities exist to increase habitat values of Oxford Basin for various native plant and wildlife species, and to promote its enjoyment by residents and visitors to Marina del Rey. This section summarizes (and in some cases paraphrases) the specialists' conservation recommendations and those contained in the draft Marina del Rey Conservation & Management Plan (Hamilton and Cooper 2010). The objective at this early planning stage, before a specific direction has been decided upon, was to set forth all potentially relevant recommendations for further consideration as planning of the renovation project progresses.

Oxford Basin's primary role is to receive storm runoff from and to provide flood control for the Marina and surrounding communities. The Basin must be regularly maintained, including periodic removal of sediments. As noted elsewhere in this report, all efforts to enhance habitat at Oxford Basin must be coordinated with the relevant County agencies, including the Department of Public Works, Department of Beaches and Harbors, and Flood Control District, and shall not in any way compromise the operation of the Basin as a flood control facility.

5.1 Recommendations of David Bramlet (Vegetation/Wetlands)

1. Investigate the feasibility of increasing the total area of the tidal prism at differing elevational levels. The principal function of Oxford Basin is to maintain maximum flood control capacity, and this may require a uniform upper elevational level. However, if sediment is to be removed from the Basin, the potential of having differing elevational levels within the Basin should be evaluated. This would allow for a greater diversity of native salt marsh "habitats" (e.g. mid-marsh, high marsh) and species that could potentially be introduced into the Basin.

2. Investigate the feasibility of establishing vascular aquatic plant species, such as eel grass (*Zostera marina*) within the mud flats of Oxford Basin. These could be placed in artificial submerged structures, that would allow "harvesting" of the eel grass. These plants would be grown more to enhance water quality and reduce the algal blooms, than to enhance the habitat found within the mudflats. Another alternative would be to create areas of sandy habitat within the Basin, to provide substrate for this or other suitable species.

3. Consider the feasibility of enhancing the salt marsh community found at Oxford Basin. This would include plans for the removal of non-native Perez's sea lavender (*Limonium perezii*), which has low habitat value for native wildlife, and replacing it with a more diverse group of native salt marsh species. Some of these species could include California marsh rosemary (*Limonium californicum*), alkali heath (*Frankenia salina*), saltgrass (*Distichlis spicata*), jaumea (*Jaumea carnosa*),

shore grass (*Monanthochole littoralis*), and American saltwort (*Batis maritima*). The plan would need to determine the suitability of the existing habitats for these species, and potential procedures that could allow for develop different marsh habitats within the Basin. Planting plans would then need to be developed with the different palettes for the salt marsh plantings, along with detailed procedures for preparing the sites for planting/seeding and long term maintenance of the marsh enhancement areas.

4. Consider the development of a native plant enhancement plan for Oxford Basin. This would include a plan for the removal of the myoporum, melaleuca, and other non-native trees and shrubs from the Basin. A planting palette of suitable native trees, shrubs and grasses could then be developed for the project site. These could include laurel sumac (*Malosma laurina*), Mexican elderberry (*Sambucus mexicana*), lemonadeberry (*Rhus integrifolia*), California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), coyote bush (*Baccharis pilularis*), bladder pod (*Cleome isomeris*) and other suitable shrubs or trees for the project site. Perennial grasses, such as purple needle grass (*Nassella pulchra*) or giant wild rye (*Elymus condensatus*), could also be planted in the understory. The planting plan would need to include procedures for testing the soils for excess salts, and preparing these soils before planting, determining the suitable planting procedures, detailing any provisions for erosion control, such as mulches on the exposed soils, and determining the potential need for supplemental irrigation. A detailed long-term maintenance plan would also have to be developed. This would develop provisions for maintaining any irrigation systems, repairing erosion, weeding the site, and replacing dead or damaged plantings in the enhancement areas.

5. Determine the native plants within Oxford Basin and a listing of non-native plant species that should be removed from the area surrounding the Basin. The botanical survey conducted for this report could not identify all of the species present within the study area, typically because the available plant materials lacked certain characters required for positive identification. Further studies would be necessary to more completely define the Basin's existing flora.

