manatee county

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1982

CM-36
Task 2.7

FINAL REPORT

MANATEE PROGRAM

IMPLEMENTATION

TURKEY CREEK, PALM BAY, FLORIDA

DER CONTRACT

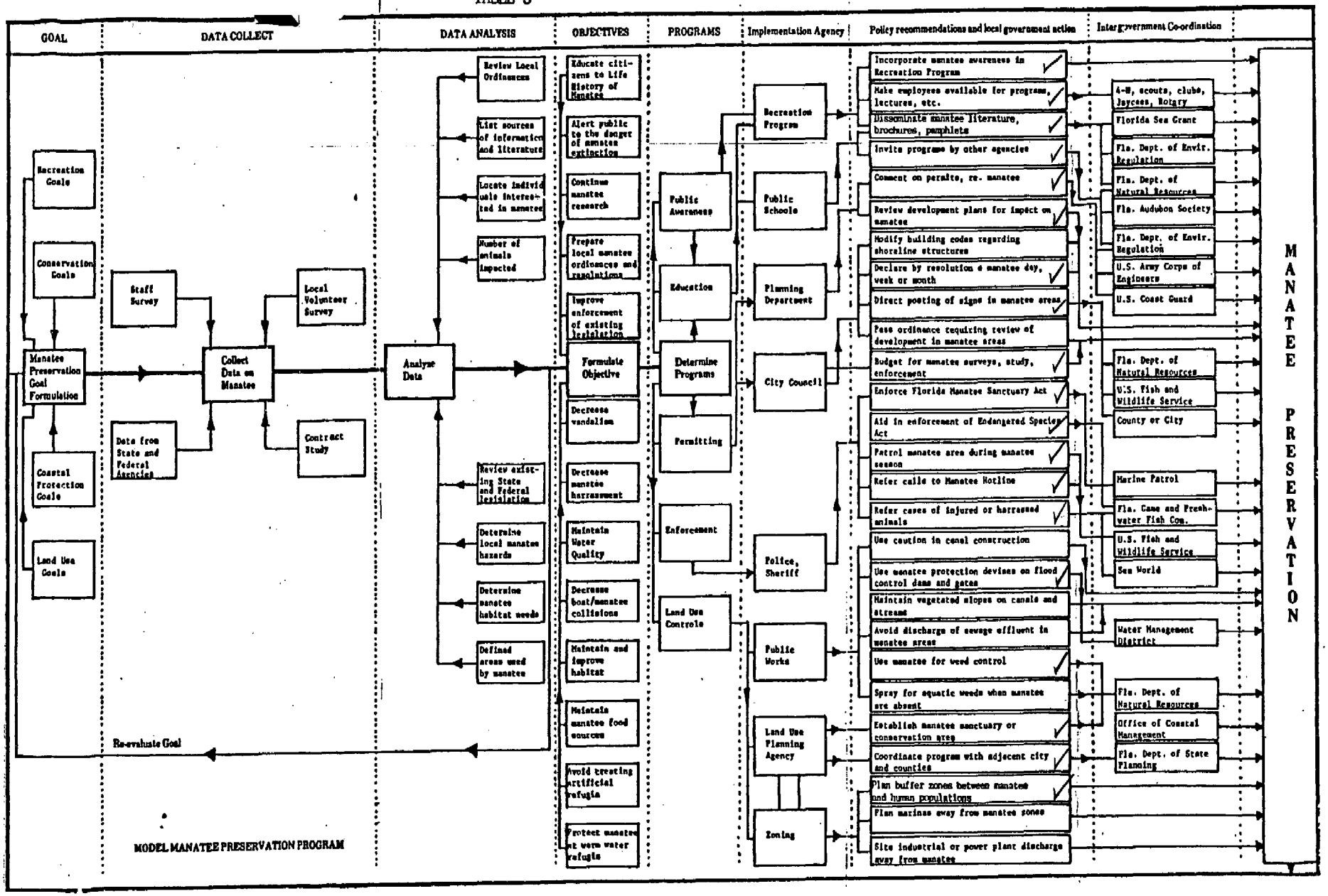
CM - 36

QL 737.S63 F56 1982

FOREWARD

The City of Palm Bay served as a model for the development of a Model Manatee Protection Program for a Coastal Zone Management Grant in 1979-80. This current project is an implementation of that program in Palm Bay. A flow diagram (figure 1) was developed in 1979-80 and served as a basis for the 1982 project. Those items checked on figure one were undertaken and completed by the City of Palm Bay between January and October 1982. The following report documents the results of each of those activities.

TABLE 3


GOAL
DATA COLLECT
DATA ANALYSIS
OBJECTIVES
PROGRAMS
Implementation Agency
Policy recommendations and local government action
Intergovernment Co-ordination
Recreation Goals
Conservation Goals
Manatee Preservation Goal Formulation
Coastal Protection Goals
Land Use Goals
Staff Survey
Data from State and Federal Agencies
Local Volunteer Survey
Contract Study
Collect Data on Manatee
Analyze Data
Review Local Ordinances
List sources of information and literature
Locate individuals interested in manatee
Number of animals impacted
Review existing State and Federal legislation
Determine local manatee hazards
Determine manatee habitat needs
Defined areas used by manatee
Educate citizens to Life History of Manatee
Alert public to the danger of manatee extinction
Continue manatee research
Prepare local manatee ordinances and regulations
Improve enforcement of existing legislation
Formulate Objective
Decrease vandalism
Decrease manatee harrassment
Maintain Water Quality
Decrease boat/manatee collisions
Maintain and improve habitat
Maintain manatee food sources
Avoid creating artificial refugia
Protect manatee at warm water refugia
Public Awareness
Education
Determine Programs
Permitting
Enforcement
Land Use Controls
Recreation Program
Public Schools
Planning Department
City Council
Police, Sheriff
Public Works
Land Use Planning Agency
Zoning
Incorporate manatee awareness in Recreation Program
Make employees available for programs, lectures, etc.
Disseminate manatee literature, brochures, pamphlets
Invite programs by other agencies
Comment on permits, re. manatee
Review development plans for impact on manatee
Modify building codes regarding shoreline structures
Declare by resolution a manatee day, week or month
Direct posting of signs in manatee areas
Pass ordinance requiring review of development in manatee areas
Budget for manatee surveys, study, enforcement
Enforce Florida Manatee Sanctuary Act
Aid in enforcement of Endangered Species Act
Patrol manatee area during manatee season
Refer calls to Manatee Hotline
Refer cases of injured or harrassed animals
Use caution in canal construction
Use manatee protection devices on flood control dams and gates
Maintain vegetated slopes on canals and streams
Avoid discharge of sewage effluent in manatee areas
Use manatee for weed control
Spray for aquatic weeds when manatee are absent
Establish manatee sanctuary or conservation area
Coordinate program with adjacent city and counties
Plan buffer zones between manatee and human populations
Plan marinas away from manatee zones
Site industrial or power plant discharge away from manatee
4-H, scouts, clubs, Jaycees, Rotary
Florida Sea Grant
Fla. Dept. of Envir. Regulation
Fla. Dept. of Natural Resources
Fla. Audubon Society
Fla. Dept. of Envir. Regulation
U.S. Army Corps of Engineers
U.S. Coast Guard
Fla. Dept. of Natural Resources
U.S. Fish and Wildlife Service
County or City
Marine Patrol
Fla. Game and Freshwater Fish Com.
U.S. Fish and Wildlife Service
Sea World
Water Management District
Fla. Dept. of Natural Resources
Office of Coastal Management
Fla. Dept. of State Planning
MANATEE PRESERVATION
Re-evaluate Goal
MODEL MANATEE PRESERVATION PROGRAM

Final Report

Manatee Program
Implementation
Turkey Creek, Palm Bay
Florida

DER Contract CM-36

I. Public Awareness

A. Presentations.

More than thirty programs were presented throughout the community, reaching over 1300 people (Table 1). The presentations included combinations of lectures, slide shows, field trips and special programs. Groups sponsoring the programs varied from adults to youth groups and schools.

Adult groups included a broad range of special interests from the Marine Dealer's Association to church groups, Dive Clubs, and residents of a retirement home on Turkey Creek. Environmental groups were The Grange, Port Malabar Garden Club and Keep America Beautiful, Inc.

Local schools, both public and private, utilized the programs from the elementary through the university graduate school level. These activities are more fully described in the following section; Education Programs.

Youth groups, Scouts, 4-H, summer camps, and recreation programs were involved in the project. The local Marine 4-H group received a Community Pride grant from Exxon Oil Company. The middle school aged children recieved statewide recognition for completion of a project related to protection of the manatee sanctuary.

Presentations on manatees were made by school children on three occasions to the City Council. Sixth graders traveled to Tallahassee to make presentations to DNR director Elton Gissendaner and Governor Graham. They circulated a petition attracting more than 8,000 signatures.

B. Media.

Press coverage included radio and TV news, public service announcements, and newspaper and community newsletter articles. Nearly fifty articles featuring Palm Bay's manatees have appeared in local and countywide newspapers since January (See Appendix 1). TV news spots covered the initiation of the program, the Governor's visit during Turkey Creek Day and purchase of the City's manatee patrol boat. Six local radio stations covered preparations for Turkey Creek Day.

Table 1.
Public Awareness and Education
Programs
Palm Bay Manatee Protection Program
February - September 1982

PRESENTATIONS

Date	Group	People in Attendance
February 18th	Palm Bay Elementary 6th Grades	180
January 28th	Indian River Grange	34
January 28th	Palm Bay High School Jr. Civitan Club	38
January 21st	1 min., 25 sec. Channel 9 Evening News Manatee Program and presentation of petition to the Mayor.	
February 4th	Brevard Marine Dealer's Association Manatee slide show, handouts.	35
February 9th	Volunteer Manatee Spotters for Grant Survey. Welcome - Mayor, Manatee slide show, Kirk Smith, Police and Todd Gipe handouts and data sheets	22
February 11th	Urban Planning and City Administration Class, FIT	35
Febraury 24th	Den 2 Cub Scout Troop walk in Turkey Creek Manatee Habitat	12
February 27th	1. 4-H Marine Club - Reef Rovers Tour of Manatee Habitat 2. Turkey Creek Sanctuary Scouting Explorer Group	25
March 4th	6th grade student presentation to City Council	110
March 8th	Radio feature WEZY	
March 10th	Reef Rovers Marine 4-H Club	18
March 20th	Questers Club	17
March 25th	Cub Scout Pack 2	70
April 2nd	Presentations to Governor Graham and Dr. Elton Gissendaner	
April 21st	Aqua-Nuts Dive Club	21

Date	Group	People in Attendance
April 23rd	Nature Walk - Port Malabar Garden Club	20
April 30th	Gifted Students from Port Malabar Elementary School	11
May 15th	3 showings of Manatee Slide Show at Turkey Creek Day	100
May 20th	Holy Trinity School Manatee Slide Show to 3rd and 4th grades	73
May 21st	Board of South Brevard "Keep America Beautiful"	30
June 26th	Nature Walk - Sponsored by the Turkey Creek Sanctuary Committee	54
June 23rd	City of Palm Bay Summer Recreation Program Wild Life Series	87
July 22nd	Childrens Summer Reading Program - Palm Bay Library	78
July 28th	City of Palm Bay Summer Recreation Program	19
August 3rd	Erna Nixson Park Camp	16
August 4th	Palm Bay Recreation Department	70
August 4th	Palm Bay Patrol Boat Launching, TV feature on boat launch WMOD and WESH	23
August 12th	Bethesda Retirement Home	32
September 5 & 11th	Field Trip Turkey Creek Hammock	30
September 27th	Port Malabar Elementary	120
	TOTAL ATTENDEES:	1376
	TOTAL PRESENTATIONS:	34

The local newspaper sponsored a Name-the-Manatee contest. Large ads ran for six weeks featuring Palm Bay's Official City Animal.

