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# Factors Influencing Seagrass Ecology In The Indian River Lagoon

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Tabb, D. C., D. L. Dubrow, and R. B. Manning. 1962. The ecology of northern Florida Bay and adjacent estuaries. Florida State Bd. Conserv. Tech. Ser. 34:1-79.

Taylor, C. C. 1953. Nature of variability in trawl catches. Fishery Bull. 54:145-166.

Turner, W. R., and G. N. Johnson. 1973. Distribution and relative abundance of fishes in Newport River, North Carolina. NOAA Tech. Rept., Natl. Mar. Fish. Serv., Spec. Sci. Rept. Fish. 666.

Wang, J. C. S., and E. C. Raney. 1971. Distribution and fluctuations in the fish fauna of the Charlotte Harbor estuary, Florida. Charlotte Harbor Estuarine Studies, Mote Marine Laboratory, Sarasota, Florida.

Wass, M. L. 1967. Biological and physiological basis of indicator organisms and communities. Sec. II—Indicators of pollution. Pp. 271-283. *In*: Olson, T. A., and F. J. Burgess (eds.). Pollution and Marine Ecology. Interscience, New York, New York.

Wilcox, J. R., and R. G. Gilmore. 1977. Some hydrological data from the Indian River between Sebastian and St. Lucie Inlets, Florida, January 1972-February 1975. Harbor Branch Foundation, Inc. Tech. Rept. 17.

Wilhm, J. L., and T. C. Dorris. 1968. Biological parameters of water quality. Bioscience. 18:477-481.

Zilberberg, M. H. 1966. Seasonal occurrence of fishes in a coastal marsh of northwest Florida. Contrib. Mar. Sci. 11:126-134.

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*Academy Symposium*

# FACTORS INFLUENCING SEAGRASS ECOLOGY IN THE INDIAN RIVER LAGOON

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Abstract: *Effects of water depth, water temperature, light intensity, epiphyte coverage, detrital accumulation and sediment resuspension and shifting on seagrass ecology in the Indian River Lagoon system were studied from April 1977 through June 1979. Seagrass beds containing* Halophila engelmannii, Halodule wrightii *and* Syringodium filiforme *located between Cocoa and Grant, Florida, were chosen as sampling sites. Increases in vegetative growth for all 3 seagrasses occurred in spring and to a lesser extent in fall months. Water temperatures ranged between 22 and 30°C. Decreased detrital accumulation, sediment resuspension and shifting, and water depth, increased light transmission and intensities at the seagrass blade level, and reduced epiphytic coverage (less than 300 mg epiphytes/gm blade) were observed during spring. Overall epiphyte levels (expressed as seasonal averages) were 850, 615 and 210 mg epiphytes/gm blade for* Syringodium, Halodule *and* Halophila, *respectively. Net photosynthetic rates were highest during spring and fall, 1185, 1090 and 670 μg C fixed/mg Chl-hr. Periods of decreased vegetative growth (in summer and winter months) were accompanied by increased blade necrosis, rhizome and/or blade detachment, more dense epiphyte coverage (in excess of 100 mg epiphytes/gm blade) and reduced photosynthetic rates. Decreased light intensities at blade level, sub-optimal temperatures (< 20°C in winter and > 30°C in summer), and extensive sediment shifting and detrital accumulation were observed at these times.*

Seasonal variations in productivity of seagrasses have been reported for

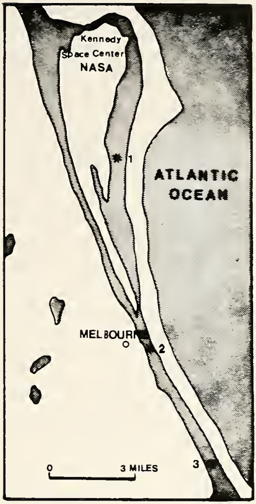


FIG. 1. Study Area: (1) Cocoa, Florida collection site, (2) Melbourne, Florida collection site, (3) Grant, Florida collection site.

the Mediterranean (Drew, 1978, 1979), the Bering Sea (McRoy, 1974), the Pacific coast of Japan (Mukai et al., 1979), shallow estuarine systems of the coast of North Carolina (Penhale, 1977) and extensively reviewed by McRoy and McMillan (1977). Similar studies of seagrass standing stocks are reported for the Indian River lagoonal system (Phillips, 1960; Thomas, 1974; Gilbert, 1976; Gilbert and Clark, 1981). However, an understanding of interrelationships between abiotic and biotic factors influencing distribution and seasonal variations in vegetative capacity is still very limited.

