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Monitoring of Seagrasses in Lake Illawarra, NSW

**A thesis submitted in partial fulfillment of
the requirements for the award of the degree of**

**MASTER OF ENVIRONMENTAL SCIENCE
(RESEARCH)**

from

UNIVERSITY OF WOLLONGONG

by

NICHANAN TADKAEW

**SCHOOL OF EARTH AND ENVIRONMENTAL
SCIENCES**

2007

CERTIFICATION

I, Nichanan Tadkaew, declare that this thesis, submitted in partial fulfillment of the requirements for the award of Master of Environmental Science, in School of Earth and Environmental Sciences, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Nichanan Tadkaew

8 January 2007

ABSTRACT

This research investigated the natural variability in leaf, shoot and meadow characteristics of *Zostera capricorni* in a coastal lagoon in SE Australia. The primary objective was to determine a set of parameters which may be indicative of the health of the major seagrass beds and which could be adopted in any long-term monitoring program. The study site was Lake Illawarra, a micro-tidal coastal lagoon located approximately 80 km south of Sydney (Australia), which contains approximately 5 km² of seagrass beds.

A pilot study investigated the optimum quadrat size and sample size for measuring seagrass characteristics, given the natural variability of seagrasses in the Lake. It was found that 20 quadrats of 0.25 m² could detect a change in seagrass percent cover of about 40% or more. The main study was carried out during winter and spring (2005) at three locations containing extensive seagrass beds, namely: Windang Peninsula; Bevans Island; and, Haywards Bay. At each location, sites were chosen at two depths, shallow (~ 1 m depth) and deep (~ 2m depth). Leaf, shoot and meadow parameters were assessed at each depth and location for each season. The measurements were designed to minimize damage to the seagrass beds. Leaf parameters assessed were number of leaves per shoot, maximum leaf length, leaf area per shoot, leaf mass, epiphyte mass and ratio of epiphyte to leaf mass. Percent cover was the major shoot parameter measured. Meadow condition was investigated by a relatively new technique involving small-scale strip mapping.

Results indicated that maximum leaf length, leaf area, leaf mass, epiphyte mass and ratio of epiphyte to leaf mass displayed consistent patterns with significant differences between seasons and depths. Percent cover exhibited no consistent pattern between depths and seasons. The small-scale strip maps revealed differences in the degree and type of fragmentation of seagrass meadows between different sites. Overall, these studies suggested that leaf characteristics such as maximum leaf length, leaf area, epiphyte mass and ratio of epiphyte to leaf mass would be useful as

indicators of the relative health of seagrass beds in Lake Illawarra. The small-scale mapping, which detected patterns in bed fragmentation, appeared to be an excellent early warning indicator of disturbance. As a result of this research, a protocol has been suggested for monitoring the seagrass meadows in Lake Illawarra.

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