C. Turkey Creek Day.

Manatees were featured as part of a new community festival, Turkey Creek Day. Proclaimed by the Mayor and City Council and sponsored by a volunteer group, the gathering had several purposes:

1. To create an awareness of the natural resource, educational, and recreational values of the creek;
2. To raise funds for programs to preserve the natural attributes of the creek including the manatee habitat.

Activities included boat rides on the creek, an auction, an education program, food and a fair. Attendance was estimated at more than 8,000.

D. Educational Materials Distribution.

Pamphlets, flyers, maps, bumper stickers and booklets were obtained from the following organizations:

Florida Department of Natural Resources
Florida Power and Light
Florida Sea Grant
Turkey Creek Sanctuary Committee

These materials were distributed at all presentations listed on table 1. Additionally, materials were made available at the Palm Bay City Hall, Community Center and Library. The local K-Mart store and marinas displayed pamphlets and posters. Manatee bumper stickers were placed on all city vehicles.

Waterproof packets of manatee information were prepared for the Palm Bay Police Department patrol boat. When boaters are stopped they will be given information concerning manatees in Florida and Turkey Creek.

The Turkey Creek Sanctuary Committee included manatee materials in packets of information made available to park tour guides and school resource coordinators and science research teachers. The committee also produced tee-shirts with two designs featuring manatees. Bumper stickers "Have You Hugged Your Manatee?" and "Stand by Your Manatee" were designed and are being sold locally.

E. Development of Public Awareness Pamphlet and Poster.

"Living With Your Manatee, a Waterfront Homeowner's Guide" was developed, printed and distributed during the course of this project (Appendix II). A manatee cartoon character was developed and featured in the guide as well as in a poster currently undergoing final design.

The 2,000 copies of the 8½ by 11" three-fold pamphlet were distributed to waterfront homeowners and made available at the City Hall, marinas and the Melbourne-Tillman Water Control District.

F. Education Program.

In addition to the thirty-four presentations listed on table 1, manatees were the focus of a twice weekly class conducted by the Palm Bay Recreation Department this summer. Appendix III is the schedule of the programs.

The County Forester included manatee preservation in programs of environmental awareness conducted for local elementary schools. Resource materials were made available in each school.

The sixth grade of Palm Bay Elementary School led their school and the community in manatee education and public awareness. The children studied manatees as a part of the web of life which is the basis for natural resources of the city. They conducted a petition drive to support the manatee as the state animal, solicited support for protection of manatees in Palm Bay and invited Jimmy Buffett to visit the city. A group of six children from the elementary school and two from the high school traveled to Tallahassee to meet with Governor Graham and Elton Gissendaner.

II. Enforcement

A. Patrol of Manatee Areas.

Funds provided by Florida DER for this project were used to purchase a seventeen foot Boston Whaler as a police patrol boat for Turkey Creek. The boat was delivered in June and outfitted with special equipment in July. The Mayor of Palm Bay officially launched the craft on August 4, 1982. Regular patrol of manatee areas have been undertaken during periods of time when boat traffic is most intense and manatees are known to frequent the area. Two independent surveys by Eagle Scouts have been used to document times of boat use in various parts of the creek. This information was coordinated with information on manatee distribution from volunteer manatee spotters and the formal manatee survey, also a part of this report.

B. Conservation Officer.

The city of Palm Bay Police Department appointed a Conservation Officer. This officer conducts vehicular, foot and boat patrols of Palm Bay's manatee habitats. He is assisted in his duties by volunteer auxillary police.

C. Florida Statute Changes, Resolutions and Ordinances.

1. The Florida State Legislature in the 1982 session passed amendments to the Manatee Sanctuary Act which directed the Department of Natural Resources to establish rules regulating boat speeds in a portion of Turkey Creek.

Although Palm Bay made recommendations on the management area, both the time and area delineated in the amendment were inconsistent with data concerning the site. Modifications to the Act to be submitted to the 1983 session of the Legislature were developed, forwarded to local legislators and prepared for legislative consideration. See Appendix IV.

2. City Animal Designation - The City Council of Palm Bay on March 25, 1982 passed and adopted Resolution 82-12 designating the manatee as the Official City Animal (Appendix V). A proclamation was prepared by the Mayor of Palm Bay and presented by school children to the Governor in Tallahassee.

3. Critical Habitat Designation - The City Council passed and adopted Resolution 82-11 declaring Turkey Creek a local critical area for manatees. The resolution requested that Florida DNR establish special enforcement zones in Turkey Creek and coordinate enforcement with the Palm Bay Police Department (Appendix VI).

4. Turkey Creek Day Proclamation - The Mayor of Palm Bay, by proclamation, established May 15, 1982 as Turkey Creek Day in recognition of the creek's significance to the natural, recreational and historical community (Appendix VII).

5. Boat Speed Regulations - A draft resolution is being considered by the City Council to regulate boat speeds in the manatee areas of Turkey Creek and its tributaries.

D. Intergovernmental Coordination.

1. A working relationship has been established between the local Florida Marine Patrol Officer and the Palm Bay's Conservation Officer.

2. The Palm Bay Officer has been deputized to enforce Florida manatee protection regulations.

3. The Palm Bay Conservation Officer has also been deputized to enforce federal manatee protection regulations under the Marine Mammal's Act and the Endangered Species Act.

4. The Boat Speed Regulation Ordinance was reviewed by the Florida Marine Patrol, Florida Audubon and the U.S. Fish and Wildlife Services.

E. Hotline.

The Police Department has been made aware of and has referred calls to the Florida Manatee Hotline. One manatee calf was found dead in a canal. Death was from undetermined neo-natal causes.

Appendix I

News Articles

Appendix II

Manatee Guide

Appendix III

Schedule of Palm Bay Recreation Department Summer Class on Manatees and Palm Bay Wildlife

Appendix IV

Proposed legislation change made to State Representative Marilyn Evans

Appendix V

Resolution 82-12 designating the manatee as the City Animal

Appendix VI

Resolution 82-11 related to critical area designation and coordination enforcement

Appendix VII

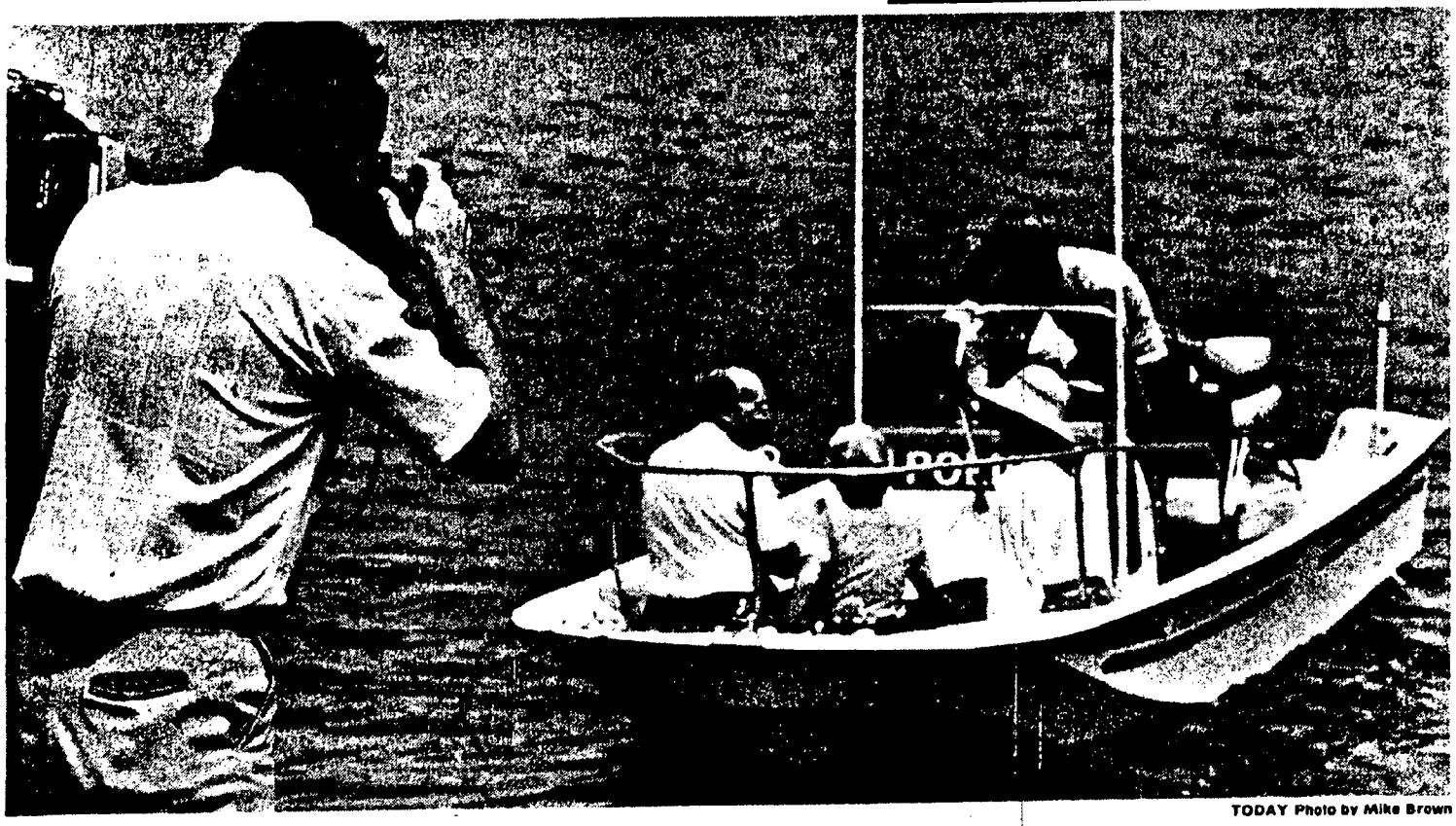
Turkey Creek Day Proclamation

Appendix VIII

Boat Speed Regulation Ordinance

Tables.

1. Presentations



TODAY Photo by Mike Brown

Maiden voyage

Palm Bay Mayor Bill Madden, left in boat, heads a group taking the first ride in the city's new police boat, which will double as a manatee patrol craft. Deputy City Manager Richard Diamond uses a camera to record the event.

APPENDIX I

Thursday, August 19, 1982
Palm Bay Post

Kids make plea for manatee protection

"Dear Palm Bay Post," writes Brian Berner, an 8-year-old, 4th Grader at Port Malabar Elementary, on behalf of the Florida Manatee...

"Please slow the boats down because we are slow and they can't move out of the way. There feeding spots are being filled in and there homes are being filled in. People are shooting them for fun. Barges are crushing them in canals. In the winter they go to warm springs but people are scaring them away and they catch a flu or they die but the way they die the most is by motor boats. To the manatee Brevard couny is a deth trap. There were more manatees killed in Brevard couny than any other place in Florida. Save the Manatee. Your friend the manatee."

'I like to eat and sleep. Motor boats tear me up.'

Joining in the plea for manatee protection were other children who attended a nature study program at the Community Center this summer. They wrote:

"I like to eat and sleep. Motor boats tear me up," Jason Dierberg, 7, Grade 2, Port Malabar Elementary.

