

**APPLICATION FOR POLLUTION RECOVERY FUND ASSISTANCE**

**DATE OF APPLICATION:** June 24, 2005

**A. BASIC ASSISTANCE**

1. Applicant: The legal name of the applicant/organization, the organizational unit and the complete mailing address of the applicant.

Name: Clinton J. Dawes and J. Nicholas Ehringer  
Organization: University of South Florida and Hillsborough Community College  
Address: Department of Biology, University of South Florida, Tampa FL 33620

2. Project Manager Information: Give name and title of the representative of the applicant who will be the Environmental Protection Commission's principle contact concerning this application

Name Clinton J. Dawes  
Title Distinguished University Professor  
Address Department of Biology, University of South Florida, Tampa, FL 33620  
Phone Number 813-974-2060  
Project Title Use of an Experimental Land-Based Seagrass Nursery  
Project Time Start: 04/01/06 End: 03/31/08  
Total Cost of Project \$ \$80,000  
Total EPC share requested \$ \$38,000

3. Assistance Type: **New or Renewal** (check one)

New - Award of funds for initial request within the project period.

**Renewal** - Award of funds for a project beyond the current project period.

4. Project Location: The specific location(s) of the project. (Attach Site Map)

Seagrass nursery at Cockroach Bay Aquatic Preserve headquarters, 3709 Gulf City Rd, Ruskin FL. 33570 (Figure 1; map of site).

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5. Is the Project for:

Restoration of a polluted area

**Mitigation of the effects of pollution (Development of a seagrass nursery)**

Pollution Control Activity to prevent or minimize pollution

Educational

6. Is the Project directed toward restoring an identified "polluted area" (a geographic area destroyed or altered by dredging or filling or contaminated by an emission or discharge), or toward terminating an identified pollution source? Identify and explain:

No

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7. Is the harm or potential harm to health, safety or welfare of the public or wildlife actual or potential? Does the project seek to alleviate actual or potential harm and what is the severity of the harm and the causal relationship between the "pollution" and the harm? Identify and explain:

A successful land-based seagrass nursery will supply transplant material to damaged beds (e.g. from propellers) without impacting natural beds.

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The seagrass nursery will also be used to demonstrate restoration techniques to HCC and USF students involved in environmental protection studies.

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8. How long has the pollution existed or how long before any harm will be evident?

N/A to this proposal

9. Identify and describe how the project proposes to alleviate the pollution (addressing technical, practical, and cost effectiveness issues):

N/A to this proposal

10. Is the polluted area one which has previously been subject to commission enforcement and, if so, when and what was the result?

N/A to this proposal

11. If no actual pollution exists and no prior commission enforcement action has occurred, does the project otherwise enhance pollution control activities within the County?

Yes, A land-based seagrass nursery will avoid the problem of damaging donor beds for transplant material, permit the restoration of seagrass beds damaged by propellers and boat hulls, and serve as a source for establishment of new beds in Tampa Bay and a model for students involved in restoration.

12. Can this Project be divided into separate and independent parts, and if so,

a) what are they? All three restoration objectives of the nursery are connected.

b) how would the costs be allocated between them? \_\_\_\_\_

c) would the applicant be willing to accept only partial funding? Yes

13. Are other funding sources committed to the project? Yes

How much and for what? \$24,000 from P.I.'s efforts to run the project.  
\$20,000 from In-Kind support funds from the  
Cockroach Bay Aquatic Preserve facility.

14. What other funding sources may be available and how much? None

Tampa Bay Estuary Program donated \$700 and HCC gave \$400 for sea salt in May 2005.

15. Why do you believe that this Project is of sufficient importance to justify the expenditure of Pollution Recovery Funds? \_\_\_\_\_

This is the only land-based seagrass nursery that is available to supply transplants for restoration of damaged seagrass beds. The study would establish protocols for growing and transplanting plus allow induction of seed production under controlled conditions.

16. Will the project enhance the value of private property, and if so, whose? No

### BUDGET CATEGORIES

	PRF Funds	Federal	Applicant	State	Other
<b>a. Personnel</b>					
<b>1. USF Students</b>	20,000	---	---	---	---
<b>2. HCC Students</b>	5,000	---	---	---	---
<b>b. Administrative</b>	---	---	24,000	---	---
<b>c. Materials</b>	13,000	---	---	---	---
<b>d. Contractual</b>	---	---	---	---	5,000
<b>e. Construction</b>	---	---	---	---	15,000
<b>f. Other</b>	---	---	---	---	--
<b>g. Total Direct Charges (Sum of a. to f.)</b>	\$38,000	---	24,000 (donated time over 2 year study by P.I.'s)	---	20,000*

\*Other: Cockroach Bay Aquatic Preserve: \$5,000 for electrical and water supply, land use, help in maintaining facility; \$5,000 for development of basin. Hillsborough EPC: \$10,000 for establishment of nursery in 2003 grant.