We evaluate the influence of biotic and abiotic parameters on the seasonal changes in seagrass beds containing *Halodule wrightii*, *Halophila engelmannii* and *Syringodium filiforme*. In addition, the capacity for vegetative growth was measured by [$^{14}$C] uptake and compared to observed seasonal vegetative patterns.

DESCRIPTION OF STUDY AREA—The study was conducted on several seagrass beds containing *Halophila engelmannii*, *Halodule wrightii* and *Syringodium filiforme* in the Indian River between Cocoa and Grant, Florida (Fig. 1). The area, a large shallow mesohaline lagoon, is isolated from the Atlantic Ocean by a barrier island forming its entire eastern shore. As a result, direct exchange between the 2 bodies of water and tidal flux in the study area are negligible. The weak north to south currents in the lagoon are largely wind induced (Schneider, et al., 1974) and are attenuated by the numerous causeways and islands located throughout the system. Much of the water input is from runoff or direct precipitation. Sediments are highly detrital, fine grain sands. Seasonal accumulation, shifting and wind-induced resuspension of these sediments in and around the seagrass beds occur continually and are important factors affecting distribution and abundance of seagrass species.

The seagrasses examined in this area are found throughout the lagoonal system as patches surrounded by open sandy areas in depths usually less than 1 m. This varies as a function of turbidity and sediment destabilization due to extensive boat traffic in the system at greater depths. *Halodule* and *Syringodium* are the more abundant seagrasses (Thompson, 1978), while beds containing *Halophila* are generally found as isolated patches in the deeper range of the seagrass habitat, or as a subdominant member in association with *Syringodium* stands. In shoreline stands containing all 3 seagrasses, an apparent depth zonation is observed in which the *Halodule* dominates in the shallowest areas, followed by *Syringodium* and then *Halophila*.

MATERIALS AND METHODS—Seagrass beds containing *Halodule*, *Syringodium* and *Halophila* were examined from April 1977 through June 1979. The study consisted of 2 phases: (a) examination of biotic and abiotic influences on seagrass ecology; (b) determination of seagrass vegetative capacities by *in vitro* [$^{14}C$] incorporation.

*Biotic and Abiotic Parameter Study:* Immediately prior to blade sampling, water and air temperature, water depth and salinity (by refractive index) were measured. Samples of the seagrasses and their attached epiphytes were harvested and transported to the laboratory in plastic bags containing water from the sampling site to prevent desiccation. In the laboratory, epiphytes were separated from the blades by careful scraping with razor blades. This method was found to be more effective than either sonication or scraping samples after freezing. After scraping, the seagrasses and epiphytes were placed in a drying oven for 48 to 96 hr and dry weights determined. Epiphyte coverage is expressed as mg epiphytes per gram seagrass blade (dry weight).

Photosynthetically active radiation (PAR, 380 to 700 nm) intensities ($\mu E/m^2$-sec) were measured at the air-water interface (S.I.) and at mean seagrass blade depth (B.I.) using a LICOR quantum radiometer (model LI-185A). Measurements were generally obtained between 1000 and 1400 E.S.T. In addition to obtaining direct PAR flux at the sites, these measurements were also used to determine an index of water clarity (in the form of per cent PAR transmission) by the formula:

$$\% \text{ PAR Transmission} = (\text{B.I./S.I.}) \times 100$$

In conjunction with measurement of physical parameters, observations on the environmental quality in and around the seagrass beds were made. Phases of seagrass vegetative growth and decline, the extent of epiphytic coverage on seagrass blades, sediment accumulations and shifting in and around the beds, water conditions and general weather patterns were recorded at the various sites throughout the study.

*Incorporation Study:* Photosynthetic rates, as determined by [$^{14}C$] incorporation into acid stable metabolites, were used as the means for determining seagrass vegetative capacity (Bassham and Calvin, 1957). Intact plants of each species were collected on the morning of each experiment. Leaf tissue samples (approximately 75 to 100 mg) were excised, cleaned of epiphytes and placed in filter sterilized seawater (FSSW). FSSW was prepared by filtration through #4 Whatman followed by millipore filtration (0.45 $\mu$). Bicarbonate concentration was determined by the method of Strickland and Parsons (1972) and salinity calculated as previously described.