"I am a manatee. I like manatee life but people hurt me," Wendy Berner, 6, Grade 1, Port Malabar Elementary.

"My name is Brent the Manatee. My friend got killed by you humans! So please watch for us manatees. But, otherwise you are doing a good job for us. Thank you," Brent Duncan, 11, Grade 6, Meadowlane Elementary.

"I am a manatee. Please protect me. I want to be free, Greg manatee," Greg Martin, 6, Palm Bay Kindergarten.

"Protect our Florida Manatee, friends of ours. Please love manatees," Christy Curry, 7, Grade 2, Port Malabar Elementary.

During the summer program the youngsters saw movies and slide shows, heard talks on plant life, fishlife, the Turkey Creek Sanctuary and went on two canoe trips along the creek. They also had two sessions on sketching wildlife presented by artist Marcy Bartlett.

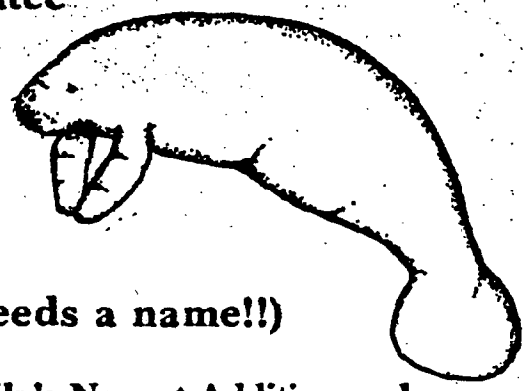
Cooperating in the program were representatives of the Native Plant Society, Audubon Society, Florida Fish and Game Commission, Florida Power and Light, graduate students from Florida Institute of Technology and other local and state organizations.

September 9, 1982

Boy Scout Shawn Hart of Melbourne and Troop 376, was congratulated last week by Palm Bay Mayor William Madden after completing a manatee survey in his Eagle Scout program. Adding their commendations were Kevin McMillan and Tod Tite, Florida Institute of Technology graduate students who have been active in the Save the Manatee program. Scout Hart worked two months compiling information on manatees and other marine life in Turkey Creek and checking boat traffic at various points along the creek.

HEY KIDS!!!

Special Announcement . . .
New Arrival . . .
The Palm Bay Post
Adopts A Manatee



(and it needs a name!!)

Name *The Post* Family's Newest Addition and Win Your Own Manatee (stuffed of course) Plus a $25 U.S. Savings Bond

Name Our Manatee Contest

Open to children age 12 and under in the Palm Bay area. Entries must be received by *The Post* not later than July 31, 1982.

☆☆ *Win Your Own Manatee by Naming Ours* ☆☆

Name *The Post's* Manatee Contest

Manatee's Name _____
Your Name _____ Age _____
School _____ Grade _____
Address _____ City _____
Parent's Name _____ Phone _____

Contest Deadline:
All entries must be in by July 31, 1982

Mail entries to *The Post*, P.O. Box 879, Palm Bay, FL 32905, or deliver them to *The Post* at Building A, Suite 2, 50 Woodlake Drive, West, Palm Bay.

All entries become the property of The Palm Bay Post.

(and it needs a name!!)

Palm Bay Post July 8, 1982

Dead manatee found, possibly stillborn

A Palm Bay manatee watcher reported a dead manatee in Turkey Creek last week. Joe Stauffer, a volunteer manatee watcher, discovered the baby manatee in the creek near his home on Daytona Drive on June 27.

Stauffer, who has been a member of the manatee watch for several months, notified the Palm Bay Police and the Florida Marine Patrol. He said the officers were at his home within minutes. They found no evidence of injury and, according to Stauffer, the marine patrol officer said the baby was possibly stillborn.

The officials then notified authorities at Sea World and a team arrived in Palm Bay within hours to take the manatee to Sea World's laboratory in Tampa for an autopsy.

The city won a state grant last year for its manatee protection program.

Turkey Creek, one of Palm Bay's most beautiful assets, is bordered by native vegetation as it meanders its way toward the Indian River.

TO THE EDITOR:

Palm Bay boaters would do well to remember how well off they are. No doubt, there are those who would gripe about mandatory anchor rules and life preservers, boat registration and others that I won't mention. Then there are the optimists. I consider myself as a part of this group. Just the other day I was contemplating the luxuries of waterfront living when it dawned on me; what if the manatees were in charge? Naturally, this makes things shine with a different light. Manatees would start their boating rules with an accent on safety, for wildlife, not people. The new rules would probably consist of propeller guards, pedestrian paths (for underwater travelers), and even off-limit areas for boats with propellers. I'm sure I've neglected a few possibilities, the ones that only underwater citizens could realize the need for. Certainly today's regulations would be no match for the inconvenience that a really fair set of laws would create.

Someday maybe the manatees will be gone. Of course, maybe someday there will be no people left. Then the manatees will only have to worry about old age.

Tim Perkins
Palm Bay, FL

The next meeting of the Friends and Newcomers Club of South Brevard will be Tuesday, July 6, at 10:30 A.M. at the United Church of Christ, corner of U.S. 1 and Strawbridge Avenue. There is parking adjacent to the church.

This will be a short business meeting, followed by a game of Bingo. All guests and members are asked to bring a covered dish, set of utensils and a prize for the winners. The prize should be of a nominal value.

Coffee and tea will be served by the Hospitality Chairwomen.

PEACE LUTHERAN CHURCH

Peace Lutheran Church Women will host the Annual Beach Brunch at Paradise Beach Thursday, July 15, 9:00 a.m. The monthly Pot Luck Fellowship will be Wednesday noon, July 14, with Mayor William Madden providing an up-date on growth and progress in the city. For additional information about these open meetings, phone the Church Office, 727-3131.

PALM BAY CATCHES CREEK FEVER and FINDS SANCTUARY

Frank Kler
Brevard County Forester
Chairman, Education Committee

The 1st Annual Great Turkey Creek Day piqued the interest and attracted the support of residents and organizations in Palm Bay and as far away as Stuart and Cape Canaveral as they gathered at the Port Malabar Yacht Club alongside beautiful Turkey Creek on Saturday, May 15. Governor Bob Graham delighted the hosts for the day (The Turkey Creek Sanctuary Committee, Inc.) and attending enthusiasts by his visit at 3 p.m.

Community concern developed into action in 1977 as a result of a land transfer from General Development Corporation to the Florida Audubon, making the establishment of the Sanctuary possible and fostering plans for a nature oriented park and passive recreation area. A portion of the property adjacent to the Audubon property on the west side of the creek is owned by the City of Palm Bay.

The Florida Audubon Turkey Creek Sanctuary Advisory Committee and following Turkey Creek Hammock Committee developed goals and plans for protection, development of park facilities, education and public awareness. The County Forester became involved in 1980 after seeing the destruction to the sand bluff area of the creek on the Audubon property, due to overuse of this sensitive area. Members of garden clubs and the Native Plant Society quickly became involved.

Organizations focused their support on the 1st Annual Great Turkey Creek Day in an effort to raise money to achieve the goals of fencing the Sanctuary to encourage preservation and limit vehicular access in preparation for the development of a park. The Education Committee welcomed an interested and enthusiastic crowd for slide presentations on the Sanctuary and Federally endangered Manatee.

The next guided tour of the Sanctuary will be held on Saturday, August 7 at 9 A.M. Meet us outside the Palm Bay Library behind the Recreation Center. Guides can answer any questions you may have. (The next tour will be held in September.)

For more information on what you can do to support a community effort, join us for the next Turkey Creek Sanctuary Committee Meeting on Monday evening, July 12th at City Hall, 7:30 P.M.

Write to Box 1209, Palm Bay, Florida for your copy of the Sanctuary history, habitats, plans for preservation, committee organization, and membership information. Mark to attention of Jerome Folmar. Slide presentations can be scheduled by calling 725-4607. Distinctive Sanctuary bumper stickers, T-shirts, Sanctuary prints and Manatee Adoption applications are available by writing to Peg Zabinski at the same address.

LIBRARY CORNER

Books about plants and landscaping. Reviewed by Vicki L. Williams, Reference Librarian.

One of the nice things about living in Florida is the number of tropical and semi-tropical plants we are able to use around our homes. However, with the drought of last summer and the freeze this winter, many homeowners are considering a landscape of juniper instead of replanting with exotics. If your flowering shrubs are looking grim, and you are tired of pruning them back to ground level, the Library may have some books you should read.

Florida Flowers: Annuals and Bulbs, and *Florida Plant Selector*, both by Lewis S. and Betty M. Maxwell, are standard sources and used by

(continued on next page . . .)

THE PALM BAY
BREEZE
Published by the Palm Bay Area Chamber of Commerce

Vol. XI, No. 6 | Palm Bay, Florida | June 1982

THE TURKEY CREEK SANCTUARY

The Turkey Creek area of Palm Bay consists of forty unique acres which have been declared a sanctuary. Most of the property has been deeded to the city. A small section is owned by the Florida Audubon Society. Turkey Creek has served for centuries as a source of food, transportation and recreational enjoyment. There is evidence that prehistoric mammals used the creek. Nomadic Indian tribes hunted and camped along its shores. Early European pioneers to this area settled along the banks.

In today's world of environmental deterioration, the uniqueness of Turkey Creek is further enhanced by the numerous species of endangered wildlife and plants still found in the sanctuary. The bald eagle and esprey can be found nesting there. The swallow tail butterfly and the scarce indigo snake are there. The gentle manatees still use the creek for their winter residence and birthing areas for their young. The flora in the hammock area of Turkey Creek consists of: red maples, hickories, swamp magnolias, oaks myrtle, sugarberries, coastal plain willows as well as air plants and wild orchids.

In the rapidly growing community of Palm Bay, it is amazing to find its "roots" still flourishing. The natural beauty and abundance of wildlife that first attracted the nomadic people are still growing and reproducing in Turkey Creek. There are differences . . . the area is more condensed and the environment is often threatened.

As with any corner of the world, change will eventually take place. Erosion, flooding and natural disasters are some of Nature's ways of purposely redefining her own creations. Ignorant destruction

(continued on next page . . .)

(continued . . .)

masquerading as development is the means by which man "improves" his environment. The Turkey Creek Sanctuary has been subjected to many forms of this ignorant destruction. Trees are being destroyed by vehicular traffic. Thoughtless foot traffic has trampled many endangered plants. Trash is regularly dumped in the sanctuary area. Almost all of the thirty-three manatee which have been spotted bear scars from speeding boaters.

Awareness and concern for the preservation of Turkey Creek Sanctuary led to the formation of the TURKEY CREEK SANCTUARY COMMITTEE. Their objectives are to: (1) Preserve the natural amenities of the Turkey Creek Sanctuary, and (2) To develop a regional nature oriented park. The committee is open to all interested residents and encourages memberships. For further information please contact:

The Turkey Creek Sanctuary Committee
Post Office Box 1209
Palm Bay, Florida 32905

Turkey Creek Day fair and auction resounding success

By Kit Carlson

The success of this month's Turkey Creek Day fair and auction has made it possible for the Turkey Creek Sanctuary Committee to begin building a much-needed fence around the hammock.

"We made almost $5,000 on the auction, and more money is still coming in," said Diane Barile, chairwoman of the sanctuary committee.

Barile said the money would be used immediately to begin building a $20,000 fence restricting and protecting access into the hammock.

"Right now, people are finding their own way into the hammock and they're tramping down new pathways. We need to manage access into the hammock with a fence and as many as three gates," she said.

