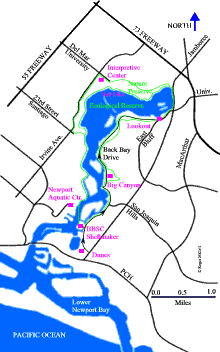
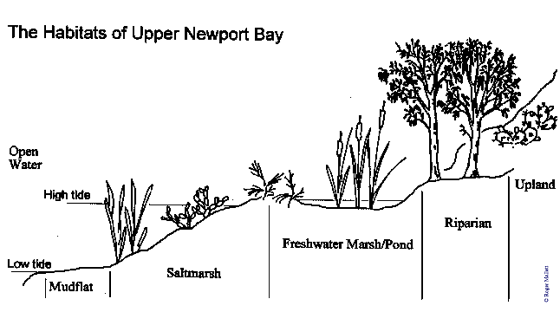
**NEWPORT BACK BAY**

Upper Newport Bay (UNB) in Newport Beach is an estuary - a place where fresh and salt water meet and mix. It is one of only a few remaining estuaries in Southern California and is the home of nearly 200 species of birds, including several endangered species, as well as numerous species of mammals, fish, other critters and native plants. The Bay is an important stopover for migrating birds on the Pacific Flyway and up to 30,000 birds can be seen here on any day during the winter months. Its close proximity to the 73 Freeway makes Upper Newport Bay easily accessible to residents of Orange County and beyond. Many people come here to hike, cycle, canoe, kayak, fish or simply enjoy nature.

The UNB Ecological Reserve was created in 1975 as result of the purchase of 527 acres of land in and around the bay from the Irvine Company and the transfer of 214 acres of tidal wetlands from the County of Orange to the State. An additional 11 acres of land in Big Canyon was added in 1982 bringing the total acreage of the Ecological Reserve to 752 acres. It is managed by the California Department of Fish and Game (DFG). In 1990 the County of Orange acquired 140 acres of bluffs on the north and north-west sides of the bay for the creation of a Regional Park. The Regional Park was rededicated as the UNB Nature Preserve in 2000. It is managed by the County of Orange Department of Harbors, Beaches and Parks (HBP).

A habitat is a type of place where a particular animal or plant or group of animals and plants is most at home. In this type of place the general combination of food, water, shelter and space allows these plants and animals to thrive. Within any one geographical area there may be several habitats. The classification of habitats is a subject of much debate among naturalists. Some bird watchers, for instance, feel that as few as five habitats are sufficient to define where birds are seen at Upper Newport Bay. On the other hand some botanists have defined as many as 13 different habitats and as many as 21 distinct plant communities here at the Bay.

The set of six habitats shown below has been found to be of most benefit in categorizing the plants, birds, marine life and other life of Upper Newport Bay in a simple and consistent manner:



Open Water. **–** The bay itself as distinct from the bottom or the shores of the bay. Fish swim in open water and seabirds are seen overhead. The water is teeming with plankton. Seaweeds (algae) and submerged marine plants such as eel grass may be present.

Mudflat. **–** The areas of the shore exposed at low tide. As the name implies these areas are generally muddy and flat. Plant life is limited to algae. Worms, mollusks and other marine critters are found in abundance in the mud and shore birds are seen pecking at the surface or probing below the surface of the mud for food.

Saltmarsh. **–** The area of the shore from the mud flats to the high tide line. The plants in this area are adapted to being submerged in water and growing in salty soils. Cord grass thrives from the mid tide region upwards. Pickleweed is found in abundance in the high tide region and adjacent dry land which has salty soil.

Freshwater Marsh/Pond. **–** Water-loving plants such as cattails and sedges grow in and around the water. Many of these plants can tolerate mild to moderate salinity. Freshwater fish, crayfish and other critters live here. Numerous ducks will be found here, particularly in winter.

Riparian. **–** The area along side a river or stream or on the banks of a lake or pond. The plants in this area like moist soil but do not necessarily grow in the water. Willows are common. Cottonwoods and other trees and large shrubs are found. Bushtits, finches and hummingbirds will be seen here.

Upland. **–** The bluffs, cliffs and undeveloped mesas around the bay make up the upland habitat. The dry slopes abound with sagebrush and drought-resistant succulents such as ice plant and cactus are found. Turkey vultures and other birds of prey are at home here. They are seen soaring effortlessly in the upward currents of warm air along the bluffs.

