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Visit at low tide, especially during spring tides when fascinating marine life can be seen. Arrive an hour earlier than the predicted low tide to allow ample time to explore. Wear snug, non-slip footwear: sun or wind protective clothing. Bring a hand lens. Follow the tide down the shore to its lowest point then work your way back up. Keep ahead of the incoming water. Watch for large or rogue waves.

Tide tables are available in local newspapers or online at www.waterlevels.gc.ca. Reference source for Stanley Park is Vancouver (Station #7735) in Pacific Region, Zone 10.

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PHOTOGRAPHS

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photographs 4b, 9, 23b, 35b © Bernard P. Hanby; photograph 13b © Joan Lopez

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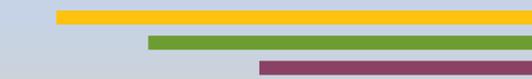
PROMOTIONS

Shell Environmental Fund

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Nature Vancouver

Explore the Rocky Shore at Stanley Park



EXPLORE THE ROCKY SHORE AT STANLEY PARK
Explore the shore? YES! There is always something new to discover. This field guide introduces you to 40 prominent intertidal species of marine life which inhabit the rocky shore in Stanley Park. The pamphlet is waterproof and durable. Please do not discard. Re-use it.

WHERE

The rocky point jutting into Burrard Inlet directly north of the SS EMPEROR OF JAPAN figurehead, between Lumberman's Arch, Children's Playground, and Girl in Wetsuit statue. (See map).

BEST TIME TO VISIT

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TIDES AND THE INTERTIDAL ZONE

The intertidal zone lies between land and sea. It is the area between the tidemarks, exposed when the tide has receded (low tide) and covered when the tide advances (high tide). The tides are caused by the gravitational pull of the moon and sun: in BC the rhythmic rise and fall of the tide occurs twice a day, every day. Each month, there are two spring tides (20% greater than average) and two neap tides (20% less than average). The most extreme spring and neap tides of the year occur between May and August and between November and January. Intertidal life is greatly influenced by the tidal cycle.

LIVING IN A HARSH ENVIRONMENT

Life in the intertidal zone is not simple. At low tide marine life lacks seawater, along with the oxygen and food found in seawater. It dries out, is exposed to heat or cold, bright sun or shade, moisture from fog, rain or snow AND terrestrial predators! Freshwater streams flowing into the intertidal zone lower the seawater salinity (make it less salty). When the tide comes in, life is refreshed but pounding waves can create chaos.

Intertidal substrata vary from rocks, to sand, to mud, or a combination of these sediments. Each marine organism must choose the right substratum on which to live, compete with many other species for space, avoid getting swept away by the tide or current, and constantly be on guard against becoming prey to bigger marine organisms.

ZONING OUT

Intertidal organisms organize themselves into horizontal bands (subzones), according to which habitat best enables them to survive. Well-defined subzones are easily seen at some locales, not so easily at others. The subzones and species living there vary from season to season, shore to shore and sometimes even rock to rock. Stanley Park is no exception. Marine life inhabiting the subzones near the SS EMPEROR OF JAPAN figurehead is primarily that of a sheltered coast. Some exposed-coast species are present.

- Upper Subzone - near the high water transition level: Photographs 1-4.
- Middle Subzone - the true intertidal habitat: Photographs 5-26.
- Lower Subzone - near the low water transition level: Photographs 27-39.
- Subtidal Zone is permanently submerged: Photograph 40.

BEACH MANNERS. PLEASE!

Treat the habitat with respect. As explorers, we are visitors to organisms living in their intertidal home and it is our responsibility to ensure their conservation into the future. Take only photographs, they are for life. Please remove your litter!

TREAD LIGHTLY. DON'T RUN!

- Some organisms are small and move slowly. The less you move, the more you will see. Observe organisms from bare rocks or sandy patches.
- Soft and hard-bodied organisms are easily crushed. Learn to identify camouflaged organisms so that you don't accidentally walk on them.
- Intertidal animals clamp on to hard surfaces, holding onto life until the tide returns. Be gentle when you observe them. Prying them off will damage their muscles, cause them to dry out and leave them defenseless.
- Barnacles look dead but they're not. Don't purposely crush or scrape them off the rocks. Be aware of their jagged edges.
- Seaweeds have reproductive parts, too! Be careful where you step.
- Seaweeds and seaweed-covered rocks are extremely slippery.