Although the auction money is not enough to fund the entire fence, the project will begin anyway. Barile said the committee hopes to make up the rest of the money through grants or future fund-raising events.

Peg Zabinski, chairwoman of the Turkey Creek Day project, said some of the cost of the fence will be offset with donated labor.

"We'll start with the fence in June and do it in bits and pieces as the money comes in," Zabinski said. Other fund-raising means will include sales of T-shirts, bumper stickers, and the Adopt-A-Manatee program.

"We had a real good crowd at Turkey Creek Day. We're real pleased with it. Now we're talking about a Fourth of July picnic, and we have two or three different ideas for fund-raising, including a dinner at Port Malabar Bowling Center," Zabinski said.

Both Zabinski and Barile agreed that the first Turkey Creek Day was so successful, that it would undoubtly become an annual tradition.

"We want to make it Palm Bay's day," Zabinski said.

"The governor's appearance had a big influence on our turnout," Barile said of Gov. Bob Graham's attendance at Turkey Creek Day. Drawn by the attraction of meeting the governor, attendees at the festival found there was a lot more to Palm Bay, and Turkey Creek, than they had imagined, she said.

"A lot of people there never knew where the hammock was. And they realized the potential of our waterfront parks. We had never had a festival there before." An added appeal of the site — near the yacht club — is that it is the place where the first settlement in Palm Bay began. Barile said the committee members dressed in period clothing to highlight this point.

"I think we struck a chord in the community. People don't realize we have so much history. There's a real interest i continuing Turkey Cree Day."

Changes for next year prob bly will not be drastic. Bari said more boats for trips up tl creek will be added, to ease tl lines festival-goers found th year.

And Zabinski said she'd sti like to see Jimmy Buffet songster and state chairman the Save the Manatee Commi tee, attend Turkey Creek Day

"But whoever jumps on th (manatee) bandwagon nex we'll try to get," she said.

Opinion

The Times Wednesday, May 26, 1982

Viewpoint

Turkey Creek Day was united effort

By Diane Barlie, President
Turkey Creek Sanctuary Committee

Something wonderful happened in Palm Bay on Saturday, May 15. Turkey Creek Day was a grand success. Not only did the event raise much needed funds for improvements to the Turkey Creek Sanctuary Park, but the community joined together in admiring one of its loveliest resources. Activities took plan in what had been an orange grove planted in 1853 and an almost forgotten park. Palm Bay celebrated not only Turkey Creek Day but the joy of the community working together, the security of knowing its historic and cultural roots and the pride and awareness of the abundant natural resources available for us all to enjoy.

There was, however, a tremendous oversight which I would hope to correct. In the excitement of the day and the tight schedule of Governor Graham, no recognition or appreciation was extended to those who made the day possible. The spirit of the day, the talent for organization and the active imagination which conceived the happening resides in all those who helped, especially the chairwoman of the event, Peg Zabinski. Her energy, ideas and creativity were reflected in the enjoyment, fun and success of Turkey Creek Day. Her organizational skills in attending to detail had flags flying, a cafe established and a backdrop of historic articles assembled. Peg is the mother of the Adopt-A-Manatee program. Her concept, adopted by the Sanctuary Committee, was brought to life with the help of Connie McTaggart, Marian Hornberg and Margery Trimmer. In addition to very productive solicitations for auction items, Peg coordinated the events of the day with John and Carol Rodier for the auction, Dick Dougherty for food, Pat and Jim Snell on concessions, Frank Kler, Ginger McAwee and Marci Bartlett for education programs and Deborah O'Keefe and Davie Cesare for Manatee Adoptions. She arranged with Ginni McGrath for the Palm Bay Energy Committee seedling sale, pony rides and even acted as a one woman cleanup team.

Each committee chairman for Turkey Creek Day took responsibility for his or her task and carried it out with real dedication and concern. I only wish each had received the applause and words of appreciation they so well earned. Each group who maintained a booth and made contributions, helped out, and should have been thanked for making May 15 run smoothly and be so much fun; Palm Bay High ROTC, 4-H, South Brevard Historical Society, Palm Bay Jaycees, the Boy Scouts, Port Malabar Garden Club, the Palm Bay Post, Palm Bay Senior Citizen's Club and Friends of the Library.

The day could only have happened because of extraordinary actions. The Palm Bay Operations Department completely renovated the grounds of the Yacht Club between 1 and 5 p.m. Friday afternoon. Even Eric Meserve, deputy city manager of operations, had his "back bent over" with a shovel. Alice Stein and Linda Carey, who had worked on the committee, arrived with plants from home and Sun and Shade Nursery to beautify the grounds. Family, friends and students from F.I.T. came to man the auction and booths. Tom Mead's recreation department team entertained the children with games during the auction. The Boy Scouts, Peter Barlie, Todd Gipe and Kevin McMillen conducted boat rides on the creek.

It was a wonderful day! Peg Zabinski had hoped to thank each person on the committee and have each person there thank those near them for coming to join the fun and caring for Turkey Creek. This then is my apology to Peg, the various committees and all who came for not letting them hear a bravo and thank you. But perhaps the greatest compliment to the day can not be made by one person but rather by all those throughout the day who with eyes shining said, "I can't wait until Turkey Creek Day next year."

Just clowning
Kristen VanScoy signs autograph using Lisa Palieri's back. Members of the Play-Tell Panto'Mime Troup, they entertained at Turkey Creek outing.

Crack the whip

Plant Society attends conference

Palm Bay residents who have taken guided tours in the Turkey Creek Sanctuary may have wondered where their guides were when the Turkey Creek Sanctuary had its recent auction. The guides, all members of the Florida Native Plant Society (FNPS), were in Gainesville for the Second Annual Florida Native Plant Society Conference.

Palm Bay FNPS members have been frustrated for nearly a year in their attempts to get satisfactory identifications of the Asimina (paw paw) growing in the Turkey Creek Sanctuary, and the group from South Brevard that attended the conference made sure they attended the plant identification workshop by Dr. David Hall.

The May issue of the Florida Native Plant Society newsletter, 'The Palmetto', carries an article on Palm Bay's paw paw. Written and illustrated by M.J.R. Bartlett, the article documents some of the problems encountered since the plant was first noticed by Margaret Hames last summer. Efforts to confirm the name of the plant have taken FNPS members to all of Florida's major universities as well as the Smithsonian Institution.

The six FNPS members who attended the conference from this area returned with enthusiasm renewed for the continuing effort to classify and list all the plants in South Brevard.

May 27, 1982

On Camera

Governor Graham answers TV questioner at Turkey Creek fund raiser.

In the Beginning

Palm Bay area favored by Indians, settlers

by Diane Barile

Palm Bay — the City with a Future — is also the city with a long history. It is the place of the wooly mastadon, ancient lost tribes, Seminole Indians, homesteaders, cowboys and settlers. Those newer residents, associated with the space age boom of the city are often unfamiliar with the landmarks of the city past which still exist.

Water and its various movements mark the progress and history of this place. As sea levels receded during the Plustocene age old sand dunes were abandoned. Two dune lines stand, one parallel to US 1 and another west of the Palm Bay Community Center. Turkey Creek was formed as water drained from high lands to the sea. The broad, often meandering, flow brought refuge to the animals in need of drink and shelter. Old sick or injured animals seeking sanctuary died at the waters edge or in the creek, their bones still protected in the rich humic soils of the flood plain. Archaeologists are now excavating the remains in Palm Bay.

Early man followed game along the broad savannas of the mighty St. Johns River, once an arm of the sea extending from Jacksonville. These nameless hunters camped at perhaps fifty sites in what is now Palm Bay.

All the ingredients for a secure and prosperous village were brought together at the mouth of Turkey Creek. Indian villages and camps ringed Turkey Creek. Vast oyster beds lined the broad expanses of the stream west of what is now the FEC railroad bridge. A freshwater spring flowed near the shore. High bands and cliffs provided an observation point for sentinels marking the movement of friend and foe along the major thoroughfare of the time, the Indian River.

Settlement of Florida by Europeans was slowed by the lack of resources dear to the economy of the time. The Spanish from St. Augustine traveled along the coast and were familiar with the Ais Indians of the region. A shipwrecked Quaker family enroute from the Caribbean to Philad phia, captured by the India described the habits and c toms of the time. The Dicke son party moved through t area in 1696 on their journey St. Augustine.

Following a few years as English colony and a return Spanish possessions, tl Floridas, east and west, becar a part of the newly form United States. A young Engli civil engineer traveled throu Florida mapping the coasts ar describing each area's potenti for settlement. In 1822 Vi

(continued to page 23)

Nature's fishing specialists, the pelicans, are a familiar sight to Palm Bay area residents.

ıoles' description of the St. Andre's River or Turkey Creek audes high bluffs suitable for homesite and rich soil for plantations.

Before 1850, a solitary figure, E.W. Estes, with his wife, took up residence on Turkey Creek. After planting an orange grove, the Estes family clung to their land during the great Seminole Indian wars. The orange groves were expanded when purchased by a group of businessmen from Georgia. The Culpepper and Creeck Company harvested the yearly crop, packed the golden fruit and shipped it up the Indian River to northern markets.

Soon steamboats plied the river and a village grew up around the grove. Tillman, named for one of the Culpepper and Creeck partners, attracted homesteaders from the north after the Civil War.

With the coming of the railroad in 1895, the tempo and rhythm of the village moved from the river, the creek and the dock to along the railroad tracks and daily train schedule. More homesteaders arrived eager to supply produce to the now more accessible market. Schools, a post office and a hotel were established.

Large scale agricultural development was planned. Tracts of land were sold throughout the mid-west. The land, however, was poor, subject to flooding in the late summer and drought in the spring. Agricultural methods sound in the Great Plains did not apply in subtropical Florida.

flooding in the late summer and drought in the spring. Agricultural methods sound in the Great Plains did not apply in subtropical Florida.

The river, however, was rich in food. Many of the nearly-ruined farmers were sustained by the fish and shellfish of the estuarine waters. Most of south and central Florida was under water most of the year. The salvation of the state in terms of increasing agricultural productivity was in draining the land. In 1922 the Melbourne-Tillman Drainage District was formed by a group of Melbourne businessmen to drain nearly 100 square miles of the low marshland on the east side of the St. Johns River. The major canal system in Palm Bay today is a result of those works.

Spurred by drainage the great Florida Land Boom in 1924 brought prople by the train-load and bus-full to see the wonders of Tillman, now incorporated as Palm Bay. Many stayed — the wooden houses along the bay and US 1 are testament to their hopes for the future.

But the future had to wait. The great hurricane of 1926 frightened prospective buyers and speculators were left to meet options they could all afford to exercise. The depression settled over the county. Many families sustained themselves once more by living off the river and the land. Cowmen, as Florida cowboys are called, bought land close to the city, rum runners sped up and down the river and the people waited for the future.

Palm Bay, as the rest of the U.S. was awakened from its sad depression by the demands of World War II. Near perfect flying weather and the threat of German U-boats off the coast brought Army and Air Force bases, new jobs and a boost to the economy. The Malabar tracking station remains in Palm Bay today. After the war veterans came home or returned to new lives near bases in which they had served.

The need for homes of the new families spurred the growth of land development companies. Mackle Brothers of Miami, in the 50s purchased land in Palm Bay and built houses before selling their interests to General Development Corporation. Those homes still stand southeast of Bianca Drive.

The recent history of Palm Bay can be tied to America's space program. Two engineers, Homer Denius and George Shaw, began a small electronics company in Melbourne called Radiation Incorporated. After moving to Palm Bay, expanding and becoming a part of Harris Intertype, the company is now the major employer in the state of Florida. We know Harris Corporation as the center of the industrial park.

