

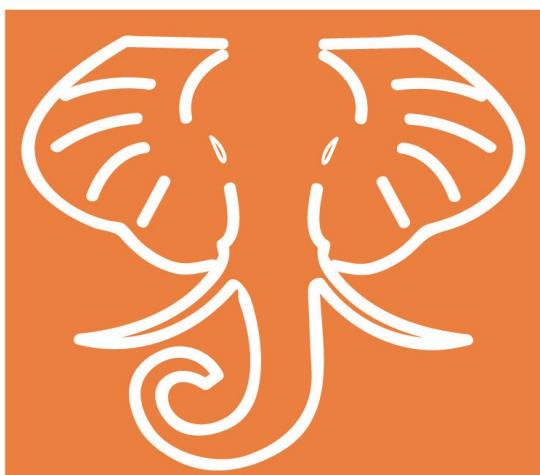
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Frey, Herbert W

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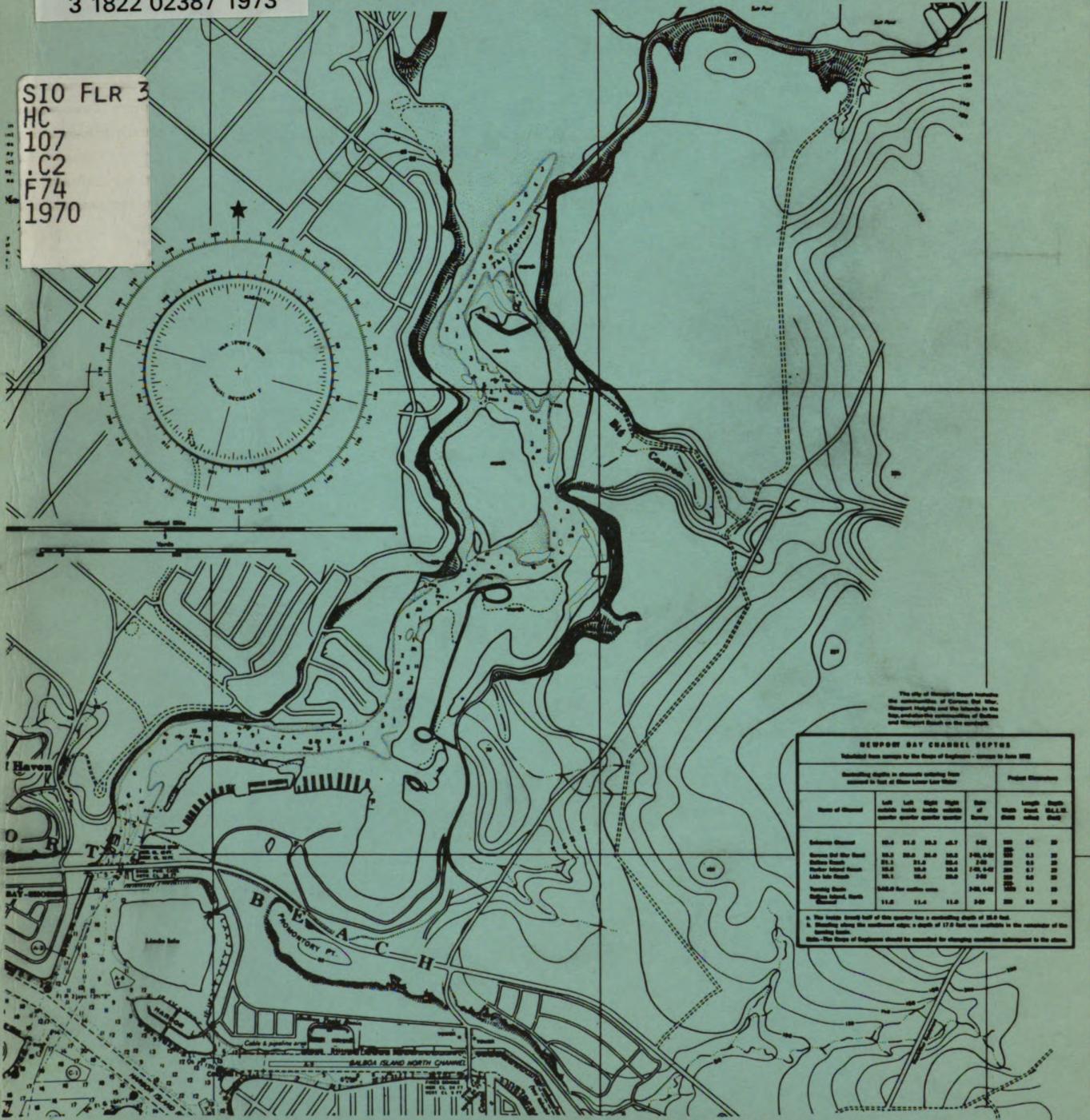
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REPORT ON NATURAL RESOURCES
OF
UPPER NEWPORT BAY AND RECOMMENDATIONS
CONCERNING THE BAY'S DEVELOPMENT

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REPORT ON

**THE NATURAL RESOURCES OF
UPPER NEWPORT BAY
AND RECOMMENDATIONS
CONCERNING THE BAY'S DEVELOPMENT**

Prepared by

**Herbert W. Frey, Marine Biologist
Ronald F. Hein, Wildlife Management Biologist
Jack L. Spruill, Wildlife Management Biologist**

Under Supervision of

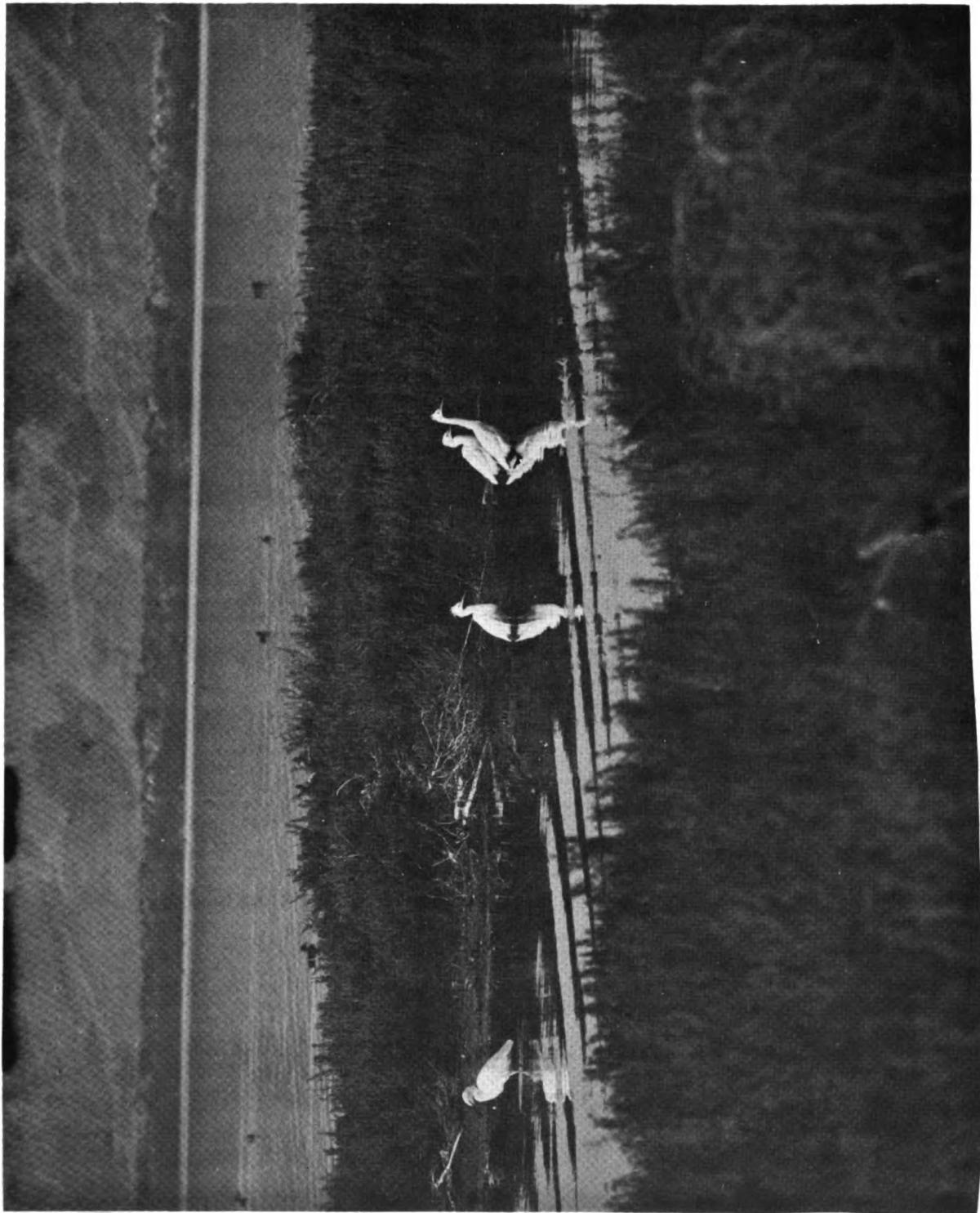
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Ronald Reagan, Governor

N. B. Livermore, Jr., Secretary, Resources Agency

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MARCH 1970



Snowy and common egrets in Upper Newport Bay. Photograph by Gary Rodgers.

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INTRODUCTION

Several planning studies and reports have been completed in the past for Upper Newport Bay. These proposals and plans were primarily directed toward developing the bay as a marina-residential complex with provisions for water-associated recreational activities and commercial installations to provide the associated services. In each of these proposed plans, minor attention was given to the natural beauty, scenic quality, and natural resource values, although these are some of the most important basic values of the area. The far-reaching ecological consequences that could result from the bay's development certainly were not considered.

This report discusses the natural resources and present uses of Upper Newport Bay, and some problems that should be considered when determining how best to develop the area. Three proposed plans for developing the bay are reviewed and the ecological effects of each is discussed. Summary comments and recommendations by the California Department of Fish and Game are presented.



SUMMARY

Upper Newport Bay is without doubt the most outstanding example of a relatively natural estuary in southern California; in fact, in the area it is one of the few remaining examples of this type habitat.

Studies to determine how best to develop Upper Newport Bay were made as long ago as 1924 and various proposals have been made over the years. Few of these considered the ecological consequences of modifying the bay. Increased public awareness of the coastal areas, particularly the fragile bays and estuaries is requiring that conservation and preservation of these areas receive adequate consideration.

Upper Newport Bay supports many resident and migratory birds; many species of plant and animals are found here; and the bay is a nursery ground for numerous marine organisms. In addition, the area now satisfies many recreational demands for boating, water skiing, nature study, bird-watching, and fishing, as well as providing for scientific and educational use. Its high aesthetic and scenic values are apparent.

This report is primarily concerned with the bay and the immediately adjacent areas, although future modifications of the nearby region also must be considered because of their impact upon the bay. Biotic communities of Upper Newport Bay are described, and species lists are presented. Over 60 species of fish, 159 species of birds, along with numerous plants and invertebrates are found in the bay.

The bay provides wintering and resting grounds for numerous migratory shorebirds and waterfowl, as well as nesting areas for a number of resident birds. A census conducted by the California Department of Fish and Game in 1967 and 1968 revealed an estimated 4,000,000 bird use days for the bay. The bay also receives moderate use by various educational institutions in southern California.

With the increased demands for boating, swimming, and other recreational facilities, and the growing demands for marine-type residential areas, the development of Upper Newport Bay has become a critical issue in recent years. Since so many different factions are interested in the bay, conflicts have arisen concerning its development. Some of these are considered in this report.

Three divergent proposals for developing the bay are discussed and the ecological consequences of each are considered.

The Upper Newport Bay Land Exchange concept proposes that the total bay be developed as an urban-marina-commercial aquatic complex with several public parks strategically located. Unfortunately, the implementation of this proposal would have far-reaching deleterious ecological effects as a result of the extensive habitat modifications.

A proposed Upper Newport Bay Park Plan suggests the bay be developed as a park and nature interpretation center maintaining its present configuration. This complex could be operated by either a city, county, or state agency, and public access would be guaranteed to most parts of the bay. Ecological values would remain high.

An Upper Newport Bay Proposed Alternate Plan is the third discussed in this report. This plan provides for channelization and urban-commercial development in the southern part of the bay and the establishment of a park and nature interpretation center in the northern end of the bay. This proposal establishes a number of islands in the northern part of the bay to replace those that are lost in the southern half. This plan proposes that fish and wildlife values be maintained, at least at the present levels. Some recreational facilities would be provided, and public access to most areas in the northern portion of the bay would be guaranteed.

Basically, the real problem involved with selecting one of the many proposals concerning the development of Upper Newport Bay is answering the question, "What kind of a legacy does this generation want to leave to those of the future?"

RECOMMENDATIONS

The California Department of Fish and Game makes the following recommendations concerning the development and use of Upper Newport Bay:

1. In order to maintain the fish and wildlife values at the highest possible level, the Department recommends that the ⁴⁰ Upper Newport Bay Proposed Park Plan (page ~~xx~~) be adopted.

This proposed plan maintains the present aesthetic and scenic values of the bay and provides for possible enhancement of the fish and wildlife values in the bay. It insures continued public access through public ownership and provides for some financial benefits to the community through establishment of a park.