PUT THEM BACK!

- If you turn over a rock to see what lives beneath, carefully return the rock to its original spot. To avoid crushing unsuspecting or immobile animals living in the cavity or attached to the surface, use stones or empty shells to prop up the heavy, re-positioned rock.
- Organisms will not survive if moved from one subzone to another, or if removed from seawater to take home with you.
- Return abandoned animals to the water or cover with seaweed to keep them moist and protected from predators.
- The marine ecosystem wisely recycles dead organisms.

DON'T EAT THEM!

- CAUTION! All of the Lower Mainland is closed to the harvest of bivalve shellfish (two valves or shells) such as clams, oysters, scallops, mussels and cockles. Shellfish closures are due to presence of marine biotoxins such as Red Tide (Paralytic Shellfish Poisoning (PSP)) and sanitary contamination. PSP neurotoxins can cause death! Call DFO at 604-666-2828 for more info.

Be a thoughtful naturalist and become informed.
Learn to care for nature's gifts that other people scorn.
Be a thinking person who observes and enjoys,
Not one who acts carelessly or knowingly destroys.
And practice good beach manners so that clever folk may say:
"You're conserving for the future. Now enjoy a wonderful day."

The following species are only a few of those that inhabit the intertidal zones of rocky shores from Alaska to California. Many of these are found at other rocky intertidal locales around the Lower Mainland.

LEGEND

S = maximum size; LS = life span (when known); C = colour; ID = identifying characteristics; → = pinpoint key characteristics on photographs; D = prey items in diet; D-SUN = algae use sunlight to make their own organic foods such as sugars (photosynthesis); D-FF = filter-feeders filter and collect free-floating plankton and detritus; P = predators. Predators and prey: the most preferred or nutritious item is listed first. Predators of birds are not included.

- **Species' names in bold** are species described in this pamphlet.
- Species' names not in bold are known to occur, or likely to occur, at this locale (not all inclusive).
- A listing such as 'sea stars (**purple star**)' indicates that the purple star is the primary predator or prey recorded in the literature but other sea stars may be as well.

Algae = all marine green, red and brown algae are also called seaweeds. Kelp is one group of brown algae. Some algae live for 700 years.

Detritus = fine organic debris from dead, disintegrated algae or animals.

Diatoms = tiny, common phytoplankton abundant in the water column but also prevalent on the sea bottom.

Plankton = tiny, floating algae (phytoplankton) or animals (zooplankton).

INTERTIDAL ZONE - UPPER SUBZONE

1 Mask limpet, *Tectura persona*
S: to 5 cm across. C: blue-brown-grey with →radiating light and dark lines or spots. ID: univalve: shell oval and thin, smooth, inflated; →shell peak hooked, way off-centre. D: feeds at night in fine, delicate algae, diatoms.
P: **Northwestern Crow**, shorebirds (Black Oystercatcher), crabs, fishes (clingfishes).

2 a Common acorn barnacle, *Balanus glandula*
S: to 2.2 cm high and wide. LS: 8-10 years. C: white to grey, or brownish. ID: arthropod: hard, →volcano-shaped casing hides soft body within.
→'M'-shaped lock to double-door enclosure protects →6 pairs of feathery legs (cirri) **2 b**. D-FF: uses legs extended outside casing.
P: univalves and sea slugs (**ribbed limpet**, dogwinkles, **barnacle-eating nudibranch**, **checkered periwinkle**), sea stars (**purple star**, **mottled star**), ribbon worms, crabs (**red rock**), fishes (**high cockscomb**, gunnels), gulls (**Glaucous-winged Gull**), diving ducks, shorebirds (Black Oystercatcher).

3 Ribbed limpet, *Lottia digitalis*
S: to 3.5 cm across. LS: to 6 years. C: white, with variable dark markings. ID: univalve: shell oval, →shell peak curved, way off-centre: →fingerlike ribbing radiates from peak. D: blue-green bacteria, diatoms, delicate algae, newly settled acorn barnacles. P: shorebirds (Black Oystercatcher), gulls (**Glaucous-winged Gull**), fishes (surfperches, clingfishes), crabs, mice.