GDC check funds club, park fix-up

A city park on Port Malabar Boulevard and the Yacht Club will soon be sporting new looks thanks to a large donation by the General Development Corporation.

G.D.C. agreed to contribute a total of $137,000 to the city's Department of Leisure Services to spruce up Fred Roach Park on Port Malabar Boulevard and to renovate the Yacht Club on Bianca Drive. So far, the city has received $100,000. New ballfield and tennis court lights have been installed, replacing aged and inefficient lighting fixtures. City officials state that the new metal halide lights are about forty percent more efficient than the former quartz lights and will be less costly to maintain.

Other park improvements include renewing the tennis courts, replacing defective fencing along the boulevard, and improving the tot lot. The city's Beautification Department has begun work on the parking lot area.

The Yacht Club improvements include replacing the roof, insulating, installing new air conditioning, enlarging the restrooms to meet federal handicap access requirements, and funds permitting, adding a screened porch. One pier has already been improved and the remaining finger pier is planned for restoration later this year. The changes to the building take into account the breezes from the ocean and Turkey Creek. Casement windows and the sliding glass doors will improve cross-ventilation, reducing the need for air-conditioning, while the screened porch will allow users to enjoy the natural beauty of the creek. The architect's plans show a wide-open effect making the room brighter in the daytime and permitting a variety of activities. The kitchen will be improved as well.

Architectural drawings for the Yacht Club building have been sent to the city Building Department for review prior to issuing the necessary permits. Once this step is completed, work should soon begin and officials expect the renovation to be completed by late summer.

The G.D.C. donation arose from an out-of-court agreement which did not specify what amenities would be provided by them. On the recommendation of Vice President and General Manager, Melton E. Broom, G.D.C. agreed to donate cash to the city for the improvements to Fred Roach Park and to the Yacht Club.

Mel Broom, General Development vice president, presents Planning Consultant Diane Barile a $2,000 donation from GD the Turkey Creek Sanctuary.

Nature Walk

The Palm Bay Hammock Club is sponsoring a nature walk on Sunday, June 6.

Escorts from the Florida Native Plant Society will act as guides for the walk, leaving the Palm Bay Library at 175 N.W. Palm Bay Road, promptly at 1:00 p.m.

All those interested in joining the nature walk should be at the library prior to 1:00 p.m.

Historical society supports sanctuary

By JOHN MACKAVICH
President
South Brevard Historical Society
Melbourne

5/23/82

It was certainly a pleasure to attend the Turkey Creek Day festivities in Palm Bay on May 15. I felt it was quite an honor to participate in it by having a booth and display of artifacts, literature and other memorabilia from our South Brevard Museum.

We found the officers and committees very dedicated to this great cause of saving Turkey Creek. One of the great highlights of the day was the appearance of our governor, Bob Graham.

We wish to see great progress in the preservation of this beautiful endangered sanctuary.

I would like at this time to thank our own volunteer workers from South Brevard Historical Society for their much-needed help and time from a usually busy weekend.

TURKEY CREEK DRAWS GOVERNOR AND CELEBRATION

Mayor Bill Madden proclaimed May 15th "Turkey Creek Day" in the city of Palm Bay. The celebration at the Yacht Club Building began with the Mayor's address at 10:00 a.m. Activities throughout the day included an auction, fair, bands and boat rides through Turkey Creek. Governor Graham heard about our manatees and our lovely creek from Mrs. Gendron's sixth grade students from Palm Bay Elementary. He accepted our invitation to come to Palm Bay and help raise funds to build a park in the Turkey Creek Hammock. Construction of a fence and improvements will begin this summer.

Nature Walk

Regular tours of the hammock have been planned on a bimonthly basis beginning Sunday, June 6th at 1:00 p.m. The walks will start at the Palm Bay Library off Port Malabar Boulevard at the Community Center site. Guides are provided by the Florida Native Plant Society.

Do You Have Room in Your Home for a Manatee?

The Manatees of Turkey Creek are the focus of a manatee adoption program. The Turkey Creek Sanctuary Committee will accept applications for those who commit themselves to care for and protect the manatees of Florida, especially of Turkey Creek. For a $25 adoption fee, you will receive a manatee and an adoption certificate. You can then name your manatee and receive mail from the other manatees of Turkey Creek.

We can't find any of the manatees who want to leave the quiet sanctuary of Turkey Creek, and we could be liable for a $20,000 fine if we harrass or try to move them. So, you will receive a unique, individually made manatee which is housebroken, soft and cuddly, and won't be eating 100 pounds of food a day like the real ones.

If you have space in your heart for a Palm Bay manatee or your club or organization would like to help the manatee by supporting the Turky Creek Sanctuary, send for an application: Turkey Creek Sanctuary Committee, P.O. Box 1209, Palm Bay, Florida 32905.

Your Opinior

Palm Bay finds its roots

By DIANE D. BARILE
Palm Bay

The City with a Future, Palm Bay, foun its roots and heart on May 15. Turkey Cree Day, proclaimed by Mayor Bill Madde brought together the people of the city t celebrate the long history of the community, t enjoy the beauty of the stream which forms major artery of the city, and to raise funds fo a park in the Turkey Creek Hammock.

The event could not have taken plac without the concern of many people for prese vation of the creek, contributions from throug out Brevard County and the work a creativity of a dedicated committee.

Of course, the visit by Florida's Gov. B Graham was the highlight of the day. T Turkey Creek Committee was indeed grate for the governor's generous efforts in shari his time and genuine concern for the preserv tion of the recreational and natural resourc of Turkey Creek. He was especially kind take extra time in signing autographs for the children who gathered near him.

The first celebration of its kind for Pal Bay was the result of the creativity and spi of a group led by Peg Zabinski, finance cha man of the Turkey Creek Committee. Pe ingenuity and enthusiasm launched the succe ful Adopt-A-Manatee Program, coordinated t events of the day and orchestrated thousan of details into a melody to be remembered un Turkey Creek Day next year.

The spirit of cooperation in making t magic happen on May 15 can only be attribut to the kind actions of

Council picks patrol boat for Turkey Creek

By CHERYL HECKLER
Times Staff Writer

The Turkey Creek Sanctuary received a patrol boat to protect those manatees that swim in the waters of Palm Bay. But with it came a disagreement between City Council and the police department as to just what kind of vessel should be used.

The patrol boat is part of a grant the city received in January from the Florida Department of Natural Resources. Yet the matter was brought before council with police asking for $1,516 from the city's contingency fund for the boat's special features they said they needed to patrol the creek.

Palm Bay Police Chief Paul Kreuzkamp asked the city for a 17-foot Boston Whaler with an extra 150 pounds of fiberglass in the industrial strength hull and a 90-horsepower motor.

The council decided that a 17-foot stock Boston Whaler with a 35-horsepower engine was adequate for the department's needs.

"We're saying to you if you want us to enforce the law, we need this boat," Kreuzkamp told the council Thursday night.

Kreuzkamp said he recommended the extra-strength hull after checking with the local Coast Guard Auxiliary and Florida Marine Patrol.

The prime purpose of the boat is enforcing the "no wake" speed zone and patrolling the Turkey Creek area, he said. The department would also patrol for other violations.

"Within the creek are numerous incidents of unruly campers, intoxicants' parties — in an area we don't reach with our patrol cars," Kreuzkamp said. "We also have recorded thefts of marine property. It's not great in number, but it does exist."

Police officer John Blackledge, who has worked extensively with the Florida Game and Fresh Water Fish Commission, told council that he checked with several area boat dealers about the size of engine that should be used.

"For my own personal safety, I'd have to reconsider before using the 35-horsepower boat," he told the council.

He said he discovered the 35-horsepower engine was not adequate and that a higher horsepower provided better maneuverability, greater gas efficiency and would not set as low in the water — which would decrease danger to the manatee.

Officer Blackledge told the council, "I recommended the 90-horsepower because that's what was originally proposed in the grant. And the trolling motor and weed guard would eliminate almost any danger to the manatee," he said.

Blackledge said officers would, of course, obey the wake laws but that a 90-horsepower engine would make pursuit and apprehension easier once they passed the "no wake" zone.

The trolling engine would be a more quiet engine which would make for an easier approach and apprehension of violators, Blackledge said.

Injury to the manatee isn't caused by the size of the boat as much as it is by the operator, Blackledge told the council. "The officers patrolling the creek would treat manatees like police treat children while cruising residential areas."

After the council rejected the police department's recommendation by a 3-2 vote, Councilwoman Sue Lenardon motioned for the stock model saying, "There is an urgency to get the boat in the water or lose the grant."

Brevard TODAY

Section B Sunday, May 16, 1982 • State news, 7-10B

Residents go to bat for creek

On a grassy hill overlooking the waters of Turkey Creek, hundreds of Palm Bay residents gathered Saturday to share food, games and sunny weather in a celebration of their roots.

Perhaps some who came to what was billed as the first annual Turkey Creek Day festival didn't know that land surrounding the Palm Bay Yacht Club was the site of the earliest settlement of Palm Bay.

But event organizers were dressed in turn-of-the-century clothes to emphasize the fact.

"People are always talking about the future here," said Diane Barile, president of the Turkey Creek Sanctuary Committee. "We've forgotten the real roots that are here."

The committee's auction and cake and pizza sales raised about $5,000 which will be used to fence about 40 acres of Turkey Creek hammock, a remnant of virgin wetland left untouched by Palm Bay's burgeoning growth.

"Besides raising money today, we wanted to make the community aware this exists; that it's a beautiful area that should be preserved," said Peg Zabinski, a committee volunteer.

She said the group plans to build a boardwalk nature trail and hopes to keep out four-wheel vehicles, garbage, and other vestiges of modern day civilization that are damaging the hammock.

Gov. Bob Graham, invited to the festival by a Palm Bay Elementary School class that visited him in Tallahassee, was impressed by what he saw.

"This is a relatively new community which has found an issue that is bringing them together, will help preserve the environment and make Palm Bay a better place to live," Graham said.

TODAY Photo by Malcolm Denemark

GOVERNOR MEETS GIRL SCOUTS AT PALM BAY YACHT CLUB
. . . Carin Hilferding is all smiles and Heather Reading appears glum

May 16, 1982

Graham: division

By DAVID BAUMAN
TODAY Staff Writer

Gov. Bob Graham says there is little chance Brevard County will escape being divided in a redrawing of Florida's 19 congressional districts.

Visiting the Turkey Creek festival Saturday in Palm Bay, Graham indicated that despite strong opposition from county business and government leaders, a portion of North Brevard likely will become part of a coastal district stretching north to Jacksonville Beach.

"Ideally, we'd like to avoid any county or city from getting split, but we are going to have some that do get

an interview with TOD

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Graham confirmed

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The Orlando Sentinel
Sunday, May 16, 1982

B

Graham in campaign form at manatee celebration

By Mike McKee
OF THE SENTINEL STAFF

PALM BAY — Gov. Bob Graham slipped in a little campaigning Saturday while making an appearance at a celebration honoring the manatee.

Though the governor never mentioned the re-election campaign he faces in November, he shook hands, cracked jokes and did everything short of kissing babies as he waded through the crowds attending the Turkey Creek Day celebration in Palm Bay, just south of Melbourne.

Graham arrived in Palm Bay in the early afternoon after flying from Miami, where he attended a police ceremony honoring officers who have lost their lives in the line of duty. He was scheduled to end his day in Daytona Beach at a celebrity roast of former House Speaker Hyatt Brown.

