Co-management of Marine Plants in the Atlantic Region

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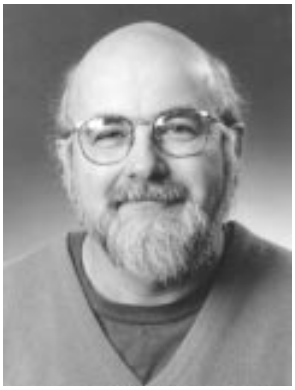
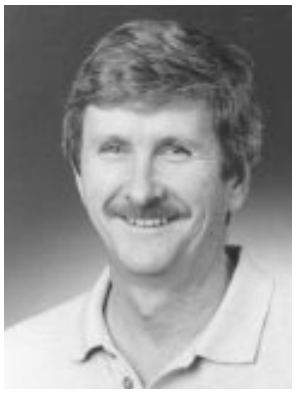


G. Sharp



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Background

The harvesting of marine plants is an integral part of the near shore fishery in the Atlantic Zone. The marine plants industry began soon after W W II and developed into a significant industry in the early 1960s. The commercial species of Marine plants are attached to rock with a very defined intertidal and subtidal distribution. The management of the harvest varies from unrestricted harvesting for some species to closely controlled annual harvests in others (Pringle 1981). Harvesting technology ranges from hand harvest gear to sophisticated mechanical harvesters (Sharp *et al*. 1994). Despite some of its "artisanal" characteristics, this industry recently became one of the first fisheries to develop co-management agreements in Atlantic Canada. Two recent examples of co-management agreements, each with very different goals and structure are: the *Furcellaria lumbricalis* (wireweed, foo foo) harvest in Prince Edward Island and the *Ascophyllum nodosum* (rockweed) harvest in southern New Brunswick.

Co-management, Harvester Initiated

Harvesters of *Chondrus crispus* (Irish moss) on Prince Edward Island observed that an increasing abundance of *Furcellaria* in the commercial seaweed beds was becoming a major threat to the sustainability of their Irish moss harvest. The seaweed beds in the Pleasant View area (Fig. 1) had less than 5% of the observations with *Furcellaria* present in the 1978-80 surveys and 67.3% of *Furcellaria* in the observations in the 1991 survey (41.3% of those observations had >20% *Furcellaria* cover) (Sharp *et al.* 1993). A ratio of *Chondrus* to *Furcellaria* exceeding 20:1 is not marketable. Although these closely associated species have similar size and morphology (Fig. 2), their reproductive cycle and vegetative recruitment mechanisms differ significantly. *Furcellaria* is more subject to detachment with wave action or dragrakes than *Chondrus*. Fully developed *Furcellaria* plants are able to reattach due to the structure of the rhizoidal holdfast while the discoid holdfast of *Chondrus* is firmly attached to the substrata and cannot regenerate quickly.

Few management options to alleviate this problem were available to the harvesters and the Department of Fisheries & Oceans (DFO), due to ice cover and conflicting fishing activity. Dragrakers could cull the beds of *Furcellaria* during the harvest season to promote a purer *Chondrus* harvest and discard *Furcellaria* ashore, which could reduce its biomass. Alternatively they could regard *Furcellaria* as another marketable species and make a separate harvest for this seaweed. A directed *Furcellaria* harvest was made possible by the company, Acadian Seaplants, which

