FH & A

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# BALLONA WETLANDS/PLAYA VISTA DEVELOPMENT DRAFT ENVIRONMENTAL IMPACT REPORT BIOTA • AMPHIBIANS, REPTILES AND MAMMALS

## INTRODUCTION

This report summarizes approximately one year of field studies of the amphibian, reptile and mammal populations of the Ballona wetlands system, Playa del Rey, Los Angeles County, California. The primary purposes for these studies was to provide updated information concerning the existing conditions of these organisms in the wetlands and adjacent habitats, and to summarize these conditions within the Playa Vista project environmental documents. The information given regarding the current status of small vertebrate populations in the system is supplemental to that contained in *The Biota of the Ballona Region, Los Angeles County* (1981, Schreiber et al) report on the system. It should be noted, however, that the present report differs in its overall scope, encompassing areas within the Playa Vista project which were not investigated by earlier teams, but not reiterating historical and general information contained therein.

In total, the Playa Vista project calls for the removal of native and disturbed ecosystems over all of the 1004.8 acreas within sections labelled Areas A, B, C, and D, except for ± 180 acres of pickleweed-dominated wetlands in area B. Area A would be developed into a marina complex, while other sections would become residential and commercial complexes of varying densities.

Based upon requests for information from biota team coordinators, major emphasis in field studies and preliminary reports was given to Phase One of the Playa Vista project. This phase would remove all existing terrestrial habitats outside the ± 180 acre saltmarsh wetlands, including open fields dominated by ruderal ("weedy, largely non-native") growth and scattered elements of coastal sage scrub. A few small areas of saltmarsh wetland vegetation (not part of any tidally-flushed wetlands) and degraded riparian habitat (freshwater-supported)

would also be eliminated by the project. Proposed mitigations for these losses include the creation of a narrow revegetated riparian corridor along a realignment of Centinela Creek (intended to function as a flood control channel) and a small freshwater marsh habitat (within and surrounding the catchbasin at the west end of the channel).

A significant corollary of the development project is the protection of the tidally-flushed saltmarsh wetland in Area B, restoration of which is part of the agreed-upon mitigations. The differing values and potential of partial and full tidal flushing of these habitats are discussed from the perspective of the herpetofauna and mammals on the site.

Numerous preliminary reports were submitted to the team coordinators during the field study period (March 1990 to March 1991). These reports discussed and summarized findings, and are reiterated herein as appropriate.

## PROJECT AREA

The proposed Maguire Thomas Partners Playa Vista residential project encompasses the remaining undeveloped natural and disturbed vacant areas collectively known as "Ballona Wetlands." Overall, the project area includes tidally-flushed (historically) saltmarsh, relictual coastal dune remnants, Centinela Creek freshwater channel, former agricultural fields, and disturbed uplands with existing manufacturing complexes, ruderal graded areas, recreational facilities, and naturalized habitats on dredging spoils.

If fully-developed, the Playa Vista project will alter the natural and invasive habitat formations and resources on all lands east of Lincoln Boulevard (areas "C" and "D"), and all lands north of Ballona Channel (including area "A," west of Lincoln). A narrow corridor of re-created riparian vegetation will line the runoff channel to be constructed along the base of the Westchester bluffs below Loyola Marymount University. Area B (west of Lincoln, between the bluffs and Ballona Channel), consisting of fallow agricultural fields, dune and wetland habitats, transected by Culver Boulevard, will be protected by a separate saltmarsh mitigation/restoration program, with the extreme eastern portion (adjacent to Lincoln) used to create a freshwater mitigation system.

Project impacts will be discussed as follows: effects of residential development on areas A, C, and D; effects of mitigation programs on areas B and C; effects of tidal flushing programs on saltmarsh habitats in Area B; cumulative impacts. Where mitigations involve habitat restoration, re-creation or enhancement, impacts will be assessed as regards biotic differences between existing natural systems (to be lost or altered) and the proposed new systems. Sensitive species impacts and changes in, or loss of, habitat will be particularly important. Also, the type and quality of habitat lost is of importance in assessing project impacts and net benefits of mitigations.

## PREVIOUS STUDIES

The last comprehensive survey of the flora and fauna of the Ballona system was *The Biota of the Ballona Region, Los Angeles County*, which provided a compilation of field studies on component groups within the biota, with each section authored independently by one or more specialists. Although most of these studies were conducted through all seasons over one or more years, the sections vary in levels of detail, methodologies and objectives. Overall, this report comprised an adequate understanding and analysis of the flora and fauna of the site at that time, and is the data baseline against which new information is assessed.

Reptiles and amphibians were investigated by M. P. Hayes and C. Guyer, who summarized existing literature on the Ballona herpetofauna, and provided maps and narratives for all species found. Their methodologies consisted primarily of direct field observations and collections. Their data adequately documented the nature and diversity of the fauna, as well as behavior, diet, phenology, reproductive cycles and relative abundance of each species found. At that time, species diversity of both amphibian and reptiles was relatively high, but with certain organisms restricted to narrow ecological zones, or existing only in low population densities. No further studies specifically of the Ballona system herpetofauna have been published, although several local schools apparently continue to collect or search for amphibians and reptiles in the area (C. R. Carter, pers. comm., 1990).

Mammals were studied by R. D. Friesen, W. K. Thomas and D. R. Patten, who completed a total of 2,005 trapnights on the property, surveying in all major ecological subdivisions south of Ballona channel. Trap results were supplemented by field observations, compilations from existing literature, and specimen records from institutional collections. Their work contrasted in part with that performed one year earlier by Envicom (in *Environmental Profile of the Playa Vista Master Plan Area*, report by Jones and Stokes), in reporting slightly different trapping results, species identifications and/or distributions. Overall, they listed 19 species of mammals residing or foraging within the wetlands habitats, of which 6 were introduced (=non-native). As many as 20 other species were known or suspected to have at one time utilized the area, but no longer could be shown to persist on site. The decline or elimination of some species was historical, having occurred as a consequence of initial developments in the area, or as a consequence of the channelization of the water systems. Other species may have been extirpated more recently, either directly (by hunting or competition by non-native species), or from habitat degradation, reduction or loss.

Studies or reviews produced for the Ballona habitat restoration program since the 1981 Schreiber report include the *Ballona Wetland Habitat Management Plan* (National Audubon Society, by Shapiro & Associates, 1986), which discussed the herpetofauna or mammals only as part of larger ecosystem concerns; and several documents produced by the Pacific Estuarine Research Laboratory [PERL], including: *Research for Adaptive Management of Ballona Wetland*, Tech. Rpt. 89-02, 1989; a Spring 1990 Progress Report; and *The Functioning of Ballona Wetland in Relation to Tidal Flushing; Part I -- Before Tidal Restoration*, 1991. These reports focused on ecosystems, marine and terrestrial invertebrates, and birds, but did not specifically discuss amphibians, reptiles or mammals (except red foxes, in the 1991 report).

During the past 10 years, the State of California, Department of Fish and Game (CDFG), and U.S. Fish and Wildlife Service (USFWS) have enacted statutes or adopted resolutions changing the legal or protected status of some Ballona wetlands organisms. Of the amphibians, reptiles and mammals known to occur, or believed to have occurred historically on site, 4 mammals, one lizard, and one turtle are listed by the state of California, as Species of Special Concern (CDFG), "Special Animals" (Natural Diversity Data Base, 1990), or candidate species for

federal listing as threatened or endangered. Of these, only two (Southern California salt marsh shrew and southern marsh harvest mouse) are known to persist today in the Ballona system (*sensu latu*), and one of these (the mouse) was recently synonymized within a more widespread taxon (George, 1991). This synonymy effectively removes the subspecies from all listings (state and federal) by virtue of its no longer being recognized as a distinctive or isolated population.

No other reptile or mammal taxa listed in the 1981 Schreiber report have been synonymized or otherwise reduced in status. Four of the six protected-status organisms are so listed as subspecies, occurring at the species level over broader ranges or in other, separate populations. Williams (1986, *Mammalian Species of Special Concern in California*) discusses the taxonomic status and ecological requirements of sensitive mammals in southern California estuarine habitats.

## METHODS AND RESULTS

Since the March, 1990, FH&A biologists have conducted numerous separate surveys of the wetlands and surrounding coastal sage scrub habitats, with emphasis given to sensitive species, and to locating and censusing all naturally-occurring reptile and mammal populations. All portions of Areas A, B, C, and D were investigated, and trap placements were situatied to cover all potential natural habitats. Literature reviews and searches of computerized and handwritten field notes from other local researchers and institutions were conducted. Agency contacts (ie. Calif. Fish and Game, U.S. Fish and Wildlife Service) were established to obtain information concerning the status of selected species on and off the property, and to assist in analyzing the effects of red fox predation on the Ballona ecosystem.

Mammal trapping utilized Sherman extra-long aluminum box-style live traps, subjectively placed in potential small mammal habitats along linear transects or on measured intervals along conventional traplines. Nearly 1,000 trapnights were accumulated, and all areas were also surveyed visually during the day. Techniques employed followed standards developed over many years of censusing rodents and other small vertebrates in wetlands and other habitats.