The governor came to Palm Bay to keep a pledge he made to visit a group of sixth-graders from Palm Bay Elementary School who had gone to Tallahassee in April to seek his support in having the manatee named the state animal. The designation later went to the Florida panther.

On Saturday Graham ceremonially adopted a manatee and named it Jimmy Buffett after the popular vocalist who has often taken a stand on behalf of the endangered mammal.

Diane Barile, president of the Turkey Creek Sanctuary Committee, said the governor's appearance encouraged conservationists and environmentalists in Brevard County who want to safeguard the manatee, and also are fighting to preserve Turkey Creek and nearby Sykes Creek.

Profits from an auction, a bake sale and other fund-raising efforts at Saturday's celebration, she said, will go toward buying a fence to enclose 40 acres of unspoiled wetlands on Turkey Creek in the heart of Palm Bay.

A site of anthropological interest as well as environmental concern, the area called the Hammock was threatened with development before the Florida Audubon Society and Palm Bay stepped in to protect it.

"This is a relatively new community," Graham said. "The fact that they've been able to find an issue that brings the whole community together is great."

Brevard TODAY

Section B Saturday, May 15, 1982

• State news, 4B

Foes of splitting county talking tough

By DAVID BAUMAN
TODAY Staff Writer

Growing lobbying efforts — both quiet and not so quiet — are under way to prevent Brevard County from being split into two separate congressional districts.

And Gov. Bob Graham, who will attend the Turkey Creek festival in Palm Bay today, can expect to get some blunt advice from Brevard business and government leaders.

They consider the latest redistricting plan — which adds 32,000 Titusville residents to a congressional district that stretches almost 125 miles north to Jacksonville Beach — an unacceptable threat to their political power base.

Even though the plan does not affect his district, Sen. Clark Maxwell, R-Melbourne, opposes the proposal. Stung by claims he is not using his political clout to protect the county, Maxwell said Friday: "No plan will pass out of the Florida Senate that doesn't keep Brevard whole. I've told the governor's office that I will not agree with any plan that splits us in two parts."

Meanwhile, business leaders believe a divided Brevard — with its growing aerospace and electronics industries that rely heavily on federal contracts — would be powerless in Washington for the next 10 years.

"I can't understand the reason behind dividing, not only a county, but a city," said Tom Burrel, Titusville Area Chamber of Commerce president. "The only way to get at a politician is the vote. We won't support anyone in favor with this plan," he said.

Because of its burgeoning population the past decade, Florida gets to add four new districts to its current 15 — for a total of 19 congressional seats.

Graham, while visiting Florida's congressional delegation in Washington on Thursday, indicated he was optimistic the plan that divides Brevard will be approved by the Legislature when he calls a special session next week.

Graham is playing the role of independent "broker" seeking a solution to the impasse that has developed in the Legislature over redistricting. Unless the Legislature can agree on a plan by next Friday, the federal courts will be saddled with drawing the new congressional districts.

But incumbent congressmen — like U.S. Rep. Bill Nelson, D-Melbourne — are seeking to influence the shaping of the new districts.

Nelson, who was in Titusville Friday to announce the expansion of the McDonnell Douglas Astronautics plant — told business leaders he will initiate court proceedings to keep the North Brevard district he is in danger of losing.

Nelson said he will file his own plan in federal court Monday to keep all of Brevard County in his district, as it is now.

A federal court hearing for alternative congressional redistricting plans is scheduled in Tallahassee Monday, with a June 1 deadline for comments. Maxwell said he also will file a plan.

The county

Governor to hand out awards

PALM BAY — Gov. Bob Graham will participate Saturday in Turkey Creek Day ceremonies on the bank of the Turkey Creek Hammock.

The festivities will run from 9:30 a.m. to 5 p.m., centered at the old Port Malabar yacht club on the end of Bianca Drive, said Diane Barile, city environmental planner.

Turkey Creek runs through Palm Bay and feeds into the Indian River, providing a home to one of the largest concentrations of manatees in Brevard County.

Three bands will provide music all day, the city recreation department will provide games from 11 a.m. to 2 p.m., and a wide variety of items will be auctioned from 10:30 a.m. to 4 p.m.

Canoe and motorboat rides also will be available.

Turkey Creek Day, as proclaimed by Mayor Bill Madden, is designed to be a day of awareness and a fund-raiser, Barile said.

Today Magazine

Friday, May 14, 1982

UpFront

Turkey Creek Day in Palm Bay

It's the original good time for a very original good cause. That's Turkey Creek Day in Palm Bay.

The purpose of Turkey Creek Day is to raise funds to build a fence around the Turkey Creek hammock.

Toward that purpose, there will be an auction (one of the auctioned items is a week's vacation at a resort in Lake Wales), canoe and boat rides, a fair, games, food (including beer and pizza), sales of trees and "I Love Turkey Creek" buttons. And representatives of the Adopt-a-Manatee will be there.

Even Gov. Bob Graham will be in Palm Bay to have a bit of fun.

The fun begins at 10 a.m. at the Palm Bay Yacht Club and will continue all day Saturday. Gov. Graham is scheduled to show up around 3 p.m.

If you have any items you'd like to donate to the auction, call 725-8565 or 725-2130.

The Space Coast

Graham to attend local celebration

Saturday's "Turkey Creek Day" festivities in Palm Bay will be highlighted by a visit from the father of Turkey Creek's first adopted manatee — Gov. Bob Graham.

Graham, who in March became the first person to adopt a manatee under a new program started by the Turkey Creek Sanctuary, will arrive in Palm Bay at 3 p.m. to take part in the Turkey Creek Day celebration, his Deputy Press Secretary Jill Chamberlain said Tuesday.

Graham's visit, which will be made during a stopover between Miami and Daytona Beach, is his second to Palm Bay this year. The governor spoke at a local Chamber of Commerce dinner in January.

It was not known late Tuesday if singer-songwriter Jimmy Buffett, chairman of the state "Save the Manatee" committee, would join Graham in Palm Bay.

Graham invited Buffett to Saturday's event at the request of six Palm Bay Elementary School students who visited the governor in March.

Turkey Creek Day, a fund-raiser sponsored by the non-profit Turkey Creek Sanctuary Committee, is scheduled to begin at 9:30 a.m. at the sanctuary, near the Palm Bay Yacht Club.

The day's scheduled activities include: musical entertainment, an auction, a tree sale, canoe rides, nature walks, manatee adoptions and children's games.

Proceeds will go to the 40-acre sanctuary to provide a boardwalk, swimming area, jogging trail, nature center, canoe launch, habitat protection and maintenance.

The Times

A Gannett newspaper published in Melbourne, Florida

Wednesday, May 12, 1982

Volume 8, Number 15

Turkey Creek lures Graham to Palm Bay

Governor Bob Graham took his first look at Palm Bay last January. He's scheduled to return Saturday to take a look at a valuable natural resource — the Turkey Creek Sanctuary.

Mayor Bill Madden has declared Saturday Turkey Creek Day in Palm Bay, and a celebration is scheduled.

The program will include an auction from 10 a.m. to 4 p.m. Canoe and boat rides up the creek will be available. Exhibits, booths and entertainment are planned. Food, such as pizza and bratwurst, will be sold.

The action will take place at the Palm Bay Yacht Club. Diane Barile, environmental consultant for Palm Bay, said proceeds from the fair and celebration will go to help build a fence around the Turkey Creek preserve.

Funds are needed to protect the hammock from further destruction and vandalism. The sanctuary, south of Port Malabar Road, is known as the home of several endangered animals and plants. Manatees often cruise up the creek. Eagles and osprey have been sighted in the forest.

Barile said the people of Palm Bay have come to recognize the area as a valuable natural resource that needs protection.

The fence is designed to prevent four-wheel drive vehicles from tearing up the hammock. Past attempts to fence the property have not worked. The fences have been destroyed by vandals.

Barile extended the invitation to Graham during her April visit to Tallahassee. She said Graham is coming to Palm Bay to see the creek and visit with the people of Palm Bay. Barile said the best way to see the hammock is by water, and that she hopes to be able to get Graham into a boat for a scenic trip.

Graham is tentatively scheduled to arrive at 3 p.m. on his way from Miami to Daytona Beach, according to the governor's office.

The day's festivities will revolve upon the auction. One of the items up for bid is a seven-day vacation at the River Ranch Resort in Lake Wales. Other items include a 21-foot boat and trailer, recreational equipment and furniture. New and used items still may be donated by calling John Rodier at 725-8568 or 725-2130.

Barile said, "Anybody who ever wanted to do anything for Turkey Creek should do it on May 15."

Ralph Haben, Speaker of the Florida House of Representatives, has participated in Palm Bay's Adopt-A-Manatee project. Presenting him his manatee are Diane Barile, environmental consultant for Palm Bay and a group of sixth grade students from Palm Bay Elementary who recently traveled to Tallahassee. From left to right are: Jason Shortes, Amy Alagood, Jason Hart, Michael Andrew Barile, Diane Barile, Haben, Brian Sicoli, Bobby Gendron, Mary Gendron, April Lansed and Lydia Herbst.

Love those manatees

By CHERYL HECKLER
Times Staff Writer

With plans to increase awareness about those lumpy, lovable sea cows that meander slowly about Turkey Creek, Palm Bay has started an Adopt-A-Manatee program.

Governor Bob Graham adopted the first stuffed manatee earlier this month and named it Jimmy Buffett.

Graham received his manatee April 2 from Diane Barile, environmental consultant for Palm Bay, Mary Gendron, and several of Gendron's sixth-grade students at Palm Bay Elementary.

The students also presented the governor a petition with 8,000 signatures proclaiming the offical animal of Palm Bay and inviting singer, song-writer Jimmy Buffet to come to Brevard County and sing about the manatee.

"If he came to Palm Bay, he could have the second manatee. We're hoping he'd name it Bob Graham," Barile said.

For $25 you can adopt one of 50 stuffed, two-foot manatees created by Palm Bay resident Margery Trimmer which represent the sea cows that in habit Turkey Creek.

During 1978 and 1979, 33 separate manatee were identified in Turkey Creek, though more than 700 were sighted in that same time, Barile said.

The easiest way to identify a manatee is by the scars it receives from careless boaters who refuse to slow in areas indicating manatees are around, Barile said.

Manatee are also identified by the algae they accumulate or a streak of paint they receive on their backs when rubbing against the bottom or side of a boat.

Barile said that an unusually high number of Florida manatee have died within the past three months though officials are not certain what has caused the deaths — which total 30.

The adoption application asks potential owners if they understand the laws protecting the manatee and if they are willing to look for the animals living within the habitats or sanctuaries near their homes.

Potential adopters must also promise to look for manatees when boating and to tell others the importance of saving the Florida manatee.

The money raised from the Adopt-A-Manatee program goes toward improving the Turkey Creek Sanctuary with elevated walkways, jogging and swimming areas, canoe landing site and a nature trail.

Adoption forms will also be available May 15 at the Turkey Creek Sanctuary Auction at the Palm Bay Yacht Club. For more information call Barile at 727-7100.

The Times April 28, 1982

Gavel gab

From 6B

Florida Native Plant Society - The South Brevard chapter will guide group tours through the Turkey Creek Sanctuary in Palm Bay on Sunday, May 2. The groups will meet at the Palm Bay Library on Port Malabar Blvd. (behind the recreation center) at 12:45 p.m. Wear sturdy shoes and plan to spend about two hours.

General information will be provided by the Turkey Creek Sanctuary Committee before the walk. The tour is free and the public is welcome.

