Illustration by Robert Perry

Coastal Zone

Species Profile Series

No. 15

Cabbage Kelp

The cabbage kelp, *Laminaria longicruris* De la Pylaie, is a brown seaweed (Phaeophyta). Another common name is the hollow-stemmed kelp.

Physical Characteristics

- Kelps have three parts: a blade or 'lamina', a stipe or 'stem', and a holdfast or 'anchor'. The cabbage kelp is khaki-brown in colour. It is a perennial plant (i.e., more than one growing season) and can grow to a length of 4.5 m in shallow water at maturity. Some have grown over 20 m long in Fortune Bay, Newfoundland. The blade is undivided and somewhat ruffled along the edges, has no 'finger-like' projections nor a midrib at its centre and is attached to a long stipe that is solid near the holdfast, but expanded and hollow near the base of the blade. Plants growing in the intertidal zone or in very exposed locations may have a solid stipe. The blade grows rapidly during winter to spring, and slows in the summer if water temperatures rise above 15ºC. Plants change in size with the seasons – an individual plant blade can be >1.5 m in the spring, while the same blade will 'shrink to' <30 cm by September. When growth resumes, the plant will have the appearance of a new blade. At the end of the stipe is a branched and fibrous, root-like holdfast that attaches the kelp to hard, rocky bottom substrates.

Distribution

- In North America, cabbage kelp occurs on the northeast coast from the Arctic, south to Long Island Sound. In Europe, its distribution is restricted to the northern portion of the northwest coast. It is widespread throughout Newfoundland and found primarily in the subtidal zone growing on a variety of rocky substrates. Winged, finger and cabbage kelps are usually the dominant marine plant species on rocky shores with moderate to high exposure.

Natural History

* Life Cycle

- Kelps have an unusual life cycle, quite different from terrestrial flowering plants. The large kelp plants are only the asexually reproducing half of the life cycle. The haploid spores (having a single set of genes and chromosomes) are released from special structures called sporangia and swim until they find a suitable habitat within which to settle. They then grow into independent, microscopic filaments that are responsible for sexual reproduction. New kelp blades subsequently develop. The cabbage kelp is reproductively active all year long except in mid-summer in the southern part of Newfoundland, and May to October in the northeastern part of Newfoundland and Labrador.

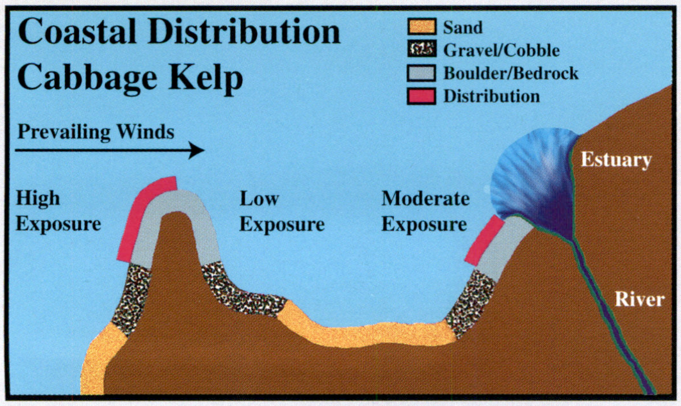
* Habitat Requirements

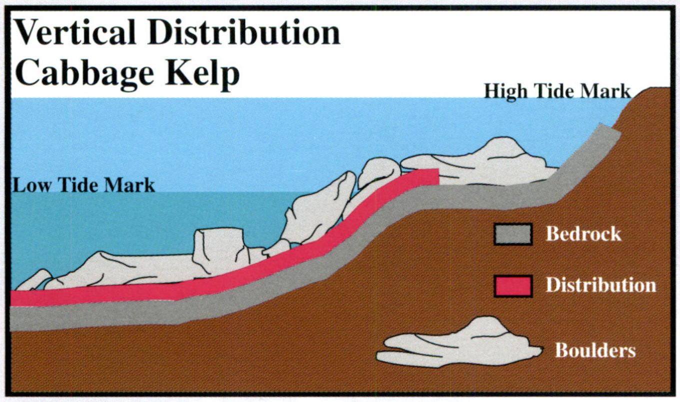
- The cabbage kelp grows attached by its holdfast to rocks, boulders, wharves or large shells. Amount of suspended material in the water, tides, waves and bottom type affect the distribution of cabbage kelp because they affect the amount of light, nutrients and space available for growth.

- Water temperature and salinity are also important factors that influence kelp growth. The cabbage kelp has the highest tolerance for warm seawater of the local kelps and can survive water temperatures close to 20ºC. It is also more resistant to reduced salinity than the other kelp species found in Newfoundland, although sudden major drops in salinity can cause mortality.

* Ecological Importance

- Kelp beds are complex ecosystems. Kelps are early colonizers of bare areas of the sea bed and are an important food resource for grazing invertebrates like





the green sea urchin (*Strongylocentrotus droebachiensis*). However, in areas where sea urchins are numerous, the kelp beds are virtually nonexistent due to intensive grazing pressure. Besides being a direct food source for grazing invertebrates, kelp beds are also producers of suspended food for many filter-feeding organisms. Kelp beds also provide shelter for juvenile fish as well as crabs, small snails and other invertebrates. Further, the blades of laminarian kelps are often covered by several layers of roe (eggs) deposited by spawning herring.

Potential Impacts of Nearshore/Coastal Development

- Human activities (e.g., dredging) that increase the amount of material suspended in the water and decrease water clarity may have a negative effect on the cabbage kelp community because an increase in suspended sediment and/or decaying material reduces the amount of light available for growth. Further, large amounts of sediment may cover the rocky substrates and prevent attachment of kelp (and other seaweeds).
- Effluent discharge from industrial plants can change water temperature and salinity, or chemical characteristics, thereby disrupting biochemical processes such as growth and reproduction. These processes are cued to a narrow range of water quality characteristics.
- Intensive harvesting of the cabbage kelp in an area without adequate recovery will have a negative impact on the overall community. It has been shown that intensive harvesting removes, totally or partially, the dominant population and changes the distribution and abundance of associated species. Harvesting practices should allow for sufficient recovery of a target species to maintain a sustainable biomass.

Commercial Applications

- Kelps (*Laminaria spp.*) are eaten widely in the Orient, especially in Japan and Korea. They are often purchased as dried sheets, crushed and served as a condiment. They are rich in vitamins and minerals such as iron, iodine and zinc and can also be used as a natural food supplement. Dried *Laminaria* stipes have been used medically for gentle cervical dilation.
- Ground kelp also has been used as a soil fertilizer and a feed supplement for animals. A kelp extract, alginate, is used by the dairy industry as a natural thickener of ice cream and chocolate milk. Alginates can also be used to produce specialty paper, printing dyes and welding rod coatings.

Selected References and Further Reading

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For further information, please contact your local office of Fisheries and Oceans Canada.