Reptiles and amphibians were surveyed opportunistically by turning sheltered microsites (beneath debris), placing "trap boards" in specific habitats, sifting dune sand, listening for nocturnal calling (frogs), flashlight searching, can seining, and visually searching suitable habitats. Methodologies also incorporated those recommended by Corn, P.S. and R.B. Bury (1990, *Sampling Methods for Terrestrial Amphibians and Reptiles*, USDA Forest Service PNW-GTR-256, 34 pp.). Pitfall trap records were supplied by R. Mattoni, from a system of shallow bowl traps set for arthropods.

Field investigators included FH&A biologists F.T. Hovore, M.C. Long, and M. Kouba; additional field information was supplied by C. R. Carter and D. Soltz of the biota team. Capture and release of reptiles and mammal trapping was conducted under California State Department of Fish and Game permits #0073 (Hovore, exp. 1991), #1312 (Kouba, exp.1991) (both renewed through 1993).

**Report of Surveys: Reptiles and Amphibians**

Extensive ground surveys for amphibians and reptiles were made over the entire project site and into adjacent coastal sage habitats. Reptile populations, while limited in species diversity, are relatively high in individual numbers, in part due to their adventitious use of unnatural non-saline habitats such as exist in Areas A and D. Amphibians populations appear to be extremely low, and only one treefrog and three slender salamanders were found in normal habitats. Western toad tadpoles were seen or reported in seasonal accumulations of fresh water in Area D. While, comparisons of present amphibian and reptile abundances with those reported in the Schreiber report must be cautiously drawn (due to subjective differences in survey methodologies, and changing environmental and non-natural factors), some obvious inferences may be made.

Ballona's original tidally-inundated saltmarsh habitats probably did not support many-- if any-- of the species which now occur over the area, as most of the fauna presently consists of typically terrestrial or freshwater-dependent organisms. Species distributions and habitat preferences therefore correspond to existing unnaturally-created (but naturalized in surface character) habitats, and are arrayed rather incongruously over the property. For example, highest reptile numbers occur along gas line service levees and in the attendant debris piles,

while lowest use areas are the relatively undisturbed pickleweed (*Salicornia*) stands and saltflat hardpan. Amphibians would not normally occur in saline or even brackish water systems, and so the increased amounts of surface freshwater habitats following the exclusion of tidal flushing have favored their spread and permitted elevated population densities. During the study period, however, the quality and salinity of surface water flows has been rapidly changed by environmental and disturbance factors, with a resulting decline in amphibians. During the drought conditions which prevailed through the winter of 1990/1991, the "freshwater" channels in Area B were hypersaline, a condition which may have been caused by low inflow rates and dissolved soil salts. In fall, 1990, a massive discharge of street runoff was directed into Centinela channel, flushing much of Area B with freshwater of unknown chemistry. The net effects of these hydrological changes has not yet been determined, but in all probably the alternation of saline and fresh waters in such a short time span probably served to eliminate most amphibians in the affected areas.

Hayes and Guyer (in Schreiber, 1981) found two snake species, the common kingsnake, *Lampropeltis getulus californiae*, and San Diego gopher snake, *Pituophis melanoleucus annectens*, to be relatively abundant in the Ballona wetlands. We encountered these same two species in roughly similar numbers to their findings, and over a similar range of habitats (in comparable areas). Gopher snakes were equally abundant in Area A, and the two species (which typically inhabit a broad range of communities, feeding on a spectrum of smaller vertebrates) appear to be reproducing successfully in the larger tracts of land, whatever their surface character. It must be pointed out, however, that abundance estimates for many reptiles and amphibians are directly related to the amount of human debris under which to search (this was particularly true in the spring months), and it is therefore also probable that population densities are in part positively correlated to human disturbance in the area.

Most snake specimens found were subadult or adults, of potential breeding size. All individuals were scarred, and the largest kingsnakes (> 120 cm overall length) and gopher snake (±150 cm) all had broken tails, or had the terminal few cm missing. This scarring may have been caused by human attempts to injure or kill these reptiles, but appeared consistent with wounds inflicted by predators,

possibly birds, but probably red foxes. No other species of snakes were found or reported.

Alligator lizards (*Elgaria* [=*Gerrhonotus* auct.] *multicarinatus webbi*) were encountered in relative abundance in the same areas and under the same circumstances as reported by Hayes and Guyer, but most specimens found were juveniles or small adults, and nearly all (about 90% where positive identification of individuals assured no duplication of records) were missing portions of their tails. This, combined with the scarring noted above on the snakes, suggests active predation by foxes or other species; when disturbed, alligator lizards characteristically seek cover under low vegetation or debris, often thrashing their tails behind them in a distraction display. Alligator lizard belly scales were found in a fox scat on the Hastings Canyon terrace.

Fence lizards (*Sceloporus occidentalis biseriatus*) remain the most abundant reptile species in all sites surveyed, but their densities and distribution are clearly related to the presence of debris or elevated habitats within wetlands formations. The areas of greatest abundance are along the margins of the elevated service levees for the gas lines on the northwest side of Culver Blvd. Terrestrial invertebrates in these areas are primarily non-native or disturbed habitat taxa such as isopods, snails and black widow spiders, and abundances beneath debris are extreme. The high number of alligator and fence lizards in these disturbed habitats is probably directly correlated to the elevated densities of these few prey items.

Side-blotched lizards (*Uta stansburiana*) are found in much lower frequencies in the project area, and occur regularly only in drier habitats away from the wetlands. They have not proliferated along the disturbed levee habitats, probably due in part to competition and/or predation by *Elgaria* and *Sceloporus*, but in general due to their preference for open, sandy substrates. This observation corresponds with the findings of Hayes and Guyer, although no census of individual numbers was undertaken by us. The greatest numbers of *Uta* occur on the Hastings Canyon alluvial fan, on the bluff faces, and in Area A.

The silvery legless lizard (*Anniella p. pulchra*), a City of Los Angeles sensitive species, occurs sporadically over the area, wherever fine-grained sandy

substrates permit its burrowing habits. Numerous individuals of all sizes were encountered beneath debris in the relict dunes, and one individual was found high on the bluff face just west of Lincoln. Hayes and Guyer recorded it from a small alluvial fan at the base of the bluffs in the western portion of Area B. Excavations for this species beneath iceplant and other non-native vegetation along the dune margins were unsuccessful (FH&A, report to Ballona team, 1990).

Only one adult treefrog was seen along the riparian corridor in area D, and none were located in the marshes in area B, and no evidence of larval forms was found by can seining the canal south of the McDonell-Douglas gate. Channels in Area B which Hayes and Guyer noted as containing treefrogs (*Hyla regilla*) in abundance were hypersaline in July, 1990, and no evidence of amphibians was found in this area. Tadpoles (probably western toad, [*Bufo boreas halophilus*]) were reported from seasonal freshwater accumulations in area D in June, but this habitat was entirely dry by month's end, and no verification of species was obtained. Nocturnal surveys encountered no frogs or toads, and none were heard calling either diurnally or nocturnally, in conditions ranging from relatively warm and breezy to cool with misting rain.

Although crayfish are relatively common in Centinela channel through area D, few aquatic invertebrates occur in the waters (other than mosquito larvae). Full channel seine net surveys were conducted in conjunction with fish and invertebrate sampling (by D. Soltz and C. Carter), and in all of Area B, where water systems have high salinity, neither amphibians or freshwater aquatic invertebrates were found. Further, according to information given in the PERL report (1991, p. 15), Mosquito Abatement District workers sprayed oil into some of the water systems in area B, and dug ditches to eliminate standing freshwater; if this occurs regularly, it would further lower or eliminate reproductive success by amphibians in open water systems. In all probability, the extremely low amphibian populations in the Ballona wetlands area are directly attributable to a combination of drought effects, human disturbances, and irregularly changing water quality and salinity of the freshwater channel systems.

The garden slender salamander (*Batrachoseps pacificus major*) was encountered in low numbers in Area A (where it was also found by Hayes and Guyer), where it occurs under debris and in natural litter accumulations beneath

laurel sumac and other large shrubs. This species has an unusually long adult life (J. Wright, LACM, pers. comm.), and may persist in an area beyond the point at which habitat changes induce general reproductive failure. Size ranges in the individuals found in Area A appeared to represent both juvenile and adult stages, and it is presumed that the species is successfully breeding on site.

Of the 9 amphibian and reptile species recorded by Hayes and Guyer in 1981, all are still in existence in the Ballona system, although the relative abundance of frogs and toads appears to be greatly reduced. Distributions of snakes and lizards correspond to those given in their report for areas A and B, and we found the same species to occur in Area D as well. No snakes or amphibians were found in Area C, and lowered densities in this area would be a reflection, no doubt, of its more heavily-disturbed nature and relative isolation. At least western toads would be expected to occur in this habitat given sufficient standing water systems for breeding.