(In a memorandum to the State Lands Commission, dated August 23, 1966, the Resources Agency transmitted recommendations of the Department of Fish and Game to preserve certain unique ecological features in Upper Newport Bay. The Department's recommendations essentially proposed the construction of three man-made islands to preserve some of these features. In a memo to the County Board of Supervisors of October 4, 1969, the Resources Agency notified the Board, "The Department of Fish and Game and the Department of Parks and Recreation have carried out

- intensive studies to determine the natural resource values of the Bay. We have found that our "three man-made islands" proposal of 1966 will not adequately protect the Bay's ecology. If the plans, which formed the basis of the land exchange, are carried out as conceived, most of the natural resource values will be destroyed.")
2. Final plans adopted for developing Upper Newport Bay should insure that the water quality remains high regardless of the modification.
 3. Flood control developments in Upper Newport Bay should take into consideration maintenance of the ecological values of the bay.

Flood control proposals for Upper Newport Bay are being formulated. Maintenance of habitat for fish and wildlife during and after construction or modification is essential.

4. Public access for fishing and viewing of wildlife shall be provided throughout the reaches of Upper Newport Bay.

RESOURCES

Description of Area

Upper Newport Bay is located in Orange County. This picturesque bay is the northerly arm of Newport Bay Harbor which is located about 24 miles southeast of the Los Angeles-Long Beach Harbor and approximately 72 miles northwest of San Diego. The early Spanish name of Bolsa de Quigara, bay with high banks, aptly describes the narrow winding cuspatate bay with its vertical cliffs. Upper Newport Bay is comprised of about 1,000 acres of tideland and salt marshland, and extends about 3.3 miles northerly from Pacific Coast Highway (Figure 1).

While the primary area encompassed by this report includes only Upper Newport Bay, it is necessary to consider a much larger area in order to evaluate the effects upon wildlife of habitat modifications that may occur in the bay. This larger study area is bordered on the north by Barranca Road; on the east by Culver Road to University Drive, to MacArthur Boulevard, to Pacific Coast Highway, to Poppy Avenue; on the south by the Pacific Ocean; and on the west by Newport Boulevard and the Newport Freeway (Figure 1).

Shoreline

The water frontage for the existing Upper Newport Bay waterways measured along the high tide line is 70,049 feet. Of this, 6,088 feet (8.7%) are publicly owned. However, the right of public access exists for a much greater portion. Public access is available along the east shore where a 40-foot easement on Back Bay Road (formally called Palisades Road) intersects the tidelands (Orange County Board of Supervisors, 1940). On the west shore, public access exists along North Star Lane (City of Newport Beach Planning Department, 1968).

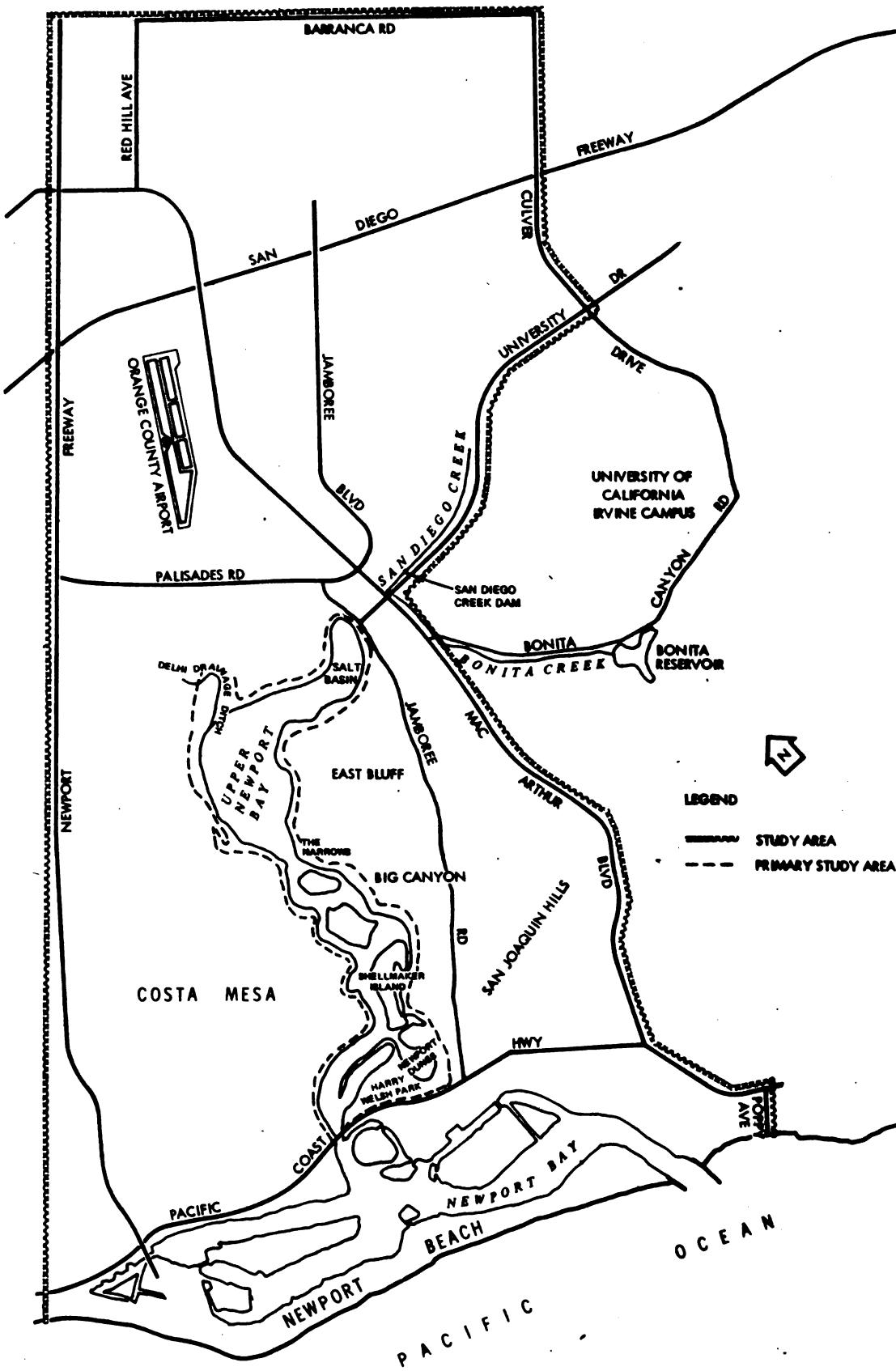


FIGURE 1
UPPER NEWPORT BAY STUDY AREA

Along both sides of the bay there are nearly vertical cliffs which reach a maximum height of 100 feet. At the base of the bluffs of Upper Newport Bay is a bench cut into ancient marsh deposits. In some areas, this is less than a foot wide, while in others its width is well over 100 feet. This bench averages 38 inches above the present marsh on the western shore and about 62 inches on the eastern shore, which has a road running along the shoreline from the "salt basins" at the northeast end of the bay toward the southern part of the bay.

The southern end of Upper Newport Bay has been modified to such an extent that its present shoreline bears little resemblance to the original conformation.

Bay and Marshland

A narrow extension of the San Joaquin Hills forms the east headland at the mouth of Upper Newport Bay. This area and the large marsh at its base have been extensively modified and bear only slight resemblance to their original condition. For this reason, these areas are not considered in this plan.

About one mile south of the bay's northern end, the bluffs on the sides of the bay are about 400 yards apart. This construction is called the Narrows. Between the Narrows and the lower end of the bay, there are two offshore islands and an extension of the eastern headland that form a northward-extending peninsula called Shellmaker Island (Figure 1).

There are numerous salt marshes, mud flats, and sand flats in the bay. The two islands and the northern portion of Shellmaker Island comprise the major marsh areas in the upper bay. Marshlands also extend from the base of the bluffs into the bay at various locations.

Extensive mud flats occur north of the Narrows, and a dike^{1/} which runs southeasterly from the mouth of the Delhi Drainage Ditch, bisects the northern half of Upper Newport Bay. Salt ponds^{2/} occupy the northeastern part of the bay.

Associated Upland

Upper Newport Bay is practically surrounded by bluffs from 40 to 100 feet in height. Beyond them, to the west, the mesa land has a gentle slope, and to the east it rises in terraces to the San Joaquin Hills. Gently rolling land lies north of its upper end. On the mesa, to the west, there is a rapidly developing residential area adjacent to the bluffs. The fast growing city of Costa Mesa lies a little further to the west. East of the bay residential and industrial complexes are in various stages of development. The University of California Irvine Campus is located about 1.5 miles northeast of the upper end of the bay. To the north, industrial and residential areas are also rapidly developing. The Orange County Airport is situated about 1.5 miles north, northeast of the upper end of the bay, which is in the plane take-off flight pattern since the prevailing winds are from the southwest.

Drainage

The principal drainage into the upper bay is from San Diego Creek. This creek receives water from a 109-square-mile area consisting of mountains, farm land, and urban development (residential, University of California Irvine Campus, industrial). The maximum peak flood discharge on record was estimated at 10,000 second feet (1969 discharge data are

^{1/} The center of this dike was washed out by floods during the early part of 1969.

^{2/} These ponds are no longer being operated since their dikes were destroyed by the 1969 flood.

not included). An earth fill dam on San Diego Creek was constructed by the Irvine Company in 1946 about 1.1 miles northeast of the upper bay. This dam has a capacity of approximately 3,000 acre feet and is used to regulate flood runoff. It also helps retard silting in the upper bay.

The Bonita Creek drainage area of 5.7 square miles discharges into the drainage ditch below the San Diego Creek dam. A dam constructed by the Irvine Company on Bonita Creek forms Bonita Reservoir.

Big Canyon, with a drainage area of 2.2 square miles, discharges into the central part of Upper Newport Bay from the east. The Delhi Drainage ditch discharges into the northwest corner of the upper bay.

Ecology

Climatically, Newport Bay may be classified as Mediterranean or dry-summer sub-tropical area. This climate is characterized by a concentration of the moderate annual precipitation during the winter season, with nearly or completely dry summers, warm to hot summers and mild winters, and reception of a high percentage of the possible sunshine for the year, especially in the summer months. The mean yearly temperature is 60° F., with an average range of 13.5° F., and the normal rainfall is 14.55 inches. As along the rest of the southern California coast, this area characteristically has much early morning fog and low stratus clouds. Usually the cloud layer dissipates in the late morning hours, and the relative humidity drops to 25 or 30 percent in the afternoon.

Hydrographic conditions are relatively simple in Upper Newport Bay. There is no continuous inflow of fresh water, nor is the bay wide enough to form the mixing and circulation patterns which occur in larger bodies of water. The principal currents are from the ebb and flow of tides,

although minor surface currents occur frequently from winds. The bay has been affected by occasional strong tides and floods, and is influenced by the daily tides as well as runoff from the coastal plain.

Water temperatures are exceedingly variable in Upper Newport Bay because of its general shallowness. They show a diurnal range of about 15° F., but small seasonal variation. Heating and cooling are affected by three factors: Tides, insulation, and absorption or radiation from the bottom. The tide plays the most important role of these three factors in influencing water temperatures. Throughout most of the year, water temperatures in Upper Newport Bay are generally higher than those of the open ocean outside the Newport barrier island, but are lower during the three winter months.

The bay forms a vital link in the ecological system of southern California, especially for marine fish and wildlife. With the continued thrust of urbanization, which already has resulted in the loss of most estuarine habitat in southern California, the role of Upper Newport Bay is becoming extremely important. It is necessary to look at a much larger geographical area to gain insight concerning the ecological importance of the bay.

At the start of this century, there were 28 sizeable estuaries in southern California. Three of the estuaries have disappeared and 10 others have been drastically modified. Most of the remaining 15 are either in the process of being severely changed or are scheduled for profound alteration. In all of California, over 60% of such estuarine areas already have been destroyed. Upper Newport Bay is the last major baylike body of water remaining in a fairly pristine condition along 400 miles of coast between Morro Bay and Estero de Punta Banda in Mexico.

Upper Newport Bay unquestionably plays many ecological roles. It receives drainage from a sizeable expanse of land. Sediments, dissolved materials, and organic substances are carried in, modified, and deposited or discharged into the sea. The bay contains a specialized fauna and flora adapted for life in the quiet shallow waters.

A wide variety of plants are found in Upper Newport Bay and the lands immediately adjacent to it because of the environmental changes between terrestrial and marine conditions. The water over the deeper parts of the bay contains phytoplankton which live near the surface. The marshes and the adjoining shallow water contain the bulk of the plant life, and two major groups of plants are common, flowering plants (phanerogams) and attached algae (Appendix A). The algae are primarily marine species but are tolerant of exposure to air and variable salinity. The flowering plants on the marshlands and islands are adapted to high salinity and to variable amounts of submergence by tidal water. Between the bluffs and the bay, a community of terrestrial plants exists that is never inundated, even by the highest of tides. However, this group of upland plants is fully exposed to salt spray and moisture-laden marine air.

Numerous species of marine invertebrates also inhabit the bay's waters and substrates (Appendix B). Many of these form vital links in the food chain of the "higher" animals, particularly the birds.

The bay also serves as a nursery ground for numerous species of marine fishes. Most of the known 61 species of marine fishes that occur in Upper Newport Bay are found south of the Narrows (Appendix C). There are 19 species of amphibians and reptiles found in areas adjacent to the upper bay (Appendix D).

The mud flats, marshlands, and the adjacent coastal habitat of Upper Newport Bay, support large aggregations of shorebirds. Wintering

populations of dunlins, western and least sandpipers, willets, short-billed dowitchers, long-billed curlews, and marbled godwits are among the more numerous of the shorebirds utilizing the area during their migrations. These birds are most dependent upon mud flats and tidal marshlands. Some shorebirds spend more than three-fourths of the year in migration and on the wintering grounds.