6. Determine the invasive non-native plants that occur within Oxford Basin and the development of a plan to remove these species. Such a plan would note the invasive plant species that are likely to cause continual problems in any native plant enhancement plantings, such as panic veldt grass (*Ehrharta erecta*). Procedures for the initial removal of the existing infestations and long-term maintenance measures to prevent further infestations of these species within the Basin would need to be developed in such a plan.

5.2 Recommendations of Emile Fiesler (Invertebrates)

Oxford Basin has great potential as a habitat for native invertebrates. Even though the site is currently in a relatively degraded state, with predominantly non-native vegetation, the Basin provides an important breeding ground for many aquatic species. The upland areas still have some native vegetation and can be restored to become a more vibrant coastal ecosystem. Specific recommendations for conservation, restoration, and overall site improvement are:

1. Remove exotic plants, ideally by hand, without the use of toxic pesticides.

2. Plant a broad diversity of native plants, specifically plants native to the local coastal area of Los Angeles County.

3. Eradicate/control Argentine ants, which displace native ant species as well as other arthropods, resulting in an impoverished biotope. A critical part of restoration efforts on the site should include the abatement of Argentine Ants. If desired, BioVeyda can assist in this effort.

4. Remove unnecessary concrete and other construction debris. Some monolithic rocks can be left or intentionally placed, as they would provide habitat for various vertebrate and invertebrate animals.

5. Possible introduction of non-listed native fauna, or at least introduction of their food-plants; for example:

    a. Pygmy blue (*Brephidium exilis*): Chenopodiaceae, including Atriplex and Chenopodium.

    b. Wandering skipper (*Panoquina errans*): saltgrass (*Distichlis spicata var. spicata*) and cordgrass (*Spartina foliosa*).

6. Invertebrates, being typically much more abundant and often more vulnerable than vertebrates, are prime indicators for ecosystem health. It would be beneficial to perform periodic surveys in the future, whose results can be compared to those obtained during this project. These future surveys would add valuable information toward completeness of the list and toward measuring changes in biodiversity over time. Ideally, monitoring should occur before, during, and after planned habitat modifications. In addition to performing qualitative surveys to compile and compare species lists, it would be of great value if quantitative data could be gathered on the relative abundance of the species present. This data would provide a detailed view on the health of the ecosystem in general.

5.3 Recommendations of Camm C. Swift and Joel Mulder of Entrix (Fish and Estuarine Biology)

1. Perform a water quality study to determine conditions present to provide a basis for predicting what fish species can be supported by the system and what changes might be made to accommodate others less likely to be currently supported.

2. Improve water circulation with Marina del Rey in order to improve water quality which is currently compromised both in Oxford Basin and its adjacent water supply, Basin E of Marina del Rey.

3. If water quality is or becomes appropriate, consider introduction of aquatic vegetation like eelgrass, ditch grass, and other species of marine algae to provide habitat for faunal elements more dependent on such vegetation (i.e. pipefishes and shiner perch).

4. Consider introducing some fish species such as California killifish which may currently be prevented from colonizing by inhospitable habitat between current populations in Marina del Rey, Ballona Marsh, and Oxford Basin.

5. Investigate options for increasing the number of algae eating snails or fish present in the Basin in order to biologically control the proliferation of algae in the summer. If the freshwater conditions present in the winter decimate the populations of such grazers, possibly they could be artificially augmented in the spring from elsewhere in the marsh area. For example, the non-native fish, the sailfin molly (*Poecilia latipinna*), has become established and is common in Ballona Marsh. Stocks of sailfin molly could be transferred to Oxford Basin as a possible way to control algae. Sailfin mollies are a fecund species producing live bearing young and are tolerant of low oxygen conditions such as those found in the Basin. Striped mullet also feed on algae and detritus, reach large size, and could potentially be artificially introduced. Striped mullet achieve much larger sizes but are more sensitive to oxygen requirements.

6. Investigate options for converting the Basin bottom substrate to more sand and less mud/fine silt. Possibly a layer of sand could be added when or after the system is dredged out periodically. If the fine sediment is determined to be primarily composed of decomposing organic matter, and water quality conditions can be stabilized, an increase in the diversity and abundance of bottom dwelling fish and invertebrate fauna may utilize and thus reduce the thickness of this silt/organic layer.