**Mammals**

A total of nearly 1,000 trapnights were run in a series of transects covering all habitats and areas of the property. Trapping was hindered somewhat by the presence of large numbers of transients living in Areas A and B during spring, 1990, and on several occasions traps were disturbed or stolen. Argentine ants fouled entire traplines in sections of Area C, and red foxes (*Vulpes vulpes*) (or domestic pets) chewed on or otherwise disturbed or relocated several traps. The intent of the surveys were to establish presence or absence of species in an area or habitat, rather than to repeatedly census populations. This is because no sensitive small mammal species readily censused in standard traps occur on the project site; and population activity of selected species (such as voles) can be assessed visually once presence has been determined. The Southern California salt marsh shrew (*Sorex ornatus salicornicus*), a California Species of Special Concern is best censused by pitfall trapping, a method which often results in the death of the specimen, and which requires a Memorandum of Understanding from the Department of Fish and Game. R. Mattoni used a systematic pitfall trap array over all of Area B, sampling invertebrates, and did capture a single specimen of the shrew.

Very few rodents were taken during the year of trapping conducted, with most captures being western harvest mice (*Reithrodontomys megalotis longicauda*) and house mice (*Mus musculus*), the latter being relatively widely-distributed in and around disturbed areas or unnatural habitats (ie. gas levees). Less-common species such as the California vole (*Microtus californicus stephensi*) and dusky-footed woodrat (*Neotoma fuscipes macrotis*) may have been more abundant or widespread over the site at one time, but both now appear restricted to specific isolated habitat types. The vole in particular would be susceptible to red fox predation, and only two specimens were recorded during 1990/1991, one from Area A and one a pitfall trap in an isolated willow-wetland along the bluff base in Area B (R. Mattoni, pers. comm.). Rabbit and squirrel populations were very low in the area during survey dates, despite abundant fecal and burrow evidence of past occurrence. Overall, the ratio of trapping success was well below that of all earlier surveys, and almost all small mammal populations appear to be declining.

Pocket gophers (*Thomomys bottae* ssp) remain abundant in all elevated or dry habitats, and are the only rodents identified from over 150 fox scats. Raccoon (*Procyon lotor psora*) tracks were seen on both sides of Culver in area B, and opossum (*Didelphis v. virginiana*) tracks were found on the south side of Culver. Both opossum and striped skunk (*Mephitis mephitis holzneri*) carcasses were seen on Lincoln and Culver boulevards during spring, 1990. Raccoon, opossum and striped skunk have all become "urban animals" in southern California, successfully reproducing in attics, crawl spaces, street drains and other similar sites. Thus they would be expected to persist in or reinvade Ballona over time, regardless of negative changes in habitat quality. The longtailed weasel (*Mustela frenata latirostra*) was reported from a skull fragment by Friesen et al., and it may yet persist in low numbers, feeding and hiding in gopher burrows.

Eastern red foxes are abundant over all areas, especially Areas A, B and D. Their point of introduction is speculative, but the single individual gray foxes reported in 1981 by M. Hayes and by Envicom (both records are listed in the Schreiber report, p. M28-29) may actually have been for red foxes. No other holocene records of gray foxes for this area have been seen by us, and none were found by Friesen et al., although it is reasonable to assume that the native fox species once occurred in this area.

The PERL group surveyors reported seeing foxes in all of their sites (1991, p. 53) during nearly all months of the year; their numbers probably reflect at most a small sampling of the actual fox population density. Active fox burrows were found in several sections in the northwestern portion of Area B, on the bluffs east of Hastings Canyon, and on Westchester bluffs below Loyola-Marymount University. In Area B, red fox pathways form extensive networks through the *Salicornia*, the intersections clearly marked with scats, fur and musk. Surface digging (for rodents and crabs) is evident everywhere, and the dismembered carcasses of dozens of shorebirds and seabirds were found in Area B. Fox scats (± 100) examined in spring months contained bird feathers ( from gulls, terns, egrets, several duck species, undetermined songbirds, and great blue heron), crab parts, gopher bones, small amounts of fur (including domestic cat), vegetable matter, and rubber bands, apparently from golf ball centers. Examination of over 150 scats in summer and fall, however, had reduced rodent materials (all gopher), and bird feathers increased in frequency of appearance, along with crustacean exoskeletons (mostly crabs), vegetable matter and inorganic debris (including more golf balls). Raccoon scats examined (± 20) consistently contained only crab or crayfish exoskeletons.

As noted above, small mammal population densities appear to be much lower than during the 1981 Friesen et al. surveys, and our trapping results are also below the rates of return experienced in the same habitats by Los Angeles County mammalogists in 1988 (Dr. S. George, LACM, pers. comm. to FTH, 29 May 1990). Species diversity has decreased, with species most sensitive to fox predation (ie. voles and lagomorphs), significantly reduced or absent from habitats wherein they were formerly trapped or observed. Many habitats capable of supporting numerous herbivorous or granivorous rodents (such as the Hastings Canyon scrub habitats) presently appear to possess virtually no rodent fauna except gophers. Trapping in desert and chaparral ecosystems during this same time period yielded normal results, ranging from ± 20 - 45% rate of return (FH&A, misc. studies), so the decline in trapping rates cannot be entirely attributed to drought or other external conditions. The slow degradation of Ballona wetland habitats has no doubt contributed to the loss of mammal diversity and numbers, but it appears that many, if not all, of the specific declines by taxon may be a direct result of depredation by red foxes.

The US Fish and Wildlife Service (1990, DEIR, Seal Beach Naval Weapons Station, Endangered Species Management and Protection Plan) has documented the direct decline or extirpation of smaller vertebrates and birds in relation to rising fox populations on site. Richard Zemball (USFWS, pers. comm., July 1990) stated that "he would not be surprised" to learn that red foxes at Ballona had virtually eliminated surface-dwelling rodents. Sarah George, LACM (pers. comm., August 1990) also felt that the apparent decline in rodents, including harvest mice, could be a consequence of fox predation rather than any other single environmental factor. While it might be premature to draw absolute conclusions from recent trapping efforts, it appears clear that fox predation is an immediate threat to the continued viability of the Ballona ecosystem, and eventually may be the primary constraint upon vertebrate species persistence or restoration.

## SENSITIVE SPECIES

The only listed sensitive species taxa on the site it the southern California saltmarsh shrew, a federal candidate, category 2, for threatened or endangered status, a California "Mammal Species of Special Concern (CSC)" (CDFG, 1990), and a California "Special Animal." The state designations are administrative, comprising a "watch" alert for taxa which are declining in the state, and while they carry no formal legal status, the CSC list cover letter suggests that researchers, "consider these species and subspecies as 'sensitive' during preparation and review of environmental documents." The only other recently-listed special status species, the southern marsh harvest mouse, was placed into synonymy with the widespread western harvest mouse, and therefore is no longer listed by state or federal agencies (Caryla Larsen, CDFG, and Dick Zimball, USFWS, pers. comm., March 1991).

One specimen of the shrew has been seen from the Ballona system, taken in a pitfall trap set in the willow-wetland portion of Area B along the western base of the bluffs. It has been given to the Los Angeles County Natural History Museum Dept. of Mammalogy for further study. Friesen et al. also saw one specimen, collected by M. Hayes in a pitfall set for amphibians and reptiles. The destructive nature of pitfall traps makes their use difficult and potentially destructive as an informational survey method for this apparently rare species,

and so we have no real knowledge of its population density or distribution in the Ballona system. Given its food habits and preference for *Salicornia* habitats, it is probable that it yet persists in low numbers over much of the area.

## DISCUSSION

### Existing Conditions

All existing habitats in the Ballona wetlands system are clearly under environmental stress and in varying states of transition from natural organization to increasingly invaded, exotic compositions. Human disturbances have for many years degraded the quality and species diversity of the plant communities, replacing much of the original biota with cultivated fields (now ruderal systems) or grading deposits. Invasive alien plants such as iceplant, myoporum and pampas grass dominate many substrates, and the hydrologic systems on site change from freshwater to hypersaline seasonally and by controlled flooding.

Biotic diversity has been further reduced by elimination of sensitive (in the biological sense of the term) species and replacement by ecological generalists, either native or introduced. Population densities of many vertebrate organisms are extremely low, and the on-site ranges of certain species have been greatly reduced or confined from historic parameters. Small mammal populations in particular are under constant predation pressure from red foxes, which appear to be increasing exponentially in numbers (this is termed a "mesopredator release" by USFWS, indicating an unrestricted upsurge in population numbers of a smaller, lower-trophic level predator species when it has few or no natural biological controls). Species such as voles and harvest mice, active above ground during all seasons, may eventually be extirpated by these predators.

Reptiles are more dependent upon food resources and substrate consistencies than on vegetation or macrohabitat types for long-term population maintenance, and the high numbers of black widow spiders and non-native isopods appear sufficient to support present lizard densities. In the absence of red fox depredation, existing lizard populations and pocket gopher colonies appear adequate to support viable numbers of gopher snakes and kingsnakes. Elimination of food sources and reductions in population numbers of individuals

by fox predation could ultimately extirpate snakes and large lizards from the system.