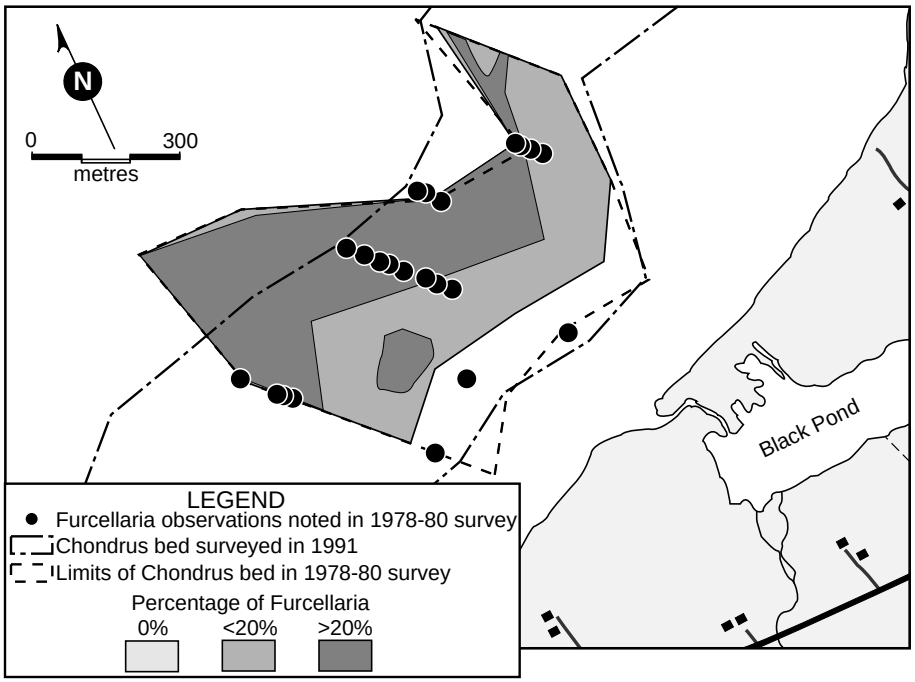

Figure 1: Map of the seaweed bed at Pleasant View, P.E.I. showing the location of the Furcellaria *observations from the 1978-80 survey and the percentage of* Furcellaria *located on the bed in the 1991 survey.*

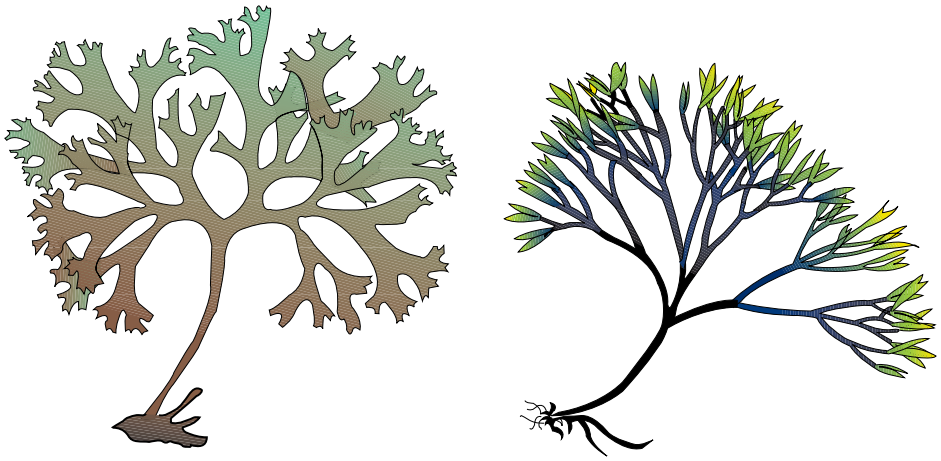

Figure 2: Diagrams of Chondrus crispus *showing its discoid holdfast and* Furcellaria lumbricalis *showing its rhizoidal holdfast.*

was interested in processing, storing, and marketing the seaweed. The P.E.I. Department of Fisheries and Aquaculture supported the handling costs. DFO issued special harvesting permits, set marker buoys to limit the area of harvest and initiated a monitoring program to measure effort distribution, catch characteristics, composition and population dynamics of the marine plant beds.