7. Explore exposing Oxford Basin to more wind, which would facilitate mixing and oxygenation of the water; this could be effective in a wide shallow system like this one, thereby reducing the need for increased water quality in the marina.

As discussed in Attachment C, the long, dark culvert between Oxford Basin and Basin E of the marina likely inhibits dispersal of fish into the Basin. This condition could be improved by replacing some of the paving above the culvert with metal grating or comparable material. However, taken by itself, such a step would not be likely to improve fish stocks in Oxford Basin due to (1) the need to limit the range of tidal fluctuations in Oxford Basin in order to maintain its flood-protection capacity, and (2) the compromised water quality of Basin E, which limits the fish populations capable of surviving there. Given the inability to change these two items, increasing the amount of light in the culvert probably would not result in significant improvement of fish stocks in Oxford Basin (without simultaneous improvement for fish in these two additional items), and so this measure is not recommended as part of the current plan.

5.4 Recommendations of Daniel S. Cooper and Robert A. Hamilton (Birds and Terrestrial Vertebrates)

Relatively simple steps could be taken to enhance habitat quality in Oxford Basin for some birds that have been extirpated since the 1970s, and possibly even for species that existed in the pre-Marina del Rey wetlands.

1. Replace the thicket of myoporum with low-profile, native vegetation would likely result in the re-colonization of the site by the white-crowned sparrow, which no longer winters there. The American kestrel might use the site with such vegetation restored, as could (migrant) northern flickers and song sparrows. These species remain common in their respective roles in the larger Ballona ecosystem where native vegetation persists or has been restored. Other migrant songbirds recorded regularly at Ballona Lagoon that could use a restored Oxford Basin could include the house wren, blue-gray gnatcatcher (*Polioptila caerulea*), common yellowthroat (*Geothlypis trichas*), and Lincoln's sparrow (*Melospiza lincolnii*). None of these currently occur at the site or in typical urban/residential vegetation, and all have responded positively to restoration at Ballona Lagoon and other nearby natural areas.

2. With increased tidal flushing, the mudflats of Oxford Basin could once again support numbers and a diversity of shorebirds, and possibly a wider variety of waterfowl than is currently represented (just four ducks and one shorebird were detected during surveys in 2009/2010, contrasting with five species of waterfowl and at least nine species of shorebirds in 1980). With most of the historical tidal mudflat habitat lost permanently in the Marina/Ballona area (and essentially

absent from the rest of the Santa Monica Bay/Los Angeles Basin south of Malibu), restoration of this habitat could have a wide-reaching, positive impact on waterbirds in the region. It is also possible that such sensitive species as the California least tern could once again use Oxford Basin as an alternate fishing site during its breeding season.

5.6 Recommendations from the Marina del Rey Conservation and Management Plan (Hamilton and Cooper 2010)

Section 6.2.1 of the plan contains the following policy recommendations for Oxford Basin.

1. Restore functional saltmash habitat. Most of the intertidal zone at Oxford Basin is currently vegetated with such native saltmarsh plants as pickleweed, sandmarsh sand-spurry (*Spergularia marina*), and salt grass (*Distichlis spicata*). Because these plants were not mentioned in earlier assessments (e.g., Schreiber and Dock 1980), it appears that they are naturally occurring here, temporarily displaced by the construction of Marina del Rey, and now regenerating within the Basin. Therefore, we recommend that this vegetation be preserved in place or stock-piled for later replanting during any reworking of the Basin's sides. The term "functional saltmarsh habitat" implies regular and, if possible, natural tidal flushing (corresponding to timing and magnitude of natural tidal cycles). A functional saltmarsh at Oxford Basin would, ideally, support a healthy sedimentary invertebrate fauna, to provide habitat for ducks and shorebirds, and a predictable population of small fish during the May–July nesting season for the California Least Tern, a listed species that maintains a large nesting colony on Venice Beach and that has been documented foraging at Oxford Basin in past years. Many other migratory and resident waterbirds would also benefit from the enhancement of this habitat, including those that currently utilize the nearby restored Ballona Lagoon.