## 2. Vitae: Principal Investigator Abbreviated Biographical Sketches

Clinton J. Dawes

### Degrees:

B.S. (1957) Univ. Minn.; M.A. (1958) U.C.L.A.; Ph.D. (1961) U.C.L.A.

### Professional Experience:

2nd Lt. U.S. Army (Artillery), 1961-1963, retired Capt. USAR., 1965.

National Science Postdoctoral Fellowship, 1963-64.

Assistant Professor, 1964-68, Dept. of Botany and Bacteriology, USF.

Associate Professor, 1968-72, Dept. of Biology, USF.

Assistant Chairman, 1973-74, Dept. of Biology, USF.

Professor, 1972-2003, Dept. of Biology, USF.

Graduate Coordinator, 1984-1985, Dept. of Biology, USF.

Chairman, Department of Biology

University Distinguished Research Professor, 1991-

### Honors:

AEC Eniwetok Summer Fellowship (1969)

American Microscopical Soc. (V. P. 1981-83; President elect 1986, P. 1987)

Brookhaven National Laboratory, Research Collaborator (1970)

Florida Society for Electron Microscopy (President 1986-87); Fellow (2001)

Fulbright Lecture/Research Fellowship, Univ. College Galway (1989-90)

International Seaweed Symposium (Brest France; 1993). Outstanding paper (#105)

National Science Foundation Fellowships (Predoctoral, 1959-61; Postdoctoral, 1963-64)

Phycological Society of America (Symposium Chair, Tulane, 1976; Co-chair Bold Award Committee, UCSB, 1977; Board of Trustees, 1984-85; Vice President, 1978;

President, 1979; Board of Trustees, 1984-88)

Society of Sigma Xi (Member, UCLA Chapter, 1961; President, USF Chapter, 1971-72;

1993-94; Outstanding Faculty Research Award, USF Chapter, 1975; National Chapter

Lecturer, Southeastern US, 3 terms, 1979-86)

University of South Florida (Distinguished University Teacher, 1980; Distinguished

University Scholar, 1985; University Teaching Incentive Award, 1995; Professional

Excellence Professorship Award, 1997)

Visiting Lecturer (Tutorial on Electron Microscopy, Univ. Chicago, 1973, 1974; Armed

Forces Institute of Pathology, Washington D. C., 1973; Mar. Sci. Inst., Univ. Philippines,

Manila, 1990.

### Editorial Duties:

American Journal of Botany (Editorial Board, 1983-85)

American Journal of Phycology (Elected, Editorial Board, 1977-79; 1984-86)

Transactions of the American Microscopical Society (Assoc. Ed., 1990-94)

Journal of Coastal Research (Editorial Board, 1983-87; 1996-2001; Assoc. Ed., 1987-96)

Journal of Applied Phycology (Editorial Board, 1987-2004)

Journal of Experimental Marine Biology and Ecology (Editorial Board, 1987-94)

### Grant Awards: (as Principal Investigator)

Binational Agricultural Research Development (BARD), (1988-91; 1995-98)

Gas Research Institute: (1982-86)

Hillsborough County EPC: (1993-96; 1997-99; 2000-2002; 2003-2005)

NSF: (1965-67; 1969-70; 1970-71; 1974-75; 1978-79; 1992-93; 1993-94; 1996-99; 2002)

NOAA, Estuarine Habitat Program: (1993-97)  
 Sea Grants: (1971-73; 1974-76; 1993-94; 2001-03)  
 U.S. Geological Survey (2002-2003)  
 Southwest Florida Water Management District: (1999-2002; 2003-2005)  
 State of Florida Dept. Environmental Protection: (1980-84; 1987-90; 1991-92)  
 U.S. Agency for International Development: (1989-93)

