Mt. San Antonio College
Field Trip to Corona Del Mar Tidepools and Bolsa Chica

Date/Time: _____ (given in class!)

This trip begins at the Corona Del Mar Tidepools.

Corner of Ocean BLVD and Poppy AVE.
Corona del Mar, CA 92625

Attendance is highly suggested. All students should be officially excused from attendance of other classes during the hours of the field trip.

IT IS A GOOD IDEA TO MAKE TABS ON THESE FIELD NOTEBOOK PAGES so that you can quickly flip to them. Make your tabs based on taxa (for example, a tab for birds, a tab for echinoderms, a tab for gastropods, etc.)

Corona Del Mar Tide Pool Field Trip Instructions

The purpose of this field trip is to study adaptations to a rocky shore environment (tide pools). The following instructions are crucial for the safety of you, your classmates, your instructor and the animal community. We are not here to identify everything but to understand the zonation found on a rocky shore and how animals must adapt to different environmental challenges in each zone.

Remember we are at an ecological reserve. **Do not** take specimens onto the dry beach. After observing specimens, return them to their original location in the tide pool. If rocks are overturned in order to locate specimens and habitats, be sure to return rocks to their original positions before leaving.

Any student abusing the specimens will have their grades lowered one full grade. It is extremely important to show respect for the wildlife (and your fellow students).

General Instructions

Wear shoes with rubber soles or walking over slippery rocks. **Do not** wear open-toed sandals or thongs. Do not go barefooted. Rocks in the tide pools are very sharp. It is a good idea to bring extra-clothes and plan on getting wet!

Above the ankles, you may wear anything that you are comfortable in but expect to get wet. (You must wear something). You may want to bring an extra pair of socks if you prefer dry feet for the ride home. There is a restroom nearby for changing clothes.

You may want to bring a sweatshirt, jacket, coat, etc. in case it is cold. Remember the weather at Mt. Sac may not be the same as the weather along the coast**. Be prepared!!!!!!! NO Alcohol, drugs, or firearms!**

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

A. Rocky Shores – Cliffs and sandy beaches border these areas
Examples: Corona Del Mar, Laguna Beach's Diver's Cove, Crescent Beach

B. Sandy Beaches – Large Areas covered with Sand
Examples: Newport Beach, Huntington Beach

C. 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

A. Two high tides and two low tides per day (about every 6 hours in Southern California)

B. Created by Gravity (Holds oceans in Basin) and Gravitational pull from celestial bodies (sun and moon) depending on
size and distance (Newton's law of universal gravitation)

$$F=m_1m_2/r^2$$

a. Moon – Small but very close – large effect
b. Sun – Large but very far away – small effect

C. Types of Tides
a. Spring Tides

1. Extreme tides (3X greater than Neap tides)
2. Direct alignment between sun, earth and moon
3. most extreme during solstices
    a) Summer – June 22 in the morning
    b) Winter - December 22 in afternoon

b. Neap Tides

1. Lower tide variation
2. 90 degree angle between sun, earth and moon

C. Types of Tides (Cont)

c. Tidal Cycles
1. Set of spring tides every 2 weeks
2. set of neap tides in between spring tides

D. Currents and Waves
a. 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

b. Waves: disturbances that move on or in the water mass which can be created locally or thousands of miles away.

E. Water Temperature
a. January/February at a low of 50-52 degrees

III. Zonation

A. Arrangement of different marine organisms in horizontal bands or zones

B. Zonation will vary from area to area depending upon rock location in respect to the surf

C. Zonation in intertidal waters is determined by physical factors:
a. Substrate
b. Water depth
c. Light

D. There are four recognized zones:

a. Spray (Splash) Zone – 5.0 feet and above sea level (ZONE1)
b. High Tide Zone – 2.5 to 5.0 feet above sea level (ZONE 2)
c. Middle Tide Zone – 0.0 to 2.5 feet above sea level (ZONE 3)
d. Low Tide Zone – Below sea level (ZONE4)