Amphibian populations at present appear to be virtually non-existent, except for the western toad, which can persist in strictly terrestrial habitats, where it breeds in seasonal surface accumulations of freshwater; and slender salamanders, which have long lifetimes which permit them to "ride out" temporary declines in habitat quality. They also do not depend upon open water system for reproduction. The treefrog populations at Ballona may yet persist in inundated rodent burrows and other protected habitats, but the current irregular hydrology in the channels precludes active population maintenance and reproductive survival.

**Restoration Proposals**

One of the proposed corollaries of project implementation would be the restoration of saltmarsh habitats by returning tidal flows to the system. While this proposal is an impact of the project, it is apart from other impacts in that it will be created with the intent that it benefit the system. Therefore, it is considered herein as part of the discussion of wildlife on the site, as it may in fact represent a return to some levels of historical habitat value. The effects of the differing levels of tidal flushing on small vertebrates in Area B may be considered in the context of the existing communities, some of which would not normally be part of a tidally-flushed saltmarsh. Freshwater riparian systems on site may be relatively recent in their colonization of lowland habitats, particularly along the eastern portion of the dune sand sheet. Vertebrate species inhabiting these areas have either entered the system following the advent of the communities (if they are riparian-obligate organisms), or have shifted into the riparian habitats as part of their broader preferences for habitat types. Many terrestrial organisms now inhabiting pickleweed subcommunities are widespread generalists (such as the kingsnake, gopher snake, alligator and fence lizards), and are neither restricted to nor dependent upon any particular habitat type on site. These species may be equally or more abundant in adjacent upland coastal sage scrub and chaparral habitats.

Species with restricted on-site distributions, either to particular soil types or to vegetation/communities, are generally more typical of the original Ballona wetlands biota. Species such as the harvest mouse and shrew characteristically inhabit saltmarshes, maintaining populations at the margin of the high-tide zone, or nesting above tidal inundation lines and foraging into the system during intertidal retreat. Depending upon their need for specific resources in any given community, these species may or may not occur in adjacent upland habitats. The fossorial (burrowing) legless lizard appears to be restricted to certain edaphic (soil) sites in the Ballona system, primarily fine-grained alluvium or dune sands, although it also occurs in loamy soils or beneath layers of leaf duff in oak woodland and chaparral habitats. One specimen was taken beneath debris near the top of the bluffs east of Hastings Canyon, in a coastal sage scrub and ruderal grassland habitat. Its restriction to particular microhabitats in Ballona would be more a result of unsuitable conditions such as soil inundation or salinity than plant community type.

A return to partial tidal flushing would bring salt water into now terrestrial "upland" portions of the habitat, removing existing vegetation formations, and eliminating or periodically inundating refugial areas such as road margins and debris piles. If incurred gradually, these impacts could permit a retreat to more easterly habitats by more mobile vertebrates, including lizards, snakes, and most mammal species. Organisms which are capable of tolerating or surviving temporary saline flooding (such as voles, shrews and the harvest mouse) might maintain or establish populations within halophytic vegetation systems remaining intact or which replace present habitats. Shrews may benefit populationally from a return to mid-tidal flushing, as such a system could provide for wider zones of foraging habitat while retaining marginal and upland habitats for nesting and retreat from high tides. A diversity of shrew food sources might likewise be promoted by a mid-tidal system. The few amphibians currently persisting in non-saline habitats or seasonal freshwater pools would be extirpated, unless they are relocated, or are able to migrate up channels into the proposed riparian and pond systems.

Few, if any, terrestrial vertebrate species would be expected to flourish or even persist within the broad saline environments provided by full-tidal flushing, except as they are able to move in and out of the system during intertidal episodes.

Marginal habitats may provide refugia for rodents and reptiles, provided such habitat values as cover, forage, food and movement corridors are retained. Also, an unnaturally abrupt environmental transition to the proposed freshwater systems would be less species-supportive than would a gradual zone of transition through a brackish water interface. The small and homogeneous nature of the full-tidal system might greatly restrict or remove existing terrestrial vertebrates from the flooded zones, except on a transitory basis during low tides. Properly established, managed and protected, the freshwater systems and surrounding coastal sage scrub habitats could continue to support a number of the species now found on site, particularly reptiles.

Project impacts are discussed separately, in the sections that follow.

## PROJECT IMPACTS

The following terminology has been taken from R. Gustafson, *The Vegetation of Ballona*, in Schreiber (1981), modified parenthetically to correspond with more current usages and definitions per R. Holland (1986, *Preliminary Descriptions of the Terrestrial Natural Communities of California*, CDFG document, 156 pp.). The effects of project implementation on the Ballona wetlands habitats may be summarized either by natural community changes, or by area description using the letter designations of the Playa Vista project and its predecessors ("Area A, B," etc.). In terms of assessing losses or gains in species diversity, the community analysis may be more effective, while the area system may be somewhat easier to comprehend geographically. For the community approach, impacts only will be discussed; mitigations for impacts will be given in the discussions of impacts by area, and will consider both community and area aspects equally.

General impacts by area are given cumulatively, with impacts for Areas A, B, C and D differing from those to Areas B, C and D only by the elimination of the impacts to Area A. Development of Areas B to D but not A would retain the habitat values of A, but removes all other support habitats on site. These impacts are discussed by area and habitat type below, and so do not require identification as separate impacts. Phase 1 impacts to small vertebrate faunas by area are identical to general impacts, again absent the Area A impacts. Species names already given in the first part of this report will be cited herein as common names only.

## BIOTIC COMMUNITIES

### Pickleweed saltmarsh, saltflats and mudflats, transitional pickleweed and salt pan (southern coastal salt marsh)

These subcommunities occur sporadically to broadly over much of what is called Area B, in the central portion of Area A, and with small stands of pickleweed also occurring in the other areas. Aside from the naturally-occurring, if severely degraded, habitats in Area B, all the other pickleweed formations exist atop grading or dredge spoils, and are not remnants of historical saltmarshes, but rather are attributable to recent colonization of salty topsoils. Amphibian species use of saline environments is negligible, and reptile use is adventitious, reflecting the lack of

tidal flushing and saline hydrology which has permitted colonization by typically terrestrial species. Mammal use of the sites includes the saltmarsh endemic southern saltmarsh shrew, and facultative saltmarsh species, the western harvest mouse, and California vole. Other mammals in the system occur as transients, or are species (such as raccoon, opossum, red fox) which forage widely over all habitats on the property.

Impacts to the small vertebrates of this habitat would be from two phases of the project: community elimination for development, and saltmarsh and freshwater habitat restoration. Areas A, C, and D would be lost altogether as habitat, and so would their small vertebrate faunas. All species presently existing on these sites would be extirpated from each area, with the possible exception of house mouse and other feral non-natives. No shrews have been found in these areas, although the slight possibility exists that the species could occur in association with saltmarsh vegetation systems in Area A. Voles have been confirmed in Area A, and the harvest mouse occurs in Area C. Loss of these areas would reduce the overall genetic diversity of these species on site, and would incrementally lower population densities, as well as remove dispersal areas from the system. All species inhabiting these subcommunities at present would be expected to persist on site in Area B, depending upon conditions during and following habitat restoration.

The establishment of either mid or full tidal flushing regimes over the remaining saltmarsh habitats in Area B would benefit the endemic and facultative species presently extant, although full tidal flows could reduce refugial areas for species not capable of living in the flooded zones. Whichever level of tidal flushing is chosen, the design must include adequate zones of habitat above the high tide line. Preservation of adequate stands of pickleweed along with marginal upland habitats surrounding inundation areas should assure continued use of the site by the existing saltmarsh species.

**Willow and freshwater marsh (southern willow scrub, coastal freshwater marsh)**

These habitats occur primarily along the course of Centinela Creek, and tributary drainages in the system, and in low spots or areas of seasonal rainfall accumulation. The largest stands of willow occur along the portion of Centinela Creek passing through Area D, and in two sites in Area B, with the densest grove

being adjacent to the Playa del Rey dune remnant. These latter systems appear to be of recent origination, and probably began as a result of runoff accumulating in the topsoils and channels following the cessation of tidal flows into the wetlands. The vole and shrew were found in the willow-dominated systems along the southern margin of the bluffs in Area B, and these areas support the California kingsnake and gopher snake as well. During the Schreiber report field investigations these areas were found to support healthy populations of treefrogs, and in general, riparian habitats have high faunistic diversity. At Ballona, this holds true more for birds than for other vertebrate species.

Project implementation would eliminate the existing riparian and freshwater marsh habitats in all areas except B, incrementally reducing the number of individuals of all organisms occurring therein. Restoration to mid or full tidal flushing may eliminate willow habitats along the dunes and bluff bases through inundation or elevated groundwater salinity. Creation of a freshwater riparian corridor and marsh as part of the drainage course and catch-basin system for the project along the southern portions of Area D and into the extreme eastern portion of Area B could provide replacement ecosystems for these losses, provided that they are established and functioning prior to the elimination of existing sites.

