

THE GROWTH OF SOME NEW ENGLAND PERENNIAL SEAWEEDS

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Growth studies on *Fucus vesiculosus* L., *Ascophyllum nodosum* (L.) LeJolis, *Rhodymenia palmata* (L.) Greville, *Laminaria digitata* (L.) Lamouroux and *Laminaria saccharina* (L.) Lamouroux were initiated at Dover Point, Dover, New Hampshire and Jaffrey Point (Fort Stark), Newcastle Island, Portsmouth, New Hampshire in July 1968. Dover Point is an estuarine tidal rapid area whereas Jaffrey Point is a semi-exposed open coastal location. Both areas have been studied extensively and much is known of their flora and ecology (Mathieson, Hehre & Reynolds, in press; Mathieson, Reynolds & Hehre, in press; Reynolds, 1971).

Approximately 20 plants of each species were tagged at both locations with plastic forester's tape and small white tags. The monthly growth of *F. vesiculosus*, *A. nodosum* and *R. palmata* was recorded by measuring their total length, while in *L. digitata* and *L. saccharina* growth was recorded by determining the monthly increase in distance between the intercalary meristem and paired holes (Sundene, 1964). The holes were made with a cork borer 1 inch above the meristem. New holes were made every 2 months, because the terminal portions of the lamina sloughed off continuously. Specimens of *L. saccharina*, *L. digitata* and *R. palmata* were transplanted from the high to the low current areas at Dover Point, and their growth and longevity was recorded. During the 16 months of the experiment, nearly all the initial plants were lost due to human interference, grazing of snails, wave action or degeneration. Consequently, it was necessary to continuously tag and measure new plants.

The growth of *Rhodymenia palmata* was sporadic in the areas of low and high currents at Dover Point. Fragmentation occurred extensively during the late winter. The

area of low currents was not suitable for the sustained growth of *R. palmata*, for when plants were transplanted there they died in a few months. All specimens of *R. palmata* grew at least one inch during June 1968.

The best growth of *Fucus vesiculosus* and *Ascophyllum nodosum* occurred during the summer while the poorest growth occurred during cold weather. The growth of *F. vesiculosus* and *A. nodosum* at Jaffrey Point was consistently lower than at Dover Point. The maximum growth of *F. vesiculosus* was 2 inches per month, and it occurred from May 15 to August 15, 1968, in the area of low currents at Dover Point.

Figures 1 and 2 show the growth of *Laminaria digitata* and *L. saccharina*. Because of the extreme variability in growth rates between individual plants, these rates are described only in relative terms as follows:

- (1) good growth = over 3 inches/month
- (2) average growth = 2-3 inches/month
- (3) poor growth = up to 2 inches/month.

The growth of *Laminaria digitata* in the low current areas at Dover Point was quite variable. When transplants were made from the high to the low current areas, the growth was initially high, but the plants eventually degenerated. The probable cause is siltation and the physiological decrease of oxygen and nutrients due to the decreased currents. Good growth of *L. digitata* occurred in the spring and summer at Jaffrey Point and in the area of high currents at Dover Point. Poor growth was particularly evident in the winter at the same locations. In general, *L. digitata* had a higher rate of growth and it was sustained for a longer time in the high current areas at Dover Point than at Jaffrey Point.

An interesting phenomenon was observed when *L. digitata* was transplanted from the high to the low current areas at Dover Point. No dissection of the newly formed parts of the blades took place, and in a few months it was difficult to distinguish the plants from *L. saccharina*, except for the identification tags. The mechanical force of