4 a Checkered periwinkle, *Littorina scutulata*
S: to 1.9 cm long. LS: at least 7 years. C: brown or purple/black with white spots in a →checkered pattern. ID: univalve snail: shell height greater than width; →tip sharply pointed; →spire of 4 whorls above body whorl; →thin, horny (uncalcified) trapdoor (operculum) **4 b**. D: diatoms, green algae (sea lettuce, sea moss), brown algae (rockweed), larvae and juveniles of acorn barnacles. P: sea stars (**purple star**), ribbon worms, fishes (clingfishes), gulls (**Glaucous-winged Gull**), diving ducks (Scoters).

INTERTIDAL ZONE - MIDDLE SUBZONE

5 Rockweed, *Fucus gardneri*
S: to 25 cm long. LS: to 5 years. C: brown algae ranging from yellow to olive-green to yellow-brown. ID: →branches divided into 2's; blades flat with →distinct midrib; →inflated tips keep branches afloat; develop into pimply, reproductive structures. D-SUN. P: univalves (**checkered periwinkle**, limpets), **rockweed isopod**, crabs (kelp), American black bear, humans.

6 Rockweed isopod, *Isoeta wosnesenskii*
S: to 4 cm long. 1 cm wide. C: olive green to dark brown, red to light-brown; varies with diet. ID: arthropod: body broad, long, flattened; →antennae, eyes on sides of →head; →7 body segments; →rear section shield-like with →tiny tooth at tip; legs with →sharp claws to cling to seaweeds, rocks or fingers! D: detritus from **rockweed**, other algae, snail eggs. P: many fishes (**high cockscomb**, gunnels, clingfishes, surfperches, kelpfishes), crabs (Dungeness), shorebirds (Black Oystercatcher).

7 Turkish washcloth, *Mastocarpus papillatus*
S: to 20 cm long. LS: annual. C: red algae ranging from yellowish-brown to reddish-black. ID: blade →palm-like in shape, branches divided into 2's. →surfaces carpeted with bumps; →edges curled like a tongue; black, crisp when dry. D-SUN. P: limpets, fishes (pricklebacks), other algae-nibbling fishes.

8 a Pacific blue mussel, *Mytilus trossulus*
S: to 1l cm long. LS: 1-2 years. C: blue-black, occasional →brown forms. Interior →lustrous, pearly. ID: bivalve: shells smooth, long →wedge shape; →tough, elastic beard of byssal threads anchor mussels to rocks, pilings, each other **8 b**. D-FF: uses siphons. P: sea stars (**mottled star**, **purple star**, sunflower star), sea anemones, snails (dogwinkles), crabs (**red rock crab**, Dungeness, black-clawed), fishes (surfperches), diving ducks (Bufflehead, Scoters, Goldeneyes, Harlequin), **Northern Crow**, gulls (Mew and **Glaucous-winged Gull**), shorebirds (Black Oystercatcher), sea otter, mink, humans.

9 Mud nemertean, *Panamermes peregrina*
S: to 25 cm long. LS: almost 2 years. C: →back blue to purple-brown; →belly cream to yellow or pink. ID: ribbon worm: long and smooth; →head with long eversible creamy-white 'tongue' (proboscis) armed with slender spear-like stylet containing poison used to pierce, paralyze and kill prey. D: feasts on bristleworms, especially **banner sea-nymph**. P: crabs, fishes (**high cockscomb**, gunnels, pricklebacks), shorebirds (Black Oystercatcher).

10 Sea moss, *Cladophora* sp.
S: to 6 cm long. LS: perennial. C: bright green algae. ID: moss-like turf of tangled branches: forms loose clump or extensive mat. D-SUN.
P: snails (**checkered periwinkle**).

11 a Green shore crab, *Hemigrapsus oregonensis*
S: to 5 cm across carapace (shell covering back). C: greyish green, →variable, especially for juveniles **11 b**. ID: arthropod: →carapace squarish; →2 pairs of lobes between eyes (one behind other); →3 teeth on each side of carapace: 1 pair of →claws with white fingers, plus →4 pairs of hairy walking legs. (See also 22b). D: diatoms, green algae (sea lettuces); oyster spat (larvae), snail eggs; scavenges organic bits. P: fishes (sculpins), diving ducks (Goldeneyes), shorebirds, ribbon worms, humans.