### **Selected Publications**

- Dawes, C.J. 1974. Marine Algae of the West Coast of Florida. Univ. Miami Press. 201 pp.
- \_\_\_\_\_. and J.M. Lawrence. 1980. Seasonal changes in the proximate constituents of the seagrasses *Thalassia testudinum*, *Halodule wrightii*, and *Syringodium filiforme*. Aq. Bot. 8: 371-380.
- \_\_\_\_\_. 1988. Introduction to Light and Electron Microscopy: Theory and Techniques. Ladd Publ. Burlington Vt. 315 pp.
- \_\_\_\_\_. 1994. Physiological differentiation of the red seaweed *Gracilaria tikvahiae* from a mangal estuary, exposed coast, and culture. Bull. Mar. Sci. 54: 361-366.
- Witz, M.J.A. and C.J. Dawes. 1995. Flowering and short shoot age in three *Thalassia testudinum* meadows off west-central Florida. Bot. Mar. 38: 431-436.
- \_\_\_\_\_. 1996. Macroalgal diversity, standing stock and productivity in a northern mangal on the west coast of Florida. Nova Hedwigia 112: 525-535.
- Hoffman, B.A. and C.J. Dawes. 1997. Vegetational and abiotic analysis of the salterns of mangals and salt marshes of the west coast of Florida. J. Coastal Res. 13: 147-154.
- \_\_\_\_\_. Andorfer, J., Rose, C., Uranowski, C. and N. Ehringer. 1997. Regrowth of the seagrass *Thalassia testudinum* into propeller scars. Aquat. Bot. 59: 139-155.
- \_\_\_\_\_. 1998. Marine Botany. 2nd Edition. John Wiley and Sons, New York. 480 pp.
- \_\_\_\_\_. Siar, K. and Marlett. 1999. Mangrove structure, litter and macroalgal productivity in a northern forest of Florida. Mangroves and Salt Marshes 3: 259-267.
- \_\_\_\_\_. Orduña-Rojas, J., and Robledo, D. 1999. Response of the tropical red seaweed *Gracilaria cornea* to temperature, salinity, and irradiance. J. Appl. Phycol. 10: 419-425.
- \_\_\_\_\_. Teasdale, B.W. and Friedlander, M. 2000. Cell wall structure of the agarophytes *Gracilaria tikvahiae* and *G. cornea* (Rhodophyta) and penetration by the epiphyte *Ulva lactuca* (Chlorophyta). J. Appl. Phycol. 12: 567-575.
- \_\_\_\_\_. and Andorfer J. 2002. Production of rhizome meristems by *Thalassia testudinum*. pp. 185-198. In: H.S. Greening (ed.) Seagrass Management: It's Not Just Nutrients. 2000 Aug. 22-24. St. Petersburg, Fl. Tampa Bay Estuarine Program.
- Andorfer, J. and Dawes, C. 2002. Production of rhizome meristems by *Thalassia testudinum*. The basis for slow recovery into propeller cuts. J. Coastal Res. SI 37: 130-142.
- Dawes, C.J., Phillips, R.C. and Morrison, G. 2004. Seagrass Communities of the Gulf Coast of Florida: Status and Ecology. Florida Fish and Wildlife Conservation Commission Fish and Wildlife Research Institute and the Tampa Bay Estuary Program. St. Petersburg. iv + 74 pp.

## 2. Vitae: Principal Investigator J. Nicholas Ehringer

**Office:** Hillsborough Community College/ Brandon Campus  
10414 E. Columbus Dr.  
Tampa, FL 33619  
Phone: (813) 253-7833  
E-Mail: [nehringer@hccfl.edu](mailto:nehringer@hccfl.edu)

### Education:

<u>Institution</u>	<u>Field of Study</u>	<u>Degree</u>	<u>Date</u>
Jacksonville University	Biology	B.A.	1968.
Florida Atlantic University	Biology / Education	M.Ed.	1974.
Florida Atlantic University	Biology / Education	Ph.D	1979.