III. Rocky Shore Characteristics
- A. Very Complex Environment – very rich biologically
- B. Fixed Substrate
  - a. Attachment – sessile forms
  - b. Adherence – motile forms
- C. Desiccation
  - a. Sessile plants and animals must endure periods of drying out when exposed
  - b. Motile animals must either move to wetter area are endure periods of drying out when exposed
- D. Insolation (radiation from the sun)
  - a. Direction of rocks (north vs. south facing)
  - b. Damage to organisms due to:
    1. UV light
    2. Overheating – rocks may get up to 100 degrees Fahrenheit

E.Wave Action
- a. Good – wetting, brings up oxygen and food for sessile forms
- b. Bad – impact, abrasion from sand and small rock suspended in water

F. Salinity
- a. Increases in higher tide pools
- b. Decreases when:
  1. raining (especially at low tide)
  2. near the mouths of rivers

G. General Adaptations to a Rocky Coast
- a. Attachment
- b. External protection
- c. Escape capabilities
- d. Physiological tolerances

H. Factors Controlling marine life
- a. Desiccation
- b. Light
- c. Wave Action
- d. Interspecific Competition
- e. Intraspecific Competition
- f. Dispersal
- g. Predation
- h. Larval Site Selection
- i. Critical levels
  - i. Exposure levels an organism can tolerate
  - ii. Extreme tides (spring tides)

Phylum Cnidaria

Aggregating Anemone - Mid/Low - Many small anemones clustered together; pale green tentacles

Giant Green Anemone – Low - Solitary and large; emerald green

(*Need to know what an Anemone looks like*)

LOW = WET

Phylum Annelida

Sand-Castle Worm – Low - Tubes made of sand; tubes form honeycomb shape; lavender tentacles

(NTNS = Need to know specifically if we see it!)

Phylum Mollusca
Class Gastropoda

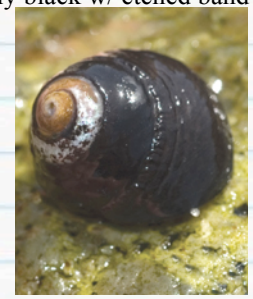
Checkered **Periwinkle** - High/Mid - Shell: small, smooth, conical, brownish to nearly black, more elongate than *L. keenae*

Eroded **Periwinkle** – High - Shell: small, smooth, conical, brownish to nearly black, stubbier than *L. keenae*

(*Need to know what a Periwinkle looks like*)
HIGH = Dry….

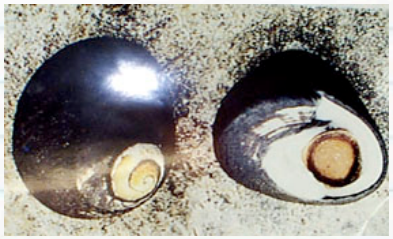
Phylum Mollusca
Class Gastropoda (Continued)

Black Turban Snail- Mid/Low- Shell: mostly black w/ etched band on middle whorl



Speckled Turban Snail - Mid/Low - Shell: dark w/ checkered pattern

Guilded Turban Snail - Mid/Low- Shell: larger w/ orange umbilicus (hole)



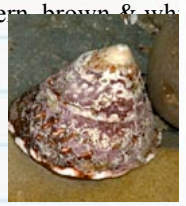
Beaded Turban Snail - Mid/Low - Shell: smaller w/ white umbilicus (hole)

(*Need to know what a Turban Snail looks like*)
LOW/MID

Phylum Mollusca
Class Gastropoda (Continued)

Wavy Turban Snail – Low- Shell: large, wavy pattern, brown & wh

(NTNS = Need to know specifically if we see it!)



Norris' Top Snail – Low - Shell: smooth, orange w/ green umbilicus (hole); bright red foot

(NTNS = Need to know specifically if we see it!)

California Sea Hare – Low - No within red algae

(NTNS = Need to know specifically if we see it!)

Hopkin's Rose – Low - No shell, deep projections covering body

NTNS = Need to know specifically if we see it!)

Phylum Mollusca
Class Gastropoda (Continued)

Rough Limpet – High/Mid - Shell: low apex (point), heavily ribbed with scalloped margin; dark dots on side of foot

Shield Limpet – Mid/Low - Shell: tall apex, smooth; white foot

Owl Limpet – Mid - Shell: largest of the limpets, low apex near front; light orange foot

NTNS = Need to know specifically if we see it!)