**Coastal dunes (southern dune scrub)**

The remnant dune habitats at Ballona possess a severely limited and highly degraded fauna. Only the lower strip of the inland face of the dune exists, and in this the natural sand is mixed with construction debris; the entire system is overshadowed by towering residences built atop the original dune. Much of the present vegetation is non-native, and the lower portion of the sand sheet is densely clothed with iceplant, pampas grass and myoporum. Easy access to the remaining area by humans, pets and vehicle traffic has further eliminated natural habitat values, and increased the amount of debris accumulated on the substrate. No amphibians have been found in this area, and the only reptiles seen were legless lizards, and a few side-blotched and fence lizards. Kingsnakes and gophersnakes no doubt occasionally stray into the area, but it is isolated from most other natural systems by the residences and commercial development, Culver Boulevard, and the large inflow channel just east of the willow thickets. Red foxes appear to forage

through the dunes regularly, and there is no sign of rodent or other small mammal activity (other than gophers).

The proposed development of areas other than this portion of Area B would not have a direct impact upon the dune system, except as it incrementally lowers population densities of terrestrial vertebrates in general. The relatively low-mobility legless lizards probably do not now have any genetic exchange with individuals in the coastal sage scrub areas of the project zone, and the project would not alter this situation negatively or positively. Project implementation includes a restoration of the native dune vegetation, and this could in turn enhance the values of the system for small mammals and reptiles.

Coastal scrub (Diegan coastal sage scrub)

This community, which is nowhere represented in a typical condition, occurs along the margins of the site on the bluff faces, and in a successional growth on the dredge spoils in Area A. It is a terrestrial community, possessing primarily generalist faunal elements in its present state, but with sensitive reptile or mammal species listed as having occurred historically (San Diego horned lizard, *Phyrnosoma coronatum blainvillei*, Pacific pocket mouse, *Perognathus longimembris pacificus*). No evidence of these or other sensitive taxa has been found during any of the surveys conducted in the past 10 years (including the Schreiber reports), and it is probable that they no longer exist locally in viable populations.

The fauna of the various forms of coastal sage scrubs on site is not particularly rich nor abundant. Species such as the dusky-footed woodrat, gopher snake, kingsnake, fence and alligator lizards are generally distributed in scrub and chaparral habitats in southern California, and are not endemic to the specific sage scrub types of Ballona. Only one species, the slender salamander, is confined in the project property to coastal sage scrub habitat, entirely within Area A. Most of the species observed or suspected to occur do not have high population densities, due in large measure to the reduced and isolated size of the habitat patches. The low numbers may also reflect recent entry into these habitats, low founder numbers, reduced genetic vigor, and depredation by humans and introduced predators.

Project implementation would eliminate altogether the fauna of the coastal sage scrub successional community in Area A. This would reduce diversity by the loss of the slender salamander, with little probability of recolonization of the system from adjacent suitable habitats (as none exist). Although the woodrat has not been found elsewhere within Ballona, it is common in similar habitats and chaparral locally, and no doubt persists outside the zone of impacts. No other species will be lost outright from the area by the development of this scrub system. The loss of individuals of other species will create an incremental impact upon overall population vigor and numbers, and will reduce genetic diversity proportionally.

The coastal sage scrub habitats on the bluffs are in a degraded condition due to dessication (from the recent drought), saltspray, and invasion by exotic ornamental plant species. Small vertebrate diversity is relatively low, and the system overall is under predation stress from red foxes. No development is planned on the bluffs themselves, but the realignment of Centinela Creek would create a riparian zone at the base of the habitat. This would benefit the coastal sage system if it increases protection of the area, and if vegetation restoration is extended onto the bluffs (including removal of iceplant and other exotics). There should be no net loss of species diversity on the bluffs due to project implementation, except as secondary impacts from the introduction of additional human and pet disturbances.

**Coyote brush and pampas grass, agricultural fields (ruderal and disturbed habitats)**

These habitats occur in scattered patches over much of Area D and B, and are most prevalent on elevated grading spoils or on non-wetland soils. They support little in the way of native wildlife, except those species which occur as transients over all of the property. Kingsnakes, gopher snakes, alligator and fence lizards, house mouse, and cottontail rabbits occur in these habitats, but no sensitive species would be expected to utilize them. The loss of virtually all such subcommunities on site would result in an incremental loss of overall numbers of some species, but would not significantly alter populations, gene flow, or dispersal opportunities.

## PROJECT AREAS

### Area A

Area A, the "marina site" consists of channel dredging spoils deposited over 50 years ago when Ballona channel was dug to its present extent. The land surface is several meters higher than surrounding or original natural terrain, and the habitat as it exists has never been part of a tidally-flushed wetland. Numerous wetland indicator species and halophytic plants exist in the area, apparently supported or permitted by the presence of salts in the dredged soils (either residual or drawn from lower sediments). Overall, the area is characterized by highly-disturbed coastal sage scrub and chaparral, with large areas of invasive non-native plants; faunal elements present are typical of such degraded communities, but the area does support low numbers of facultative wetland species (such as voles). Red foxes are common throughout area A, and their depredation appears to be reducing diversity and overall abundance of smaller vertebrates. Transient humans living in the scrub area have created further disturbances, and have even preyed upon selected species. Illegal vehicle use and dumping have introduced volumes of debris.

Low numbers of rodents, including California voles, a facultative wetland species, dusky-footed woodrat, a chaparral species, and the non-native house mouse occur in this area, and population densities of all smaller mammals (including Audubon cottontail (*Sylvilagus auduboni*) were well below typical norms for coastal scrub habitats. No typical saltmarsh mammal species (such as saltmarsh shrew or western harvest mice) were taken in this area. Because house mice tended to occur in and around disturbed areas, utilizing debris and urban improvements for shelter, their numbers are higher than those of other rodents on site, and it is probable that they are expanding their on-site distribution to occupy habitat niches vacated by other species. The pocket gopher, a primarily subterranean species, appears to be maintaining normal population densities despite red fox predation. Although Area A is generally disturbed and degraded, fox predation is the probable immediate cause for low numbers of most species censused.

Several amphibian species, including garden slender salamander and western toad occur in portions of the habitat, associated with moisture-retentive debris, leaf duff, and seasonal freshwater accumulation. Great Basin fence lizards are abundant in the heavily-vegetated portions of the property, particularly around

the laurel sumac (*Malosma laurina*), and in areas of accumulated debris. Side-blotched lizards are less common, and are primarily confined to more open, sandy substrates. California kingsnakes and San Diego gopher snakes are still relatively common in area A, but most larger specimens exhibited scars on the body and tail, probably indicative of attempts at predation or injury by foxes or humans.

Construction of a marina in this site will eliminate all terrestrial flora and fauna, with no avenues for relocation or escape. Because no sensitive or endangered species of reptiles, amphibians or mammals are known to occur on area A, this impact would be considered locally important, consisting of an incremental loss of successional coast sage scrub habitat and its associated fauna. Construction of Phase One of the Playa Vista project would occur off-site and beyond Ballona channel, and does not directly affect area A.

Area B (southern section, below Culver Boulevard)

This portion of the property consists of a relatively large, primarily wetland system, with ruderal non-halophytic vegetation on the eastern portion in an area of fallow, regenerating agricultural land. Also found within Area B are a small alluvial fan/dune system, degraded saltmarsh with dense accumulations of invasive non-native flora, open saltflats, elevated soil and concrete debris berms (service roads and facilities for natural gas wells), and *Salicornia*-dominated saltmarsh. The bluffs surrounding Hastings Canyon (just west of Lincoln Boulevard) contain degraded and drought-stressed coastal sage scrub and chaparral, intermixed with invasive non-native herbs and grasses. The present fauna of Area B is predominantly upland terrestrial, reflective of the fact that this area no longer receives tidal flushing and has been colonized by species favoring habitats supported by fresh or brackish water systems. Low rainfall in recent years has resulted in high salinity in normally fresh or brackish runoff water channels, a condition which appears to have reduced or eliminated most amphibians.

Fox population density is very high in Area B, and predation pressure on smaller vertebrates is severe; fox dens with pups were noted in spring, 1990, in the saltmarsh near the main inflow channel, and on the bluffs near Hastings Canyon. Three nests of the western harvest mouse were found in *Salicornia* habitats in Area B, but all appeared to have been abandoned or were disturbed by predators. Species

diversity is relatively lower in this area, despite its ecotonal nature and relatively large acreage. No voles were trapped in the area, but one juvenile individual was taken in a pitfall in 1990 in the riparian area at the bluff base. House mice occurred in higher numbers than did native rodents, and were always in association with disturbed areas or debris. Rodent and lagomorph (rabbits and hares) activity was most prevalent along the base of the bluffs, in more sheltered habitats or around areas of human disturbance. Pocket gophers are abundant throughout non-inundated areas. Predation on native species by domestic animals was noted in Area B, and there was also fecal evidence of fox predation upon domestic cats.