### Awards:

- "Exotic Plant Removal Project of the Year - 1995" presented by the West Coast Association of Environmental Professionals.
- Who's Who among America's Teachers in 1996 and 1998.
- Appointed "arbitrator" by Hillsborough County in February 2000 to settle ecological disputes with water withdrawal projects.
- Beta Beta Beta National Honorary Biological Society

### Publications / articles:

- "Tampa Bay: A Recovering Estuary" in Environmental Sciences, by: Chiras. Benjamin Cummings Publ. 1991.
- An Ecological Vegetation Study in the Cockroach Creek Area of Hillsborough County, Florida." The Institute of Florida Studies Occasional Papers: Number 2, 1990.
- "Assessment of 'Live Rock' Harvesting in Tampa Bay. Published by Sea Grant in 1992 and also by the Institute of Florida Studies as Occasional Papers #3: 1993.
- Published a brochure on Live Rock with the Florida Sea Grant program in the fall of 1993.
- Re-growth of the seagrass *Thalassia testudinum* into propeller scars. Aquatic Botany 59(1997) 139-155. Joint article with Clinton J. Dawes et al.
- "Protecting Seagrasses in Tampa Bay" in Proceedings of the Twenty Fourth Annual Conference on Ecosystems and Restoration. Hillsborough Community College, Tampa, Florida 1998. Co-authored with James Wysong and Clinton Dawes.
- "New and Innovative Techniques for Seagrass Restoration" in Proceedings on the Twenty sixth Annual Conference on Ecosystems Restoration and Creation, Hillsborough Community College, Tampa, Florida 1999.

### Publications: books and manuals

- "Ecology Laboratory Manual" for Hillsborough Community College.
- "Biological Sciences II Laboratory Manual" for Hillsborough Community College.
- "Biology/Ecology Laboratory Manual": Burgess Publishing Company. 1996.
- "Anatomy and Physiology laboratory Manual": Burgess Publication Company. 1997

- “Biology/Ecology Laboratory Manual”: 2<sup>nd</sup> edition. Burgess Publishing Company. 1998.
- “Alafia River Laboratory Manual”: published by HCC in 1996.
- Book: “Ecology of Tampa Bay: A Users Guide”: EMC Paradigm Publishers, May 1999.
- Book: “Internet Exercises for Biology and Ecology”: EMC Paradigm Publishers, August 1999.
- “Biology Laboratory Manual” published by CE Publishing, January, 2000.
- “Biology Laboratory Manual” published by Starfish Publishing Company, June, 2000.
- “Anatomy and Physiology Laboratory Manual” published by Starfish Publishing Company, June. 2000.
- Book/CD: “Environmental Science – Florida” published by Starfish Publishing Company, June 2000.

### Grants and Contracts:

- Abbott Laboratories from Chicago awarded 4 straight years of grants to study the effects of Bacillus thuringiensis and Bacillus sphericus on mosquito larvae in the state of Florida. The bacteria were known to kill mosquito larvae, exactly which species and in which types of environments was unknown prior to the study.
- Grant from Tampa Electric Company to perform an ecological survey of the plants in the Cockroach Creek area of Hillsborough County, Florida.
- Grant from the State of Florida HRS, Entomology Services to make four educational videos on the procedures for identification of mosquitoes, adult and larvae, in Florida.
- Sea Grant project: Assessment of "Live Rock" harvesting in Tampa Bay. Project was completed in July of 1991.
- Grant from student government at Hillsborough Community College to make a museum exhibit on the fresh water fish of Florida, identification and osteology. Finished in the winter of 1993.
- Grant from Tampa Electric Company to identify and remove exotic plants from the Cockroach Creek property, summer of 1992 and also in 1993.
- Grant from the Hillsborough County Environmental Protection Commission to study the effects of propeller scars on seagrasses in Cockroach Bay Florida. The grant is a joint grant with Clinton Dawes from U.S.F. and myself for a two year period. Amount: \$113,000. Extended to June of 1995 for further research.
- Florida Sea grant award to publish a brochure on Live Rock harvesting and techniques in the state of Florida. Published in the fall of 1993.
- Grant from the Department of Environmental Management of Pinellas County to monitor, map and study the seagrasses in the Fort Desoto Management area. This grant was awarded in October of 1993 and is valued at \$52,000.
- Project awarded from Pollution Recovery Funds in Hillsborough County to kill and remove exotic plants from the ELAPP site at Cockroach Bay. Trash was also removed as a part of the grant. Value: \$99,300 Dates: June 1994 to October of 1995. Over 85 acres of Brazilian Pepper trees and Australian Pine trees were killed and removed.
- Cooperative funding grant from the Southwest Florida Water Management District to make an educational video and laboratory workbook concerning the Alafia River. Value: \$33,270. Dates: November 1995 to August 1996.
- Continuing grant from the Pinellas County Department of Environmental Management to map and study the seagrasses at Fort Desoto Aquatic Management Preserve. This grant was renewed in 1994, 1995, 1996, 1997, 1998, 1999 and in 2000 to gather data on the status of seagrasses in the preserve.
- Writing grant from the University of South Florida to write a curriculum on using a pond as a method to teach ecosystem ecology. The project included a lab manual and field exercises.
- Grant from the Florida Department of Transportation (FDOT) to evaluate the effectiveness of

the Hydrogeomorphic Wetlands Classification System. This grant was awarded in the fall of 1996 and is a three-year grant valued at \$269,000.