The bay's gentle slopes and the rise and fall of the tide expose many acres of tidal land for foraging by shorebirds. In all, the bay provides over 450 acres of excellent habitat for water oriented birds. Higher densities of birds are most commonly found on the islands and in the northern portion of the bay. There are about 70 species that are commonly seen in or adjacent to the bay, with an additional 89 species that may be occasionally seen (Appendix E). Over 10 species of mammals commonly occur adjacent to the bay (Appendix F).

Habitat

While there are 1,282.9 acres in the primary area (Figure 1), an additional 14,704.9 acres also are considered (Table 1) when looking at possible ecological consequences of developing the upper bay. A number of habitat types or zones are found, and in the following discussion only the primary area will be considered; nevertheless, in assessing effects on the living resources that may result from altering existing habitat in the primary area, man's modification of adjacent areas certainly must be considered.

TABLE 1
Upper Newport Bay Habitat Areas

<u>Zone</u>	<u>Primary Area (Acres)</u>	<u>Adjacent Area (Acres)</u>	<u>Total (Acres)</u>
Marine	170.0	520.8	690.8
Littoral	574.5	15.0	589.5
Maritime	262.8	330.6	593.4
Salt Ponds	130.0	0.0	130.0
Upland	50.0	2,419.0	2,469.0
* Agriculture	0.0	2,767.7	2,767.7
Urban/Industrial	95.6	8,316.0	8,411.6
Duck Ponds	0.0	335.8	335.8
Totals	<u>1,282.9</u>	<u>14,704.9</u>	<u>15,987.8</u>

* These lands are rapidly decreasing as the area becomes more urbanized.

The primary area contains six habitat zones or types:

- | | |
|-------------|---------------------|
| 1. Marine | 4. Upland |
| 2. Littoral | 5. Salt Ponds |
| 3. Maritime | 6. Urban/Industrial |

The first four are "natural" in occurrence, while the last two are the result of man's activities.

The marine zone in Upper Newport Bay is continually submerged under seawater (Figure 2) and encompasses 170 acres. The littoral zone may be defined as that area subjected to submergence by tidal waters, and comprises the largest portion of the upper bay (574.5 acres). This is undoubtedly the most critical zone as far as alterations by man are concerned. The Upper Newport Bay mudflats, exposed at low tides, and all the marshlands make up this habitat type that is most rapidly being lost in California. Adjacent to the littoral zone there is an area that is never inundated, even during the highest spring tides, but is fully exposed to salt spray and moisture-laden marine air. This area is called

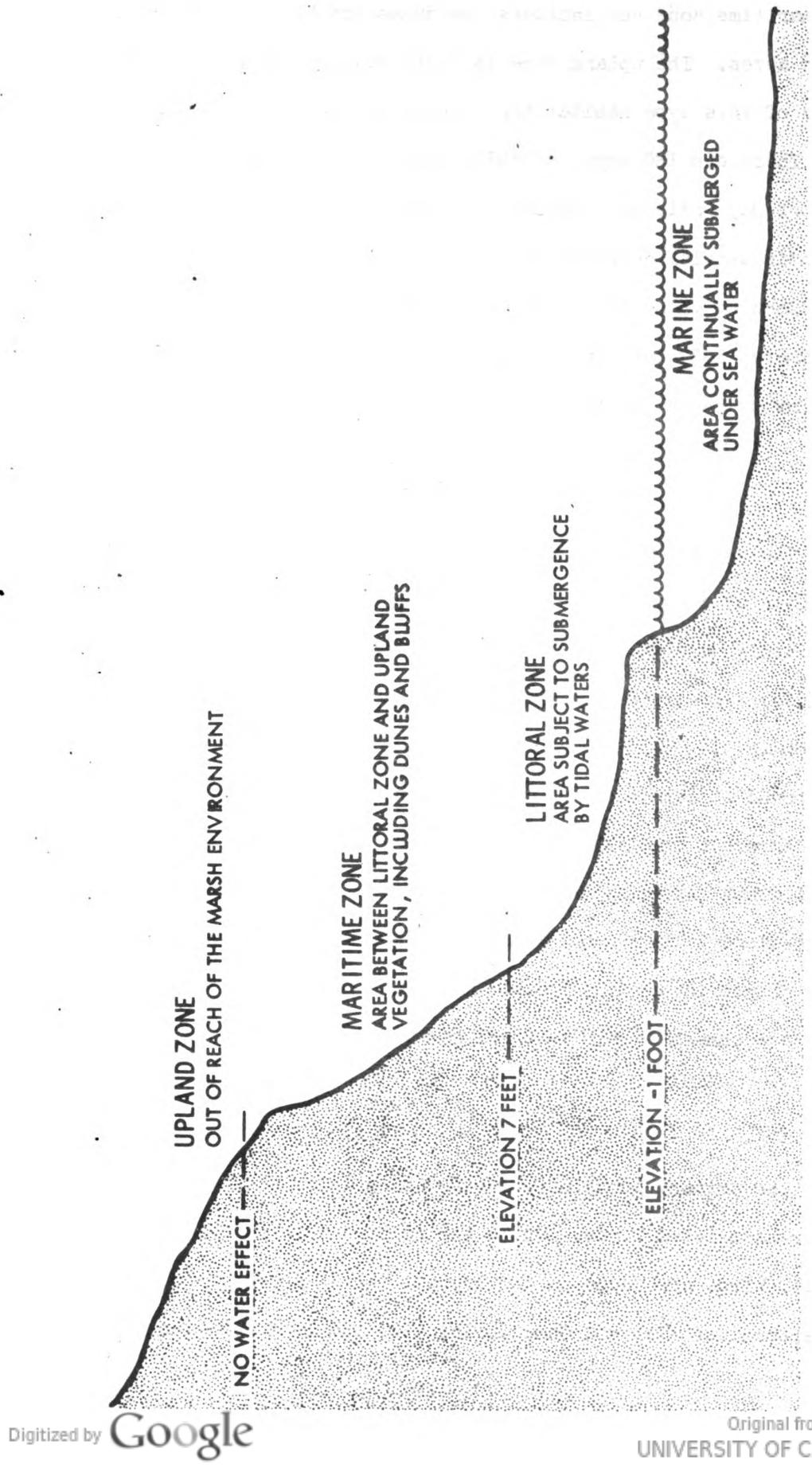


FIGURE 2
HABITAT ZONES OF UPPER NEWPORT BAY

the maritime zone and includes the dunes and bluffs, and consists of 262.8 acres. The upland zone is found beyond the maritime zone and 50 acres of this type habitat are located in the primary area.

There are 130 acres of salt ponds in the northeastern corner of Upper Newport Bay while the southern portion of the bay contains 95.6 acres of urban/industrial development.

Each of these zones has its characteristic flora and fauna (Stevenson and Emery, 1957; and Barnard and Rush, 1959; Vogel, 1966), and any modifications to these habitats result in biological changes, some predictable.

Fisheries

The waters of Upper Newport Bay are used for spawning and nursery purposes by a number of fish species. For example, the spotted sand bass, California halibut, and California barracuda use the bay as nursery grounds. In all, 61 species of fish have been reported from the bay (Appendix C). While a number are common, the deepbody anchovy, topsmelt, and round stingrays are very common in certain areas.

Numerous shellfish occur in the deeper channels as well as on the tidal flats (Appendix B). Smooth chiones, wavy chiones, bay mussels, rough-sided littlenecks, common littlenecks, and rosy razor clams are very common in certain areas. Numerous "bait species" of invertebrates also are common in the littoral zone.

Wildlife

The primary group of wildlife using Upper Newport Bay is the migrant water-associated birds. While the greatest use is from mid-September to April, birds are found on the bay all year. A census conducted by the Department of Fish and Game during 1967 and 1968 revealed the low period

of bird use occurred during June. On February 14, 1968, an estimated 56,250 birds were tallied; by June 14, 1968, the count was only 550 birds (Table 2).

Based upon the 1967-68 census, a conservative estimate of close to 4 million bird day use was calculated. Shorebirds accounted for 74% of this use. They were in greatest abundance between mid-September and April. Use by ducks accounted for the other 26%. Their peak number occurred between mid-September and March. These use figures are based upon the bay proper and the adjacent marshlands, and do not include use of the areas immediately adjacent to the bay. There are a number of resident and migrating birds that use these habitats.

Numerous amphibians, reptiles, and mammals are found in areas just adjacent to the bay; however, there are no data available concerning population sizes.

Land Ownership

The uplands adjacent to Upper Newport Bay are privately owned. The bay is under both private and public ownership. The Irvine Company owns 346.3 acres while 411.8 acres are owned by Orange County (Table 3). The water frontage for existing Upper Newport Bay waterways measured along the high tide line is 70,049 feet. The Irvine Company owns all water frontage except 6,088 feet located at Harry Welch Park. In other words, the public owns 8.7% of the bay's water frontage (Sampson and Ballinger, 1964), while 91.3% is in private domain. There is a 600-foot

TABLE 2
ESTIMATED BIRD DAY USE OF UPPER NEWPORT BAY
Based on 1967-68 Census

<u>Date</u>	<u>Census</u>	<u>Adjusted Census</u>	<u>Percent * No. Ad- justment</u>	<u>Adjusted Bird Numbers</u>	<u>Number Days in Period</u>	<u>Total Bird Day Use</u>
9-07-67	4,554	4,500	50	9,000	1	9,000
9-08-67	5,683	5,500	50	11,000	118	1,298,000**
1-04-68	8,550	8,500	50	17,000	6	102,000
1-10-68	4,339	4,500	50	9,000	15	135,000
1-25-68	17,224	17,000	50	34,000	1	34,000
1-26-68	10,553	10,500	50	21,000	5	105,000
1-31-68	10,778	11,000	20	13,200	5	66,000
2-05-68	20,192	20,000	25	25,000	9	225,000
2-14-68	45,241	45,000	25	56,250	6	337,500
2-20-68	15,929	16,000	25	20,000	6	120,000
2-26-68	7,322	7,500	30	9,750	7	68,250
3-04-68	21,621	21,500	30	27,950	16	447,200
3-20-68	18,206	18,000	30	23,400	5	117,000
3-25-68	11,446	11,500	25	14,375	8	115,000
4-03-68	13,998	14,000	25	17,500	7	122,500
4-10-68	13,783	14,000	30	18,200	8	145,600
4-18-68	15,252	15,000	25	18,750	11	206,250
4-29-68	2,318	2,500	15	2,875	9	25,875
5-07-68	1,279	1,200	15	1,380	38	52,440
6-14-68	483	500	10	550	14	7,700
6-28-68	1,077	1,000	10	1,100	14	15,400
7-12-68	1,397	1,500	30	1,950	49	95,550
8-30-68	5,116	5,000	25	6,250	7	43,750
9-06-68	12,813	13,000	25	16,250	1	16,250
Total						3,910,265

* Estimated percentage of census area not included in count.

** This 118-day period occurs when the bird population in Upper Newport Bay normally is increasing; therefore, this is considered a conservative figure.

county beach on the east side of the ski area in the bay. The slope of this beach is on lands owned by Orange County; however, the back portion is on Irvine land. A 20-foot easement over Irvine lands provides public access to the ski area.

TABLE 3

* UPPER NEWPORT BAY OWNERSHIP

Public Ownership

Exclusive Public Ownership

County Tidelands (Tidelands Grant, 1919; 1929)	403.7 acres
Harbor District (Coney Island Purchase, 1958)	<u>8.1</u> "
Total	411.8 acres

Limited Public Rights

** Public Easement (Tidelands Patent No. 204)	<u>243.0</u> acres
---	--------------------

Under Public Ownership or Prescriptive Rights	654.8 acres
---	-------------

Private Ownership

Irvine Company

** Tidelands Patent No. 204	243.0 acres
Fee Owned Islands	<u>103.3</u> "

Total	346.3 acres
-------	-------------

* Source: Sampson and Ballinger, 1964

** The County of Orange was granted a public easement and rights of fishery and navigation over the Tidelands Patent No. 204 in Superior Court Decree No. 20436.

The northerly end of Upper Newport Bay was granted to James Irvine on January 25, 1901, by Tidelands Patent No. 204. These lands are subject to a public easement for navigation and fishing. The boundaries of this parcel were adjusted by the Superior Court of the State of California in and for the County of Orange in its Decree No. 20436, dated May 6, 1926, that defined the line of ordinary high tide and further defined the title granted in the tidelands patent. This parcel consists of 243.0 acres.

The upland adjacent to the bay and the three islands in the bay are owned in fee by the Irvine Company. The line of ordinary high tide for the uplands and the northerly island was adjudicated by Superior Court Decree No. 20436. The other two islands were referred to in the decree as being excluded from the county tidelands; however, the line of ordinary tide was not included in the adjudication. The two islands were not owned by the Irvine Company at that time but have since been acquired. Aerial photos and government charts of the area indicate the mean high tide line along the islands has been relatively unchanged from early maps to the present; therefore, the estimated size of the area owned by Irvine Company is reasonably accurate. The three islands comprise 103.3 acres.

Orange County owns 411.8 acres of Upper Newport Bay. The State of California granted 403.7 acres to the County on July 25, 1919 (Statutes of California, 1919 and 1929), and the Orange County Harbor District purchased 8.1 acres, known as Coney Island, through an eminent domain action on March 6, 1958, for \$112,310. Portions of the County's Coney Island were included in the 69.5 acres leased to Newport Dunes, Inc., in 1958, for the development and operation of an aquatic park.

Harbor

The southern end of Upper Newport Bay now provides anchorage and berthing facilities for a number of small craft. There are some private boat facilities associated with the residential area on the upper bay's southwestern shore (Dover Shores). The present berthing capacity is approximately 500 boats. There are launching facilities for trailered boats which have a daily capacity of about 900 boats.