File Limpet – Mid/Low - Shell: low apex, fine, radial ribs; fine parallel dark lines on side

(For the others, need to know what a limpet

Phylum Mollusca
Class Gastropoda (Continued)

Fingered Limpet – High - Shell: apex at front, strong, radiating ribs, chevron patterns

Volcano Limpet – Mid/Low - Shell: small in size, hole in apex, red str

NTNS = Need to know specifically if we see it!)

Giant Keyhole Limpet – Low - Shell: large in size, hole in apex, large, black foot

NTNS = Need to know specifically if we see it!)

Phylum Mollusca
Class Bivalvia (Continued)

California Mussel – Mid - Blue/black streaked with brown; ridges

Mediterranean Mussel – Mid - Dark blue; triangular shell; smaller and smoother than California Mussel

NTNS = Need to know specifically if we see it!)
Mid

Phylum Mollusca
Class Polyplacophora

Hartweg's Chiton – Mid (under algae) – Olive Green with Brown Stripes; girdle is banded and smooth

(*Need to know what a Chiton looks like)
Mid

Phylum Mollusca
Class Polyplacophora

Spiny Chiton – Mid – Black/Dark Brown w/white stripes. Girdle h bristles.

Phylum Mollusca
Class Cephalopoda

Two Spotted Octopous – Low -

Phylum Arthropoda
Subphylum Crustacea

Little Brown Barnacle – High - Smooth round margin. Smooth brownish plates

Small Acorn Barnacles – High - Irregular margin. White plates. Rough

Large Acorn Barnacle – High/Mid - Larger in size than *Chthamus*

NTNS = Need to know specifically if we see it!)
HIGH

Red Thatched Barnacle – Mid/Low - Brick red and volcano shaped; ridged or thatched in appearance

(*need to know specifically)

Gooseneck Barnacle - Mid/Low - Stalked with white plate

(*need to know specifically)

Phylum Arthropoda
Subphylum Crustacea
Order Decapoda

Blueband Hermit Crab - Mid (in tidepools) - Bright blue bands circ walking legs. Red antennae

(*Need to know what a hermit crab Looks like)

Hairy Hermit Crab - White bands on walking legs; brown antennae bands

Striped Shore Crab: - High/Mid - Reddish purple with green and bla stripes across front

NTNS = Need to know specifically if we see it!)

hylum Echinodermata
Class Asteroidea

Ochre Seastar – Low - Can be purple, orange, or brownish red; 5 arms

(NTNS = Need to know specifically if we see it!)

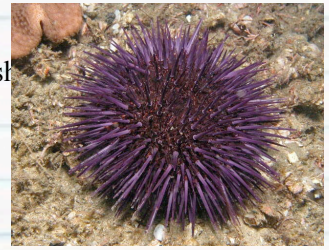
Phylum Echinodermata
Class Ophiuroidea

Brittle Star –Mid beneath rocks in sand tide pools) – Light brown with long flexible arms

(*Need to know what a brittle star looks like)

Phylum –Echinodermata
Class Echinoidea

Purple Sea Urchin – Low - Purple with sh



(*Need to know what an urchin looks like)
LOW=Wet

Red Sea Urchin – Low – Reddish with short s

Phylum Chordata
Class Osteichthyes

Opaleye

NTNS = Need to know specifically if we see it!)

Sculpin

NTNS = Need to know specifically if we see it!)

Algae
Green Algae

Sea Lettuce – Mid

(*NTNS = Need to know specifically if we see it!)

Sea Staghorn (Dead Man's Fingers) – Low

(*NTNS = Need to know specifically if we see it!)
Brown

Feather Boa Kelp - Low

(*NTNS = Need to know specifically if we see it!)

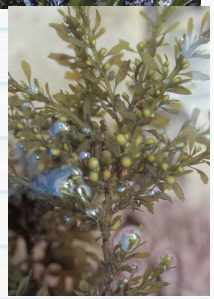
Brown

Double Pompom Kelp (Southern Sea Palm) - Low

Spindle-Shaped Rockweed - Mid

(*NTNS = Need to know specifically if we see it!)