Over 60 fishers registered for the first year of this harvest and 36 participated in the harvest, landing 542 t of *Furcellaria*. The composition of the beds changed dramatically in the short term compared to control areas (Fig. 3). *Furcellaria* biomass had begun to recover by the end of the *Chondrus* harvest season. Dragrakes are selective for the bushier, taller and lightly attached mature *Furcellaria* plants. Once the fronds longer than 60 mm with over 4 branches are removed, the slender lower-branched fronds are not as vulnerable to the dragrake. The subsequent *Chondrus* harvest that followed the *Furcellaria* harvest in Western P.E.I. was 4013 t greater than the previous year's 5021 t (up 80%). The reduction of *Furcellaria* on the commercial beds prior to the regular season allowed more *Chondrus* to be harvested without exceeding the limit for *Furcellaria* in the mixed yield. The *Furcellaria* harvest of the same beds during the second year was 819 t with no significant change in Catch Per Unit Effort (CPUE) compared to the first year. A similar pattern of short-term reduction and medium-term recovery was noted in 1995. The key to the success of this experiment was the cooperative management of the harvest by the fishermen. Under the leadership of a committee, harvesters took the responsibility to harvest within the boundaries set for the *Furcellaria* harvest. Harvesters made the decision to cease harvesting *Furcellaria* once the amount of *Chondrus* had reached an unacceptable level in the harvest (20%). The harvesters cooperated fully with harvest monitors by providing open access to their vessels for at sea boardings and sampling. The third year of this experiment will confirm the sustainability of a dual season-dual species harvest.

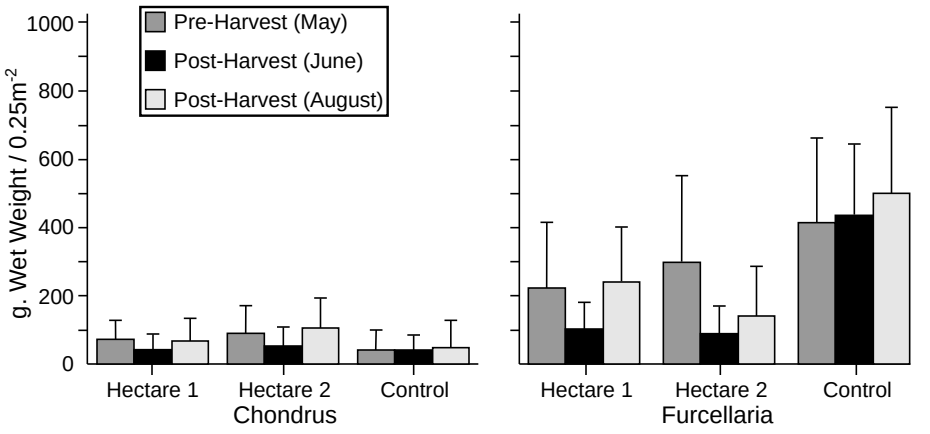

Figure 3: Abundance of Furcellaria *and* Chondrus *in experimental and control hectares, located on the Pleasant View bed, P.E.I.*