- A three-year grant from Pollution Recovery Funds of Hillsborough County valued at \$67,000 to work with USF on a study of seagrasses at Cockroach Bay. This grant will evaluate the recovery status of seagrasses, take aerial photography of the site, and will continue seagrass growth experiments.
- A seagrass mitigation grant from Pinellas County to move one third of an acre of seagrasses from Fred Howard Park to Fort Desoto and to conduct seagrass re-growth experiments at Fort Desoto. This grant is valued at \$71,400 and has a three-year monitoring aspect. The project will begin in April of 1997 and concluded in August of 1999. The transplanting project met successful criteria.
- Audubon Society grant to study seagrass re-growth techniques at Lignum Vitae preserve in the Florida Keys, April 1998 to October 1999.
- National Science Foundation (NSF) Grant: An Interdisciplinary Live Rock Project: 1998 to 2001. Value: \$295,806. Concept: to study live rock growth on four types of rock in four locations in the Gulf of Mexico and the Florida Keys to compare growth patterns.
- USDA grant to write a curriculum on Aquaculture. 1999.
- Hillsborough County Pollution Recovery Funds to study restoration of seagrasses in Tampa Bay. Grant period from 2000 to 2002. Value = \$25,606. A joint grant with the University of South Florida.
- Hillsborough County Pollution Recovery Funds to restore of seagrasses and *Paspalum* on the Alafia River. Grant period from 2001 to 2002. Value = \$25,000.
- Received joint research grant for seagrass experiments from Pinellas County as a joint effort with Clinton Dawes at the University of South Florida – 2001 and 2002.
- NOAA Coastal Partnership grant in 2001/2002. The project is a joint project with Tampa Electric Company to restore *paspalum* and seagrasses in a portion of Tampa Bay near the Big Bend facility. Value = \$35,000.

### **Certification:**

- Certified Ecologist with the Ecological Society of America.

### **Occupation:**

Full-time tenured professor of biological and ecological sciences at Hillsborough Community College, Tampa, Florida (Brandon Campus). Primary teaching duties include the teaching of General Biology I and II, ecology, environmental science, anatomy, marine biology and the corresponding laboratories.

President: Tampa Bay Education and Research Foundation – a non-profit organization.

### 3. Project Narrative: Use of an Experimental Land-Based Seagrass Nursery.

**3A Introduction:** The proposal focuses on testing production methods of the dominant seagrass in Florida waters, *Thalassia testudinum* Banks and Solander *ex* König (turtle grass) in a land-based nursery at the Hillsborough County Cockroach Bay Aquatic Preserve Headquarters.

Declines of coastal seagrass meadows are evident throughout the world and have been linked to natural and human-induced disturbances (Short and Wyllie-Escheveria, 1996). Seagrass losses have been most severe in estuaries and coastal communities of Florida where beds are most abundant. Studies in Florida have involved Tampa Bay (Johansson, 1991), Indian River, and Florida Bay (Roblee *et al.*, 1991; Durako, 1994). Livingston (1984) reviewed the status of seagrass beds along Florida coasts and reported a decline in 7 of 12 bay systems studied. Tampa Bay, with 1,036 km<sup>2</sup> of surface water, may have supported 30,970 ha of seagrass meadows in 1870 (Johansson, 1991); however, by 1982, there were only 8,763 ha of seagrass beds remaining.

The slow recovery and the probability of continued impacts on *Thalassia testudinum* beds, both direct (e.g. propeller cuts) and indirect (e.g. pollution, decline in water transparency), could be reduced by a source of replacement plants from a land-based nursery. A land-based seagrass nursery will permit us to (1) control light and temperature so that rhizome growth is enhanced in the winter; (2) use seagrass seeds instead of damaged planting units; (3) induce rhizome meristem production with hormones and nutrients; and (4) induce flowering and seed set that is not completed in Tampa Bay (Witz and Dawes, 1994). Presently, the only source for turtle grass transplants is by damaging existing beds. Unfortunately, transplants from these beds have a survival rate around 30%, for single short-shoots (Tomasko *et al.*, 1991). Further, growth studies have shown rhizomes do not proliferate after being damaged (Tomlinson, 1974; Dawes *et al.*, 1997; Dawes and Andorfer, 2002). In addition to *T. testudinum*, *Halodule wrightii* Ascherson (shoal grass) will also be grown in the nursery because of its rapid proliferation and growth (Fonseca *et al.* 1998) and ability to stabilize the substrate and enable *T. testudinum* to spread into the area (Fonseca *et al.*, 1998).