RELATIVE GROWTH OF LAMINARIA DIGITATA

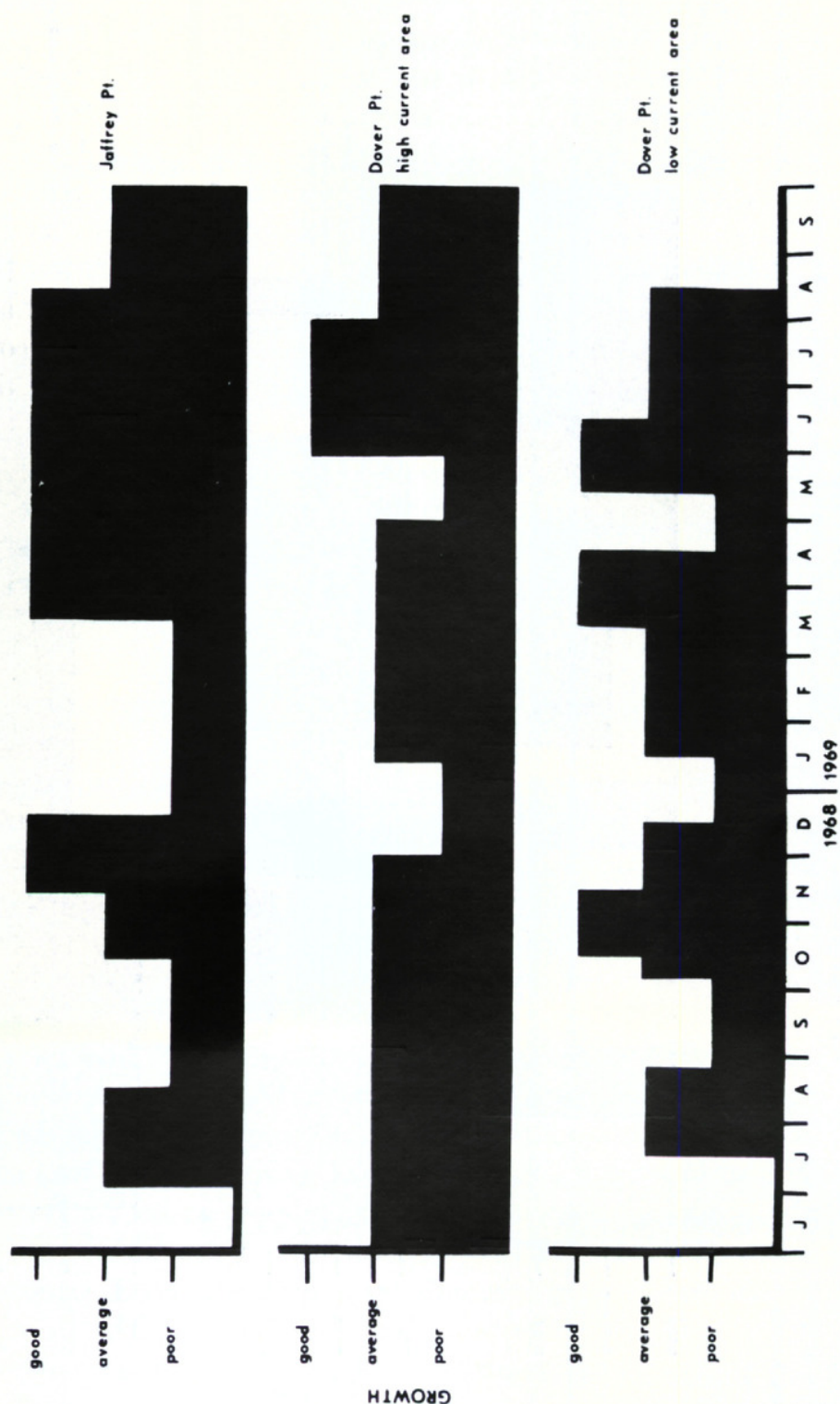


Figure 1
RELATIVE GROWTH OF *Laminaria digitata*

LEGEND:

| | |
|----------------|-----------------------|
| Poor Growth | 0-2 inches per month |
| Average Growth | 2-3 inches per month |
| Good Growth | 3-5½ inches per month |