12 Thatched acorn barnacle, *Semibalanus cariosus*
S: 6 cm across; 30 mm high. LS: 10-15 years. C: white to grey, or brownish. ID: arthropod: volcano-shaped casing with downward pointing, →finger-like spines (thatched). →S-shaped lock to double-door enclosure protects 6 pairs of feathery legs (cirri) (See 2b). NB: →tiny acorn acorn barnacles cover most of spines. D-FF: uses legs extended outside casing. P: snails (dogwinkles), sea stars (purple star), limpets (**ribbed limpet**), crabs (black-clawed).

13 a Barnacle-eating nudibranch, *Oncidioris bilamellata*
S: to 3 cm long. C: dark, irregular, chocolate stripes on yellowish background. ID: sea slug: body soft; →surface warty; →16 to 32 simple gills in 2 tight semi-circles at rear end. Attached, →snow-white irregular ribbon of eggs **13 b**.

D: adults eat barnacles (**common acorn**, **thatched acorn**); juveniles eat encrusting bryozoans (**kelp-encrusting bryozoan**). P: crabs (kelp).

14 Filamentous red seaweed, *Pterisiphonia bipinnata*
S: to 25 cm long. C: red algae ranging from blackish to red. ID: →fine, intricate, abundant branches; branching flattened in one plane. D-SUN.
P: likely chitons, snails, limpets, amphipods, and others.

15 Banner sea-nymph, *Nereis vaxillosa*
S: to 30 cm long. LS: to 1 year. C: dark reddish-brown; iridescent with light. ID: bristleworm: with many →feet and bristles; →banner-like extensions on each rear foot; →head with eyes and sensory tentacles; muscular, eversible tongue (proboscis) with 2 strong black jaws that pinch! D: algae, small animals like isopods (gribble), amphipods, juvenile sea cucumbers.
P: ribbon worms (**mud nemertean**), fishes (**high cockscomb**, pricklebacks, gunnels), crabs (**red rock crab**), shorebirds (Black Oystercatcher), humans.

16 Pacific littleneck clam, *Protothaca staminea*
S: to 13 cm across. LS: 14-16 years. C: white or tan to chocolate brown; often with dark, angular patterns, especially in young. ID: bivalve: shells round to oval, inflated; latticed sculpture: →fine radial ribs, →finer concentric ribs; →growth lines: inside edge of shells finely toothed; interior without colour. D-FF: uses siphons. P: sea stars (**mottled star**, sunflower star), snails (Lewis's moonsnail), crabs (Dungeness), giant Pacific octopus, siphon-nipping fishes (sculpins), sea otter, **Northwestern Crow**, humans.

17 Sea lettuce, *Ulva lactuca*
S: to 1 m long (usually less than 30 cm long). C: green algae ranging from pale to emerald. ID: blades flat, shiny, smooth and paper thin; long and narrow or fan-shaped, with →ruffled edge; root-like holdfast inconspicuous. D-SUN.
P: snails (**checkered periwinkle**, Lewis's moonsnail), limpets, chitons (giant Pacific), bristleworms (**sea-nymphs**), isopods, crabs (**green shore crab**), sea urchins, fishes (**high cockscomb**, gunnels, pricklebacks, sculpins), humans.

18 Square-tooth sea flea, *Amphithoe valida*
S: to 3 cm long. C: emerald green; varies with type of algal diet. ID: amphipod: body compressed side to side; →long antennae, eyes on →head; →7 pairs of legs for eating, walking, turning and jumping; eating claw of male with square median tooth. D: algae, likely green (sea moss, sea lettuces), red (filamentous red), brown (rockweed).
P: many fish species (sculpins, **high cockscomb**, gunnels, pricklebacks, snailfishes, clingfishes), ribbon worms, crabs (Dungeness).

19 Nuttall's cockle, *Chinocardium nuttallii*
S: to 14.6 cm across. LS: 15-19 years. C: yellowish-brown; young mottled with russet and brown patterns. ID: bivalve: massive, heavy shell, →strong, radiating rounded ribs, crossed by →wavy nodes of concentric ribs; → growth lines: shells heart-shaped in side-view. D-FF: uses siphons. P: sea stars (sunflower star), crabs (Dungeness), gulls, **Northwestern Crow**, humans.