Sargassum - Low



(*NTNS = Need to know specifically if we see it!)

Red

Encrusting Coralline Algae – Mid/Low

(*Need to know what Red Algae looks like)

Stone Hair – Mid/Low

Red

Tidepool Coralline Algae – Mid/Low

Nail Brush Seaweed – Mid/Low

Flowering Plants

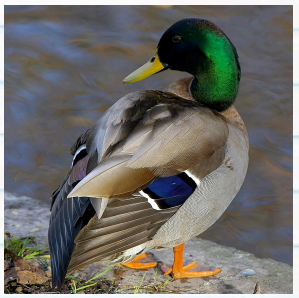
Surf Grass

(NTNS = Need to know specifically if we see it!)

Meet at: Bolsa Chica Conservancy
3842 Warner Avenue
Huntington Beach, CA 92649-4263
Phone: (714) 846-1114
Fax: (714) 846-4065
Date:_____
Time:_____

Bird Species	W	Sp	Su	F	BC	CP
Common Loon	**Fcom**			**Fcom**	•	•
Grebes						
Pied-billed Grebe	Com	Com	Fcom	Com	•	•
Eared Grebe	Com	Com	uncom	Com	•	
Western Grebe	Com	Com	uncom	Com	•	•
Clark's Grebe	Fcom	Fcom	uncom	Fcom	•	•
Pelicans						
Brown Pelican	Abund	uncom	uncom	Abund	•	•
Cormorants						
Double-crested Cormorant	Abund	Abund	Fcom	Abund	•	•
Bitterns and Herons						
Great Blue Heron	Com	Com	uncom	Com	•	•
Great Egret	Com	Com	uncom	Com	•	•
Snowy Egret	Com	Com	uncom	Com	•	•
Green Heron	uncom	uncom	uncom	uncom	•	•
Black-crowned Night Heron	Com	Com	Com	Com	•	•

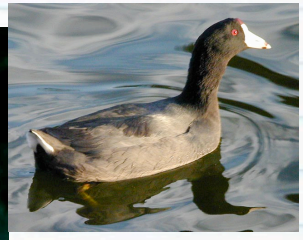
Geese and Ducks						
Canada Goose [SBNWR]	Abund	Abund		Abund	•	•
Green-winged Teal	Com	Com		Com	•	•
Mallard	Abund	Abund	Abund	Abund	•	•
Northern Pintail	Abund	Abund		Abund	•	•
Blue-winged Teal	Fcom	Fcom		Fcom	•	•
Cinnamon Teal	Abund	Abund	uncom	Abund	•	•
Northern Shoveler	Abund	Abund		Abund	•	•
Gadwall	uncom	uncom		uncom	•	•
American Wigeon	Abund	Abund		Abund	•	•
Redhead	uncom	uncom		uncom	•	•
Lesser Scaup	Abund	Abund		Abund	•	•
Surf Scoter	Abund	Abund	uncom	Abund	•	
Red-breasted Merganser	Abund	Abund	uncom	Abund	•	
Ruddy Duck	Abund	Abund	uncom	Abund	•	•
Vultures						
Turkey Vulture	Fcom	Com	Fcom	Com	•	•



Raptors

Osprey	uncom	uncom	uncom	uncom	•	•
White-tailed Kite	uncom	uncom	uncom	uncom	•	•
Northern Harrier	uncom	rare		uncom	•	
Sharp-shinned Hawk	uncom	uncom		Fcom	•	•
Cooper's Hawk	uncom	uncom	rare	uncom	•	•
Red-shouldered Hawk	uncom	uncom	uncom	uncom	•	•
Red-tailed Hawk	Com	Com	Com	Com	•	•
American Kestrel	Com	Com	Com	Com	•	•