For more information on the Florida Native Plant Society, call Hester Wagner at 723-3219.

To arrange a weekday tour of the Sanctuary, call Ginger McAlwee at 725-4607.

Auction to benefit Palm Bay sanctuary

By PEG ZABINSKI
Palm Bay

TODAY 4-26-82

The time has come for our community to do all we can for the Turkey Creek Hammock Sanctuary. This unique area of 40 acres adjacent to the community center in Palm Bay is slowly being mutilated. We can no longer allow anyone to remain ignorant of the sanctuary's existence nor of its valuable resources.

The loveliness of the sanctuary did not come into being in one simple evolutionary step — it has existed for thousands of years! There are numerous endangered plants and animals living there in interlocking dependency.

It has weathered years of Mother Nature's challenges, but now is up against a foe who is obsessed with balancing life according to his own desires. The thoughtless biker, the careless partygoer, and the indiscriminate shooter will all share the guilt for the sanctuary's destruction.

The Turkey Creek Sanctuary Committee is dedicated to eliminating this destruction so that as the future becomes the present, Turkey Creek will remain as it has in the past.

On May 15 we will be holding an auction at the Palm Bay Yacht Club. All proceeds will go toward maintaining the sanctuary, building a boardwalk, nature study center and jogging trail. Anyone interested in donating items or helping with the auction, please call John Rodier at 725-8565 or 725-2130.

Join us May 15, Great Turkey Creek Day, and help make Turkey Creek Sanctuary a vital resource for our community instead of a useless memory.

JUNGLE PARK TOUR

Have you seen the Palm Bay jungle? There are no tigers, but the elephant's cousins play there often. The Turkey Creek Sanctuary is right in the middle of the city, but as far away as a primeval forest. You can see manatees, alligators and otters in the water; orchids and rare plants and even violets in the woods.

The Turkey Creek Sanctuary Committee invites you to visit this unique and beautiful wilderness and help to develop a park which will preserve this special place.

Come to a short meeting of the committee April 12th from 12 to 1 P.M. at the Community Center on Port Malabar Boulevard. Demonstrate your support by becoming a member at $15.00 per year or send donations to the Treasurer, Peggy James, 1641 Anthony Ave., Palm Bay. Tour the park with the Florida Native Plant Society on Sunday, May 2 at 1 P.M., leaving from the Palm Bay Library.

If you have any questions or would like to schedule a special tour for a group or organization, please call Marci Bartlett at 725-4555.

April 1982

South Brevard's community newspaper since 1894

The Times

A Gannett newspaper published in Melbourne, Florida

Wednesday, April 21, 1982

Column one

We're watching

The Great Turkey Creek Auction is scheduled to be held on Saturday, May 15, at the Palm Bay Yacht Club located on Bianca Drive.

Items donated by local merchants and local residents will be auctioned from 10 a.m. to 4 p.m.

All businesses, clubs and residents are invited to donate items, as well as money if desired. To donate items call John Rodier at 725-8563 or 725-2130 or Peg Zabinski at 729-9008 for pick up of items.

The Turkey Creek Sanctuary Committee, sponsors of the auction, say there is a great need for help from the community to preserve this rare and beautiful, but endangered, sanctuary. Funds from the auction will be used to provide a boardwalk, swimming area, jogging trail, nature center, canoe launch and habitat protection and maintenance.

Space Coast
Brevard bulletin board

Graham first to 'adopt' manatee

PALM BAY — Gov. Bob Graham has become the first person to "adopt" a Palm Bay manatee, accepting a stuffed toy symbol presented by students of Palm Bay Elementary School.

Eight students from Mrs. Mary Gendron's sixth-grade science class read poems and sang a manatee song to the governor Friday as part of their class project to increase manatee awareness.

The students began their project in February after the city's environmental planner, Diane Barile, told them about the friendly mammals, which are threatened with extinction. Around 30 of the animals live in Turkey Creek, which runs through the city.

City officials have adopted the manatee as the official city animal and are implementing a citywide program to urge their protection.

Students spread manatee mania

By ELLYN FERGUSON
TODAY Staff Writer

Manatee mania, bred and nutured on the banks of Turkey Creek in Palm Bay, is heading north to the corridors of the capital.

Sparked by a group of Palm Bay sixth-graders, their science teacher Mary Gendron and environmental planner Diane Barile, Palm Bay residents hope the fever catches on.

The group left for Tallahassee Thursday to show Gov. Bob Graham public support for the city's manatee protection program. Gendron and six of her students have petitions signed by about 8,000 people — roughly a third of Palm Bay's population. Barile also has a resolution the city council recently passed that adopts the manatee as the official city animal.

They will see Graham today for about 20 minutes.

Besides showing Graham how much the public cares about the water mammals, the students' petitions also repeat a now familiar Palm Bay request. The people who signed the petitions want singer Jimmy Buffett, chairman of the Florida Save the Manatee Committee, to perform a concert in South Brevard.

The trip to see the governor, talk with Department of Natural Resources officials and tour the Senate is an outgrowth of Gendron's belief in "accentuating the positive. I think one of my parents said it beautifully: Flowers bloom where they are planted."

Gendron got her class interested in manatees to show the students they could do more than just complain about the environment. Her students became caught up in the drive to protect manatees, which are an endangered species.

The petitions, she said, eventually became a schoolwide project with all 1,120 Palm Bay Elementary School students and school staff signing petitions. Principal Norma Murphy backs the drive and the youngsters' enthusiasm.

"They're really excited. Kids do love animals. When all the facts are presented . . . they really do get involved," she said.

Although the manatee lost out to the panther in a bid to become Florida's official state animal, the students literally will sing the praises of the manatee — sometimes called sea cows or mermaids of the sea.

Graham also will get a chance of a lifetime to adopt a cuddly, stuffed toy manatee. The adopt-a-mantee project is part of Palm Bay's program to get the public involved in protecting the mammals.

Although adult manatees can weigh as much as a ton and reach a length of 1[illegible] feet, they have a reputation as gentle giants. They feed on aquatic weeds and face the greatest danger from boat propellers, locks and dams and destruction of their natural habitat.

After the students make their presentations to Graham, the Palm Bay group will extend an invitation to the governor to teach one day in Palm Bay. Two years ago, a class of Gendron's issued the same invitation to Graham. He turned it down, she said, because the school year was nearly over.

She and principal Murphy hope for better luck this time.

The students also will ask Graham to deliver their petitions to Buffett and relay their request for a concert.

Newsmakers

Tourist learns about manatees

"My school is saving the manatee. Would you like to sign my petition?"

The little girl held out a pencil and a clipboard. The tourist, enjoying a cup of clam chowder at the Grant Seafood Festival, looked down at the ten-year-old girl, and said with a cold northern voice, "Whud's a man-o-tee?"

The girl got her signature and a Palm Bay Elementary School project was a step closer to obtaining 6,000 names on its "name the manatee the official state animal" petition.

Sometime this week, the month-long effort will culminate when two of Palm Bay Elementary students, Mary Gendron (the teacher whose class started the project), two mothers and Palm Bay City Planner Diane Barile go to Tallahassee. There, they will present the petition to the State Senate and House of Representatives.

Jason Hart, representing the schools students council, and April Lansed, sixth-grade student president, along with the adult chaperones will be guests of Sen. John Vogt and Rep. Marilyn Evans-Jones.

Not a school about to rest on its manatee, Palm Bay Elementary's next project is focused on Jimmy Buffet. The kids would like for him to give a benefit concert for the sea cows.

The Space Coast

Palm Bay wants manatee as symbol

Now that the state Legislature has snubbed the manatee as Florida's symbolic animal, the city of Palm Bay is ready to claim the gentle mammal for its own.

Tonight, Palm Bay City Council members are expected to pass a resolution designating the manatee as the city's chosen creature. It will take its "rightful place" alongside Palm Bay's longtime favorite animal, the white pelican, said Diane Barile, city environmental planner.

Council members are holding a special meeting and workshop at 6 p.m. in City Hall to consider the resolution and also to discuss joint projects Palm Bay shares with the city of Melbourne. These projects include Lipscomb Street Park improvements and a proposed major South Brevard civic center.

The manatee resolution demonstrates Palm Bay's "commitment to the preservation of the manatee's natural heritage," Barile said.

C Brevard

Orlando, Florida Tuesday, March 9, 1982

Students sign for manatee

By PEGGY McLAUGHLIN
Sentinel Star

PALM BAY — The plight of the gentle manatee has drawn support from a group of elementary school children planning to present legislators this week with 7,000 signatures backing the creature for state animal.

On Feb. 18, sixth graders at Palm Bay Elementary School listened to city environmental planner Diane Barile tell them about the manatee, a plant-eating, underwater mammal that often falls prey to boat props.

Her remarks hit home, and the students began a petition drive aimed for members of the Senate Natural Resources Committee, which is considering designating a state animal from a list that includes the alligator, the dolphin, the Key deer, the Florida panther and the manatee.

The students' action was more than Barile had hoped for as part of the city's program to enhance awareness of the manatee.

With a $28,000 grant from the state Department of Environmental Regulation, $7,000 from the city and $7,000 from Florida Institute of Technology in Melbourne, the city is implementing a model program to make residents more sensitive to the threat of extinction facing the animal.

Last year more than 112 manatees were found dead in Florida waters, according to figures from the U.S. Fish and Wildlife Service. Florida's approximately 1,000 manatees have been protected since 1907 and are now covered by the Endangered Species Act of 1973, the Marine Mammal Protection Act of 1972 and the Florida Manatee Sanctuary

Palm Bay's Turkey Creek is home to about 33 manatees, which attracted city interest in the project, Barile said. The city is serious enough to have included the manatee program in its comprehensive plan.

Since the program began, a manatee watch program has started. About 35 residents along Turkey Creek have organized to make daily checks of the underwater herd so they can be monitored and protected.

Talks to civic, fraternal, social and school groups are part of the city's effort, and that's how the students got involved, Barile said.

Student representatives enlisted the aid of the city council last week, presenting a program complete with a choreographed song and dance and poems about the manatees.

Mayor William Madden signed a proclamation pledging the city's love and respect for the manatees and supporting their efforts to get the manatee designated the state animal, something Palm Bay officials believe would be a tremendous boost to awareness of the creatures.

In addition, police have increased surveillance of canal areas and enforcement of ordinances protecting the manatees. The grant money will also be used to purchase a patrol boat.

Two FIT graduate students also are working with the program. One is surveying manatees in and around the city while the other is investigating the feasibility of using manatees for aquatic weed control.

"Manatees eat about 100 pounds of food a day," Barile said. "The student is looking into the possibility that we can help protect them and they can help save the citizens of Palm Bay some money."

Aquatic weed control is a continuing problem in the city's canals, in areas beyond locks that are currently not accessible to the manatees. Barile said the students hope they can show that the manatees can help.

Barile said the students ar
ger to take on more manatee
jects and to present their peti
to the Senate committee. Ba
said she expected to hear fro
the committee early this wee
about when the committee ca
schedule a presentation.

TODAY, Monday, March 8, 1982

Pupils on campaign trail for manatee

A group of Palm Bay Elementary pupils will sing the praises of the manatee before the state Senate Natural Resources Committee today.

The sixth-graders' trip to Tallahassee is part of a school project to have the manatee selected as Florida's state animal.

The pupils earlier presented its city council with a petition backing protection of manatees.

natee protection program.

And some of the town's smaller residents have gone so far as circulating petitions asking for Buffett, who is chairman of the Florida Save the Manatee Committee, to join the town's effort on behalf of the gentle water mammal.