Lower Newport Bay is really the center of boating activity and has both private and public boating facilities. It also is the base of operations for sport and commercial fishing activities.

PRESENT AND FUTURE USES

Parks

Harry Welch Park is located on the southeast shore of Upper Newport Bay. This county-owned 69.5-acre aquatic park is under lease to Newport Dunes, Inc., and includes swimming beaches, picnic grounds, boat launching ramps, and a large trailer park. Landscaping is sparse and the signs, toll gates, and extensive paved areas give the park a distinctly commercial character. The 28.5-acre Harry Welch Park Lagoon provides public swimming facilities along a 6,058-foot beach. This facility now provides over 1 million user days annually and has an estimated daily capacity of about 24,000 people (based on a 100% turnover in 1 day).

A 600-foot county beach is located on the eastern shore of the bay by the water ski area. This beach is used by a number of people, primarily in association with water skiing activities. This area was not in use during 1969 because of contamination problems caused by floods in January.

The population continues to grow in southern California and demands for "quality" swimming and recreational areas remain high.

There is a rapidly increasing demand for maintaining the natural environment. As more and more of the agricultural areas become urbanized, people are asking that additional undeveloped areas be set aside to help maintain the quality of their environment. The concepts of recreational areas and undeveloped areas need not be in conflict; with proper

planning areas for "low density" recreation activities (parks, bird-watching areas, fishing areas, etc.) and marine and wildlife reserves are highly compatible. Upper Newport Bay has the natural resources as well as being ideally located for meeting future "low density" recreational demands.

In 1965, over 7.7 million people were living within two hours driving time of Upper Newport Bay. This does not include San Diego County. By 1990 the same area will contain an estimated 15.5 million people. This population increase plus a shorter work week, more leisure time, and higher incomes will certainly increase the demands for "low density" recreation.

Sport Fishery

The upper bay is a spawning grounds and nursery for some sport species. Sportsmen fish from the bank at several spots along the eastern side of the bay. They catch spotfin croaker, spotted sand bass, California corbina, queenfish, opaleye, white seaperch, shiner perch, diamond turbot, and California halibut. There is some sport use of the clam resources in the bay. While present sport use of Upper Newport Bay is relatively light, 5,700 man-days fishing annually, demands will increase in the future. These demands can be met if adequate public access is maintained in the future. The public enjoys access to much of Upper Newport Bay for the purpose of fishing, and with growing recreational demands, this access should be considered in any development plan for the upper bay.

Nature Study and Birdwatching

The marshlands, mud flats, and uplands attract many species of birds to Upper Newport Bay. Since the bay is the only remaining inlet on the

southern California coast that is neither developed nor in Defense Department ownership, it is the ideal spot for sightseeing and bird-watching. No hunting is permitted in the bay so it is an ideal resting and feeding area for migratory shore and water birds as well as an excellent habitat for resident birds. There are 159 species of native birds that are known to occur in the area as well as a species of flamingo  (These birds escaped from Sea World in San Diego several years ago and are regularly seen in bays and estuaries along the southern California coast.)

Presently there is moderate use of Upper Newport Bay by bird watchers; however, this nonappropriative activity is becoming much more popular. On February 15, 1969, over 1,200 people visited the upper bay to view the birds and wildlife. The attendance records of nature study areas emphasize the interest in this activity in southern California. The Tucker Bird Sanctuary in Orange County has approximately 35,000 school children visiting it each year (Table 4).

TABLE 4

USE OF SOME NATURE ORIENTED FACILITIES
IN THE LOS ANGELES AREA

<u>Facility</u>	<u>Acres</u>	<u>Operated By</u>	<u>Annual Visitor-Days</u>
San Dimas Park La Verne, California	138	Los Angeles County	175,244
Robt. M. McCurdy Nature Center Pasadena, California	185	Los Angeles County	7,569 in groups, no record for individual attendance
Audubon Center of Southern California El Monte, California	127	Audubon Society	46,138
Tucker Bird Sanctuary Orange County	10	San Fernando Audubon Society	34,114

With the increase in population and the decrease in undeveloped areas in southern California, the demands for birdwatching areas will rapidly increase. Even in relatively undeveloped areas like northern California this nonappropriative use of living resources is becoming very popular. For example, at Gray Lodge (a Fish and Game Wildlife Area in the Sacramento Valley) July 1968 through June 1969, records indicate there were 11,377 hunters, 7,370 fishermen, and 11,172 visitors who came to view wildlife. During the same period at the Imperial Wildlife Management Area near the Salton Sea, there were 9,288 hunters, 5,154 fishermen, and 8,481 other individuals who came to see the wildlife. Department of Fish and Game records indicate that statewide approximately 72,000 hunters, 74,000 fishermen, and 31,000 wildlife viewers visited State Wildlife Management Areas which are removed from population centers.

The demands for nature areas in Orange County is certainly going to increase, and Upper Newport Bay can help meet them.

Scientific and Educational

There are considerable zoological, botanical, geological, and archeological resources in Upper Newport Bay that are of scientific value and interest. The broad mudflats, marshlands, marine waters, and their associated biota represent an ecological complex that is rapidly passing out of existence in southern California. The proximity of the University of California at Irvine and Orange Coast College to the bay make it very accessible for use by these institutions of higher learning. In addition to these nearby institutions, California State College at Fullerton, California State College at Long Beach, and several junior colleges make considerable use of the bay for research. Annually the Marine Biology Program at California State College at Fullerton is provided approximately

\$240,000 of federal support monies for research mainly conducted in Upper Newport Bay. The Bay also is used by several high schools in the area for field trips. While the use by educational institutions may now be described as moderate, the future demands for scientific and educational use of Upper Newport Bay certainly will increase since this is one of the last places in southern California where mudflat-marshland environment exists.

Boating

Recreational boating is a very popular activity in the Newport area. A large portion of the business activities in the lower portion of the bay is devoted to this pastime. A private marina complex, Dover Shores, is located on the southwestern shore of the upper bay. A number of vessels are berthed in this area. Across the bay on the eastern shore, over 500 boats are berthed in the Harry Welch Park area. In addition, there are facilities for launching trailered boats not only at Harry Welch Park, but at several other places on the southern end of the bay. There is also a launching area at the mouth of Big Canyon. This facility services the water ski area just north of the Narrows.

The demand for boating areas and facilities will continue to increase in the Newport Bay region, as well as throughout southern California. At the present time much of this demand is being satisfied in Newport Bay; however, facilities in this area are reaching their maximum use, and additional facilities are sorely needed. Upper Newport Bay could help satisfy at least a part of this demand.

Urban

Almost the entire perimeter of the west side of Upper Newport Bay contains costly, single-family homes. The northern end is also rapidly becoming an urban area of single-family dwellings. On the east side, north of Big Canyon, there is a well-planned, high quality town house and garden apartment development known as "The Bluffs". The Newporter Inn is located just to the northeast of Harry Welch Park, but at the present time the area between the inn and the southern side of Big Canyon is not developed. It is only a matter of time until this area too will become another residential or commercial complex. The sparkling bay, with its picturesque banks and islands, covered with marsh grasses and other plants, provides a pleasant contrast to the surrounding hard-surfaced, man-made developments.

The Irvine Company plans to build a complete new city on the portion of its vast Orange County holdings nearest Newport Bay. In addition to the residential development around the upper bay, a golf course, cemetery, and several research and development plants now are located on Irvine lands. The center of the University of California at Irvine is about 1.5 miles northeast of the upper bay, while the Orange County Airport is situated approximately 1.5 miles north of the bay. Agricultural lands in the vicinity are rapidly being urbanized since this is one of the fastest "growing" urban areas in southern California.

Industry and Commerce

The Western Salt Company had a series of evaporation ponds in the northeastern portion of the upper bay. These ponds were washed out during the floods in early 1969. The ponds have not been repaired, and the associated structures have been dismantled. This operation had been in existence for a number of years on land leased from the Irvine Company.

Most industry in Upper Newport Bay is located on the eastern bank of its lower end, and is associated with the tourist or recreational trade. The Newport Dunes Corporation operates Harry Welch Park where boat launching facilities, trailer boat storage, picnic grounds, swimming beaches, and a large mobile home park are located. There are several other commercial parking and boat launching facilities located between Harry Welch Park and the Highway 101 bridge. A bait shop, snack bar, and several other small businesses face Highway 101 on the western shore of the lower bay. A trailer court is located just to the north of these establishments.

The privately operated Upper Bay Boat Launch and Auto Park is located at the mouth of Big Canyon. This facility is used primarily to launch boats for the ski area. The private concession on Irvine lands has not been in operation since the floods of 1969.

The Newporter Inn is located just to the northeast of Welch Park. A golf course is operated in conjunction with the tourist facilities at this installation.

With the ever increasing demands for boating and tourist facilities in the Newport area, there is a need to increase the number of establishments catering to these demands.

Aesthetic and Scenic

The green marshlands, the clear water, the numerous shore and water birds feeding on mudflats or moving among green foliage, the multi-colored, almost vertical cliffs rising majestically on both sides of the bay, and the peaceful serenity of the bay all contribute to the aesthetic quality of Upper Newport Bay. This area receives moderate use by people driving along Bayside Drive just to enjoy the scenery. Cherished by residents of the area is the bay's natural beauty, and this aesthetic value is translated

into the real estate values of the area. With the rapidly evolving urban complexes throughout southern California and associated loss of "open space", public demands for areas with the scenic qualities of Upper Newport Bay will become greater and greater as other natural areas are changed by developments.

Other

Water skiing is another recreational activity in Upper Newport Bay. A ski course north of the Narrows was used heavily prior to the January 1969 floods. A considerable volume of sediments was deposited in the ski area at that time, and the waters were contaminated to a point where body-contact sports were prohibited. As a result, no skiing activities occurred in the upper bay in 1969. There is a large and increasing number of people water skiing, and demand for areas in which to ski is growing. Upper Newport Bay could satisfy some of this demand.

One potential use of Upper Newport Bay is an emergency landing area since the upper end of the bay is in the flight pattern of the Orange County Airport (Figure 1). With urbanization of the immediately adjacent areas, the bay's value for emergency landings continues to increase. This safety factor should be considered in any development plan for the area.

CONFLICTS IN PROPOSED USES

In California, particularly in southern California, recreational boating has experienced phenomenal growth during the past two decades. This growth has placed heavy pressures on existing small craft harbors and marinas. In addition to the increased interest in boating and associated water sports, the population growth in southern California has been tremendous. Add to this a very affluent society, and the result is a high

demand for residential-marina complexes. Developers in response to these economic opportunities are modifying California's coastline, resulting in a severe loss of tidal wildlife habitat. Today this loss of wildlife habitat has reached a critical point whereby any additional alteration of bays, estuaries, and lagoons without taking steps to maintain ecological values will result in severe damage to certain wildlife species.

While there has been an increase in the demand for boating facilities and marina complexes, there also has been a sizeable increase in demand for wildlife and marine life reserves to make sure that certain of our living resources will survive. People are becoming very concerned about their present environment and the legacy they will leave their children and their children's children. They have become aware of the sensitivity of the ecology to even minor alterations in the environment, and are demanding that steps be taken to protect, and where possible, to improve the quality of our present environment.

Upper Newport Bay is the only bay in southern California that still is in a relatively pristine condition. Since 1924, there have been a number of studies to determine how best to develop the area. Most of these studies have been conducted by engineers and each succeeding report essentially modified or refined the previous one. General Lansing H. Beach, U. S. Army, Retired, in an "Engineering Report on Newport Bay", dated April 1925, proposed a channel to Upper Newport Bay. In 1942, R. L. Patterson prepared a "Preliminary Report on Upper Bay Development" which suggests the development of the Upper Bay should be for yachting and recreational use. Again, in July 1950, R. L. Patterson submitted a report "Improvement of Upper Newport Bay, Newport Harbor, Orange County, California", in which he details a general development plan for Upper Newport Bay. In March 1964, K. Sampson and J. E. Ballinger submitted the "Upper Newport Bay

Exchange Plan", in which they proposed harbor lines they felt would provide the best possible channel for the ultimate development of Upper Newport Bay, based on the current (1964) recreational boating needs.

Some of these reports considered the need for parks and recreation areas adjacent to the upper bay. None, however, initially considered the living resources nor the ecological consequences of completely modifying the upper bay.

When the first of the development plans was prepared (1924), Upper Newport Bay was "in the country", and most of the bays, estuaries, and lagoons in southern California were undisturbed. Even in 1950 this was still reasonably true; however, it wasn't true in 1964, and certainly isn't true today. None of the proposals considered what effects development of Upper Newport Bay would have on the ecology of nearby areas, let alone all of southern California. In 1924, it wasn't considered necessary to examine these effects, but it certainly is today.

Public access is certainly an important factor that must be considered when looking at the future of Upper Newport Bay. One of the major problems facing the general public today in southern California is access to recreational areas. While many coastal areas, beaches, and bays are in public ownership, the routes of access are restricted by private ownership of adjacent lands. At present, the public enjoys access to most of Upper Newport Bay's waterfront and tidelands.

There is a number of special interest groups concerned with the future of Upper Newport Bay. Each has reasons for urging a particular use of the bay. These special interests should be considered in planning for the bay's future.

PROPOSED PLANS FOR DEVELOPMENT OF UPPER NEWPORT BAY

The development of Newport Bay has been of concern since the early part of the 20th Century. With the increased demands for boating, swimming, and other recreational facilities, and the growing demand for marina-type residential areas, the development of Upper Newport Bay has become a critical issue in recent years. There has been a number of proposals concerning the development of the upper bay. Some of these primarily represent the needs of single-interest groups such as boating, while others were much broader in their approach, but none, until recently, considered more than superficially the ecological effects upon the fish and wildlife resources of southern California. Furthermore, due to increased urbanization of nearby areas, any proposal must take into account flood control measures.

