Progress Report for 2001 & 2002

Project Title: Trophic status of Casco Bay, Maine as delineated by Seaweed Biodiversity and Tissue Analysis

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Period and Amount of Award: Initiation Date 10/15/2000; completion date 1/31/2004 ($196,055, 3 years)

Publications:


also see proposed papers outlined below under #s 1-5

Accomplishments:

(1) Evaluation of long term floristic changes from mid-late 1800's versus present-day

-We have evaluated all historical records of seaweeds from Casco Bay within the Jepson Herbarium at the University of California @ Berkeley.

-We have also evaluated all of Collins' historical records from Casco Bay deposited in the Herbarium at the University of Michigan (Ann Arbor), plus those at Harvard (i.e. the Farlow Herbarium), the New York Botanical Garden, and Brooklyn Botanical Garden's Herbaria- i.e. sites where Collins' collections are primarily housed. Most of Collins' Casco Bay specimens have been examined and his field notes have helped to clarify otherwise incomplete label data on several herbarium specimens. A few specimens (e.g. Bryopsis plumosa from Jaquish Island) were not found and are presumed lost.
-We have obtained a copy of F. S. Collins diary via Dr. Paul Silva of the Jepson Herbarium at the University of California, Berkeley. The diary, which dates back to the late 1890's, records all of his marine algal collections beginning in 1898, documenting collection numbers, dates, and places. Many historical records from the Casco Bay area are present in this detailed documentation, particularly for the South Harpswell, Maine region.

Historical records of several other people who collected seaweeds in the Portland/Casco Bay area have also been documented, including the earliest collections by Captain Nicolas Pike (1842) and J. Hooper (1851). Other collections by well-known phycologists, W. G. Farlow (1874 & 1876) and W. A. Setchell (1888 & 1889) from Peaks Island were evaluated, as well as A. R. Norton & C. B. Fuller, president and curator of the Portland Society of Natural History, respectively. Additional collections by individuals who we have little or no information about were also evaluated: T. F. Allen, H. J. Banker, C. E. Clarke, E. B. Chamberlain, C. C. Curtis, Mr. Goode, C. W. Perry, Miss Roy, Miss Rosalie Weikers, and A. Woodward.

-We've made detailed seasonal and spatial collections of all conspicuous seaweed populations at approximately 110 coastal and estuarine sites within Casco Bay-i.e. from Cape Elizabeth to Cape Small.

-These "recent collection" will be used as a template to make comparison with historical records by F. S. Collins, plus several other people who collected seaweeds in the Portland/Casco Bay area (see above). A tabulation of all historical and recent records is currently being assembled.

(2) Evaluation of several recent changes during the past 50 years due anthropogenic effects and human introductions

An assessment of seaweed populations within the major insular, nearshore open coastal, and estuarine habitats within Casco Bay is currently being being assembled. That is, a comparison of the four major tidal rivers (i.e. Fore, Harrasekek, New Meadows, Presumpscot, Royal), plus various insular and nearshore open coastal sites is being made, using data collected at the 110 sites described above. The Fore River is by far
the most contamination tidal river within Casco Bay, due to transport of oil, etc., while the offshore island should be the most pristine. An assessment of species diversity patterns in analogous habitats should help to evaluate varying trophic conditions. Most of the historical records described above (#1) do not include documentation within tidal tributaries, but only nearshore and insular records. Hence they cannot be used in historical comparisons.

A synopsis of these spatial results will be made and compared with other estuarine/coastal areas in New England (cf. Hardwick-Witman and Mathieson 1983; Mathieson et al. 1991, 1993, 2001).

(3) Tissue assessments of *Ascophyllum nodosum* and *Ulva/Enteromorpha*

- Presently we are finalizing collections of various fucoid and green algal populations that will be used for trace metal analysis. That is, samples of both groups of seaweeds have been collected at multiple sites (~19 to date), and they have been dried and archived prior to laboratory analysis (atomic absorption analysis). As *Ascophyllum nodosum* is a perennial seaweed with distinct annual growth, two age classes of material have been prepared, including one and three year old tissue samples. By contrast all ulvroid algal samples are annuals and their tissues represent a maximum of one year’s growth.

A synopsis of spatial, temporal and specific tissue composition will be made (cf. Hardwick-Witman and Mathieson 1986)

(4) Initiation of transplant studies of *A. nodosum* and corresponding tissue environments

- The transplant studies will be initiated in the fall of 2002 and followed until the duration of the study (i.e. 1/30/2004)

A synopsis of spatial and temporal tissue composition will be made as outlined above under #4 (cf. Hardwick-Witman and Mathieson 1986)

(5) Initiation of floristic assessment at ~ 20 estuarine and open coastal sites
-These studies will be initiated during the winter of 2002-2003 and followed until 1/30/2004.

A synopsis of floristic assessments will be made as outlined above under #2 (cf. Hardwick-Witman and Mathieson 1983; Mathieson et al. 1991, 1993, 2001)

References Cited