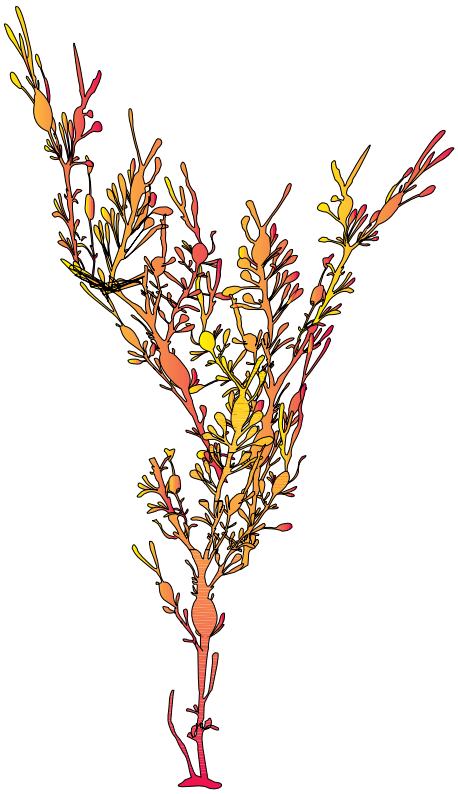

Figure 4: Diagram of Ascophyllum nodosum *plant.*

Co-management, Agency Initiated

Ascophyllum nodosum (Fig. 4), commonly called rockweed, is the dominant intertidal seaweed in the sheltered to semi-wave exposed coastline of Atlantic Nova Scotia and the Bay of Fundy. This perennial plant is attached to stable substrate and forms a floating canopy as the tide rises. The *Ascophyllum* harvest in the Maritimes began in 1959 with few restrictions except for the provision of several exclusive buying areas by the province (Sharp 1987). The

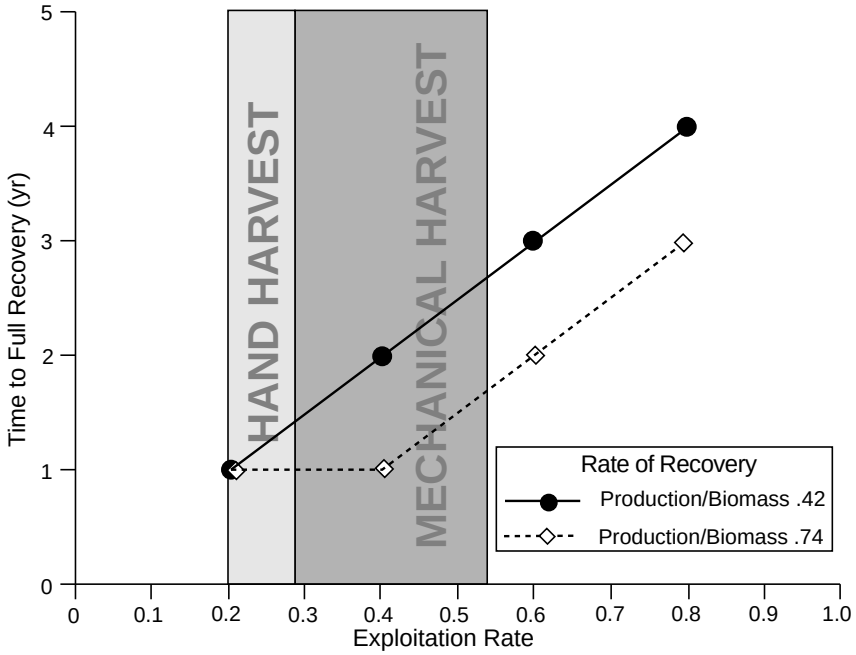

Figure 5: Rate of recovery for Ascophyllum *biomass showing 42% and 74% regrowth rates at increasing rates of removals by harvest.*

industry harvested and processed 4,000 to 6,000 t annually until 1985. A change of processing plant ownership, mechanization and the entry of second buyer/ manufacturer resulted in a rapid rise in exploitation and geographical expansion of the industry (Sharp *et al*. 1994). The response of management agencies to this change was to some degree uncoordinated and piecemeal (Pringle *et al*. 1996). The industry was interested in expansion to the New Brunswick side of the Bay of Fundy in 1989. Based on past experience in Nova Scotia, a Memorandum of Understanding was signed between DFO and N.B. Department of Fisheries and Aquaculture (NBDFA) clearly dividing management and development responsibilities (Pringle *et al*. 1996). The existing information on the resource base and related habitat issues was reviewed and provided to the proponents prior to a Call for Development proposal (CAFSAC, advisory document). The rate of exploitation was one of the most