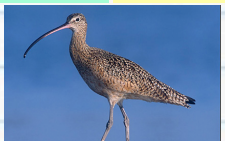
Bird Species	W	Sp	Su	F	BC	CP
Rails and Coots						
Clapper Rail [SBNWR]	rare	rare	rare	rare	•	
Virginia Rail	rare	rare		rare	•	•
Sora	uncom	uncom	rare	uncomm	•	•
American Coot	Abundant	Abundant	Abundant	Abundant	•	•



Bird Species	W	Sp	Su	F	BC	CP
Rails and Coots						
Clapper Rail [SBNWR]	rare	rare	rare	rare	•	
Virginia Rail	rare	rare		rare	•	•
Sora	uncom	uncom	rare	uncomm	•	•
American Coot	Abundant	Abundant	Abundant	Abundant	•	•
Plovers						
Black-bellied Plover	Abundant	Abundant	uncom	Abundant	•	•
Semipalmated Plover	Common	Common		Common	•	•
Killdeer	Abundant	Abundant	Abundant	Abundant	•	•
Stilts and Avocets						
Black-necked Stilt	Abundant	Abundant	Abundant	Abundant	•	•
American Avocet	Abundant	Abundant	Abundant	Abundant	•	•

Sandpipers and Phalaropes

Greater Yellowlegs	Fcom	Fcom	rare	Fcom	•	•
Willet	Abundant	Abundant	Common	Abundant	•	•
Spotted Sandpiper	Fcom	Fcom	rare	Fcom	•	•
Whimbrel	Fcom	Fcom	rare	Fcom	•	•
Long-billed Curlew	Fcom	Fcom	rare	Fcom	•	•
Marbled Godwit	Abundant	Abundant	uncom	Abundant	•	•
Ruddy Turnstone	uncom	Common	uncom	Common	•	
Black Turnstone	uncom	uncom		uncom	•	
Sanderling	Common	Common	Fcom	Common	•	
Western Sandpiper	Abundant	Abundant	Common	Abundant	•	•
Least Sandpiper	Common	Common	Fcom	Common	•	•
Dunlin	Common	Common	rare	Common	•	•
Short-billed Dowitcher	Abundant	Abundant	Fcom	Abundant	•	•
Long-billed Dowitcher	Abundant	Abundant	Fcom	Abundant	•	•
Common Snipe	uncom	uncom		uncom	•	•
Wilson's Phalarope		uncom		Fcom	•	•
Red-necked Phalarope		uncom		Fcom	•	•



Gulls and Terns

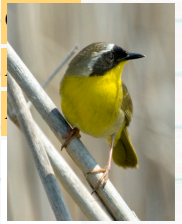
Bonaparte's Gull	Abundant	Abundant	rare	Abundant	•	•
Heermann's Gull	uncom	rare	uncom	uncom	•	
Mew Gull [SAR]	Fcom	Fcom		Fcom	•	•
Ring-billed Gull	Abundant	Abundant	Abundant	Abundant	•	•
California Gull	Abundant	Abundant	Abundant	Abundant	•	•
Herring Gull	Fcom	uncom		uncom	•	•
Western Gull	Abundant	Abundant	Abundant	Abundant	•	•
Caspian Tern	Fcom	Abundant	Abundant	Abundant	•	•
Royal Tern	Fcom	Fcom	Fcom	Fcom	•	
Elegant Tern		Common	Abundant	Abundant	•	•
Forster's Tern	Abundant	Abundant	Abundant	Abundant	•	•
Least Tern		Abundant	Abundant		•	•
Black Skimmer	uncom	uncom	Abundant	Abundant	•	•

Bird Species	W	Sp	Su	F	BC	CP
Auks, Murres, and Puffins						
Common Murre [pier]	uncom	uncom		uncom	•	
Cassin's Auklet [pier]	uncom	uncom		uncom		
Rhinoceros Auklet [pier]	uncom	uncom		uncom		
Pigeons and Doves						
Rock Dove	Abundant	Abundant	Abundant	Abundant	•	•
Spotted Dove	Abundant	Abundant	Abundant	Abundant	•	•
Mourning Dove	Abundant	Abundant	Abundant	Abundant	•	•
Common Ground Dove	Fcom	Fcom	Fcom	Fcom		•
Owls						
Barn Owl	uncom	uncom	uncom	uncom	•	•
Great Horned Owl	uncom	uncom	uncom	uncom	•	•
Nightjars						
Lesser Nighthawk				rare	•	•
Swifts						
White-throated Swift	uncom	uncom	uncom	uncom	•	•