20 High cockscomb, *Anoplarchus purpurescens*
S: to 20 cm long. LS: about 5 years. C: body dark brown, deep purple or black; belly pale; →dorsal fin lighter than →white scalloped pattern on back. ID: fish: slippery, eel-shaped, →fleshy crest down centre of head; →fan-shaped tail fin; →long anal fin; breeding male with bright orange fins; female with white spots. D: barnacle legs (**common acorn**, **thatched acorn**), limpets, amphipods (sea fleas), isopods (**rockweed isopod**), snails (**periwinkles**), bristleworms (**banner sea nymph**, **Vancouver feather-duster**), ribbon worms (**mud nemertean**), crabs (hermits), sea cucumbers, clam siphons, sea star tube feet, green and red algae (sea lettuces, nori). P: diving ducks (Mergansers), snakes (common garter, western garter); humans.

21 Washington butter clam, *Saxidomus gigantea*
S: to 15 cm across. LS: 20 years or more. C: chalky white to grey; often blackened by sulfides in oxygen-poor sediments. ID: bivalve: shells heavy, oval to square, →fine concentric ribs; →huge black external hinge ligament; interior of shells smooth, white. D-FF: uses siphons. P: sea stars (sunflower star, **mottled star**), snails (Lewis's moonsnail), crabs (Dungeness), siphon-nipping fishes, sea otter, **Northwestern Crow**, gulls (**Glaucous-winged Gull**), humans.

22 a Red rock crab, *Cancer productus*
S: to 20 cm across carapace (shell covering back). LS: estimate 8 years. C: brick to dark red; belly dirty white or yellowish; juveniles highly variable. ID: arthropod: carapace broadly oval; →5 small teeth protruding between eyes. →mouth below; 9 broad teeth on each side of carapace. →widest at 8th; 1 pair of →claws with dark finger tips, plus 4 pairs →walking legs; abdomen folded beneath: →female (F) broad, male (M) narrow **22 b**. D: barnacles (**common acorn**, **thatched acorn**), clams (**Pacific littleneck**, soft-shell), snails (**periwinkles**), mussels (**Pacific blue**), sea cucumbers (red), bristleworms (**sea-nymphs**, **Vancouver feather-duster**), amphipods (**square-tooth sea flea**), crabs (**green shore**), oyster spat (larvae). P: fishes (sculpins, clingfishes, scorpionfishes), gulls (**Glaucous-winged Gull**), rarely river otter, humans.

23 a Vancouver feather-duster, *Eudistylia vancouveri*
S: to 25 cm long. 1.2 cm wide, tentacular crown to 6 cm wide. C: tube golden-brown; tentacular crown with bands of blueberry/green and maroon. ID: bristleworm: tube-dwelling, in large colonies; →tube: thick rubbery parchment; →crown of tentacles retracted, dark like stringy brush at tube mouth; →crown extended resembles household 'feather duster' **23 b**. D-FF: uses tentacular crown. P: gill-nipping fishes (**high cockscomb**, gunnels, pricklebacks), crabs (**red rock**), sea stars (**purple star**), shorebirds (Black Oystercatcher), likely wading birds (**Great Blue Heron**).

24 a Mossy chiton, *Mopalia muscosa*
S: to 10 cm long. LS: at least 2 years. C: shells brown, blackish olive or grey, some with →white stripes. ID: chiton: body oval, flattened, slightly elevated median ridge; →surface of 8 shells dull; →mantle (soft tissue envelope) densely covered with stiff, brownish-red bristles; small, →shallow notch at rear end. Underside with →mouth, →foot for creeping, →gills for breathing and →mantle **24 b**. D: red algae (Turkish washcloth), green algae (sea moss).
P: likely sea stars (purple star), gulls (**Glaucous-winged Gull**), shorebirds (Black Oystercatcher).

25 a Purple star or ochre star, *Pisaster ochraceus*
S: to 50 cm across. LS: to 20 years or more. C: bright purple to dusky orange or yellow. ID: echinoderm: 5 stout arms, high arched disc; →many blunt white spines, those on disc in →star-shaped pattern **25 b**; →orange pore (madreporite) for seawater intake/exhaust. D: mussels (**Pacific blue**), barnacles (**common acorn**, **thatched acorn**), limpets, snails (**checkered periwinkle**, dogwinkles), abalones, chitons (mossy), bristleworms (**Vancouver feather-duster**, red-trumpet calcareous tubeworm).
P: sea otter, gulls - **Glaucous-winged Gull** swallows small stars whole.