**3B Objectives:** The use of a land-based seagrass nursery would avoid problems in the field including permitting, lack of control of physical factors (temperature, salinity, current), and damage to field beds by boats, fisherman waders, plus rays. Based on our previous studies with field populations of *T. testudinum* and *H. wrightii* we propose to utilize a new land-based seagrass nursery with the primary P.I noted to test these objectives:

1. Year-around growth of *T. testudinum* and *H. wrightii* collected from various sites in Tampa Bay and grown in the land-based nursery will be measured (USF).
2. Growth enhancement will be tested against controls using injected nutrients and plant growth regulators (HCC).
3. Techniques will be developed for transplanting seagrass units (e.g. sod) from the nursery into damaged beds in Tampa Bay and their survival will be followed (USF).

**3C Project Location, Nursery Description, and Permits:** A land-based seagrass nursery was completed in May 2005 at 27° 41.364' N 82° 30.934' W (Figure 1; map of site). The site is on the grounds of the Cockroach Bay Preserve (3709 Gulf City Road, Ruskin FL 33570-2647; Phone: 813-671-7754) that is being restored for fresh and

salt water communities. The nursery building consists of aluminum poles with a transparent black fiberglass roof and roll up white fiberglass side screens (Fig. 2a).

The seagrass nursery basin is 40' long by 20' wide by 2.5' deep (12.52 x 6.26 x 0.78 m) and has a plastic liner (Fig. 2b). The liner is covered with a 8-12 cm thick layer of cement sand (Fig. 2c) and filled with well water. A salinity of 30 ppt was established using sea salt (Crystal Sea Maritime Mix). Two sump pumps are used to circulate the water and water heaters are available for the winter (Fig. 2d).

We have permits from the Department of Environmental Protection (Permit #2073) for collection of seagrasses from sovereign submerged lands of Hillsborough, Pinellas, and Manatee counties, a permission from the Preserve Manager, Richard Sullivan to collect and study seagrasses in Cockroach Bay (Letter of July 16, 2002), and permission to collect and plant within the boundaries of Pinellas County Aquatic Preserve (E-mail of February 14, 2003).

#### 4. Scope and Schedule of Work

**4A Scope of Work:** Objective 1. Double short shoot units of *T. testudinum* and plugs of *H. wrightii* (20-30 each) will be collected from at least 6 sites around Tampa Bay in order to compare growth rates in the nursery. All sediment will be removed from the units and plugs by carefully rinsing in seawater and then attached to PVC "growth racks" that have been used successfully in the field. Growth will be measured by blade and short shoot production during the first year and rhizome growth will be measured at the end of the year by removal of the entire rack.

Objective 2. Growth enhancement under controlled conditions using injections of precise mixtures of cytokinins, gibberellins, liquid urea and phosphorous will be tested. The solutions will be injected into the sand next to the roots and rhizomes in a plot of 20-30 double short shoots of *T. testudinum* and plugs of *H. wrightii*. The planting units will be taken from Cockroach Bay. The amount of nutrients used will be limited to avoid nitrification of the nursery water. Blade growth and short shoot production will be compared with similar control plots and all plots will consist of cleaned planting units.

Objective 3. Substrates will be tested for transplantation of "sod-like units" of *T. testudinum* and *H. wrightii*. Various substrates (e.g. coconut fiber blankets, sphagnum peat/wood pulp segments) will be tested that will allow penetration of rhizomes and roots. Some substrates have been tested in the field (e.g. coconut fiber, peat pots) and will remain for up to 1.5 years before disintegrating. By the end of the first year transplants units will be moved from the nursery into the restored basins of the Cockroach Bay Aquatic Preserve. New plantings and monitoring of existing transplants will occur every other month during the second year.