Many plants and animals may be found in more than one habitat and the boundary between two habitats is not necessarily well-defined. In particular, because Upper Newport Bay is an estuary, the distinction between saltwater and freshwater marsh is not always clear. There is a region where the seawater coming in from the ocean and the freshwater entering from San Diego Creek mix. Here the water is moderately saline (salty). It is said to be brackish. This brackish region changes as a result of both the twice-daily ebb and flow of the tide and the big seasonal difference in flow along the creek.

One of the things that makes Upper Newport Bay so interesting and exciting is the ability to experience so many different habitats on a short nature walk. At Big Canyon algae, cord grass, pickleweed, salt grass, cattail, willow and cactus can all be seen in a quarter of a mile hike. Terns, sandpipers, ducks, songbirds, hawks and many more birds are found there.



The Peter and Mary Muth

Interpretive Center is located at 2301 University Drive, Newport Beach, CA 92660, at the corner of University and Irvine Ave. The Center is currently open to the public from 10:00 AM to 4:00 PM  Tuesday through Sunday. Call (714) 973 6820 for information. Please note that the building is not visible from the street.

The Back Bay Science Center (BBSC) is located at Shellmaker Island, 600 Shellmaker Road, Newport Beach, CA 92660. School tours, patch programs, shark camps, canoe tours, campfires and walking tours take place at Shellmaker Island. The island is only open to the public when programs and tours are scheduled.

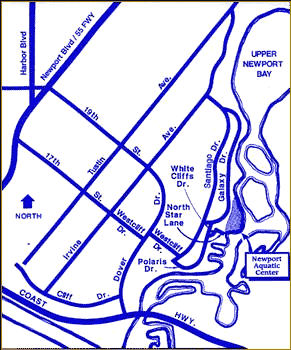
Friends tours meet at the Lookout on the corner of Back Bay Drive and East Bluff at the north end of Back Bay Drive.

For motor vehicles, Back Bay Drive is a one-way street from the Shellmaker end.

**Newport Aquatic Center - 1 Whitecliffs Drive, Newport Beach, CA 92660**

**Ph: (949) 646-7725**

The Newport Aquatic Center was founded in 1987 as a non-profit corporation offering the public unique opportunities in the Olympic water sports of rowing, canoeing, kayaking and outrigger canoe competition.



Upper Newport Bay

Peter and Mary Muth Interpretive Center

**Wall Near The Front Door**

1. What is an estuary?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. Upper Newport Back Bay: General Information Panels

A. How many acres does Newport Bay Cover?\_\_\_\_\_752\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

B. What is a wetland and what ecosystem services do wetlands perform?

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**Vanishing Habitat Wall Near Pelicans**

3. What is the primary cause of plant and animal extinction?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. What is the percentage of wetlands that have disappeared in southern California?\_\_\_\_\_

**Working Wetlands**

5. List 6 major causes of habitat loss.

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6. How is a wetland like a strainer?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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7. How is a wetland like an egg beater?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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8. How is a wetland like a sponge?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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9. How is a wetland like a hotel?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Tunnel of Mud**

10. Why do the bills of different species shorebirds differ so much in length?

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11. Why can you find so many birds on the mud flats of estuaries at low tide?

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12. Why does the mud in estuaries stink?

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13. Which habitat at Newport Bay has the most organisms?

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**The Littoral Region**

I. The coastline of Los Angeles-Orange Counties is a series of rocky shores and sandy beaches interspersed with bays and harbors.

1. Rocky Shores – Cliffs and sandy beaches border these areas

Examples: Corona Del Mar, Laguna Beach’s Diver’s Cove, Crescent Beach

1. Sandy Beaches – Large Areas covered with Sand

Examples: Newport Beach, Huntington Beach

1. Bay and Harbors – Estuary’s with water that has varying amounts of salinity

Examples: Upper Newport Back Bay, Bolsa Chica Slough, Kings Harbor, Dana Point Marina