Amphibian activity was virtually undetectable in Area B during 1990, at times and localities wherein Hayes and Guyer (1981) recorded abundant treefrog activity. Water quality tests conducted by other researchers (D. Soltz and C. R. Carter, pers. comm., July 1990) indicated hypersalinity in the runoff channels west of Lincoln Boulevard. This condition alone could account for lowered adult population densities of amphibians, and water quality problems would negatively affect amphibian reproduction. Subsequent flushing by sewer discharge during late summer and fall may have returned these systems from saline to freshwater, but until a stable source of freshwater is present in the system, the fluctuations in salinity and chemical quality will likely restrict amphibian population dynamics.

California kingsnakes and gopher snakes were found along the bluffs and in the lowlands of area B, usually hiding or hibernating under trash and debris. A few southern alligator lizards were found beneath debris or in open habitats, and both fence and side-blotched lizards were present, although the latter is not common away from open, sandy substrates. All of these species (except the side-blotched lizard) are more abundant in the portion of area B north of Culver Boulevard. The silvery legless lizard, a Los Angeles City-listed sensitive species, occurs in the Hastings Canyon alluvial fan, in the relictual Ballona Dunes habitats, and on the face of the bluffs above Lincoln Boulevard.

Both phase one and the general buildout plan for Playa Vista would directly affect only the southeastern portion of Area B, with the proposed construction of a freshwater catchbasin structure adjacent to the west margin of Lincoln Boulevard. The catchbasin would be surrounded by an earthen berm, and its construction would require deposition of fill into delineated wetlands. This area is presently

dominated by ruderal herbaceous non-wetland vegetation, and supports the lowest density of native faunal elements of any portion of the area. Loss of this habitat would have no significant affect on the native herpetofauna or mammals.

Once developed, the residential and commercial structures on the east side of Lincoln, and to a lesser extent on Area C, will have some long-term impacts to the saltmarsh and freshwater systems in Area B. Existing open space provides foraging and refuge values to wildlife, particularly birds and medium-sized mammals (ie. raccoons, skunks). Relatively abundant populations of kingsnakes and lizards occur in Area D, and these no doubt interact genetically with those in Area B via channel openings under the roads. The removal of these other areas as open space, even though they possess relatively low habitat values, will result in an incremental loss of population density and genetic vigor. The nature and timing of these effects upon the remaining populations cannot be assessed *a priori*, but could, in a worst case scenario, lead to inbreeding depression or inability to successfully find mates or defend territory, and eventually to the loss of one or more species.

Interruption of "normal" (=existing) freshwater flooding and nutrient deposition into Area B's lower wetlands from Centinela Creek could significantly reduce overall, long-term habitat values and restrict species diversity. The absence of a brackish water transition zone between the Centinela drainage and the tidally-flushed saltmarsh could reduce species diversity by those elements which are resource-dependent upon such ecotonal systems. Subsquently, the loss of transition zone species might directly or indirectly affect movement or population dynamics of saltmarsh species within interrelationship groups. None of the existing or historically-known amphibian, reptile or mammal species of Ballona would be directly affected by the absence of brackish systems, but a reduction of other resources could cause some species, such as western harvest mouse, to lose a portion of their food base should selected plant species be eliminated or reproductively inhibited. The saltmarsh shrew has a relatively diversified diet of invertebrates, requires moist habitats and dense cover (Williams, 1986), but is not known to be dependent upon particular water salinity levels, and so may be expected to persist in the absence of a brackish water interface.

Area C

Most of this area is highly disturbed, and the land exhibits overall habitat values which are a decrement of those in Areas A and B. Much of the substrate is heavily altered and developed, and natural resources are confined to small areas along the margins of the site, adjacent to existing residential development. A small area of delineated, adventitious wetland has been identified, and mammal use of this subcommunity is surprisingly high in terms of numbers of individuals trapped; most, however, were house mice, probably reflective of the volume of suitable habitat created by debris, adjacent residential areas, and fewer foxes. The western harvest mouse also occurs here, and appears to maintain a small population in association with ruderal habitats and isolated wetland patches. Very few reptiles (lizards only), and no amphibians were found in this area.

Development of any phase of the project as proposed would result in the elimination of this site , but no sensitive or site-restricted resources would be lost. There would be an incremental loss of open space adjacent to the wetlands, general habitat diversity, and individual numbers of those species occurring on the site.

Area D

Most of Area D is severely degraded, and a significant proportion of the area is under older fill and graded materials, existing factories, storage facilities, access roads and parking lots, evaporation ponds, and other remnants of former factory operations. Centinela Creek is confined to a narrow, steep-sided runoff channel, carrying flows from street drainage, adjacent plant operations, and wastewater dumping. Some natural runoff discharge occurs during rainfall, but generally comprises only a small portion of the flow. Opportunistic riparian elements, primarily willows (*Salix* spp.) and cattails (*Typha* sp.) have colonized channel margins and bottom, but overall the area is dominated by ruderal herbaceous vegetation. Maintenance of the channel during spring, 1990, including clearing marginal vegetation and cutting cattails and other aquatic plants. Additional riparian, coastal sage scrub and chaparral elements are mixed with invasive non-native species on the bluff faces above the area (below Loyola Marymount). In its densest growth, this scrub vegetation possesses relatively high habitat values for

reptiles, small mammals, and birds. Trapping in this area, however, yielded only house mice, and red fox activity was noted during every site visit.

As noted, house mice were the only rodents trapped in Area D, and these were commonest in association with debris and construction materials along the bluff base; none were found in open areas away from the bluffs, or in the small adventitious patches of wetland vegetation. Although still extant in 1990, cottontail and jackrabbit populations appear greatly reduced, and sightings of either species were rare. Fox predation pressure is very great in area D, and adult foxes were commonly seen hunting in and around the lawn areas of the Playa Vista building. A fox "den," lined with fur, heavily musked, and containing the remains of numerous shorebirds was uncovered in a debris pile in the southwest corner of the building fenceline. Pocket gophers were the only rodents (other than house mice) maintaining normal population levels in Area D. In general, mammal diversity and individual numbers appear to be very low.

Kingsnakes, gopher snakes, fence and side-blotched lizards occur in varying densities in Area D, with the greatest numbers of snakes occurring along the bluff base in association with disturbed habitats and debris. Trash and debris provide shelter from weather and predators, and several kingsnakes were found wintering beneath larger pieces of wood or metal (pallettes, refrigerator doors, etc.). Two juvenile kingsnakes were observed in the northern portion of the site and in the lawn area of the Playa Vista building during late summer, 1990. Overall, the reptile fauna of Area D appears to have remained moderately high, but consists entirely of species characteristic of coastal sage scrub and chaparral habitats.

A single male Pacific treefrog (*Hyla regilla*) was sweep-net collected in spring, 1990, from cattails along the upper end of Centinela Creek (adjacent to Teale Road); this area may have remained sufficiently non-saline to permit breeding early in 1990, but was dry by June. Seine-netting yielded large numbers of crayfish and mosquitofish (*Gambusia affinis*), but no treefrog tadpoles were found. Western toad tadpoles were reported in seasonal pools in the grading fill portions of the site, where small, adventitious wetlands are supported by rainwater accumulation. The entire channel and all seasonal pools were completely dry by early summer, 1990.

All of Area D will be developed with residential and support facilities as part of phase one and subsequent phases of the Playa Vista plan. The present channel of Centinela Creek will be realigned into a runoff channel along the bluff base, on the south margin of the site. Existing vegetation will be removed, and faunal elements not able to escape into bluff habitats will be eliminated. Development of this site must be preceded by establishment of riparian mitigation habitats to permit native species to escape or be relocated prior to grading or construction.

## CONSTRUCTION IMPACTS

Direct impacts of implementation of the current plan for Phase One of the Playa Vista project to the herpetofauna and mammals of the Ballona system will be the outright elimination of most species from the developed properties. Larger, more mobile and disturbance-sensitive organisms (ie. raccoons, foxes) may be able to flee as grading approaches, but for the most part, smaller, less-aware species will be killed during the leveling of the land. Conversion of the all (or nearly all) existing natural habitat, combined with the fact that no refugial habitats exist within easy access, assures that few, if any, organisms will escape destruction. Those not eliminated outright during construction will not be able to re-establish populations, and will eventually die or be killed.

The net impacts regionally of this loss of species and individuals will be moderately significant, but no sensitive or agency-listed species will be eliminated or directly affected by habitat losses in areas A, C and D. The only sensitive mammal species (the shrew) yet extant in the Ballona system appears to be confined to saltmarsh wetland habitats, and will be more broadly affected by those phases of the Playa Vista project which involve freshwater and saltmarsh restorations.