Tissue samples were equilibrated at 700 $\mu E/m^2$-sec for 10 min at 30°C, transferred to 5 ml FSSW containing 15 $\mu l$ [$^{14}C$] bicarbonate (1 mCi/ml, 50 mCi/mM), and allowed to incorporate under 700 $\mu E/m^2$-sec PAR at 30°C for 15 min. Tissues were then rinsed thoroughly with deionized (DI) water, homogenized and extracted with 1 ml hot methanol (x4) and final pellets extracted with 1 ml DI water (x4). Chlorophyll was extracted from the methanol-water mixture using the ratio methanol-water:ether:water (1:1:1.2). Total chlorophyll in the ether phase was calculated according to Strain and Svec (1966). Radioactivity in the remaining methanol-water phase was determined by adding a 0.1 ml aliquot to 10 ml Aquasol-2 (New England Nuclear) and counted in a Beckman LS-100C scintillation counter (counting efficiency = 72%). Photosynthetic rate was determined as described by Goldman et al. (1974).

SITE MONITORING STUDY—Stands containing *Halodule* and *Syringodium* exhibited similar patterns of development and decline over the study period between April 1977 and May 1978. Vegetative periods, characterized by rhizome extension and rapid seagrass blade elongation, were observed during the spring of 1977 and continued into July. At that point, increased blade necrosis and detachment became evident, reaching a maximum in late August. Blade detachment was more extensive in *Syringodium* than *Halodule*. This period was followed by a second, less extensive, vegetative phase which lasted into late fall and consisted mainly of blade replacement rather than new rhizome formation. During the winter an overall decline in the beds was observed. Uprooting of complete plant systems, in addition to blade detachment, was common during this period. The beds remained thinned until late March 1978, when another vegetative phase was observed, which continued through the remainder of the monitoring study (May 1978). Reexamination of the beds from October 1978, through June 1979, showed the same general trends.

Observations at the *Halophila* stand initially chosen for monitoring (Fig. 1, Site 3) were suspended in October 1977 after noting a rapid decline and subsequent loss of above ground portions of this seagrass during midsummer. Although intact plants were located the following spring, concern over further disruption of the bed precluded resumption of sample collection of this species at this site. However, while this bed was monitored, patterns of physical parameter fluctuation and the spring vegetative phase were similar to those of other seagrasses. A similar decline was noted in another *Halophila* stand at Site 2. No return of this species was seen as of June 1979.

Biotic and abiotic parameters varied extensively. Water depth fluctuations (Fig. 2A) corresponded to the seasonal wet and dry periods observed in the area, and salinity (Fig. 2D) generally varied inversely with water depth. Although water and air temperatures (Fig. 2B) are shown only for Site 2, measurements at all sites were similar and reflected seasonal warming and cooling trends. Temperatures ranged from 13°C (water) and 11°C (air) at mid-day in winter to 32°C (water) and 36°C (air) in the summer. PAR intensities (Fig. 3) and percent PAR transmission (Fig. 2C) at the mean seagrass blade depth generally varied inversely with water depth (Fig. 2A). Periods of increased detrital accumulation and sediment shifts noted during summer and early winter of 1977 were accompanied by decreased PAR intensity and transmission measurements.

Epiphyte coverage (Fig. 4) also varied extensively. Increased seagrass blade necrosis and detachment were observed during periods of highest epiphytic coverage.