Three proposals are presented and reviewed in this section. Particular emphasis is placed upon the ecological consequences of each.

Upper Newport Bay Land Exchange Proposal

On March 31, 1964, the Orange County Harbor District transmitted to the Board of Supervisors of Orange County, a report prepared in compliance with Board Resolution No. 63-1808 of December 18, 1963 (Sampson and Ballinger, 1964). The purpose of this report was to present the City of Newport Beach's requirements for an acceptable land exchange plan. These requirements were:

1. That two neighborhood beach parks, averaging three acres each, be located on the westerly side of the channel, and a large park with a minimum of 1,500 feet of main channel frontage be located on the easterly side of the channel at Big Canyon.

2. That a continuous roadway be provided along the water on both the east and west sides of the channel.
3. That the control, development, administration, and use of these parks be vested exclusively in the city in perpetuity.

The main concern of the Newport Beach City Council members at that time was the lands immediately adjacent to the bay, since they had approved, on February 26, 1962, the harbor lines as proposed for the Upper Newport Bay by the Orange County Harbor District, dated January 26, 1962. The land exchange negotiations were initiated by a letter dated May 20, 1963, from the Irvine Company to the Orange County Board of Supervisors that proposed an exchange of fee owned islands, uplands, and patented tidelands for portions of the County tidelands, in order to permit the development of Upper Newport Bay. This proposal was essentially the same as the plan recommended for approval by the Orange County Harbor Commission in the Upper Bay Land Exchange Report, dated August 26, 1963.

Proposed Development

The proposed plan consists of developing Upper Newport Bay into a marina-residential complex with provisions for water-oriented commercial and recreational facilities. The development calls for dredging a 10-foot deep, 800-foot wide navigable channel to the north end of the bay, and using the spoils to fill tidelands to the foot of the bluffs. The proposed land configuration would create a waterway extending about 2.5 miles north from the highway bridge (Figure 3). At the northern end of the bay, the waterway would widen into a turning basin. A mile-long rowing course and a marine stadium, separated by a long arm of park land, are proposed. The north side of the stadium and the rowing course is

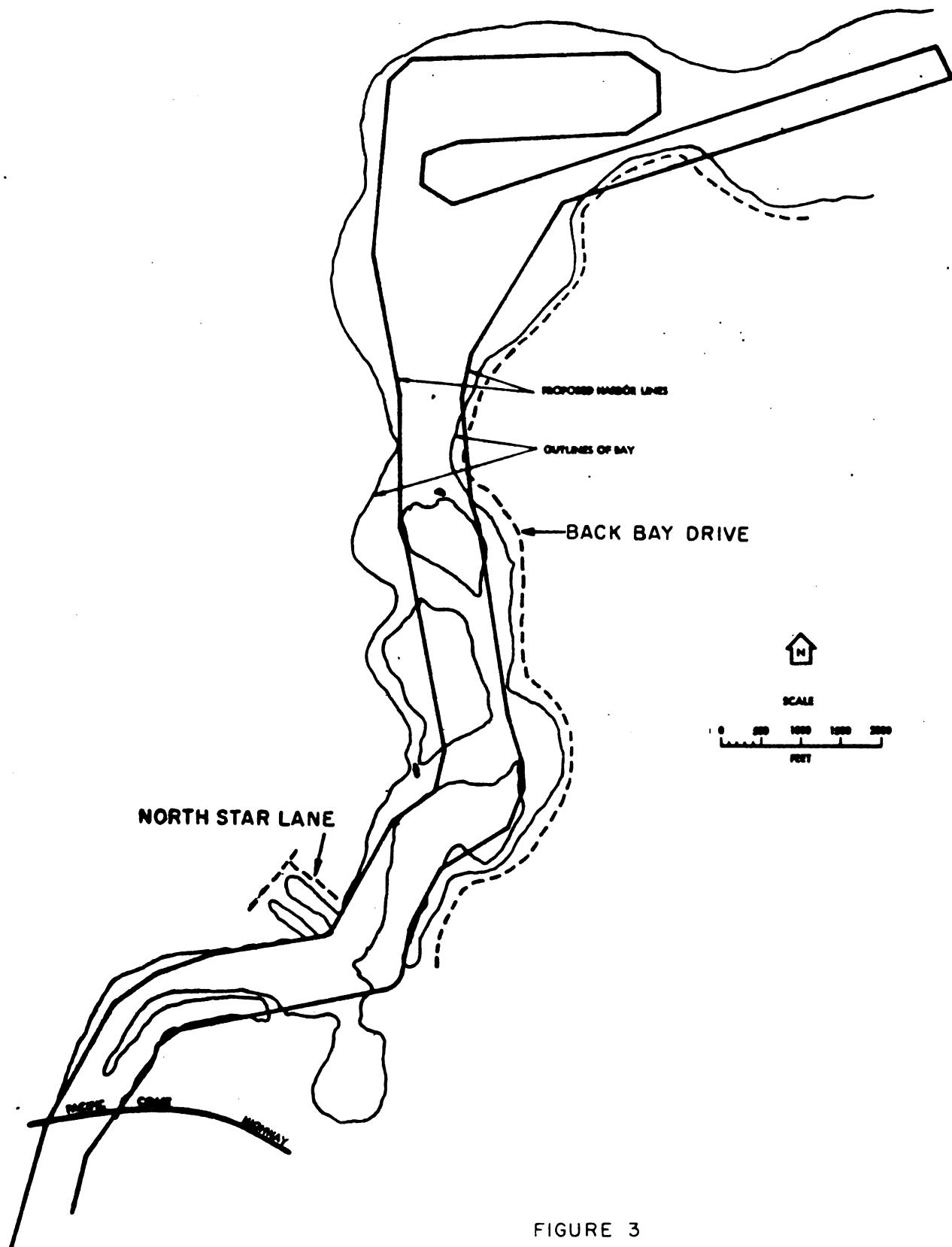


FIGURE 3
UPPER NEWPORT BAY PROPOSED LAND EXCHANGE PLAN

designated for park use, but much of this area probably would be used for parking. The proposal designates that 1,600 feet of channel frontage on the east side of the bay, in the Big Canyon area, would be devoted to a 70-acre public park that would extend up the canyon to Jamboree Road. Two small parks would be established on the west side of the main channel. The balance of the filled tidelands, with about 34,000 feet of water frontage (measured along the proposed harbor lines) would be developed for private residential and aquatic commercial uses.

Effects on Living Resources

The results of these extensive modifications of Newport Bay upon the present biotic community will have far-reaching ecological consequences. Changes to the biota may be even more dramatic because of habitat modifications now taking place in many other coastal areas of southern California. While faunistic changes that would be brought about by this modification of the bay cannot be ascertained fully, there are many that can be predicted. Many of the aquatic animals would be able to adapt to changes. Certain of the fishes and invertebrates found in a little deeper water probably would move into the area as permanent residents. There would be an increase in areas for spawning and for a nursery which might influence more aquatic animals to reside in the area. Some of the migrating waterfowl, grebes, gulls, and diving ducks, would continue to use the bay as a resting area until boating activities increase. With the urbanization of the area, there would be an increase in the number of songbirds taking up residence in the tree and shrub landscaping.

Many of the animals that might benefit from the proposed habitat alteration would do so only if the water quality remains at least at the present level. There is considerable concern at present about the physical

and chemical features of water that might exist after channelization and development of Upper Newport Bay. The accumulation of petroleum pollutants resulting from boating activities, and possible decrease in flushing action in the upper bay, as well as in the lower bay, could lead to degradation of marine water quality in the area. In fact, before dredging and landfill operations begin in Upper Newport Bay, a study should be conducted to insure that there will be adequate flushing action in the bay.

Deleterious effects on the living resources can be predicted if Upper Newport Bay is developed as proposed by this plan. A number of invertebrates found on the mudflats or on the islands will no longer occur in the bay. Several of these occur only in this bay and would become extinct. (Laurence and Reish, 1959.)

In the proposed bay modification, over 950 acres of littoral, maritime, and salt pond habitat would be lost from the environment. This is over two-thirds of the primary area under consideration. As a result, over 60 species of birds would no longer occur in Upper Newport Bay (Appendix E). Unfortunately, for a number of these species, there is very little suitable habitat left in southern California so there will be further reductions in their already diminished population sizes. Many of the waterfowl may continue to use the area for resting; however, it no longer will serve as a feeding area for many of these birds. This bay modification, along with alterations proposed in other coastal areas, will have far-ranging ecological effects on birds that use the Pacific Coast Flyway.

Plants that comprise the salt water marshland flora will be gone. Once again, these represent a habitat type that has all but disappeared from southern California. Without question, ecological degradation would result from developing Upper Newport Bay along the lines outlined in the Land Exchange Proposed Plan.

Upper Newport Bay Proposed Park Plan

Because of its wildlife, inherent high aesthetic and scenic values, and proximity to the University of California at Irvine and to the rapidly developing urban areas, Upper Newport Bay would lend itself extremely well to development as a park (city, county, or state) and a nature interpretation center. This is referred to as the Upper Newport Bay Proposed Park Plan. Because of the uniqueness of this type of fast dwindling and essential habitat, it would be desirable to maintain the upper bay in a condition somewhat resembling its present configuration and to keep the marshlands, islands, and mudflats intact.

Proposed Development

A park could be developed along the following lines:

Nature interpretative facilities could be developed to allow each visitor the opportunity to appreciate and understand the ecological importance of a salt marsh and mudflat. Without question, educational institutions (elementary, secondary, and collegiate), as well as the general public, would make extensive use of these facilities. Other areas that have been developed along similar lines enjoy heavy use (Table 4). A limited amount of laboratory and storage space would be provided for the use of scientific investigations. Some on-site parking would be provided. This installation would be situated unobtrusively so as not to conflict with the wildlife or the visitor's experience. A site adjacent to the salt beds would be ideal.

Bicycles and pedestrian paths, complete with catwalks, would be constructed along the estuary's edge and to the islands. Vista points would be provided at various points along the bay's periphery. The north-eastern part of the upper bay, which was used for salt evaporation, would

be reestablished as an estuarine environment. The northern half of the upper bay would be preserved as a wildlife habitat, and only a few small footpaths would penetrate the area. The lower half of the upper bay would provide facilities for boating, water skiing, and swimming.

Effects on Living Resources

With the reestablishment of a marsh-mudflat environment in the northeast section of the upper bay, wildlife values would be enhanced. The carrying capacity of the area for migrating and resident birds would be increased. The living marine resources would be maintained at about the present level. The flushing action of the bay probably would be improved and water quality would remain high. The southern part of the upper bay would help satisfy some of the demand for water-associated sports. The park would provide certain financial benefits to the nearby communities.

This type of development for Upper Newport Bay would provide the public with maximum benefits and usage, as well as maintain the high ecological values inherent to the area. It would not only maintain public title to tidelands and waterways, but would insure continued public access to all the upper bay. This development does require the acquisition of patent lands (now subject to public easement), the salt beds, and the fee owned islands now under private ownership (the Irvine Company).

Upper Newport Bay Proposed Alternate Plan

The two proposed plans already presented in this document represent divergent viewpoints.

The Upper Newport Land Exchange proposal recommends the total development of the bay into an area of low to medium density housing with

associated boat mooring facilities, commercial areas, a marine stadium, bathing beaches, a rowing course, and several parks. It does not take into consideration the far-reaching ecological consequences that would result from its implementation.

The Upper Newport Bay Proposed Park Plan retains the bay in its present configuration. It recommends the bay be maintained as a park (city, county, or state), with the northern half being preserved as a wildlife habitat and the lower half providing boating and swimming facilities. This proposal does consider the ecological consequences in its "development" of the bay, as well as the growing recreational needs of the general public. It also maintains or even enhances the aesthetic and scenic values of the area; however, it makes no provisions for any additional housing or commercial development.

There are alternates to these two views. One of these provides some residential and commercial development, and yet maintains to a degree the ecological integrity of Upper Newport Bay. This is really a compromise whereby the upper bay can be developed for residential and commercial uses south of the Narrows, and north of this point it can be developed and maintained as a park and nature interpretation area (Figure 4). This alternative would require at least 5 years to implement from the time development commences. It does not consider present land ownership patterns or acquisition problems, but does stipulate that after development, the area north of the Narrows, including the salt beds, be under public ownership and the area south of the Narrows, including Big Canyon, be in private ownership (except the Harry Welch Park).