II. Tides

1. Two high tides and two low tides per day (about every 6 hours in Southern California)
2. Created by Gravity (Holds oceans in Basin) and Gravitational pull from celestial bodies (sun and moon) depending on size and distance
   1. Moon – Small but very close – large effect
   2. Sun – Large but very far away – small effect
3. Types of Tides
   1. Spring Tides
      1. Extreme tides (3X greater than Neap tides)
      2. Direct alignment between sun, earth and moon
      3. most extreme during solstices
         1. Summer – June 22 in the morning
         2. Winter - December 22 in afternoon
   2. Neap Tides
      1. Lower tide variation
      2. 90 degree angle between sun, earth and moon
      3. Occurs during first and last quarter moon
   3. Tidal Cycles
      1. Set of spring tides every 2 weeks
      2. set of neap tides in between spring tides
4. Currents and Waves
   1. Currents: major horizontal movements in a definable path
      1. California Current is the principle current in Southern California which is a colder current brought in from the north
      2. Other currents – during the winter, a counterclockwise current may flow from the south and during Santa Ana conditions, an offshore current can occur
   2. Waves: disturbances that move on or in the water mass which can be created locally or thousands of miles away.
5. Water Temperature
   1. January/February at a low of 50-52 degrees
   2. August/September at a high of 75 degrees

III. Zonation

1. Arrangement of different marine organisms in horizontal bands or zones
2. Zonation will vary from area to area depending upon rock location in respect to the surf
3. Zonation in intertidal waters is determined by physical factors:
   1. AN02327_Substrate
   2. Water depth
   3. Light
4. There are four recognized zones:
   1. Spray (Splash) Zone – 5.0 feet and above sea level
   2. High Tide Zone – 2.5 to 5.0 feet above sea level
   3. Middle Tide Zone – 0.0 to 2.5 feet above sea level
   4. Low Tide Zone – Below sea level

III. Rocky Shore Characteristics

1. Very Complex Environment – very rich biologically
2. Fixed Substrate
   1. Attachment – sessile forms
   2. Adherence – motile forms
3. Desiccation
   1. Sessile plants and animals must endure periods of drying out when exposed
   2. Motile animals must either move to wetter area are endure periods of drying out when exposed
4. Insolation (radiation from the sun)
   1. Direction of rocks (north vs. south facing)
   2. Damage to organisms due to:
      * 1. UV light
        2. Overheating – rocks may get up to 100 degrees Fahrenheit
5. Wave Action
   1. Good – wetting, brings up oxygen and food for sessile forms
   2. Bad – impact, abrasion from sand and small rocks suspended in water
6. Salinity
   1. Increases in higher tide pools
   2. AN04238_Decreases when:
      * 1. raining (especially at low tide)
        2. near the mouths of rivers
7. General Adaptations to a Rocky Coast
   1. Attachment
   2. External protection
   3. Escape capabilities
   4. Physiological tolerances
8. Factors Controlling marine life
   1. Desiccation
   2. Light
   3. Wave Action
   4. Interspecific Competition
   5. Intraspecific Competition
   6. Dispersal
   7. Predation
   8. Larval Site Selection
   9. Critical levels
      1. Exposure levels an organism can tolerate
      2. Extreme tides (spring tides)





**ROCKY INTERTIDAL FIELD TRIP – Corona del Mar**

**INVERTEBRATE LIST:**

**ANEMONES**

|  |  |  |  |
| --- | --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** | **DESCRIPTION** |
| Aggregating Anemone  377865508_e648176884 | *Anthopleura elegantissma* | Mid/Low | Many small anemones clustered together; pale green tentacles with pink or purple tips |
| Giant Green Anemone  giantgreenanemone | *Anthopleura xanthogrammica* | Low | Solitary and large; emerald green |

**WORMS**

|  |  |  |  |
| --- | --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** | **DESCRIPTION** |
| Sand-Castle Worm  Sandcastlea | *Phragmatopoma californica* | Low | Tubes made of sand; tubes form honeycomb shape; lavender tentacles |
| Sandy Worm Shell  WormSnail1 | *Serpulorbis squamigerus* | Low | Tube circular, with many longitudinal, finely roughened or scaly ridges |