INCORPORATION STUDIES—*In vitro* [$^{14}$C] uptake experiments were per-

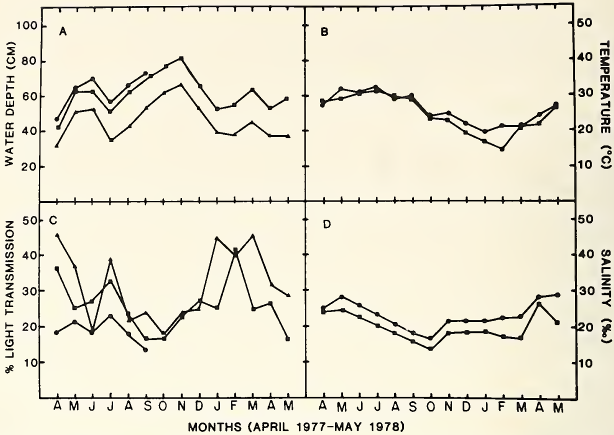


Fig. 2. Abiotic parameters in the system as monthly averages. (A) Water depth, *Halophila* bed (●———●) site #3; *Syringodium* bed (▲———▲) and *Halodule* bed (■———■) Site #2. (B) temperature at site #2 in water (■———■) and air (●———●). (C) Percent light transmission at mean blade depth for *Halophila* (●———●) site #3; *Syringodium* (▲———▲) and *Halodule* (■———■) site #2. (D) Salinity at the *Syringodium* bed (●———●) and *Halodule* bed (■———■) at site #2.

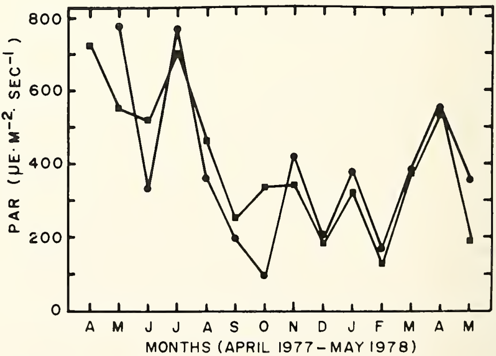


Fig. 3. Average PAR intensities at mean blade depth at site #2: *Syringodium* bed (●———●); *Halodule* bed (■———■).

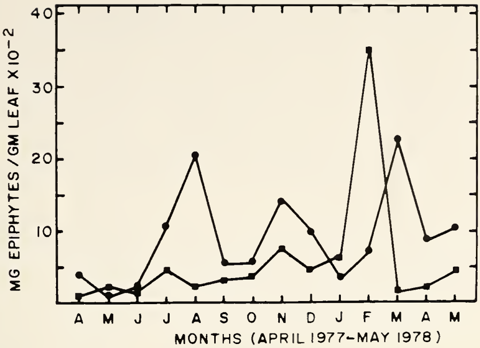


FIG. 4. Epiphytic coverage (dry weight basis) as monthly averages at site #2: *Syringodium* (●———●); *Halodule* (■———■).

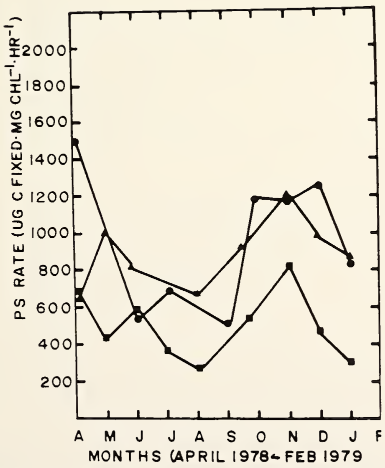


FIG. 5. Photosynthetic rates at 30°C and 700 $\mu E/m^2$-sec as monthly averages: *Halophila* (●———●) site #1; *Halodule* (▲———▲) and *Syringodium* (●———●) site #2.

formed on the seagrasses from April 1978 through January 1979 to determine seasonal patterns in net photosynthetic capacity (Fig. 5). Overall average rates were 935, 905 and 485 $\mu$g C mixed mg Chl-hr for *Halophila*, *Halodule* and *Syringodium*, respectively. Periods associated with decreased photosynthetic rates were times of maximal chlorophyll concentrations in *Halophila* and *Halodule* (Fig. 6). Chlorophyll content in *Syringodium* was relatively unchanged, yet the seasonal pattern of photosynthetic rate was similar to that of the other seagrasses.

Incorporation studies were also performed to determine responses of the seagrasses to increasing PAR intensities (Fig. 7). Results show that near maximal photosynthetic rates are obtained at fairly low PAR intensities (approximately 200 to 300 $\mu E/m^2$-sec at 30°C).

Discussion—Increased vegetative growth in the seagrass beds was associated with moderate water temperatures (between 22° and 30°C), increased PAR intensities at the seagrass blade level, relatively low water depths, periods of decreased detrital accumulation and sediment shifting and low epiphyte coverage.