26 Fat gaper, *Tresus capax*
S: to 28 cm across. LS: to 15-16 years (1l cm shell size). C: chalky white; often

blackened by sulfides in oxygen-poor sediments. ID: bivalve: shells heavy, oval, inflated, →wide growth lines; →protruded lower margin; →wide-gaping rear end for huge, partially retractable siphons. D-FF: uses siphons. P: sea stars (sunflower star), snails (Lewis' moonsnail), crabs (Dungeness crab), humans.

INTERTIDAL ZONE - LOWER SUBZONE

27 Wireweed, *Sargassum muticum*
S: to 2 m long. C: brown algae ranging from golden brown to blackish. ID: →many floats (stem-like) and →lateral branches with →smooth, rounded gas-filled stipes individually attached to stipes; →small narrow blades: root-like holdfast disk-shaped. D-SUN. P: sea urchins, crabs (kelp).

28 Turkish towel, *Chondracanthus exasperatus*
S: to 1 m long. C: red algae ranging from yellowish pink to rich purple; iridescent if wet. ID: blade simple, unbranched, tough, →surfaces carpeted with bumps; stem-like stipe short; root-like holdfast a small disk. D-SUN. P: chitons (giant Pacific chiton), algae-nibbling fishes (pricklebacks), humans.

29 Mottled star, *Evasteria troscheli*
S: to 60 cm across. C: variable; pinkish, orange, pale to dark green, bluish, brown or pale purple. ID: echinoderm: body stiff, 5 long, tapered arms. →disk small; →many short surface spines but not in star shape; →pale yellow pore (madreporite) for seawater intake/exhaust. D: mussels (**Pacific blue**), clams (**Washington butter**, **Pacific littleneck**, softshell), barnacles (**common acorn**, **thatched acorn**), snails (**periwinkles**), limpets, chitons, sea squirts.
P: few: sunflower star, red king crab, **Glaucous-winged Gull**.

30 Sugar wrack kelp, *Saccharina latissima*
S: to 3 m long, 18 cm wide. LS: up to 3 years. C: brown algae ranging from rich milk chocolate to golden to wine. ID: blade flat, thin and smooth or with →2 rows of blisters or ripples (undulations), →ruffled edges along its length; →stipe (stem-like) short (less than 20 cm), cylindrical: multi-branched holdfast (root-like structure) anchors kelp to rocks. D-SUN.
P: sea urchins, limpets, snails, chitons (giant Pacific), crabs (kelp); humans.

31 a Kelp-encrusting bryozoan, *Membranipora serrilamella*
S: to 20 cm across. LS: to 3-4 months. C: colony forming white to silver crust. ID: moss animal →colony: a thin, single-layered flat cluster; lacy, honeycomb appearance formed by tiny →rectangular boxes, each containing polyp-like feeding individual (zooid) with horseshoe-shaped structure of feeding tentacles (lophophore); →boxes radiate from centre of colony **31 b**. D-FF: uses lophophore. P: sea urchins, sea slugs, sea stars (blood star).

32 Iridescent seaweed, *Mazzaella splendens*
S: to 1.2 m long. C: red algae ranging from deep reddish purple to yellowish brown; displays →iridescent, oily-blue sheen of rainbow when wet. ID: blade long and broadly oval often with split lobe or terminal cleft; thick and smooth with stretchy elastic quality; stem-like stipe short (up to 6 cm). D-SUN.
P: various snails, limpets, chitons (giant Pacific), fishes (pricklebacks).

33 Leather star, *Dermasterias imbricata*
S: to 3 cm across. C: body blue-grey, mottled with reddish brown and orange. ID: echinoderm: surface slightly swollen, smooth, texture of wet suede; 5 short, tapering arms, →slightly webbed near bases; →lemnon yellow pore (madreporite) for seawater intake/exhaust; →bunched gills in rusty brown pits. D: sea anemones (giant plumose anemone); diatoms, encrusting sponges, bryozoans, sea pens, sea urchins, sea cucumbers (red), sea squirts, chitons, Pacific herring spawn. P: sea stars (sunflower star).