The proposed study will begin in April 2006 and will focus on testing the growth and survival of 6 populations of *T. testudinum* and *H. wrightii* in the nursery during the first year (04/06 to 04/07). Also, in the first year, we will test substrates to support "sod-like units" of the seagrasses and limited use of nutrient injection and gibberellic acid to enhance growth. During the second year (04/07 to 04/08) transplantation methods will be tested and the transplants monitored in Cockroach Bay.

**4B Schedule of Work:** The proposal is for a 2 year study to be initiated in April 2006. During the first 6 months double short shoots of *T. testudinum* and plugs of *H. wrightii* will be transplanted from Cockroach Bay and around Tampa Bay and to plots in the nursery. Initial tests using transplantation substrates and phytohormone-nutrient

injections will also begin. These phases will continue during the first 1.5 years. Growth will be measured every other month during the 2 year study. Transplantation to the damaged seagrass beds will begin after 1 year and will be monitored quarterly.

The land-based nursery at the Cockroach Bay Preserve became operational at the end of May 2005 (Fig. 2a-d). We plan on running a series of small tests and maintaining the nursery without funding between May 2005 and April 2006. This will allow us to test the circulation and aeration systems we intend to install this summer plus carry out initial seagrass planting tests.

## **5. Budget Information**

**5A. Contributing Partners:** Mr. Richard Sullivan, Manager of the Cockroach Bay Preserve supported our proposed studies on seagrass restoration (Letter of July 2002), had the basin dug by the Hillsborough County Parks and Recreation Department in February 2005, and had an electrical line run to the nursery in May. The Environmental Protection Commission (EPC) of Hillsborough County awarded the funds (\$10,000) for development of a seagrass nursery in a grant to the University of South Florida (Pollution Recovery Fund Project #99) for seagrass restoration studies by the Principal Investigators. The grant ends on December 31 2005. After running out of funds, \$400 was obtained from Hillsborough Community College by Dr. Nick Ehringer and \$700 from the Tampa Bay Estuary Program by Dr. Holly Greening (Senior Scientist) for buying sea salt.

**5B Matching funds:** Matching funds for the study are \$42,000. Regarding In-Kind funds, Hillsborough County Parks and Recreation Department supplied the site within the fenced headquarters grounds of the Cockroach Bay Aquatic Preserve. They also dug the basin, ran a electrical land line to the nursery, and built two hard-wired electrical outlets. They are supplying the electricity and water, and helping in the maintenance of the nursery on a daily basis. Thus, they have contributed at least \$5,000 In-Kind funds for construction and another \$5,000 in In-Kind funds to run the nursery. Most importantly, the nursery exists because of a Hillsborough County Environmental Protection Commission award of \$10,000 within a grant to the P.I.'s in 2003. In addition, the Tampa Bay Estuary Program contributed \$700 and Hillsborough Community College \$400 for sea salt in May 2005. In addition, the P.I.'s will continue to donate about 20 h per month at \$25.00 per hour over the 2 year period for a total of \$24,000 in In-Kind funds.

**5C: Budget:** Funds requested from the Pollution Recovery Fund are \$38,000. PRF Funds (\$15,000 per year) are requested for student support. Undergraduate students from USF and HCC will be involved in setting up and maintaining experiments. Of special interest are HCC students enrolled in the Aquaculture Program. All students will be involved in the research experiments. No salary is requested for the P.I.'s for the 2 year study. PRF Expense funds (\$13,000) are also requested for travel, use of the P.I.'s boat, planting materials, pumps, chemicals, copying, and phone use.

Category	PRF Funds		Federal	Applicants	State	In-Kind funds	
	USF	IICC					
Personnel	\$20,000	\$5,000	---		\$24,000	---	---
Expenses	\$10,000	\$3,000	---		---	---	\$20,000
<b>Total Direct Costs</b>	<b>\$38,000</b>		---		\$24,000	---	\$20,000