*In vitro* experiments to determine optimal temperatures for photosynthesis by seagrasses (Krepley, 1978) have shown that photosynthetic rates of *Halodule* and *Syringodium* increase with temperature and are near maximal at approximately 30°C, while rates for *Halophila* increased with temperature to about 36°C (Trocine, 1978). Rates decreased sharply at temperatures in excess of these maxima. Phillips (1960) has described "cold kill" in seagrasses found in Florida waters when temperatures fall below 20°C for an extended time. In this study, water temperatures between these extremes occurred during mid spring and early summer and again in mid fall, which coincides with increased vegetative growth observed in the seagrass beds. During mid summer when temperatures in excess of 30°C were prevalent, photosynthetic capacity and vegetative growth of the beds were decreased. In late fall and through winter, when temperatures averaged less than 22°C, bed thinning was very apparent and *in vitro* photosynthetic capacity declined.

Periods of increased PAR intensities at the seagrass blade level noted during spring and fall, as compared to late summer (Fig. 3), also coincide with photosynthetic rate and vegetative increases during the study. Although PAR intensities measured at the seagrass blade level (Fig. 3) are generally in excess of the amounts required for near maximal photosynthetic rates (Fig. 7), these measured levels are not always available to seagrasses. This is due to several factors including shading of seagrasses by their attached epiphytes, by phytoplankton in the overlying water column, and by adjacent seagrass blades. A study involving epiphyte productivity in eelgrass (*Zostera marina*) beds in North Carolina has shown that increased *in situ* photosynthetic rates of epiphytes, as compared to the blades to which they are attached, are due partially to shading by epiphytes (Penhale, 1977). In addition to shading, the quality of light actually reaching the seagrass blades may change due to

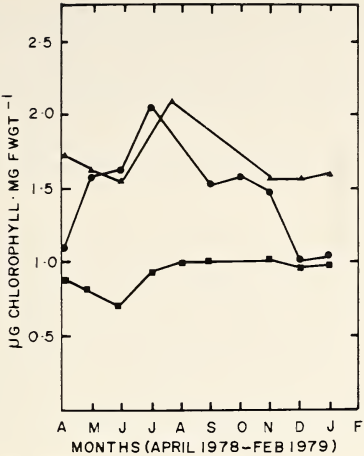


FIG. 6. Seagrass chlorophyll content (fresh weight basis) as monthly averages: *Halodule* (▲———▲) and *Syringodium* (■———■), site #2; *Halophila* (●———●), site #1.

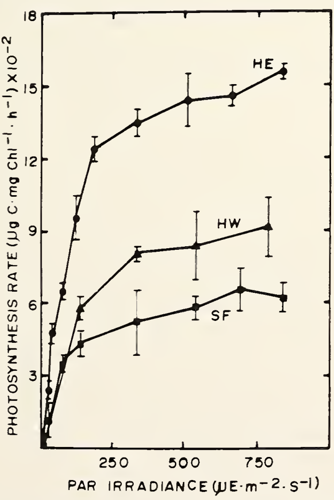


FIG. 7. Photosynthetic rate as a function of PAR intensity at 30°C: *Halophila* (●———●), *Halodule* (▲———▲), and *Syringodium* (■———■) all from site #3. Vertical lines, standard deviation; closed points, mean of 3 replicates.

selective absorption of certain wavelengths by different species of epiphytes and phytoplankton. (Russell-Hunter, 1970). Other factors affecting PAR fluctuations include increased light scattering with water depth and sediment resuspension. During summer, increasing water levels were accompanied by decreasing PAR intensities and percent light transmission (Fig. 2C) at the various sites. Sediment resuspension appears to occur throughout the year in this system: however, increased bottom disturbance, as observed during winter storms, probably contributes to the fluctuations of PAR intensities during this time of year.

Conversely, rapid sediment settling may increase PAR intensities in the water column while covering seagrass blades, thus physically restricting PAR penetration. This phenomenon appears to be more important in seagrasses with low profiles in relation to the substratum. At 2 sites, during July and August of 1977, above ground portions of *Halophila* were completely covered by sediment deposition. At site #2 sediment deposition was coincident with the building of the high rise bridge on the Melbourne causeway. Stands of *Halodule* and *Syringodium*, both with more upright profiles, appeared to be little affected by this occurrence.