34 Great Blue Heron, *Ardea herodias*
S: 105 to 130 cm. LS: 24 years. C: blue-grey with white marks on the head. ID: large wading bird, →long neck and legs, →dagger-like bill. Stands with neck erect or head back on shoulders. In flight, neck folds in an 'S', legs trailing. D: fishes (sculpins), frogs, snakes, crayfishes, mice, insects, small birds.

35 Broad-winged kelp, *Alaria marginata*
S: to 3 m long. LS: annual. C: brown algae ranging from olive to dark; midrib golden. ID: main blade long with →distinct midrib (to 1 cm wide); double row of broad, wing-like reproductive blades near base; →stem-like stipe less than 15 cm long; multi-branched root-like holdfast. D-SUN.
P: amphipods (**sea fleas**), isopods, black-tailed deer, humans.

36 a Red sea cucumber, *Cucumaria miniata*
S: to 25 cm long. C: purple to brick red; tentacles bright orange. ID: echinoderm: body soft, cylindrical with tapering ends; →5 long rows of tube feet to hold onto rocks. D-FF: uses →10 finely branched tentacles **36 b**. P: sea stars (**leather**, sunflower), crabs (**red rock**); tentacle-nipping fishes (greenlings), gulls (**Glaucous-winged Gull**).

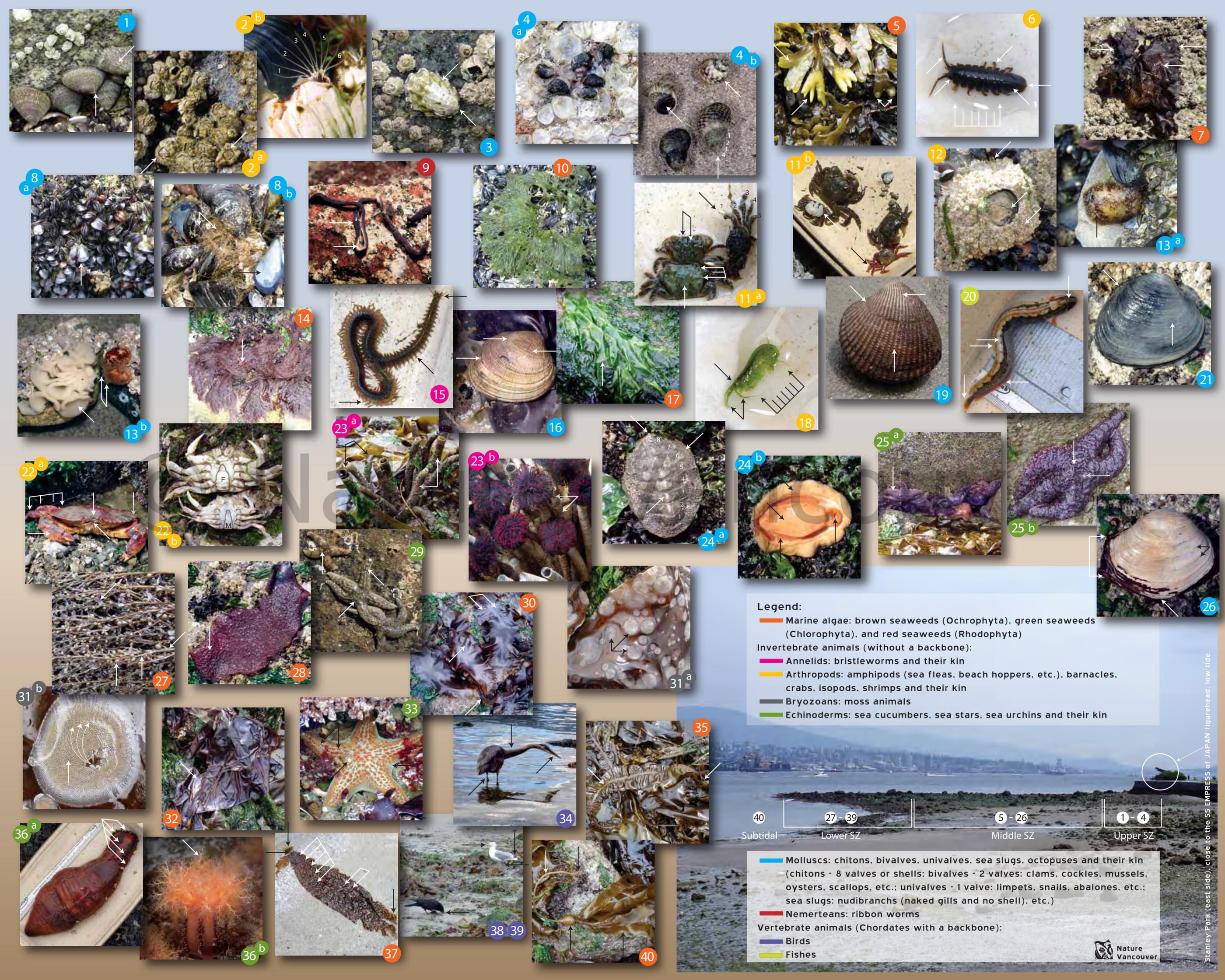
37 Seersucker kelp, *Costaria costata*
S: to 3 m long. LS: usually annual. C: brown algae ranging from caramel to chocolate. ID: blade broad, thin, →5 or 7 distinct, parallel midribs along its length, midribs folded; →tissue blistered into ridges and valleys like seersucker fabric; →tips become torn; →smooth stem-like stipe usually to 30 cm long; →branched root-like holdfast anchors to rocks. D-SUN. P: sea urchins, abalones.