Dredging and landfill operations south of the Narrows would proceed as outlined in the Upper Newport Land Exchange Plan (Sampson and Ballinger, 1964) or a modification thereof; however, north of this point there would

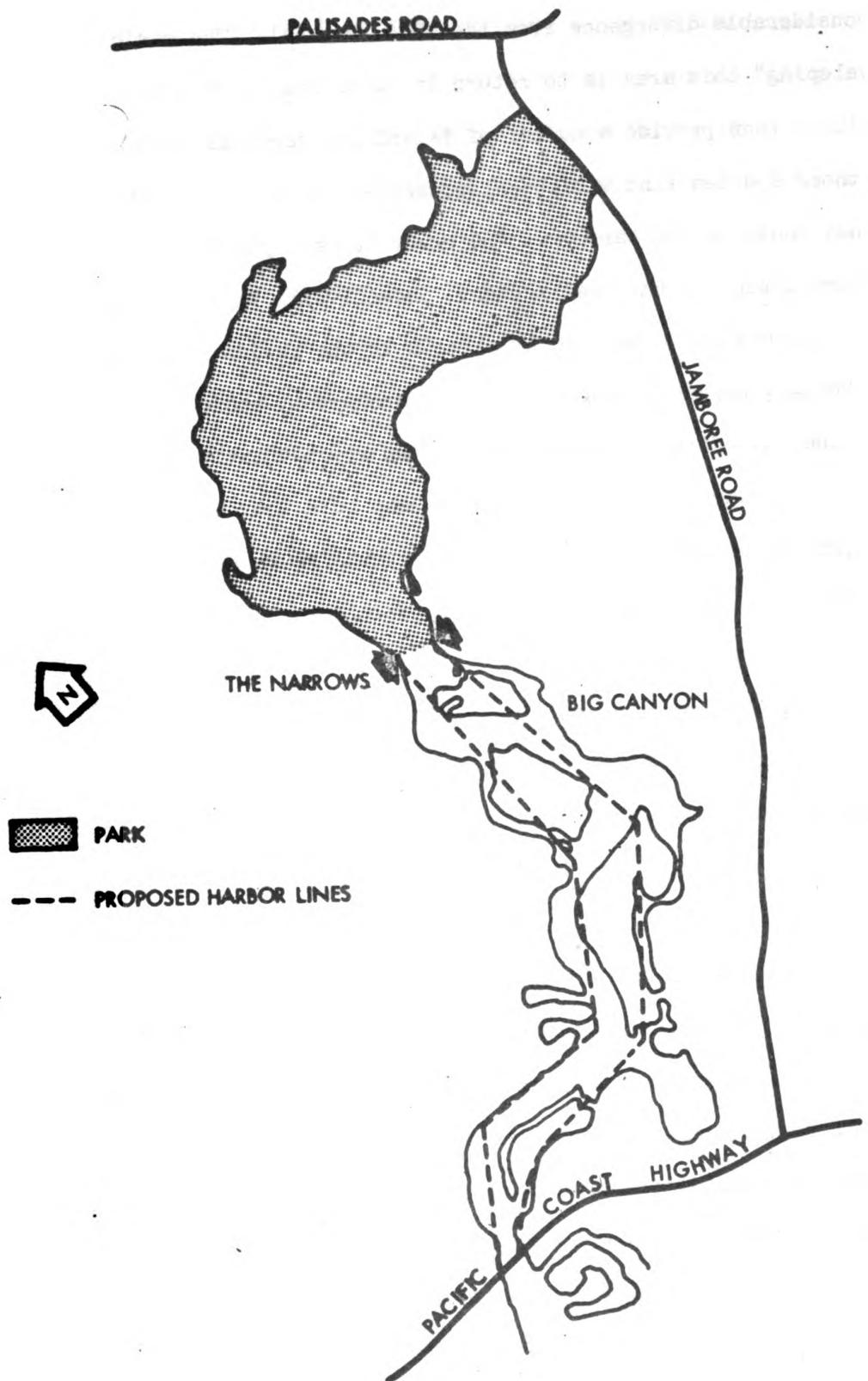


FIGURE 4
ALTERNATE DEVELOPMENT PLAN
PROPOSED
FOR UPPER NEWPORT BAY

be considerable divergence from the 1964 proposal. The basic concept in "developing" this area is to return it to as near a natural condition as possible, then provide a number of islands to serve as replacement habitat for those species that will be dispossessed by the destruction of the islands south of the Narrows. The exact number, placement, configuration, and composition of the "replacement" islands will be determined through an extensive study conducted by experts in the fields of geology, botany, ornithology, marine biology, wildlife management, ecology, and engineering. After the islands are constructed and the representative flora planted, a period of 5 years will be required to make sure they have reached an ecological equilibrium with the islands south of the Narrows. If at the end of 5 years, equilibrium has been reached, development of the southern half of Upper Newport Bay may proceed.

A Nature Interpretation Center could be established in the area adjacent to the southside of the salt beds. A considerable amount of habitat manipulation would be necessary in the salt bed area to return it to a near natural state; therefore, it easily lends itself to establishing a number of representative habitats that are found in the Newport area. Interpretation Center facilities would include a parking area, exhibits, some laboratory space, and trails and walkways to the habitat and wildlife interpretative areas. This site is ideal for interpretative purposes since it forms a continuum between the saltwater-mudflat-marshland environment and the freshwater-marsh habitat represented by San Joaquin Marsh located less than one mile to the east.

The dike that divides the northern end of the bay would be removed and the mudflats would be retained in their present condition. The ski area just north of the Narrows would be maintained. A road around the

entire periphery of the park with parking provided at appropriate spots will insure public access to the area. Green areas and picnic facilities could be incorporated in the design of some of the parking areas.

This proposed plan for developing Upper Newport Bay, while a compromise, does maintain the ecological integrity with little or no loss of wildlife values. Marine resources would possibly be enhanced to some extent, and water quality would remain high since the bay would retain its present flushing action. The Nature Interpretation Center would attract thousands of people annually and the bay would still sustain heavy use by the academic institutions.

The facilities of the park would satisfy many recreational needs of southern Californians, and still provide a low density area in the flight pattern of the Orange County Airport. The area south of the Narrows will help satisfy the demand for boating facilities and will provide for a marine-type low density housing development. There would be some loss of the scenic and aesthetic values now inherent to the area, but by maintaining strong architectural control over building designs, the development could be made very pleasing to the eye.

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APPENDIX A

PLANTS OF UPPER NEWPORT BAY

These species have been collected in sublittoral, littoral, and maritime ecological zones of Upper Newport Bay.

KEY

- V = Very common (Makes up over 50% of flora in given area)
C = Common (Makes up from 5% to 49% of flora in given area)
R = Rare (Makes up less than 4.9% of flora in given area)

ALGAE

Green Algae

<i>Enteromorpha intestinalis</i>	V
<i>Enteromorpha tubulosa</i>	V
<i>Ulva lactuca</i>	V
<i>Ulva lobata</i>	C
<i>Ulva</i> sp.	V

Brown Algae

<i>Colpomenia sinuosa</i>	C
<i>Macrocystis integrifolia</i>	R
<i>Macrocystis pyrifera</i>	R
<i>Ralfsia</i> sp.	R

Red Algae

<i>Antithamnion</i> sp.	R
<i>Cryptosiphonia</i> sp.	C
<i>Gigartina canaliculata</i>	V
<i>Gracilaria</i> sp.	V
<i>Gracilaria sjoestedii</i>	V
<i>Lophosiphonia</i> sp.	R
<i>Nienburgia andersoniana</i>	C
<i>Polysiphonia</i> sp.	R
<i>Polysiphonia pacifica</i>	V
<i>Porphyra perforata</i>	C
<i>Pterosiphonia dendroidea</i>	V

APPENDIX A

PLANTS OF UPPER NEWPORT BAY

PHANEROGAMS (Flowering Plants)

Filaree	<i>Erodium botrys</i>	C
Frankenia	<i>Frankenia grandifolia</i>	C
Bladderpod	<i>Isomeris arborea</i>	R
Sand spurrey	<i>Spergularia marina</i>	R
Ice plant	<i>Mesembryanthemum crystallinum</i>	C
Sea fig	<i>Mesembryanthemum chilense</i>	R
Salt brush	<i>Atriplex watsonii</i>	R
Salt brush	<i>Atriplex canescens</i>	R
Glasswort	<i>Salicornia subterminalis</i>	C
Annual Pickleweed	<i>Salicornia bigelovii</i>	V
Pickleweed	<i>Salicornia virginica</i>	V
California seablite	<i>Suaeda californica</i>	C
Sand verbena	<i>Abronia maritima</i>	R
Saltwort	<i>Batis maritima</i>	V
Sea lavender	<i>Limonium californicum</i>	C
Saltmarsh dodder	<i>Cuscuta salina</i>	R
California desert thorn	<i>Lycium californicum</i>	R
Live forever	<i>Dudleya stolonifera</i>	R
Sweet clover	<i>Melilotus indica</i>	C
Deerweed	<i>Lotus scoparius</i>	R
Beach evening primrose	<i>Oenothera cheiranthifolia</i> var. <i>suffruticosa</i>	V
Coastal encelia	<i>Encelia californica</i>	C
Beach sandbur	<i>Franseria chamissonis</i>	R
Jaumea	<i>Jaumea carnosa</i>	R
Eriophyllum	<i>Eriophyllum confertiflorum</i>	R
Telegraph weed	<i>Heterotheca grandiflora</i>	V
Goldenbush	<i>Haplopappus venetus</i>	R
Coastal sagebrush	<i>Artemisia californica</i>	R
Arrow grass	<i>Triglochin maritima</i>	C
Eel grass	<i>Zostera marina</i>	C
Cat-tail	<i>Typha latifolia</i>	R
Spiny rush	<i>Juncus acutus</i> var. <i>sphaerocephalus</i>	R
California bulrush	<i>Scirpus californicus</i>	R
Salt grass	<i>Distichlis spicata</i>	C
Ripgut grass	<i>Bromus rigidus</i>	R
Cord grass	<i>Spartina foliosa</i>	V

APPENDIX B

MARINE INVERTEBRATES OF UPPER NEWPORT BAY

These species have been collected in Upper Newport Bay.

KEY

V = Very Common

C = Common

R = Rare

Sponges

Sponge	<i>Geodiidae</i> (unid.)	R
Crumb-of-bread sponge	<i>Halichondria panicea</i>	C
Sponge	<i>Hymeniacidon sinapium</i>	V
Sponge	<i>Leucetta losangelensis</i>	C
Sponge	<i>Leuconia barbata</i>	C
Sponge	<i>Leuconia heathi</i>	R
Sponge	<i>Sycettidae</i> (unid.)	R
Sponge	<i>Sycon</i> sp.	R
Sponge	<i>Tetilla mutabilis</i>	C

Jellyfish, anemones, and hydras

Anemone	<i>Actinaria</i> (unid.)	C
Hydroid	<i>Aglaophenia diegensis</i>	V
Aggregate	<i>Anthopleura elegantissima</i>	C
Solitary anemone	<i>Anthopleura xanthogrammica</i>	C
Moon jellyfish	<i>Aurellia</i> sp.	R
Anemone	<i>Corynactis</i> sp.	R
Anemone	<i>Diadumene</i> sp.	R
Anemone	<i>Diadumene franciscana</i>	V
Colonial hydroid	<i>Tubularia crocea</i>	C
Hydroid	<i>Corymorphia palma</i>	R
Sea pen	<i>Stylatula elongata</i>	R

Flatworm

Flatworm	<i>Polycladida</i> (unid.)	C
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Ribbonworm	<i>Nemertea</i> (unid.)	V
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APPENDIX B -contd.

MARINE INVERTEBRATES OF UPPER NEWPORT BAY

<u>Phoronid worm</u>	Phoronidea (unid.)	C
<u>Roundworms</u>	Menatoda (unid.)	C
<u>Bryozoans</u>		
Bryozoan	<i>Bugula neritina</i>	C
Bryozoan	<i>Bugula pacifica</i>	R
Bryozoan	<i>Diaperocoecia floridina</i>	V
Bryozoan	<i>Filicrisia geniculata</i>	R
Bryozoan	<i>Holoporella brunnea</i>	V
Bryozoan	<i>Scrupocellaria bertholetti tenuirostris</i>	R
Bryozoan	<i>Scrupocellaria californica</i>	V
Bryozoan	<i>Scrupocellaria diegensis</i>	V
<u>Segmented worms</u>		
Polychaete	Ampharetidae (unid.)	R
Polychaete	<i>Anaitides</i> sp.	C
Polychaete	<i>Arctonoe vittata</i>	R
Polychaete	<i>Armandia bioculata</i>	V
Polychaete	<i>Axiothella rubrocincta</i>	V
Polychaete	Capitellidae (unid.)	C
Polychaete	<i>Capitella capitella</i>	V
Polychaete	<i>Chaetopteris variopedatus</i>	R
Polychaete	Cirratulidae (unid.)	R
Polychaete	<i>Cirriformia luxuriosa</i>	C
Polychaete	<i>Cossura candida</i>	V
Polychaete	<i>Dorvillea articulata</i>	C
Polychaete	<i>Epitobous</i> sp.	R
Polychaete	<i>Eteone</i> spp.	C
Polychaete	<i>Euchone limnicola</i>	C
Polychaete	<i>Eudistyla polymorpha</i>	C
Polychaete	Eunicidae (unid.)	R
Polychaete	<i>Eusyllis</i> sp.	V

APPENDIX B contd.