Epiphyte coverage was highly variable throughout the study (Fig. 4). In addition to shading, indications are that epiphytes are in part, responsible for the extent of blade detachment in seagrass beds. Heavily epiphytic blades became necrotic and detached more readily than those with few or no epiphytes. During summer and fall of 1977 the more extensive blade detachment of *Syringodium*, which exhibited greater epiphytic densities opposed to *Halodule*, supports this observation. Although studies have shown epiphytes to be an effective shield against ultraviolet radiation (Trocine et al., 1981), the associated physical damage incurred by the attachment of epiphytes would seem to outweigh such benefits.

Seasonal trends in photosynthetic rate (Fig. 5) generally followed the observed trends of seagrass vegetative growth. Increased photosynthetic rates during spring, in conjunction with increased rhizome extension, shoot formation and blade elongation, indicate that much of the photosynthate produced is utilized for structural development of the beds.

Overall photosynthetic rates were highest in fall. However, structural development of seagrasses was reduced and primarily limited to replacement of blades lost during summer. Dawes and Lawrence (1980) have demonstrated that soluble carbohydrate levels in seagrass rhizomes increase dramatically in the fall and then gradually decline over winter. Thus, it would appear that photosynthetic products formed during the fall are primarily stored, to be utilized during times of low productivity rather than for immediate structural development.

Conclusion—The data obtained in this study show seagrass communities to be responsive to a variety of interrelated environmental parameters. Parameters such as temperature, light intensity and epiphyte cover may vary seasonally, while others such as sediment deposition and resuspension fluctuate continually in response to changing weather patterns and use of the system as part of the Florida east-coast inland waterway.

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## LITERATURE CITED

BASSHAM, J. A., M. CALVIN. 1957. The Path of Carbon in Photosynthesis. Prentice-Hall, Englewood Cliffs, New Jersey.

DAWES, C. J., AND J. M. LAWRENCE. 1980. Seasonal changes in the proximate constituents of the seagrasses *Thalassia testudinum*, *Halodule wrightii*, and *Syringodium filiforme*. Aquat. Bot. 8:371-380.

DREW, E. A. 1978. Factors affecting photosynthesis and its seasonal variation in the seagrasses *Cymodocea nodosa* (Ucria) Aschers, and *Posidonia oceanica* (L.) Delile in the Mediterranean. J. Exp. Mar. Biol. Ecol. 31:173-194.

__________. 1979. Physiological aspects of primary production in seagrasses. Aquat. Bot. 7:139-150.

GILBERT, S. S. 1976. Seasonal variations in standing crop of benthic vegetation in the northern Indian River. M.S. thesis, Florida Inst. of Tech., Melbourne, Florida.

__________, AND K. B. CLARK. 1981. Seasonal variation in standing crop of the seagrass *Syringodium filiforme* and associated macrophytes in the northern Indian River, Florida. Estuaries. 4:223-225.

GOLDMAN, C. R., E. STEEMANN NIELSEN, R. A. VOLLENWEIDER, AND R. G. WETZEL. 1974. Measurements *(in situ)* on isolated samples of natural communities. The $^{14}C$ light and dark bottle techniques. Pp. 88-91. *In*: R. A. Vollenweider (ed.). IPB Handbook No. 12. A Manual on Methods for Measuring Primary Production in Aquatic Environments. 2nd edition. Blackwell Scientific Publishers, Oxford.

KREPLEY, B. K. 1978. Some photosynthetic characteristics of *Halodule wrightii* Aschers and *Syringodium filiforme* Kutz. M.S. thesis, Florida Inst. of Tech., Melbourne, Florida.

MCMILLAN, C., AND F. N. MOSELEY. 1967. Salinity tolerances of five marine spermatophytes of Redfish Bay, Texas. Ecology 48:503-506.

MCROY, C. P. 1974. Seagrass productivity: carbon uptake experiments in eelgrass, *Zostera marina*. Aquaculture. 4:131-137.

__________, AND C. MCMILLAN. 1977. Production ecology and physiology of seagrasses. Pp. 53-87. *In*: McRoy, C. P. and C. Helfferich (eds.). Seagrass Ecosystems, a Scientific Perspective. Marcel Dekker, New York.