38 Northwestern Crow, *Corvus caurinus*
S: to 43 cm long. LS: 15 years. C/ID: entirely black bird with violet gloss, young birds show brownish tinge to feathers, →Strong, longish bill. D: dead salmon and marine mammals; uses bill to dig out snails, limpets (mask), cockles (Nuttall's), clams (**Pacific littleneck**, **Washington butter**), mussels (**Pacific blue**), sea urchins; amphipods (**sea fleas**), Pacific herring spawn, eggs of marine birds.

39 Glaucous-winged Gull, *Larus glaucescens*
S: to 68 cm long. LS: to 10 years, some to 22 years. C/ID: large, medium grey gull; →grey and white pattern on primaries; →pink legs and feet; →heavy yellow beak with orange/red spot on lower jaw near tip; eyes brown or pale but not yellow. D: snails (**checkered periwinkle**), limpets (**ribbed**), barnacles (**common acorn**), cockles (Nuttall's), clams (**Washington butter**), mussels (**Pacific blue**), sea stars (**mottled**, sunflower, purple), sea cucumbers (red), chitons (**mossy**), crabs, bristleworms, fishes (Pacific herring and spawn, salmon carcasses).

SUBTIDAL ZONE

40 Bull kelp, *Nereocystis luetkeana*
S: to 36 m long. LS: annual. C: brown algae ranging from yellow to olive-green to dark chocolate. ID: →tough, multi-branched root-like holdfast anchors to rocks; →long, stretchable, hollow stem-like stipe leads to →bulbous float at surface with 2 bunches of →flat, broad reproductive blades. D-SUN.
P: sea urchins, abalones, algae-eating amphipods (**sea fleas**), crabs (kelp), humans.



Legend:

- Marine algae: brown seaweeds (Ochrophyta), green seaweeds (Chlorophyta), and red seaweeds (Rhodophyta)
- Invertebrate animals (without a backbone):
 - Annelids: bristleworms and their kin
 - Arthropods: amphipods (sea fleas, beach hoppers, etc.), barnacles, crabs, isopods, shrimps and their kin
 - Bryozoans: moss animals
 - Echinoderms: sea cucumbers, sea stars, sea urchins and their kin



- Molluscs: chitons, bivalves, univalves, sea slugs, octopuses and their kin (chitons - 8 valves or shells; bivalves - 2 valves: clams, cockles, mussels, oysters, scallops, etc.; univalves - 1 valve: limpets, snails, abalones, etc.; sea slugs: nudibranchs (naked gills and no shell), etc.)
- Nemertean: ribbon worms
- Vertebrate animals (Chordates with a backbone):
 - Birds
 - Fishes



Stanley Park (east side), close to the SS EMPRESS of JAPAN figurehead, low tide.