### Literature Cited

- Dawes, C. and Andorfer, J. 2002. Production of rhizome meristems by *Thalassia testudinum*. pp. 185-198. In: Greening, H.J. (ed.) Seagrass Management: It's Not Just Nutrients! 2000 Aug 22-24. St. Petersburg, FL. Tampa Bay Estuary Program.
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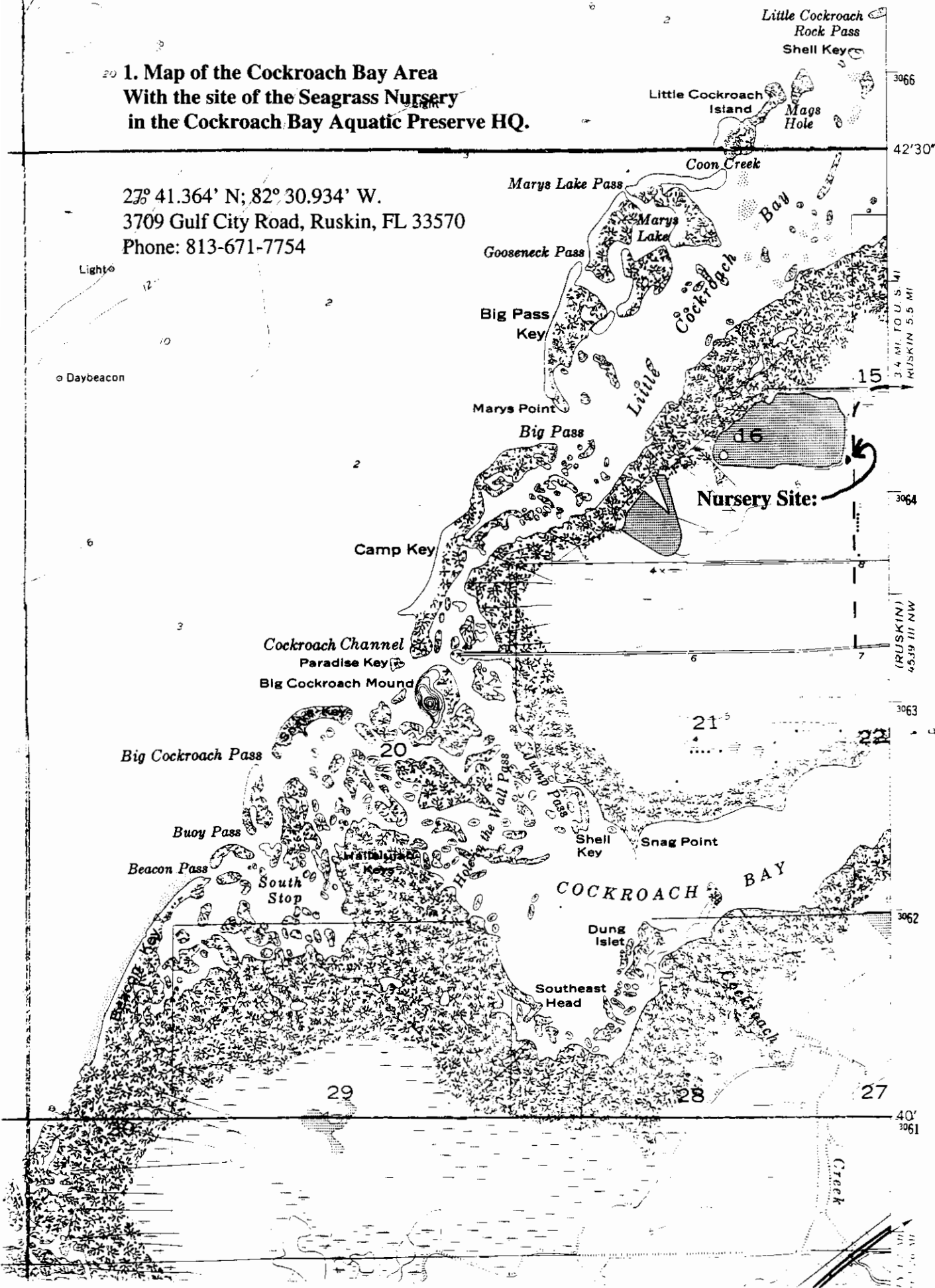
**Figure Descriptions:** Figure 1. Map site of the land-based seagrass nursery in the Cockroach Bay Aquatic Preserve. Figure 2. 2a. Nursery building (03/05). 2b. Interior showing the plastic liner and building supports (03/05). 2c Exterior showing the rolled up side and layer of cement sand (04/05). 2d. Interior filled with salt water (05/05).

18 Figure

20 **1. Map of the Cockroach Bay Area  
With the site of the Seagrass Nursery  
in the Cockroach Bay Aquatic Preserve HQ.**

27° 41.364' N; 82° 30.934' W.  
3709 Gulf City Road, Ruskin, FL 33570  
Phone: 813-671-7754

Light  
Daybeacon



2a



Figure 2



2b



2c



2d