MUKAI, H., K. AIOI, I. KOIKE, H. OHTSU, AND A. HATTORI. 1979. Growth and organic production of eelgrass (*Zostera marina* L.) in temperate waters of the Pacific coast of Japan. I. Growth analysis in spring-summer. Aquat. Bot. 7:47-56.

PENHALE, P. 1977. Macrophyte-epiphyte biomass and productivity in an eelgrass (*Zostera marina* L.) community. J. Exp. Mar. Biol. Ecol. 26:211-224.

PHILLIPS, R. C. 1960. Observations on the ecology and distribution of the Florida seagrasses. Prof. Pap. Ser. No. 2 Fla. St. Bd. Conserv. Mar. Lab. St. Petersburg, Florida.

RUSSELL-HUNTER, W. D. 1970. Aquatic Productivity. Macmillan Publ. Co., New York.

SCHNEIDER, W. K., P. W. DUBBLEDAY, AND T. A. NEVIN. 1974. Measurement of wind driven currents in a lagoon. Florida Sci. 37:72-77.

STRAIN, H., AND W. A. SVEC. 1966. Extraction, separation, estimation, and isolation of the chlorophylls. Pp. 21-66. *In*: L. P. Vernon, Sneely, G. R. (eds.). The Chlorophylls. Academic Press, New York.

STRICKLAND, J. D., AND T. R. PARSONS. 1972. A Practical Handbook of Seawater Analysis. Queens Printer, Ottawa.

THOMAS, J. R. 1974. Benthic species diversity and environmental stability in the northern Indian River, Florida. M.S. thesis, Florida Inst. of Tech., Melbourne, Florida.

THOMPSON, M. 1978. Species composition and distribution of seagrass beds in the Indian River Lagoon, Florida. Fla. Sci. 41:90-96.

Trocine, R. P. 1978. Effects of ultraviolet-B radiation on the photosynthesis of seagrasses. M.S. thesis, Florida Inst. of Tech., Melbourne, Florida.

__________, J. D. Rice, and G. N. Wells. 1981. Inhibition of seagrass photosynthesis by ultraviolet-B radiation. Plant Physiol. 68:74-81.

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# TOXIC SUBSTANCE MONITORING IN THE INDIAN RIVER LAGOON, FLORIDA

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Abstract: *Investigation of chlorinated pesticides and polychlorinated biphenyls (PCBs) in samples of water and sediment were made near sewage and power plant outfalls, freshwater tributaries, and agricultural runoff canals located along the Indian River between Vero Beach and St. Lucie Inlet. Chlorinated pesticide residues and PCB were not detected in surface water samples. Concentrations of several compounds such as DDT and PCB (Aroclor 1254) were low in sediment samples (< 0.1 ppm), although they were detected at least once in most samples. The persistence of malathion and parathion decreased with increasing pH and salinity. When temp was above 26°C and salinity above 20 ppt, hydrolysis was the predominant pathway of degradation of malathion and biological interaction was the most significant pathway of degradation for parathion. Industrial chemicals such as trichloroethylene and other volatile organic compounds are currently being monitored in the Main Relief Canal and Indian River at Vero Beach. Background levels of trichloroethylene were low in both water and sediment samples (< 0.1 ppb and ≅ 0.5 ppb, respectively).*

Polychlorinated biphenyls and Σ DDT are ubiquitous environmental contaminants. Reports of widespread distribution of organochlorine pesticide residues in the global ecosystem are increasing (Risebrough et al., 1968; Jensen et al., 1969; Holden, 1970; Risebrough, 1972; Korte, 1976). Occurrence of organochlorines in the Indian River was investigated between Vero Beach, Indian River County, and St. Lucie Estuary, Martin County in 1977 and 1978. The Indian River is a lagoonal estuary situated along the east central coast of Florida, and extends 190 km from Titusville (Brevard County) in the north, to St. Lucie Inlet (Martin County) in the south. Figure 1 indicates approximate locations of sampling stations which were chosen between Vero Beach and Fort Pierce on the basis of proximity to major tributaries, sewage plant outfalls, or municipal areas. Surface water and sediment samples were collected and analyzed. The analytical schemes (Wang et al., 1980) for both water and sediment samples are shown in Fig. 2 and Fig. 3, respectively. Table 1 illustrates the amount of PCB and Σ DDT