Native species to be lost do include rodents and reptiles, all of which function within the overall Ballona wetlands food web, interacting directly through various trophic levels by feeding upon smaller invertebrates, gathering and dispersing seeds, and providing a food source for larger predators. Loss of rodent and lizard habitats in areas A and C would be locally significant, as both areas appear to be important foraging and hunting grounds for predatory birds (including loggerhead shrike, American kestrel, red-tailed and red-shouldered hawks, barn and great-horned owls, northern harrier and great blue heron). Kestrels and shrikes

were observed feeding upon lizards and snakes; red-shouldered hawks frequently prey upon snakes and alligator lizards; owls, northern harriers and black-shouldered kites actively hunt voles and other small diurnal vertebrates; great blue herons feed upon a wide variety of smaller vertebrates, including amphibians, reptiles and rodents. Remains of alligator lizards were found in raccoon and fox scats.

Retention of Area A would preserve the foraging areas discussed above, and would provide a large area of suitable habitat for most species occurring in Areas C and D. It could serve as a refugium for most species, provided they are able to reach it safely. A relocation program for terrestrial species from C and D into A would greatly benefit the populations of most species, and would mitigate the impacts of development in these other areas.

## FRESHWATER DRAINAGE CHANNEL AND CATCH BASIN IMPACTS

As part of the proposed restoration/mitigation for lost wetlands as proposed within the Playa Vista project, Centinela Creek will be relocated along the base of the Westchester bluffs (in the southern portion of Area D), and the existing channel and resources will be eliminated. The new alignment of the drainage channel and catch basin will be planted with native riparian vegetation, to approximate and enhance existing freshwater ecosystem values. The runoff channel will cover approximately 25 acres, extending from the eastern margin of Area D (near the 405 Freeway) to Lincoln Boulevard; at this point the flow will be carried under the roadway, through debris filters, and into a 27-acre settling basin. This basin will be maintained as a flood control structure, and its freshwater contents will be kept separate from the proposed saltmarsh restoration area by a high earthen berm. The berm will be planted with native vegetation, and will have a service roadway along its crest.

Sluicegates and spillways will permit flood overflows to enter the saltmarsh, and will allow for managed amounts of freshwater to be released. Maintenance proposed for this channel and basin system includes clearance of flow-restricting vegetation and periodic removal of accumulated sediments. Both channel and catch basin are mandated flood control systems, and may carry water from a variety of sources, including groundwater, surface flows from local drainages, discharge from groundwater remediation and tertiary treatment facilities. Preliminary studies of water quality indicate that pollutant loading should not be a biological problem in

the channel or basin riparian habitats (hydrological information *fide* the project Public Notice of Permit Application, U.S. Army Corps of Engineers, 02 Jan 1991).

Entrapment of nutrient-bearing sediment within the catchbasin may create an ecological problem: organic materials normally are carried into the saltmarsh with freshwater during flooding and residual surface flows, creating a brackish water interface and depositing nutrients within the estuarine system. This nutrient flow is essential to the energy and food chain dynamics of the saltmarsh, and is a prerequisite to seed germination of many halophytic plants (some of which are basic food resources for mammal species). In the absence of this flow, there could be a net loss of plant species diversity, which in turn could affect other trophic levels.

Channel construction impacts include removal and alteration of existing habitats along the lower margin of the bluffs east of Lincoln Boulevard. Although the areas to be lost currently fosterthe spread and proliferation of invasive non-natives such as house mouse and red fox, the debris provides shelter and breeding sites for lizards and snakes. In 1990, fence lizard and kingsnake populations in degraded habitats and dumping areas along the bluff base were the highest censused for the entire Ballona system. Mammal trapping, however, was very poor in this area, and the catch consisted solely of house mice. The loss of existing habitat along Centinela channel and the bluff base would have no significant direct impacts to native mammal populations, but would remove numbers of upland, non-riparian reptile species.

The only amphibians found in the southern portion of the Ballona system in 1990 occurred in upper Centinela Creek and in temporary freshwater pools in graded sections of area D. Population levels appear to be extremely low at present, and the loss of existing riparian habitat would not constitute a significant impact at present species densities and composition. Habitat values might be reestablished over time, particularly after the prolonged drought breaks, and the existing conditions should be regarded as a "low cycle" phenomenon, and not as an indicator of long-term community conditions. The realigned corridor could serve as a replacement habitat for the creek, with similar herpetofaunal and mammal resource values, provided that a suitable riparian ecosystem is established within the mitigations, prior to the onset of construction.

## LONG-TERM AND CUMULATIVE IMPACTS

### Post Completion Impacts

The primary potential long-term impacts of project build-out, aside from the direct effects of habitat and organism destruction, would result from several elements within communities and industries developed. The most significant potential impacts to the riparian habitats created to mitigate lost ecosystems would result from pollution of groundwater and surface freshwater by infiltrative chemicals, direct spills, surface flushing, and illegal dumping. Commonly-available commercial solvents, herbicides and pesticides may, in sufficient concentration, render freshwater habitat toxic to wildlife, inhibit or eliminate amphibian reproduction, accumulate in animal tissues, or poison streambed and riparian vegetation. Source points for potentially toxic chemicals commonly occur in residential and light industrial developments, and runoff filtration systems must be carefully planned against as a condition of project approval.

Human intrusion, even in controlled recreational activities, within riparian corridors can lower or eliminate sensitive species use of the habitat. Youths frequently hunt and capture small vertebrates, virtually all of which are either killed for sport or taken indoors to become short-lived pets. Dogs and cats may severely reduce local populations of native rodents, lizards, snakes, and birds, and can introduce domestic pet diseases and parasites to native species. Foot traffic within the riparian understory creates ever-widening denuded areas, loosens topsoil (accelerating direct erosion and siltation), compacts subsoil (restricting gaseous exchanges to plant root systems and inhibiting seedling growth), and generally disturbs and reduces sensitive species use of the system. Open access to restoration habitats would invite illegal trash dumping (which often results in fire) and other intrusive disturbances (partying, transient residence, etc.). Degeneration of habitat quality and accumulation of trash and debris often result in establishment of non-native, disturbance-favoring species such as house mouse, brown and/or black rats (*Rattus norvegicus, R. rattus*), and eastern fox squirrel (*Sciurus niger*).

Adjacent placement of roadways, tennis courts, baseball fields and other similar facilities requiring outdoor night lighting can also create long-term disturbances to riparian areas. Many of the species for which this mitigation is

intended are nocturnal, and may be highly sensitive to adjacent night-lighting. Further, continuous illumination of habitat may contribute to breeding depression in sensitive species, and favors less-sensitive non-native predators such as domestic pets and red foxes. It also would encourage human entry.

Alternatives for waste disposal and other effluent treatments proposed as part of the project design are divided into "Conventional vs Ecological Infrastructure Options." Issues of relevance to habitat and biota protection include materials recycling, water reclamation, and organic recycling of wastewater sludge. The "Ecological" alternative would develop reclamation and recycling facilities within the development to deal with locally-generated waste, while the "Conventional" alternative would utilize existing off-site facilities. Clearly, the "Ecological' alternative is superior to the other in terms of eliminating off-site impacts and accumulation of excessive amounts of trash. Recycling encourages proper trash disposal, and can result in slightly lower rates of illegal dumping. Organic composting systems support water reclamation efforts, and do not appear to directly affect mitigations. According to project description, the conventional option does not call for discharge or deposition of effluent into the riparian corridor; to achieve habitat protection within the mitigation, no such degradation may be permitted. Under the ecological option; Class 1 quality reclaimed water may be discharged into the system. If suitable in quality for wildlife consumption, this source of water could permit year-round habitat maintenance within the riparian corridor (approximating historic conditions), which would be beneficial if permitted to enter the wetlands. In general, waste reduction and recycling should be a mandatory condition of all such projects.

**Cumulative Impacts**

This term is generally applied to impacts of the project as they relate to similar projects nearby, or to the general effects of reductions of similar resources on a local or regional basis. Numerous other developments are underway or planned within reasonable distance, but only those within the bluffs drainage appear to bear directly upon this project. Virtually no other similar habitats exist locally, and so the cumulative impacts of this project do not increase or decrease with respect to other similar developments outside the Centinela Creek drainage. Residential developments on the bluffs continue to spread the erosional effects already visible

above the wetlands in Area B, and expand the post-completion impacts (discussed earlier) following development occupation. Development of Hastings Canyon would remove a source point for alluvial soils into the wetlands, eliminate the sand sheet habitat currently supported by these soils, and reduce somewhat the diversity of vegetation and wildlife species along the bluff margin. Residences placed atop Hastings Canyon would have direct intrusive impacts upon freshwater mitigation habitats and wetlands below.

Reductions of coastal sage scrub, coastal freshwater riparian scrub, and coastal saltwater marsh incurred as a result of project implementation may be factored against similar losses elsewhere along the California coast. In this relation, the projected cumulative impacts of habitat loss in areas A, B, C and D each would be to further reduce the overall areas available for species dispersal, incrementally reduce the gene pools of virtually all reptile and mammal species in the system, lower the overall number of individuals for virtually all native species, and reduce resource values for prey species. The latter loss of values would be most severely incurred by destruction of open and disturbed habitats on site, all which are utilized as hunting and foraging areas by predatory species, most notably birds of prey.