MARINE INVERTEBRATES OF UPPER NEWPORT BAY

Polychaete	<i>Exogone lourei</i>	C
Polychaete	<i>Fabricia limnicola</i>	V
Polychaete	<i>Flabelligeridae</i> (unid.)	R
Polychaete	<i>Halosydna johnsoni</i>	C
Polychaete	<i>Haploscoloplos elongatus</i>	V
Polychaete	<i>Lumbrineris</i> sp.	V
Polychaete	<i>Lumbrineris erecta</i>	R
Polychaete	<i>Lumbrineris minima</i>	R
Polychaete	<i>Marphysa</i> spp.	C
Polychaete	<i>Marphysa sanguinea</i>	C
Polychaete	<i>Marphysa stylobranchiata</i>	R
Polychaete	<i>Megaloma pigmentum</i>	C
Polychaete	<i>Nainereis</i> sp.	R
Polychaete	<i>Nainereis dendritica</i>	C
Polychaete	<i>Neanthes caudata</i>	C
Polychaete	<i>Nereis eakini</i>	R
Polychaete	<i>Nereis</i> sp.	R
Polychaete	<i>Nerinides pigmentata</i>	R
Polychaete	<i>Notomastus tenuis</i>	R
Polychaete	<i>Ophiodromus pugettensis</i>	R
Polychaete	<i>Phyllodocidae</i> (unid.)	C
Polychaete	<i>Pista</i> sp.	C
Polychaete	<i>Pista alata</i>	C
Polychaete	<i>Platynereis bicanaliculata</i>	C
Polychaete	<i>Polydora</i> sp.	V
Polychaete	<i>Polynoidae</i> (unid.)	R
Polychaete	<i>Prionospio heterobranchia newportensis</i>	C
Polychaete	<i>Sabellidae</i> (unid.)	C
Polychaete	<i>Saccocirrus papillocercus</i>	V
Polychaete	<i>Serpulidae</i> (unid.)	R
Polychaete	<i>Sphaerosyllis pirifera</i>	C
Polychaete	<i>Spiophanes missionensis</i>	R
Polychaete	<i>Streblospio benedicti</i>	C
Polychaete	<i>Syllidae</i> (unid.)	V
Polychaete	<i>Syllis gracilis</i>	R
Polychaete	<i>Terebellidae</i> (unid.)	R

APPENDIX B contd.

MARINE INVERTEBRATES OF UPPER NEWPORT BAY

Sipunculids**Sipunculid worm***Sipunculus nudus*

R

Inkeeper worms**Inkeeper***Urechis caupo*

R

Arthropods**Sea spiders****Sea spider***Anoplodactylus erectus*

C

Sea spider*Pycnogonida (unid.)*

R

Crustaceans**Barnacles****Acorn barnacles****Cirripeda**

V

Acorn barnacles*Balanus aquila*

C

Acron barnacles*Balanus concavus pacificus*

C

Acorn barnacles*Balanus glandula*

R

Acorn barnacles*Balanus tintinnabulum*

V

Copepods**Copepoda (unid.)**

C

Ostracods**Ostracoda (unid.)**

C

Cumacenas**Cumacea (unid.)**

C

Cheliferans**Chelifera (unid.)**

C

Paratanaidae (unid.)

V

Pill bugs**Cymothoidae (unid.)**

R

Pill bug*Idothea resecata*

R

Pill bug*Livoneca californica*

R

Pill bug*Nerocila californica*

C

Pill bug*Paracerceis caudata*

V

Pill bug*Paracerceis gillianna*

C

Pill bug*Paracerceis sculpta*

V

Pill bug*Parathura elegans*

R

Pill bug*Sphaeroma pentodon*

C

APPENDIX B contd.

MARINE INVERTEBRATES OF UPPER NEWPORT BAY

<u>Leptostracans</u>	Leptostraca (unid.)	R
<u>Amphipods</u>		
Skeleton shrimp	<i>Coprella californica</i>	V
Skeleton shrimp	<i>Coprella equilibra</i>	V
Gammarid	Gammaridae (unid.)	V
<u>Crabs, lobsters, shrimp</u>		
Ghost shrimp	<i>Callianassa californiensis</i>	C
Shore crab	<i>Hemigrapsus</i> sp.	R
Purple shore crab	<i>Hemigrapsus nudus</i>	C
Crab	<i>Lophopanopeus</i> sp.	R
Crab	<i>Lophopanopeus frontalis</i>	C
Crab	Majidae (unid.)	R
Striped shore crab	<i>Pachygrapeus crassipes</i>	R
Hermit crab	<i>Pagurus</i> sp.	C
Hermit crab	<i>Pagurus samuelis</i>	C
Crab	<i>Pinnixa tubicola</i>	R
Crab	<i>Pyromaria tuberculata</i>	C
Fiddler crab	<i>Uca crenulata</i>	R
Pistol shrimp	<i>Upogebia pugettensis</i>	R
<u>Molluscs</u>		
Hartweg's baby chiton	<i>Cyanoplax hartwegi</i>	R
Fenestrate limpet	<i>Acmaea fenerstrada</i>	R
Shield limpet	<i>Acmaea pelta</i>	R
Rough limpet	<i>Acmaea scabra</i>	R
Barrel snail	<i>Acteocina</i> sp.	R
Nudibranch	<i>Anisodoris nobilis</i>	R
Sea hare	<i>Aplysia</i> sp.	C
Sea hare	<i>Aplysia californica</i>	C
Rissoid snail	<i>Barleeia</i> sp.	R
California bubble snail	<i>Bulla gouldiana</i>	R

APPENDIX B contd.

MARINE INVERTEBRATES OF UPPER NEWPORT BAY

California caecum	<i>Caecum californicum</i>	C
Many-named caecum	<i>Caecum crebricinctum</i>	C
Nuttall's hornmouth snail	<i>Ceratostoma nuttalli</i>	C
California hornsnail	<i>Cerithidea californica</i>	C
Hornsnail	<i>Cerithiopsis</i> sp.	C
Carpenter's miniature cerith	<i>Cerithiopsis carpenteri</i>	C
Slipper shell	<i>Crepidula</i> sp.	R
Onyx slipper shell	<i>Crepidula onyx</i>	V
Pacific half-slipper shell	<i>Crepidatella lingulata</i>	C
Cup-and-saucer limpet	<i>Crucibulum spinosum</i>	V
Nudibranch	<i>Dendrodoris albopunctata</i>	C
Nudibranch	<i>Dendrodoris fulva</i>	C
Nudibranch	<i>Diadula sandiegensis</i>	C
Rough keyhole limpet	<i>Diodora aspera</i>	C
Nudibranch	<i>Dorididae</i> (unid.)	R
Tectibranch	<i>Haminoea vesicula</i>	R
Stern's lamellaria snail	<i>Lamellaria sternsi</i>	C
Hardegedged keyhole limpet	<i>Lucapinella callomarginata</i>	C
Gem murex	<i>Maxwellia gemma</i>	C
Keeled dove snail	<i>Mitrella carinata</i>	C
Frieze-covered dove snail	<i>Mitrella gausapata</i>	C
Channeleddog whelk	<i>Nassarius fossatus</i>	C
Muddog whelk	<i>Nassarius tegulus</i>	C
Tectibranch	<i>Navanax inermis</i>	C
Poulson's dwarf triton	<i>Ocenebra poulsoni</i>	R
Western three-winged murex	<i>Pterynotus trialatus</i>	C
Barrel bubble	<i>Retusa</i> sp.	R
Snail	<i>Rissoella</i> sp.	R
Scaly worm shell	<i>Serpulorbis squamigerous</i>	C
Festive rock snail	<i>Shasyus festivus</i>	C
Black top shell	<i>Tegula funebralis</i>	C
Bay scallop	<i>Adquipecten circularis</i>	C
Agate chama	<i>Chama pellucida</i>	V
Banded chione	<i>Chione californiensis</i>	C

APPENDIX B contd.

MARINE INVERTEBRATES OF UPPER NEWPORT BAY

Smooth chione	<i>Chione fluctifraga</i>	V
Wavy chione	<i>Chione undatella</i>	V
Rough-nestling clam	<i>Hiatella arctica</i>	V
Basket cockle	<i>Clinocardium nuttalli</i>	R
Wedge clam	<i>Donax californicus</i>	R
Sunset clam	<i>Gari californica</i>	R
Little egg cockle	<i>Laevicardium substriatum</i>	R
Kelp-weed scallop	<i>Leptopecten latiauratus</i>	C
California papershell	<i>Lyonsia californica</i>	R
Bent-nose clam	<i>Macoma nasuta</i>	R
California mactra	<i>Mactra californica</i>	C
Bay mussel	<i>Mytilus edulis</i>	V
Native oyster	<i>Ostrea lurida</i>	C
Goeduck	<i>Panope generosa</i>	R
Speckled scallop	<i>Plagioctenium circularis</i> <i>aequisulcatum</i>	R
Rough-sided littleneck	<i>Protothaca laciniata</i>	V
Common littleneck	<i>Protothaca staminea</i>	V
Thin-shelled littleneck	<i>Protothaca tenerima</i>	C
Rosy razor clam	<i>Solen rocaceus</i>	V
Purple clam	<i>Sanguinolaria nuttalli</i>	R
Narrow dish clam	<i>Spisula catilliformis</i>	R
Hemphill's dish clam	<i>Spisula hemphilli</i>	R
California jackknife clam	<i>Tagelus californianus</i>	C
Gaper	<i>Tresus nuttalli</i>	R
Spiny cockle	<i>Trachycardium quadragenarium</i>	C
Fat horse mussel	<i>Volsella capax</i>	R
Straight horsemussel	<i>Volsella recta</i>	R
Giant horsemussel	<i>Volsella flabellata</i>	R
Ribbed horsemussel	<i>Volsella demissa</i>	R
Octopus	<i>Octopus bimaculatus</i>	C

Starfish and sea urchins

Brittle star	<i>Amphipholis squamata</i>	R
Brittle star	<i>Amphipholis pugetana</i>	C

APPENDIX B contd.

MARINE INVERTEBRATES OF UPPER NEWPORT BAY

Pale sea urchin	<i>Lytechinus pictus</i>	C
Brittle star	<i>Ophiactis simplex</i>	V
Sea bat or sea star	<i>Patiria miniata</i>	C
Red sea urchin	<i>Strongylocentrotus franciscanus</i>	R

Chordates

Ascidian	<i>Amaroucium</i> sp.	R
Ascidian	<i>Amaroucium californicum</i>	C
Ascidian	<i>Ciona intestinalis</i>	V
Ascidian	<i>Styela barnharti</i>	V
Ascidian	<i>Styela montereyensis</i>	R
Ascidian	<i>Styela truncata</i>	V

APPENDIX C

MARINE FISHES OF UPPER NEWPORT BAY

These species have been collected in Upper Newport Bay

KEY

V = Very common

C = Common

R = Rare

Sharks and rays

Gray smoothhound	<i>Mustelus californicus</i>	C
Brown smoothhound	<i>Triakis henlei</i>	R
Leopard shark	<i>Triakis semifasciata</i>	C
Thornback	<i>Platyrrhinoidis triseriata</i>	R
Shovelnose guitarfish	<i>Rhinobatos productus</i>	R
Diamond stingray	<i>Dasyatis dipterurus</i>	R
California butterfly ray	<i>Gymnura marmorata</i>	R
Round stingray	<i>Urolophus halleri</i>	V
Bat ray	<i>Myliobatis californicus</i>	R

Bony fishes

Bonefish	<i>Albula vulpes</i>	R
Threadfin shad	<i>Dorosoma petenense</i>	R
Pacific sardine	<i>Sardinops caerulea</i>	R
Pacific thread herring	<i>Opisthonema libertate</i>	R
Deepbody anchovy	<i>Anchoa compressa</i>	V
Slough anchovy	<i>Anchoa delicatissima</i>	R
Northern anchovy	<i>Engraulis mordax</i>	R
California killifish	<i>Fundulus parvipinnis</i>	C
Bay pipefish	<i>Syngnathus griseolineatus</i>	C
Salema	<i>Xenistius californiensis</i>	R
Kelp bass	<i>Paralabrax clathratus</i>	R
Spotted sand bass	<i>Paralabrax maculatofasciatus</i>	C
Sand bass	<i>Paralabrax nebulifer</i>	C
Striped bass	<i>Roccus saxatilis</i>	R
Sargo	<i>Anisotremus davidsoni</i>	R
Opaleye	<i>Girella nigricans</i>	C
Pacific mackerel	<i>Scomber japonicus</i>	R
Black croaker	<i>Cheilotrema saturnum</i>	R

APPENDIX C contd.

MARINE FISHES OF UPPER NEWPORT BAY

White seabass	<i>Cynoscion nobilis</i>	R
White croaker	<i>Genyonemus lineatus</i>	R
California corbina	<i>Menticirrhus undulatus</i>	C
Spotfin croaker	<i>Roncadour stearnsi</i>	R
Queenfish	<i>Seriphis politus</i>	C
Yellowfin croaker	<i>Umbrina roncadour</i>	C
Barred surfperch	<i>Amphistichus argenteus</i>	R
Shiner perch	<i>Cymatogaster aggregata</i>	C
Black perch	<i>Embiotoca jacksoni</i>	C
Silver surfperch	<i>Hyperprosopon ellipticum</i>	R
White seaperch	<i>Phanerodon furcatus</i>	C
Rubberlip perch	<i>Rhacochilus toxotes</i>	R
Pile perch	<i>Rhacochilus vacca</i>	R
Walleye surfperch	<i>Hyperprosopon argenteum</i>	R
Arrow goby	<i>Clevelandia ios</i>	C
Longjaw mudsucker	<i>Gillitchthys mirabilis</i>	C
Shadow goby	<i>Quietula y-cauda</i>	C
Rockfish	<i>Sebastodes</i>	R
Giant kelpfish	<i>Heterostichus rostratus</i>	C
Reef finspot	<i>Paraclinus integrifinnis</i>	R
Bay blenny	<i>Hypsoblennius gentilis</i>	C
California barracuda	<i>Sphyraena argentea</i>	C
Striped mullet	<i>Mugil cephalus</i>	R
Topsmelt	<i>Atherinops affinis</i>	V
California grunion	<i>Leuresthes tenuis</i>	R
Specklefin midshipman	<i>Porichthys myriaster</i>	C
Plainfin midshipman	<i>Porichthys notatus</i>	R
Pacific staghorn sculpin	<i>Leptocottus armatus</i>	C
Pacific sanddab	<i>Citharichthys sordidus</i>	R
Speckled sanddab	<i>Citharichthys stigmaeus</i>	R
California halibut	<i>Paralichthys californicus</i>	C
Diamond turbot	<i>Hypsopsetta guttulata</i>	C
Spotted turbot	<i>Pleuronichthys ritteri</i>	C
California tonguefish	<i>Syphurus atricauda</i>	C

APPENDIX D

REPTILES AND AMPHIBIANS OF UPPER NEWPORT BAY

These species have been observed adjacent to Upper Newport Bay.