2. To the extent possible, the Oxford Retention Basin Flood Protection Multiuse Enhancement Project (currently in design) should maintain the natural characteristics of the site. Once the final contours are established, habitat should be established to include areas of emergent native marsh vegetation exposed during high tide, to serve as refugia for animals, and areas of exposed mud ("mudflats") at low tide, to serve as foraging areas for migratory and resident birds. Although the extent of mudflats may be limited by engineering constraints, including at least a band of this habitat at low tide would be valuable, considering how much mudflat habitat was lost during construction of Marina del Rey, and how vital such areas are for a wide variety of native wildlife, including birds, mollusks, and other intertidal invertebrates.

3. Subsurface debris, including chunks of concrete and asphalt, and sections of pipe, should be removed from the Basin where possible, as these would interfere with ecological functions of the mudflat.

4. Establish the primacy of habitat values over recreation as part of restoration. Removing non-native landscaping and increasing passive recreation potential along the margins of Oxford Basin are worthwhile improvements, but the existing dense vegetation and fencing currently provide considerable security for the herons and egrets that use the Basin's existing habitats in large numbers. Improving public access to the Basin and replacing the tall myoporum with low-growing scrub will be of little or no practical value (for wildlife or the public) if increased human activity causes the herons, egrets, and other wildlife species to stay away from Oxford Basin. Therefore, the Basin must be managed carefully for its wildlife habitat values, along with providing for flood protection and water quality improvement. Levels of passive recreation and other non-essential human uses should not conflict with these main purposes.

5. With plans for new fencing and increased public access to the Basin, care must be given to ensure that the old pattern of dumping of pets or other feral animals into the Basin does not recur, perhaps by the creation and support of a local stewardship organization (including a volunteer ranger/docent program) and clear, vandal-resistant (and easily-replaced/repaired) signage.

6. Any new development at Oxford Basin should be evaluated for its role in promoting natural wildlife habitat, vs. degrading or hindering this habitat. As the site is restored and public access improves, the County may receive proposals from groups to make various uses of the area (e.g., filming, special events, trash clean-up). The County should establish a mechanism for handling such requests, or should include appropriate provisions in a contract with an outside resource management group or a local Audubon chapter.

7. Following renovation, care should be taken to communicate effectively with all relevant users and managers that Oxford Basin, although first and foremost a flood-control facility, can be managed simultaneously as a habitat for native plants and wildlife without affecting flood-control capabilities. Therefore, activities like dumping compost or construction material, planting inappropriate vegetation, and feeding wildlife or domesticated birds, should not be tolerated.

8. Non-native vegetation should be removed from all parts of Oxford Basin on a regular, continuing basis under the supervision of a qualified professional, except where demonstrated to be critical to fulfilling an important natural process (e.g., retention of a small number of eucalyptus, ficus, or other non-native trees with regularly-nesting herons/egrets), consistent with the operation and maintenance requirements of the LACFCD. However, no new non-native

vegetation, or even "California native" (but not locally-native) vegetation inappropriate for the Ballona Wetlands, should be introduced.

9. The establishment of appropriate native landscaping will probably require a complete removal of all existing ground cover and weeds, and could also require eradication of the weed seedbank (e.g., through "solarization" or appropriate means).[1]

10. All vegetation above the high-tide line to be preserved, promoted, and restored/re-created should consist only of the two habitat types native to the historical Ballona Wetlands area (from Cooper 2008): 1) coastal scrub (a low-profile, summer-deciduous community dominated by such species as California sagebrush *Artemisia californica*, California sunflower *Encelia californica*, and coast goldenbush *Isocoma menziesii*), and 2) willow scrub (a low thicket-like community dominated by narrow-leaved willow *Salix exigua*). A professional firm, or firms, specializing in southern California native plant restoration, installation, and maintenance is recommended to prepare the site for planting, and to achieve successful establishment of these native communities.

11. Unnecessary and derelict concrete structures currently on the site (such as old wildlife watering troughs) and redundant fencing should be removed from the upper slopes where feasible.

12. Telephone lines that currently cut across the northern part of Oxford Basin may be re-routed along Washington Boulevard or Admiralty Way, as they could conflict with future wildlife use of the site (and lead to collisions with flying birds, including the listed California Brown Pelican, especially on foggy days).

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[1] The term solarization refers to sterilization of soil by covering it with plastic sheeting for roughly six weeks during warm weather. The sun's radiation is converted to heat by absorption, heating the material above 60°C, hot enough to kill seeds and pathogens in the soil.

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