

# Central and Northern California Coastal Marine Habitats: Oil Residence and Biological Sensitivity Indices

## RELATIVE ABUNDANCE OF MAJOR MACROBIOTA\*

| Taxa                                  | A   | B   | C   | D   | E   | F   | G   | H   | I   | J   | K   | L   | M   | N   | O   | P   | Q   | R   | S   | T   | U   | V   | W   | X   | Y   | Z   | AA  | BB  | CC  |  |
|---------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| <b>ROCKY INTERTIDAL MACROBIOTA</b>    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Acorn barnacles                       | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |  |
| Chlorophyta                           |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Porphyra spp.                         |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 0   | 0   | 0   | 0   | 0   | 0   | 0   |  |
| Pelvetiopsis limitata                 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Endocladia muricata                   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   |  |
| Pelvetia fastigiata                   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |  |
| Fucus distichus                       | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |  |
| Gigartina spp.                        | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   |  |
| Pollicipes polymerus                  | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   |  |
| Mytilus californianus                 | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   |  |
| Corallina spp./Gigartina spp.         | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C |  |
| Postelsia palmaeformis                | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   |  |
| Halosaccion glandiforme               | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   |  |
| Iridaea spp.                          | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   |  |
| Odonthalia spp./Rhodomela larix       | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |  |
| Coralline algae                       | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   |  |
| Phyllospadix spp.                     | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |  |
| Alaria marginata                      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Egregia menziesii                     | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   |  |
| Laminaria spp.                        | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C |  |
| Lessoniopsis littoralis               |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| <b>OTHER MACROBIOTA</b>               |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| <b>Kelp beds:</b>                     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Macrocystis spp.                      | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |  |
| Nereocystis luetkeana                 | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C | 0-C |  |
| <b>Marine mammals:</b>                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Elephant seal                         |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Harbor seal                           |     |     |     |     | 0   |     |     |     |     | 0-A |     |     |     |     |     |     | 0-A | 0-A |     |     |     |     |     |     |     |     |     |     |     |  |
| Steller sea lion                      |     |     |     |     |     |     |     |     |     | 0   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| California sea lion                   |     |     |     |     |     |     |     |     |     | 0-A | 0-A |     |     |     |     |     | 0   | 0   |     |     |     |     |     |     |     |     |     |     |     |  |
| <b>Seabird nesting colonies:</b>      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Fork-tailed storm petrel              |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Leach's storm petrel                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Ashy storm petrel                     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Brandt's cormorant                    |     |     |     |     |     |     |     |     |     | A   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Double-crested cormorant              |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Pelagic cormorant                     | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   |  |
| Black oystercatcher                   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |  |
| Western gull                          | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   |  |
| Common murre                          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Pigeon guillemot                      | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   | A   |  |
| Cassin's auklet                       |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Rhinoceros auklet                     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Tufted puffin                         |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| <b>Threatened/Endangered Species:</b> |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Aleutian Canada goose                 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Southern sea otter                    | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   | C   |  |

\*Relative abundance for summer conditions: 0 = occasional, C = common, A = abundant