California newt	<i>Taricha torosa</i>	C
California slender salamander	<i>Batrachoseps attenuatus</i>	V
Western spadefoot toad	<i>Scaphiopus hammondi</i>	R
California toad	<i>Bufo boreas halophilus</i>	V
Pacific treefrog	<i>Hyla regilla</i>	V
Bullfrog	<i>Rana catesbeiana</i>	R
Red-legged frog	<i>Rana aurora</i>	R
Western pond turtle	<i>Clemmys marmorata</i>	R
Coast horned lizard	<i>Phrynosoma coronatum</i>	C
Western fence lizard	<i>Sceloporus occidentalis</i>	V
California side-blotched lizard	<i>Uta stansburiana hesperis</i>	V
Western skink	<i>Eumeces skiltonianus</i>	C
San Diego alligator lizard	<i>Gerrhonotus multicarinatus webbi</i>	C
California legless lizard	<i>Anniella pulchra</i>	C
Western yellow-bellied racer	<i>Coluber constrictor mormon</i>	R
California kingsnake	<i>Lampropeltis getulus californiae</i>	C
San Diego gopher snake	<i>Pituophis melanoleucus annexens</i>	V
Long-nosed snake	<i>Rhinocheilus lecontei</i>	C
California red-sided garter snake	<i>Thamnophis sirtalis infernalis</i>	C

KEY

C = Commonly observed

V = Very common

R = Rarely observed

APPENDIX E

BIRDS OF UPPER NEWPORT BAY

These species are known to occur in or adjacent to Upper Newport Bay.

KEY

A = Abundant
 C = Common
 U = Uncommon
 O = Occasional
 R = Rare
 V = Vagrant

* = Breeding birds (known or presumed)
 + = Expected loss with dredging and
 bulkheading.
 Ø = Breed in adjacent freshwater marsh.
 † = Marsh breeders (salt or fresh/
 brackish)

Shorebirds

Semipalmented plover +	<i>Charadrius semipalmatus</i>	C
Snowy plover * +	<i>Charadrius alexandrinus</i>	U
Killdeer * +	<i>Charadrius vociferus</i>	C
American golden plover +	<i>Pluvialis dominica</i>	V
Black-bellied plover +	<i>Squatarola squatarola</i>	C
Ruddy turnstone +	<i>Arenarie interpres</i>	U
Black turnstone +	<i>Arenaria melanocephala</i>	R
Common snipe +	<i>Capella gallinago</i>	O
Long-billed curlew +	<i>Numenius americanus</i>	C
Whimbrel +	<i>Numenius phaeopus</i>	U
Spotted sandpiper +	<i>Actitis macularia</i>	O
Solitary sandpiper +	<i>Tringa solitaria</i>	O
Willet +	<i>Catoptrophorus semipalmatus</i>	A
Greater yellowlegs +	<i>Totanus melanoleucus</i>	C
Lesser yellowlegs +	<i>Totanus flavipes</i>	O
Knot +	<i>Calidris canutus</i>	U
Pectoral sandpiper +	<i>Erolia melanotos</i>	R
Baird's sandpiper +	<i>Erolia bairdi</i>	R
Least sandpiper +	<i>Erolia minutilla</i>	C
Dunlin +	<i>Erolia alpina</i>	C
Short-billed dowitcher +	<i>Limnodromus griseus</i>	A
Long-billed dowitcher +	<i>Limnodromus scolopaceus</i>	U
Western sandpiper +	<i>Ereunetes mauri</i>	A
Marbled godwit +	<i>Limosa fedoa</i>	A

APPENDIX E-contd.

Sanderling †	<i>Corcethia alba</i>	U
American avocet * +	<i>Recurvirostra americana</i>	C
Black-necked stilt * +	<i>Himantopus mexicanus</i>	C
Red phalarope	<i>Phalaropus fulicarius</i>	O
Wilson's phalarope	<i>Steganopus tricolor</i>	C
Northern phalarope	<i>Lobipes lobatus</i>	C

Grebes, loons, pelicans and cormorants

Red-necked grebe	<i>Podiceps grisegena</i>	V
Horned grebe	<i>Podiceps auritus</i>	C
Eared grebe	<i>Podiceps caspicus</i>	A
Western grebe	<i>Aechmophorus occidentalis</i>	C
Pied-billed grebe * + Ø	<i>Podilymbus podiceps</i>	C
Common loon	<i>Gavia immer</i>	O
Arctic loon	<i>Gavia arctica</i>	O
Red-throated loon	<i>Gavia stellata</i>	O
White pelican	<i>Pelecanus erythrorhynchos</i>	O
Brown pelican	<i>Pelecanus occidentalis</i>	U
Double crested cormorant	<i>Phalacrocorax auritus</i>	C
Brandt's cormorant	<i>Phalacrocorax penicillatus</i>	U

Miscellaneous marsh birds

Clapper rail * + Ø	<i>Rallus longirostris</i>	C
Virginia rail * + Ø	<i>Rallus limicola</i>	U
Sora * + Ø	<i>Porzana carolina</i>	U
Black rail +	<i>Laterallus jamaicensis</i>	V
Common gallinule * + Ø	<i>Gallinula chloropus</i>	U
American coot * + Ø	<i>Fulica americana</i>	A

Wading birds

Great blue heron +	<i>Ardea herodias</i>	C
Green heron +	<i>Butorides virescens</i>	U
Common egret +	<i>Casmerodius albus</i>	C
Snowy egret +	<i>Leucophoyx thula</i>	A
Reddish egret +	<i>Dichromonassa rufescens</i>	R V

APPENDIX E-contd.

Louisiana heron +	<i>Hydranassa tricolor</i>	R
Little blue heron +	<i>Florida caerulea</i>	V
Black-crowned night heron +	<i>Nycticorax nycticorax</i>	C
American bittern +	<i>Botaurus lentiginosus</i>	U
White-faced ibis +	<i>Plegadis chihi</i>	V
American flamingo +	<i>Phoenicopterus ruber</i>	V

Gulls and terns

Glaucous-winged gull	<i>Larus glaucescens</i>	U
Western gull	<i>Larus occidentalis</i>	C
Herring gull	<i>Larus argentatus</i>	C
California gull	<i>Larus californicus</i>	A
Ring-billed gull	<i>Larus delawarensis</i>	A
Mew gull	<i>Larus canus</i>	U
Bonaparte's gull	<i>Larus philadelphia</i>	C
Heermann's gull	<i>Larus heermanni</i>	C
Gull-billed tern	<i>Gelochelidon nilotica</i>	V
Forster's tern	<i>Sterna forsteri</i>	A
Common tern	<i>Sterna hirundo</i>	U
Arctic tern	<i>Sterna paradisaea</i>	R
Least tern * +	<i>Sterna albifrons</i>	C
Royal tern	<i>Thalasseus maximus</i>	O
Elegant tern	<i>Thalasseus elegans</i>	U
Caspian tern	<i>Hydroprogne caspia</i>	U
Black tern	<i>Chlidonias niger</i>	O

Swans

Whistling swan +	<i>Olor columbianus</i>	R
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Geese

Canada goose +	<i>Branta canadensis</i>	R
Black brant +	<i>Branta nigricans</i>	O
White-fronted goose +	<i>Anser albifrons</i>	R
Snow goose +	<i>Chen hyperborea</i>	R

APPENDIX E-contd.

Surface ducks

Mallard * †	<i>Anas platyrhynchos</i>	C
Gadwall †	<i>Anas strepera</i>	U
Pintail * †	<i>Anas acuta</i>	A
Common teal †	<i>Anas crecca</i>	V
Green-winged teal †	<i>Anas carolinensis</i>	C
Blue-winged teal †	<i>Anas discors</i>	O
Cinnamon teal †	<i>Anas cyanoptera</i>	C
European widgeon †	<i>Mareca penelope</i>	U
American widgeon †	<i>Mareca americana</i>	A
Shoveller †	<i>Spatula clypeata</i>	C

Diving ducks

Redhead	<i>Aythya americana</i>	O
Ring-necked duck	<i>Aythya collaris</i>	O
Canvasback	<i>Aythya valisineria</i>	O
Greater scaup	<i>Aythya marila</i>	V
Lesser scaup	<i>Aythya affinis</i>	C
Common goldeneye	<i>Bucephala clangula</i>	O
Bufflehead	<i>Bucephala albeola</i>	V
White-winged scoter	<i>Melanitta deglandi</i>	U
Common scoter	<i>Oidemia nigra</i>	U
Surf scoter	<i>Melanitta perspicillata</i>	A

Stiff-tailed ducks

Ruddy duck * †	<i>Oxyura jamaicensis</i>	C
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Mergansers

Hooded merganser	<i>Lophodytes cucullatus</i>	R
Common merganser	<i>Mergus merganser</i>	O
Red-breasted merganser	<i>Mergus serrator</i>	C

Vultures

Turkey vulture	<i>Cathartes aura</i>	C
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APPENDIX E -contd.

Hawks, falcons, and eagles

White-tailed kite *	<i>Elanus leucurus</i>	U
Sharp-shinned hawk	<i>Accipiter striatus</i>	U
Cooper's hawk *	<i>Accipiter cooperii</i>	U
Red-tailed hawk *	<i>Buteo jamaicensis</i>	C
Swainson's hawk	<i>Buteo swainsoni</i>	R
Rough-legged hawk	<i>Buteo lagopus</i>	R
Golden eagle	<i>Aquila chrysaetos</i>	R
Marsh hawk	<i>Circus cyaneus</i>	U
Osprey	<i>Pandion haliaetus</i>	R
Peregrine falcon	<i>Falco peregrinus</i>	R
Sparrow hawk *	<i>Falco sparverius</i>	C

Birds occurring in the immediate areas adjacent to Upper Newport Bay.

Ring-necked pheasant *	<i>Phasianus colchicus</i>	U
California quail *	<i>Lophortyx californicus</i>	C
Mourning dove *	<i>Zenaidura macroura</i>	A
Spotted dove *	<i>Streptopelia chinensis</i>	O
Roadrunner *	<i>Geococcyx californianus</i>	R
Barn owl *	<i>Tyto alba</i>	C
Burrowing owl *	<i>Steotyto cunicularia</i>	C
Short-eared owl *	<i>Asio flammeus</i>	U
Anna's hummingbird *	<i>Calypte anna</i>	A
White-throated swift *	<i>Aeronautes saxatalis</i>	U
Belted kingfisher * †	<i>Megaceryle alcyon</i>	U
Red-shafted flicker *	<i>Colaptes cafer</i>	C
Western kingbird *	<i>Tyrannus verticalis</i>	U
Black phoebe * †	<i>Sayornis nigricans</i>	U
Horned lark *	<i>Eremophila alpestris</i>	C
Cliff swallow *	<i>Petrochelidon pyrrhonota</i>	C
Common crow *	<i>Corvus brachyrhynchos</i>	C
Common bushtit *	<i>Psaltriparus minimus</i>	C
Cactus wren *	<i>Campylorhynchus brunneicapillus</i>	R
Long-billed marsh wren * † ‡	<i>Telmatodytes palustris</i>	U

APPENDIX E-contd.

Mockingbird	<i>Mimus polyglottos</i>	C
Ruby-crowned kinglet	<i>Regulus calendula</i>	O
Water pipit	<i>Anthus spinosus</i>	C
Loggerhead shrike *	<i>Lanius ludovicianus</i>	C
Starling *	<i>Sturnus vulgaris</i>	A
Audubon's warbler	<i>Dendroica auduboni</i>	C
Yellowthroat * †	<i>Geothlypis trichas</i>	U
House sparrow (English sparrow) *	<i>Passer domesticus</i>	A
Western meadowlark *	<i>Sturnella neglecta</i>	A
Red-winged blackbird (* freshwater marsh only)	<i>Agelaius phoeniceus</i>	C
Tricolored blackbird	<i>Agelaius tricolor</i>	U
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	A
House finch *	<i>Carpodacus mexicanus</i>	A
American goldfinch	<i>Spinus tristis</i>	O
Lesser goldfinch	<i>Spinus psaltria</i>	C
Brown towhee *	<i>Pipilo fuscus</i>	C
Savannah sparrow * †	<i>Passerculus sandwichensis</i>	C
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	A
Lincoln's sparrow	<i>Melospiza lincolni</i>	U
Song sparrow * †	<i>Melospiza melodia</i>	C
Lazuli Bunting *	<i>Passerina amoena</i>	U
Blue grosbeak	<i>Guiraca caerulea</i>	U

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APPENDIX F

MAMMALS OF UPPER NEWPORT BAY

These species have been observed on or adjacent to Upper Newport Bay.

Raccoon	<i>Procyon lotor</i>
Striped skunk	<i>Mephitis mephitis</i>
Ground squirrel	<i>Citellus beecheyi</i>
Valley pocket gopher	<i>Thomomys bottae</i>
Black-tailed jack rabbit	<i>Lepus californicus</i>
Deermice	<i>Peromyscus</i> sp.
House mouse	<i>Mus musculus</i>
Pacific kangaroo rat	<i>Dipodomys agilis</i>
Dusky-footed wood rat	<i>Neotoma fuscipes</i>
Audubon cottontail	<i>Silvilagus auduboni</i>