The general value of the Ballona habitats to migratory species would be of greatest concern as regards the bird fauna, while the same habitat losses represent a lesser impact to reptiles and mammals. The system is isolated from similar resources by many miles of impassable non-habitat. Terrestrial movement into and out of the Ballona wetland system is limited to species capable of ranging widely and rapidly along beach strand, or through urban environments. Habitat-sensitive or narrowly resource-dependent species (such as amphibians and certain small mammals) would not be expected to naturally enter or recolonize this system from other similar habitats along the coast due to intervening ecological barriers.

## UNMITIGATIBLE IMPACTS

No proposal has been made to mitigate the loss of terrestrial habitat (coastal sage scrub) or faunal elements from areas A, C and D. Although coastal sage scrub habitats are generally rated "highest inventory priority" by the California Department of Fish and Game, Natural Diversity Data Base, the vegetation formations to be lost do not conform to agency definitions of sensitive habitats. The

loss of terrestrial habitats cannot be mitigated within the remaining acreage of Playa Vista or the Ballona wetlands area, except by retention of Area A. The loss of open ruderal fields and adventitious *Salicornia* wetlands will not be mitigated within remaining habitats, nor by the creation of freshwater riparian and marsh areas.

Habitat loss without replacement will result in significant incremental decreases in the present numbers of lizards, snakes, voles, gophers, rabbits and hares, woodrats, and smaller predators (such as raccoons, skunks and opossum). The possibility exists for the the complete extirpation of the slender salamander, found in Ballona only in area A.

Small, fragmented habitat patches, particularly of specific resources such as wetlands may lose biotic diversity through a loss of genetic diversity and other reductive processes. Research by the PERL group (1991) has discussed some nutrient cycling processes which are not at normal rates or levels within Ballona, and it may be assumed that further removal of resources may generate additional systemic imbalances or a similar nature. Surrounding fragmentary habitats with highly-disturbed or developed areas further reduces diversity by eliminating site use by sensitive species, and human intrusion eventually degrades all natural resource values. Should the project be redesigned to encompass, rather than remove, existing wetland patches, the resulting isolation of habitat and restriction of animal movement would be functionally equivalent to the removal of resources, and must require the same basic mitigation measures as would outright loss of habitat.

## MITIGATION MEASURES and MONITORING

The following are mitigation measures to be taken to: (1. mitigate to the extent possible the direct impacts of Phase One of the Playa Vista master plan; (2. mitigate all phases of the project as currently proposed; (3. ensure and increase the probability of continued amphibian, reptile and mammal use of the Ballona system at present species diversity levels; (4. augment the existing fauna within the proposed created riparian habitat system; and (5. mitigate impacts to sensitive species. Some of the mitigations proposed actually constitute enhancements of existing habitat, in association with the restoration plans. These are discussed separately, following the specific mitigations. Ordering is not according to priority; all mitigations should be fully implemented as a condition of project approval.

- The proposed riparian corridor and freshwater marsh amenities to the flood control system must be established to the full extent described within the permit application. This must be done as the first phase of the project, to allow the system to mature and provide habitat values for wildlife displaced from other project areas. A monitoring program, utilizing professional botanists and ecologists, should be established and maintained for at least five years to assure that the habitats restored achieve the desired biotic and physical goals.

- Water quality entering the freshwater riparian corridor must be sufficiently high to assure healthy, reproducing populations of amphibians, fish, plants and other wildlife. No polluted water should be permitted to enter the system, but tertiary treatment water may be allowed. Water quality in the corridor and catchbasin habitats should be monitored by testing on a regular basis, and as needed following seasonal flooding.

- The riparian corridor should function as a wildlife sanctuary, and be protected from all human intrusion by perimeter fencing. No recreational facilities or "improvements" should be placed within or immediately adjacent to the corridor, and "screening" vegetation should separate it visually from housing, industry, roads, or other developments. Law enforcement agencies must vigorously enforce trespass ordinances.

- Maintenance of the riparian corridor should be performed by hand, not by machine, and should never include herbicide or pesticide application. Trash and debris must not be allowed to accumulate in or near the habitat. If necessary a special homeowners association or similar internal benefit assessment should be created to assure proper maintenance of the habitat.

- Eastern red foxes must be completely eradicated from the Ballona ecosystem prior to establishment of new habitat opportunities. At present these predators are decimating small vertebrate populations throughout the system, in all areas, and their continued presence could severely devalue restored mitigation habitat. Invasive non-native species, such as largemouth bass (*Micropterus salmoides*) and African clawed frogs (*Xenopus* spp.) must

be kept out of the freshwater habitat. All other non-native species (ie. muskrat, brown rat, etc.) should also be removed whenever they are found to occur. California Fish and Game should oversee all such programs.

- Native amphibians, reptiles and small mammals should be trapped from areas to be developed and relocated into protected mitigation habitats, after habitat values have become established for cover, forage and reproduction. Populations of rodents in Areas A and C should be trapped and relocated into suitable habitats in area B prior to project initiation.

- Only low-level, non-intrusive lighting shall be permitted adjacent to natural areas, and this shall be shielded and directed away from habitats. This would be maintained within zoning codes, or by CC&Rs.

- Informational materials should be developed for distribution to residents, noting the sensitivity of the mitigation habitats and notifying them of the need for compliance with protection measures for same. It would be the responsibility of the developer to provide and distribute information.

Once established, riparian habitats along the channel and around the catchbasin/freshwater pond could support denser and more diverse amphibian populations than currently exist in the area. If the riparian corridor aspects of the channel approximate natural conditions, stable populations of more mobile amphibian species (ie. western toad, pacific treefrog) might become established. The garden slender salamander could be introduced from Area A into suitable microsites within the created riparian channel margins.

The channel and basin, once vegetated, should support low densities of the same reptile species as presently occupy the Centinela drainage. Shaded, moist riparian understory habitat is generally not as favorable microclimatically to lizards and snakes as are more open scrub areas, but should support viable populations of species currently known to occur on site. Further, the California red-sided garter snake (*Thamnophis sirtalis parietalis*, reported as occurring in the area prior to habitat degradation and channelization), or Hammond's two-striped garter snake (*Thamnophis h. hammondi*), could be reintroduced to the system as frog and toad population densities permit. Southwestern pond turtle (*Clemmys marmorata*

*pallida*), recorded historically from Centinela Creek, is now listed as a California Species of Special Concern. It also be reintroduced once riparian habitats mature, provided that protections against human and domestic animal depredation are established and enforced.

Mammal use of the riparian corridor will depend largely upon the amount and type of understory vegetation, in combination with riparian overstory density. Many mammal species found in this area move or forage nocturnally through open habitats, and would not be particularly abundant within mature riparian habitats. Notable exceptions would be native species such as deer mice (*Peromyscus* sp., reported from the region in earlier accounts, but not found in recent studies), raccoon, and opossum. Wide-ranging predators such as coyote (*Canis latrans*), long-ago extirpated from the region, might return to such habitat on a transient hunting/foraging basis, but the areal extent of the habitat is too small to support populations of such "upper-end" predators.

Open, grassy habitats along the riparian corridor margin would permit reintroduction and/or population expansion of the California vole, as well as provide grazing areas for other rodents and lagomorphs. This, in combination with maturing riparian forest, might in turn encourage residence establishment of rarer wetland and riparian-associated raptorial birds such as black-shouldered kite and long-eared owl.

Overall, the potential mitigative benefits of the proposed riparian corridor and freshwater pond could outweigh the direct impacts of their construction, provided that they are established at least a year in advance of destruction of their ecological analogues. Further, the full spectrum of positive environmental benefits may only be accrued through careful maintenance and monitoring of the habitats created. Human intrusion into the riparian corridor should not be permitted, even under controlled conditions (such as jogging paths, etc.), and the system must be fenced against casual entry by people and domestic animals. Understory habitats are easily eroded and trampled, processes which quickly eliminate microsite values and increase sedimentation. Impacts of human and domestic animal predation and harrassment of sensitive wildlife in restricted or degraded ecosystems can be very significant; the absence of several species (ie. garter snakes, pond turtles) from the

existing Ballona wetland system may be due in large measure--if not entirely--to human collection and other depredation activities.

Water quality must be maintained at unpolluted levels; episodic flooding with clean freshwater would pose no significant threat to the system unless the flow is of sufficient strength to scour the channel (an unlikely occurrence given the extent of the drainage). Tertiary treated water may be satisfactory, but direct discharge from residential and light industrial streets and gutters should not be permitted to enter the channel untreated (standard debris collectors and oil traps do not constitute water treatment facilities for urban runoff flowing into riparian systems). No recreational facilities requiring night-lighting, watering, fertilization, herbicide, pesticide or other chemical maintenance should be permitted on porous substrates adjacent to the corridor. Waste disposal systems must be kept at a safe distance, and raw sewage must never be permitted to enter the system.