**SNAILS:**

|  |  |  |  |
| --- | --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** | **DESCRIPTION** |
| Checkered periwinkle  Periwinkle1 | *Littorina scutulata* | High/Mid | Shell: small, smooth, conical, brownish to nearly black, more elongate than *L. keenae* |
| Eroded periwinkle  1418 | *Littorina kennae* | High | Shell: small, smooth, conical, brownish to nearly black, stubbier than *L. scutulata* |
| Black Turban Snail  black_turban_snail | *Tegula funebralis* | Mid/Low | Shell: mostly black w/ etched band on middle whorl |
| Speckled Turban Snail  Tgallina1 | *Tegula gallina* | Mid/Low | Shell: dark w/ checkered pattern |
| Guilded Turban Snail  teau | *Tegula aureontincta* | Mid/Low | Shell: larger w/ orange umbilicus (hole) |
| Beaded Turban Snail  teei | *Tegula eiseni* | Mid/Low | Shell: smaller w/ white umbilicus (hole) |
| Wavy Turban Snail  Astraea3 | *Lithopoma undosa* | Low | Shell: large, wavy pattern, brown & white |
| Norris’ Top Snail  norissnail | *Norrisia norrisi* | Low | Shell: smooth, orange w/ green umbilicus (hole); bright red foot |
| California Sea Hare  SeaHare1 | *Aplysia californica* | Low | No shell, purple color, in tide pools or within red algae |
| Hopkin’s Rose  hopkins_rose_nudibranch | *Hopkinsia rosacea* | Low | No shell, deep rosy pink w/ finger-like projections covering body |

**LIMPETS**

|  |  |  |  |
| --- | --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** | **DESCRIPTION** |
| Rough Limpet  Rough2 | *Lottia scabra* | High/Mid | Shell: low apex (point), heavily ribbed with scalloped margin; dark dots on side of foot |
| Shield Limpet  Lottia pelta | *Lottia pelta* | Mid/Low | Shell: tall apex, smooth; white foot |
| Owl Limpet  OwlLimpet1 | *Lottia gigantea* | Mid | Shell: largest of the limpets, low apex near front; light orange foot |
| File Limpet  KelpLimp2 | *Lottia limatula* | Mid/Low | Shell: low apex, fine, radial ribs; fine parallel dark lines on side of foot |
| Fingered Limpet  http://www.martinbeebee.com/photos/marine_invertebrates/im1028s.jpg | *Lottia digitalis* | High | Shell: apex at front, strong, radiating ribs, chevron patterns |
| Volcano Limpet  fissurella_volcano | *Fissurella volcano* | Mid/Low | Shell: small in size, hole in apex, red stripes |
| Giant Keyhole Limpet  **California+Feb+2006+043** | *Megathura crenulata* | Low | Shell: large in size, hole in apex, large, black foot |

**MUSSELS**

|  |  |  |  |
| --- | --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** | **DESCRIPTION** |
| California Mussel  Mytilus1a | *Mytilus californianus* | Mid | Blue/black streaked with brown; ridges |
| Mediterranean Mussel  mytilus | *Mytilus galloprovincialis* | Mid | Dark blue; triangular shell; smaller and smoother than California Mussel |

**OCTOPUS:**

|  |  |  |  |
| --- | --- | --- | --- |
| Two-spotted Octopus  [http://jaffeweb.ucsd.edu/pages/projects/Jillian%20Lai/two%20spotted%20octopus%20page.htm](http://www.google.com/imgres?imgurl=http://jaffeweb.ucsd.edu/pages/projects/Jillian%20Lai/two%20spotted%20octopus%20page_files/image005.jpg&imgrefurl=http://jaffeweb.ucsd.edu/pages/projects/Jillian%20Lai/two%20spotted%20octopus%20page.htm&h=220&w=310&sz=17&tbnid=W9i7pDABlmcJ::&tbnh=83&tbnw=117&prev=/images?q%3Dtwo%2Bspotted%2Boctopus&hl=en&usg=__f9PP77Pq7oH3C4EjL2We2MqA5sA=&sa=X&oi=image_result&resnum=1&ct=image&cd=1) | *Octopus bimaculoides* | Low | Two blue, eyelike spots on the web just below the eyes give this octopus its name. |

**CHITONS**

|  |  |  |  |
| --- | --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** | **DESCRIPTION** |
| Spiny Chiton  Chiton1 | *Nuttallina sp.* | Mid | Black/dark brown w/ white stripes; girdle has bristles |
| Hartweg’s Chiton  [Image](http://biology.fullerton.edu/biol317/ftm/ft_s06_RanchoMarino_2_06.html#row33) | *Lepidochitona hartwegii* | Mid (under algae) | Olive green with brown stripes; girdle is banded and smooth |