## PHYSICAL SHORE-ZONE CHARACTERISTICS

| UNIT IDENTIFIERS                              | A              | B              | C                      | D              | E                    | F                        | G                        | H               | I              | J              | K              | L             | M                        | N                 | O                     | P                  | Q                | R                      | S                  | T                         | U                         | V                         | W                         | X                         | Y                         | Z                         | AA                        | BB                        | CC                        |     |
|---|----------------|----------------|------------------------|----------------|----------------------|--------------------------|--------------------------|-----------------|----------------|----------------|----------------|---------------|--------------------------|-------------------|-----------------------|--------------------|------------------|------------------------|--------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-----|
| ALONGSHORE LENGTH (km)                        | 0.2            | 0.2            | 1.2                    | 0.8            | 0.1                  | 0.7                      | 0.7                      | 1.2             | 1.5            | 0.6            | 1.3            | 0.1           | 0.8                      | 1.0               | 0.4                   | 0.1                | 0.4              | 0.1                    | 0.4                | 0.1                       | 3.0                       | 1.0                       | 1.5                       | 0.2                       | 0.1                       | 0.7                       | 0.4                       | 0.2                       | 0.2                       | 0.2 |
| ACROSS-SHORE WIDTH (m)                        | 10-15          | 5-20           | 5-25                   | 0-25           | 30                   | 30-100                   | 20-50                    | <10             | 5-20           | 20-30          | 0-25           | 10-20         | 30-50                    | 30-50             | 30-50                 | 20-40              | <5               | 20-40                  | 15                 | 20-40                     | <10                       | 20-40                     | 5-20                      | 40                        | 5-25                      | <10                       | 75                        | 30                        | 100-150                   |     |
| WAVE EXPOSURE                                 | 10             | 8              | 10                     | 10             | 10                   | 10                       | 10                       | 8               | 8              | 2-10           | 10             | 10            | 10                       | 10                | 10                    | 10                 | 10               | 10                     | 10                 | 10                        | 10                        | 10                        | 10                        | 3-10                      | 3                         | 4                         | 4                         | 4                         | 4                         |     |
| ACROSS-SHORE COMPONENTS (morphology, texture) | Cc, Rs, Bi, Cg | Ca, Rs Ore, Rs | Cc, Rs Bi, Cg Ores, Rs | Ca, Rs Ore, Rm | Cp, Sc Bb, Cg Bf, Cg | Ca, Rs Bi, Ceb Pf, Cb Rs | Ca, Rs Bi, Csp Pf, Cb Rs | Cc, Rs Ores, Rs | Ca, Rs Ore, Rs | As, An Aj, Aed | Ca, Rs Ore, Rm | Ca, Rm Pi, Rm | Ca, Rs Bi, Ceb Pi, Cb Rm | Ca, Rs Bi, Cgb Rm | Ca, Rs Pi, Rm Ore, Rm | Ca, Rs Bi, Cgbr Rs | Ca, Rm Pi, Cb Rs | Ca, Rs Bi, Cgbr Pi, Rs | Ca, Rs Bi, Cgbr Rs | Ca, Rs Bi, Cgbr Pi, Cb Rs | Ca, Rs Bi, Cgbr Pi, Cb Rs | Ca, Rs Bi, Cgbr Pi, Cb Rs | Ca, Rs Bi, Cgbr Pi, Cb Rs | Ca, Rs Bi, Cgbr Pi, Cb Rs | Ca, Rs Bi, Cgbr Pi, Cb Rs | Ca, Rs Bi, Cgbr Pi, Cb Rs | Ca, Rs Bi, Cgbr Pi, Cb Rs | Ca, Rs Bi, Cgbr Pi, Cb Rs | Ca, Rs Bi, Cgbr Pi, Cb Rs |     |
| Primary                                       |                |                |                        |                |                      |                          |                          |                 |                |                |                |               |                          |                   |                       |                    |                  |                        |                    |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |     |
| Secondary                                     |                |                |                        |                |                      |                          |                          |                 |                |                |                |               |                          |                   |                       |                    |                  |                        |                    |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |     |
| MICRO RELIEF                                  | S              | R              | S                      | R              | S                    | R                        | R                        | R               | R              | -              | R              | R             | R                        | R                 | R                     | R                  | R                | R                      | R                  | R                         | R                         | R                         | R                         | R                         | S                         | R                         | R                         | S                         | R                         |     |
| MACRO RELIEF                                  | S              | R              | R                      | R              | S                    | R                        | S                        | R               | R              | -              | R              | R             | R                        | R                 | R                     | R                  | R                | R                      | R                  | R                         | R                         | R                         | R                         | R                         | S                         | R                         | S                         | R                         | R                         |     |
| SUMMARY CHARACTERISTICS                       | Rbx            | R              | RbD                    | Rb'mD          | bR                   | Rb'm                     | Rb's                     | R               | R              | Rb'mD          | A              | Rb'mD         | Rb'mD                    | Rb'mD             | Rb'mD                 | Rb'mD              | Rb'mD            | Rb'mD                  | Rb'mD              | Rb'mD                     | Rb'mD                     | Rb'mD                     | Rb'mD                     | Rb'mD                     | Rb'mD                     | Rb'mD                     | Rb'mD                     | Rb'mD                     | Rb'mD                     |     |
| OIL RESIDENCE INDEX                           | 3              | 3              | 3                      | 3              | 3                    | 3                        | 3                        | 3               | 3              | 3              | 3              | 3             | 3                        | 3                 | 3                     | 3                  | 3                | 3                      | 3                  | 3                         | 3                         | 3                         | 3                         | 3                         | 3                         | 3                         | 3                         | 3                         | 3                         |     |
| GROUND TRUTH                                  | 0              | 0              | 0                      | 0              | 0                    | 0                        | 0                        | 0               | 0              | 2,3,4          | 4              | 4             | 0                        | 0                 | 0                     | 0                  | 0                | 0                      | 0                  | 0                         | 0                         | 0                         | 0                         | 0                         | 0                         | 0                         | 0                         | 0                         | 0                         |     |