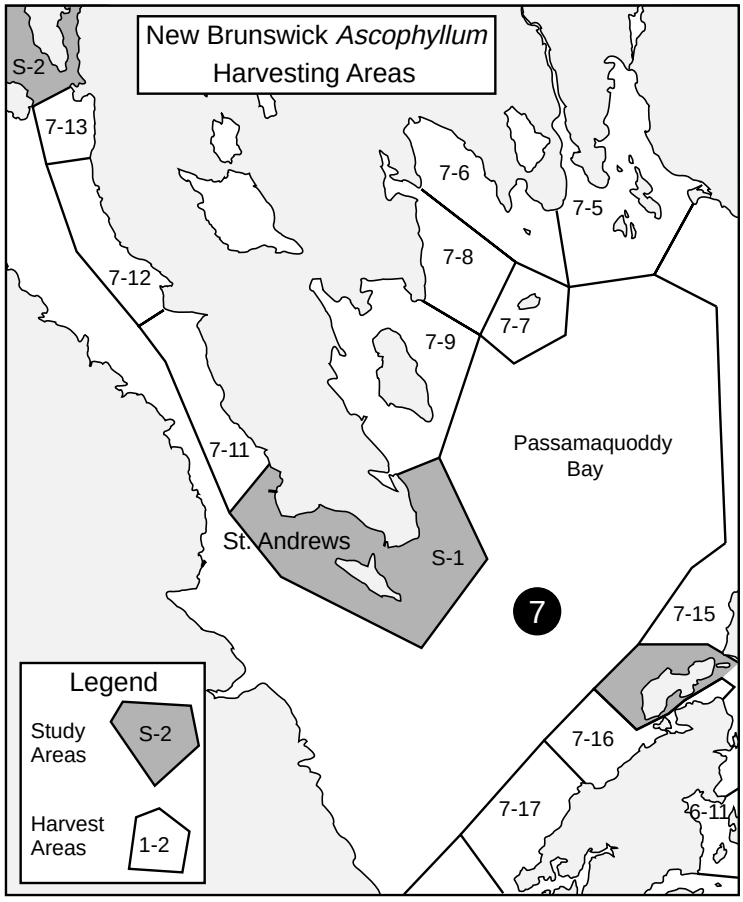

Figure 6: Map of New Brunswick Ascophyllum *harvesting area showing sectors of the harvest areas and study areas.*

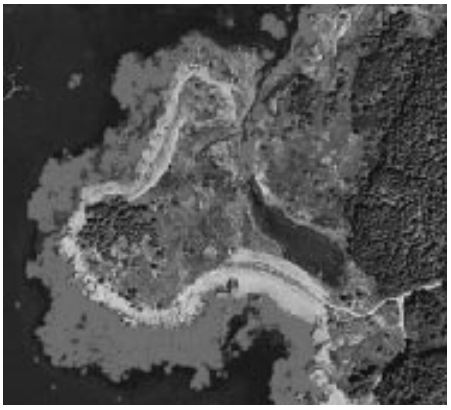

Figure 7: Aerial photo of Ascophyllum *beds near Letete, N.B. showing computer enhanced area used to determine the biomass.*

critical issues, especially if the resource is to be harvested on a yearly basis. The resource must be left fallow to recover yield if the exploitation is greater than 30 % of standing biomass (Fig. 5). A pilot scale harvest was based on an exploitation rate of 50% and a 3 year harvest interval within 90 sub-sectors of the resource (Fig. 6). The call for development proposals required the proponents to enter into a co-management agreement with DFO and NBDFA. The terms of the agreement included: means of harvest, degree, limits to harvest, assessment-monitoring requirements and report-

ing commitments. Monitoring included not only the degree and extent of harvest and recovery of standing crop, but also addressed the impact on associated fauna. The co-management agreement was put in place July, 1995 and a partial season harvest was completed by October. Close adherence to the terms of the harvest plan has resulted in detailed assessment information. Aerial photography (1:12,550) associated with ground-truth measurements has increased the resolution of the rockweed areas and decreased the error in biomass estimations (Fig. 7). Other benefits include compilation of data bases on the density and size distribution of key species in the intertidal.

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