**CRABS**

|  |  |  |  |
| --- | --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** | **DESCRIPTION** |
| Blueband Hermit Crab  DSCF0041b | *Pagurus samuelis* | Mid (in tidepools) | Bright blue bands circle walking legs. Red antennae |
| Hairy Hermit Crab  DSCF0039 | *Pagurus hirsutiuculus* | Mid (in tidepools) | White bands on walking legs; brown antennae with bands |
| Striped Shore Crab:  DSCF0037a | *Pachygrapsus crassipes* | High/Mid | Reddish purple with green and black stripes across front |

**BARNACLES:**

|  |  |  |  |
| --- | --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** | **DESCRIPTION** |
| Little Brown Barnacle  (small acorn barnacles)  Chthamhabitat | *Chthamalus dalli*  *Chthamalus fissus* | High | Smooth round margin. Smooth brownish plates  Irregular margin. White plates. Rough |
| Large Acorn Barnacle  DSCF0015a | *Balanus glandula* | High/Mid | Larger in size than *Chthamalus* |
| Red Thatched Barnacle  Tetraclita | *Tetraclita rubescens* | Mid/Low | Brick red and volcano shaped; ridged or thatched in appearance |
| Gooseneck Barnacle  Goose | *Pollicipes polymerus* | Mid/Low | Stalked with white plates |

**SEASTARS & SEA URCHINS**

|  |  |  |  |
| --- | --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** | **DESCRIPTION** |
| Ochre Seastar  DSCF0032b | *Pisaster ochraceus* | Low | Can be purple, orange, or brownish red; 5 arms |
| Banded Brittle star  Brittle1 | *Ophionereis annulata* | Low/  under rocks | Gray to light brown with dark rings circling each arm |
| Purple Sea Urchin  PurpleUrchin5 | *Strongylocentrotus* *purpuratus* | Low | Purple with short spines |
| Red Sea Urchin  DSCF0022b | *Strongylocentrotus franciscanus* | Low | Red with longer spines |

**Vertebrate List**

**Fish**

|  |  |  |  |
| --- | --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** | **DESCRIPTION** |
| Tidepool Sculpin  Tidepool%20Sculpin | *Oligocottus masculosus* | Low | Brown to green or reddish on dorsal side |
| Opaleye  Opaleye | Girella nigricans | Low | Brownish green with two white dots on their back |

**ALGAE LIST:**

**GREEN ALGAE**

|  |  |  |
| --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** |
| Sea Lettuce  photo of sea lettuce | *Ulva. sp.* | Mid |
| Sea Staghorn (Dead Man’s Fingers)  http://www.beachwatchers.wsu.edu/ezidweb/seaweeds/images/codiumfragile.jpg | *Codium fragile* | Low |

**BROWN ALGAE**

|  |  |  |
| --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** |
| Sea Cauliflower  photo of the seaweed known as sea cauliflower | *Leathesia difformis* | Mid |
| Banded Tidepool Fan  [ladiving > Zonaria farlowii; photo by Debbie Karimoto](http://ladiving.smugmug.com/gallery/5747704_dk57e/1/355240575_uEjnA/Large) | *Zonaria farlowii* | Low |
| Feather Boa Kelp  image of a Feather Boa Kelp | *Egregia menziesii* | Low |
| Double Pompom Kelp (Southern Sea Palm)  ladiving > Southern sea palm; Eisenia arborea; photo by Debbie Karimoto | *Eisenia arborea* | Low |
| Spindle-Shaped Rockweed  deliquescens | *Pelvetia fastigiata* (old name); *Silvetia compressa* (current name) | Mid |
| Sargassum  133_3348 | *Sargassum muticum* | Low |

**RED ALGAE**

|  |  |  |
| --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** |
| Encrusting Coralline Algae  Phycal | *Lithothamnion sp.* | Mid/Low |
| Stone Hair | *Lithothrix aspergillum* | MidLow |
| Tidepool Coralline Algae  o_coroff | *Corallina chilensis* | Mid/Low |
| Nail Brush Seaweed  [Endocladia muricata](http://calphotos.berkeley.edu/cgi/img_query?query_src=photos_flora_sci&enlarge=0000+0000+0208+1864) | *Endocladia muricata* | High |

**FLOWERING PLANTS LIST:**

|  |  |  |
| --- | --- | --- |
| **COMMON NAME** | **SCIENTIFIC NAME** | **ZONE** |
| Surf-Grass  2534307554_44955a11d6 | *Phyllospadix sp.* | Low |