RELATIVE GROWTH OF LAMINARIA SACCHARINA

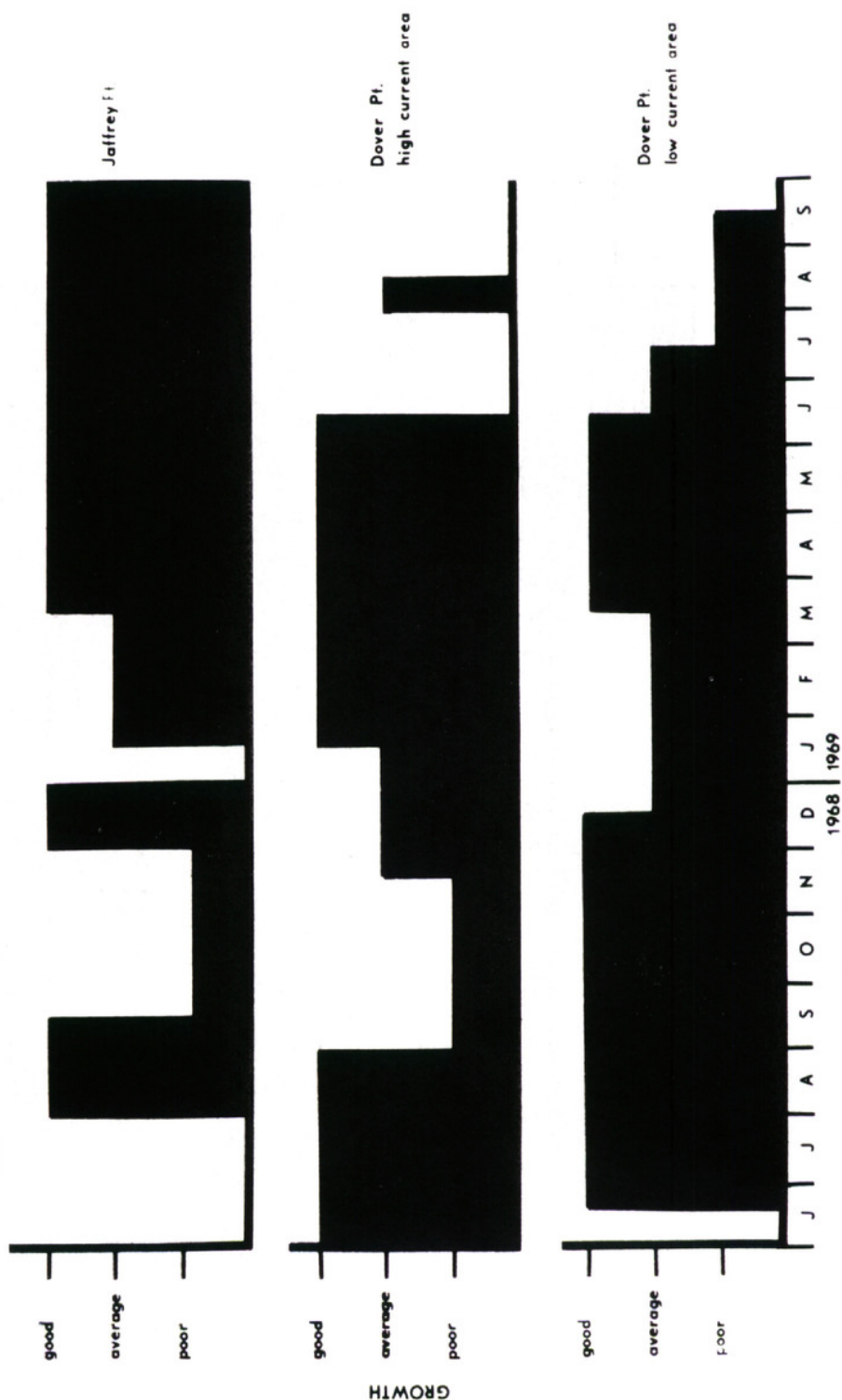


Figure 2

RELATIVE GROWTH OF *Laminaria saccharina*
 LEGEND:

| | |
|----------------|------------------------|
| Poor Growth | 0-2 inches per month |
| Average Growth | 2-3 inches per month |
| Good Growth | 3-5 ½ inches per month |

the current was not high enough to cause the final separation of the frond segments.

The growth rate of *L. saccharina* was good for most of the year in the low current areas at Dover Point. A slight decrease in growth occurred during the winter. Good growth of *L. saccharina* occurred during the summer and early fall at Jaffrey Point and in the high current areas at Dover Point. Poor growth was evident during the late fall and early winter.

Laminaria saccharina exhibited good growth at all areas during the summer. *Laminaria saccharina* dominated the kelp beds at Dover Point during the winter, but *L. digitata* was dominant the rest of the year. It can be concluded that *L. saccharina* is better adapted to the estuarine environment than is *L. digitata*. The penetration of *L. saccharina* into the estuary is dependent on the presence of currents to compensate for the reduced salinities.

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Reynolds, N B. 1974. "THE GROWTH OF SOME NEW-ENGLAND PERENNIAL SEAWEEDS." *Rhodora* 76, 59–63.

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