\* Significant component of organic debris present on beaches during summer.

## ABBREVIATED PHYSICAL SHORE-ZONE CODING EXPLANATION

This is an abbreviated legend for the physical shore-zone coding sheets; consult the main text for a complete discussion of codes and rationale. Only the across-shore descriptors for morphology and texture are discussed.

ACROSS-SHORE COMPONENTS - dominant morphologic and textural character of each across-shore component, described in a landward to seaward sequence. Each component consists of a geomorphic form descriptor and a substrate descriptor:  
FORM → Bb, Csg ← TEXTURE

The primary geomorphic forms are initially described by a series of 12 codes:

A Anthropogenic  
B Beach  
C Cliff  
D Dune  
E Coastal Bay, Lagoon, Estuary  
I Inlet  
M Marsh  
O Offshore Rocks  
P Platform  
R River  
S Bar/Trough  
T Delta

Each of these groups is then further modified by codes as indicated below.

Anthropogenic (A)  
e causeway  
f float  
g groin  
j jetty  
m marina  
r boat ramp  
t trench  
s seawall  
w wharf

Beach (B)  
b berm  
c washover channel  
f beach face  
i inclined slope  
m multiple intertidal bars  
r single intertidal bar  
s storm ridge  
t low-tide terrace  
w washover

Cliff (C)  
a active or erosional  
p passive  
c caves present

Dune (D)  
b blowout  
d stabilized  
f foredune  
r random form  
s ridge and swale  
l longitudinal

Coastal Bay, Lagoon, Estuary (E)  
b enclosed bay  
e estuary

Inlet (I)  
e ephemeral  
f stable  
a opening fixed by offshore structures  
f flood-tidal delta  
l ebb-tidal delta

Marsh (M)  
c tidal creek

Offshore Rocks (O)  
e intertidal reef  
r rock outcrop (>2 m above M.S.L. and <10 m in width or length)  
s sea stack

Platform (P)  
h high-tide platform  
l low-tide platform  
f horizontal  
r ramp  
t terraced  
i irregular

River (R)  
b braided  
m multiple  
s single channel

Bar/Trough (S) subtidal  
r with rip channels

Delta (T)  
c channel  
f fan  
l levee  
m multiple channels  
p delta plain  
s single channel  
v crevasse

Substrate type or sediment texture are described in detail by a series of codes. The sediments or materials of the shore are initially coded into one of four groups:  
A anthropogenic materials  
B biogenic sediments  
C clastic sediments  
R bedrock

Each of these groups is then further modified by texture or composition as indicated below.

Anthropogenic materials (A)  
a metal  
d debris, rubble  
e concrete (individually formed)  
n concrete (solid)  
l logs  
u wood (structural; e.g., pilings or boards)  
w bark or wood debris

Biogenic sediments (B)  
l trees or wood particles  
s shell hash (with a texture as described below)  
o organic litter

Clastic sediments (C)  
b boulder  
c cobble  
p pebble  
s sand  
silt  
clay  
m mud