Hummingbirds						
Anna's Hummingbird	Abundant	Abundant	Abundant	Abundant	•	•
Allen's Hummingbird	Fcom	Fcom	Fcom	Fcom	•	•
Kingfishers						
Belted Kingfisher	uncom	uncom	rare	uncom	•	•
Tyrant Flycatchers						
Pacific Slope Flycatcher		Common		Common	•	•
Black Phoebe	Common	Fcom	Fcom	Common	•	•
Say's Phoebe	Fcom	Fcom		Fcom	•	•
Vermilion Flycatcher (x)						
Western Kingbird		Common	Fcom	rare	•	•
Swallows						
Tree Swallow	uncom	Common		Fcom	•	•
Northern Rough-winged Swallow	rare	Common	Common	Fcom	•	•
Cliff Swallow		Common	Common		•	•
Barn Swallow		Common	Common	Fcom	•	•

Jays and Crows						
American Crow	Abund	Abund	Abund	Abund	•	•
Common Raven	uncom	uncom	uncom	uncom	•	•
Titmice and Bushtits						
Bushtit	Abund	Abund	Abund	Abund	•	•
Wrens						
House Wren	Common	Fcom	Fcom	Common	•	•
Kinglets, Gnatcatchers & Thrushes						
American Robin	Common	Common	uncom	Common	•	•
Mockingbirds & Thrashers						
Northern Mockingbird	Abund	Abund	Abund	Abund	•	•
Pipits						
American Pipit	Comm	Comm		Comm	•	•
Waxwings						
Cedar waxwing (irruptive)	Fcom	Fcom		Fcom	•	•

Starlings						
European Starling	Abund	Abund	Abund	Abund	•	•
Warblers						
Orange-crowned Warbler	Comm	Comm	Fcom	Comm	•	•
Yellow-rumped Warbler	Abund	Abund		Abund	•	•
Townsend's Warbler	uncom	Comm				
Common Yellowthroat	Abund	Abund	Comm			
Wilson's Warbler	rare	Abund				
Tanagers, Grosbeaks, Buntings and Towhees						
Western Tanager	rare	Comm		Comm	•	•
Black-headed Grosbeak		Comm	uncom	Fcom	•	•
Rufous-sided Towhee	Fcom	uncom		Fcom		•
Sparrows						
Savannah Sparrow	Abund	Abund	Abund	Abund	•	•
Song Sparrow	Abund	Abund	Abund	Abund	•	•
White-crowned Sparrow	Abund	Abund		Abund	•	•
Blackbirds and Orioles						
Red-winged Blackbird	Abund	Abund	Abund	Abund	•	•
Western Meadowlark	Abund	Abund	Comm	Abund	•	•
Brewer's Blackbird	Abund	Abund	Abund	Abund	•	•
Brown-headed Cowbird	Abund	Abund	Abund	Abund	•	•
Bullock's Oriole	rare	Comm	Comm	uncom	•	•
House Finch	Abund	Abund	Abund	Abund	•	•
Lesser Goldfinch	Comm	Comm	Comm	Comm	•	•
American Goldfinch	Fcom	Fcom	uncom	Fcom	•	•
Old World Sparrows						



Key to Symbols and Abbreviations	
BC	= Bolsa Chica
CP	= Huntington Central Park
•	= has been seen at this location
bold	= breeds locally

Abundance Codes

(x)	= accidental	(1 - 10 sigtings / decade)
rare	= rare	(1 - 10 sigtings / season)
uncom	= uncommon	(up to 5 individuals / day)
Fcom	= fairly common	(6 - 10 individuals / day)
Common	= common	(11 - 50 individuals / day)
Abund	= abundant	(over 50 individuals / day)

General Information
Bolsa Chica Conservancy
3842 Warner Avenue
Huntington Beach, CA 92649-4263
Phone: (714) 846-1114
Fax: (714) 846-4065