Sixth-graders at Palm Bay Elementary are circulating the petitions. A similar support effort is making the rounds at Palm Bay High where students are asking for a Buffett visit and consideration by the Legislature of the manatee as the official state animal.

Although the city's manatee program is just getting under way, some people in the city think it would be a fitting gesture if the popular singer did a benefit concert, said Diane Barile, Palm Bay's environmental planning consultant.

Barile has organized a group of 25 volunteers who live along Crane Creek, Turkey Creek and the canals to keep daily logs of manatee sightings.

Because of the "unusually warm" winter, manatees already have started to arrive in South Brevard in the Crane Creek area, she said. The mammals, which can reach a length of 15 feet and weigh a ton, face dangers from boat propellers and locks and dams.

Palm Bay's police department has put out bids on a patrol boat to monitor waterways and guard the manatees against possible injury.

Barile supports the petition drive and, she said, she doesn't see why Palm Bay can't have all three items.

Although statewide balloting for a state animal has been completed, she said the final winner — the panther — was a recommendation, not a binding mandate.

But it may be easier to persuade the state's legislators to make Florida's new state animal the manatee than it is to get Buffett to Palm Bay.

Duane Bradford, with the Department of Natural Resources in Tallahassee, said Barile has spoken to him about a possible Buffett appearance.

Bradford said Palm Bay's request will be logged with similar requests from Santa Rosa County, Tampa, a consortium of Jacksonville hotels, Orlando, Fort Myers and many others.

The singer, Bradford said, is hesitant to do manatee benefits because they take a lot of time and energy. "When he does one of those, he needs to be able to draw multitudes," Bradford said.

Yet Bradford didn't rule out a match of Palm Bay and Jimmy Buffett. Afterall, he said, one

Today

Brevard

Section B Sunday, February 14, 1982

Manatee friends petition Buffett

By ELLYN FERGUSON
TODAY Staff Writer

The odds may be against them, but some Palm Bay residents want singer Jimmy Buffett to come to town and lend his support to the area's model manatee protection program.

And some of the town's smaller residents have gone so far as circulating petitions asking for Buffett, who is chairman of the Florida Save the Manatee Committee, to join the town's effort on behalf of the gentle water mammal.

Sixth-graders at Palm Bay Elementary are circulating the petitions. A similar support effort is making the rounds at Palm Bay High where students are asking for a Buffett visit and consideration by the Legislature of the manatee as the official state animal.

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THE PALM BAY
BREEZE
Published by the Palm Bay Area Chamber of Commerce

Vol. XI, No. 2 Palm Bay, Florida February 1982

DO YOU HAVE A MANATEE IN YOUR BACKYARD?

The city of Palm Bay wants to know about it. As part of a manatee preservation program, a survey of the city's manatee population is being undertaken to determine how many manatees are in Turkey Creek and when they visit our shores. Residents living on the Indian River, Turkey Creek, or waterfront canals are asked to volunteer to make regular observations of manatee sightings and report to the city Planning Department.

This project is a part of Palm Bay's new Manatee Awareness and Preservation Program funded by a $28,000 grant from the Florida Department of Environmental Regulation. Manatee bumper stickers and pamphlets are available at city hall and the community center. Special programs are being planned for this summer.

Those interested in serving as manatee spotters for the survey should call the Palm Bay City Hall, 727-7100 Ext. 200, to leave their name, address, and telephone number. A meeting to introduce volunteers for manatee spotting will be held on February 9 at 7:30 p.m. in the city hall.

Wednesday, February 17, 1982 The Times

Column four

Go for a stroll along Turkey Creek

By WEONA CLEVELAND
Times Staff Writer

The spring flowers will be in bloom, and you might even see the four-petaled paw-paw, a rare plant in this area, if you join the Florida Native Plant Society for a tour of Turkey Creek on Feb? 28 at 1 p.m.

"And the manatee are back in the creek," added Diane Barile. "So if people are quiet, we may even see manatee."

The tour will begin at the Palm Bay Public Library, behind the Palm Bay Community Center on Port Malabar Boulevard. There will be a charge of $1 for adults and 25 cents for children. Proceeds will go to the Turkey Creek Sanctuary Committee, a group working to preserve the unique area of Turkey Creek.

Tours may last from an hour and a half to two hours.

South Brevard's community newspaper since 1894

The Times

A Gannett newspaper published in Melbourne, Florida

Wednesday, Januar

Manatee time in Palm Bay

By CHERYL HECKLER
Times Staff Writer

Thanks to a $35,000 grant it received last week, the city of Palm Bay — with help from local grade schoolers, police and even singer, song-writer Jimmy Buffet — is helping save the manatee.

Contributing $7,000 worth of work, Palm Bay received $28,000 from the Florida Department of Environmental Regulation and $7,000 from Florida Institute of Technology.

The grant will be used to educate the public about the one-ton sea cows, which frequent parts of Turkey Creek and the Indian River in Palm Bay, said Diane Barile, environmental planning consultant for Palm Bay.

But Barile is quick to add that the greatest use of the grant will be combating the most fearsome foe of the manatees — speed boaters.

Each year careless or unaware boaters kill and injure a large number of the harmless hulks, which roam the water lazily and stay close to the surface.

Ninety percent of the 33 manatees living in the area have deep scars from boats' propellers.

With a shallow draft boat purchased through the grant, Palm Bay police will begin patrolling canals too shallow for the larger vessels used in the past.

Also through the grant, Todd Gipe, a Florida Institue of Technology biological sciences major, will determine the favorite hangouts of the animals.

Another student at F.I.T., Kevin McMillen, who studies coastal zone manage ment, will determine if manatees can be used for weed control within the canals. Manatees are capable of eating 100 pounds of weeds daily.

Palm Bay residents are inviting Florida native Jimmy Buffet, who has been named the chairman of the Save The Manatee Campaign by Gov. Bob Graham, to come to Brevard County and sing his song about the sea cows.

Local school children have also become involved in the manatees project. Students at Palm Bay Elementary and Stone Middle School are circulating petitions to solicit support for strict protection of the endangered specie.

The city also encourages Palm Bay home owners who live on Turkey Creek and Indian River to maintain data sheets on manatees spotted in their areas.

A meeting for interested participants is scheduled for 7:30 p.m. Feb. 9 at Palm Bay City Hall.

Anyone wanting to volunteer services for the project can call 727-7100 and ask for Diane Barile.

There are only 1,000 manatees left in Florida.

The Space Coast

12-year-old petitions to protect manatee

After nearly a month of making the rounds for signatures in shopping centers and her neighborhood, 12-year-old Davie Cesare presented her "Save Our Manatees" petitions to Palm Bay's mayor and city council Thursday night.

The Melbourne student told the council 152 signatures she'd collected were her way of letting the city know there's support for its proposed manatee protection program. The large, slow-moving manatees are frequently maimed or killed by boat propellers because boaters don't watch out for them.

Her petition work even attracted the attention of an Orlando television station which sent a reporter to interview her Thursday.

Mayor Bill Madden congratulated Cesare for her efforts and urged her to continue her interest in

TODAY Photo by J. Gillis Courson

LOIS BRIGDEN SIGNS DAVIE CESORIE'S PETITION FOR MANATEES
. . . 12-year-old circulated petition Saturday among shoppers at Brevard Mall

Girl starts petition to protect manatees

By ELLYN FERGUSON
TODAY Staff Writer

Davie Cesare wants to save the manatee. And to make sure someone in government knows the public cares about the gentle giants of Florida's canals, she's started a petition drive.

Since Wednesday, the 12-year-old Melbourne resident has collected 92 of her 200-signature goal.

She's encouraged by the number of people who've signed her petition, which consists of several sheets of mimeographed notebook paper. The signees include people in her East Melbourne Avenue neighborhood, her mother's co-workers and shoppers in the Brevard Mall.

The Stone Middle School student sees the petition as a way to educate people about the slow-moving sea mammals and the danger they face from motor boat propellers, locks and dams and destruction of their natural habitat.

Uncaring boaters can maim or even kill the manatees, also known as sea cows. It's unnecessary, Davie said.

"They are so slow and able to be seen (and avoided), but people don't care," she said. "These animals are friendly. They don't harm anybody."

Manatees, which can grow up to 15 long and weigh about a ton, live on vegeta such as water hyacinths. Their only ener are careless and sometimes brutal human

Davie started her petition after lear about Palm Bay's proposed manatee pro tion program. The city expects to rec $35,000 in grant money this year and $7,000 of its own to start the model man preservation program.

"It just kind of made me feel good t someone wanted to help," Davie said.

Brevard, Dade and Duval counties h the list in manatee deaths in Florida. At 107 manatees died in Florida during 1981.

Over the Labor Day holiday, a mana was apparently shot in Palm Bay's Tur Creek area, but the body was so decompo it couldn't be proved conclusively that bullet was the cause of death.

Davie, who saw her first manatee in dian River after moving from Wisconsin, s when she has 200 or more signatures she'll ther give them to Palm Bay Mayor Bill M den or Gov. Bob Graham.

The idea, she said, is to show officials t "people are starting to care and we n their help to pass a bill to see if we can something."

Editorials TODAY

Big, ugly and lovable

This is the time of year when Space Coast residents are able to view one of the world's most endangered species, the manatee. The "sea cows," as they are called, are a familiar sight in this area. Each winter the homely, ungainly animals enter Florida's shallow rivers seeking warmer temperatures and a peaceful existence until spring.

Unfortunately, what they usually encounter is far from peaceful: motorboats.

Man is slowly but surely destroying the manatee. Ironically, much of the slaughter is being conducted unintentionally: the chief instrument of destruction is the boat propeller.

There are only about 1,000 manatee left in this country, and Florida has most of those. Most surviving manatee bear ugly scars caused by encounters with whirling propeller blades.

In the battle between the manatee and boats, the manatee clearly is losing. One hundred and seven of the animals died in Florida this year. That's 40 more than last year.

Efforts to save the manatee have had mixed success. In Brevard County, signs were erected in the Indian River near power plants where the animals like to congregate, but most of the warnings were stolen. The Marine Patrol plans to install more permanent ones.

In Palm Bay there is talk of using manatee to control pesky water weeds that clog the more than 150 miles of canals in the city. The Melbourne-Tillman Water Control District each year spends thousands of dollars on chemicals to do the job the manatee's powerful jaws could do for nothing.

Since policing marine speed limits in all areas frequented by manatee is difficult if not impossible, a large-scale effort must be undertaken to keep the animals in protected areas, at least for the winter.

Projects such as the one proposed for Palm Bay could contribute much toward saving a lovable species that is slowly but surely drifting toward extinction.

Manatees losing grip on life

TODAY Special Photo

FEDERAL AGENCY SAYS 107 MANATEES DIED THIS YEAR — 40 MORE THAN DURING 1980

Palm Bay is considering using the endangered species to help keep weed-choked canals cleared

Palm Bay coming to creatures' aid

By MIKE THOMAS
TODAY Staff Writer

Imagine a herd of sea cows roaming in Palm Bay residential canals, each chomping through 100 pounds of bothersome water hyacinths daily.

That's one of the ideas Palm Bay City Planner Dianne Barile will explore when the city receives $35,000 in grants next year, and matches the money $7,000 of its own to embark on a model manatee preservation program.

The money will be put to a number of uses, Barile said. And it couldn't have come at a better time.

It's been a bad year for manatees — 107 of the hulking sea mammals died in Florida this year, 40 more than in 1980, according to U.S. Fish and Wildlife Service figures. The figures did not break down the deaths by county, but wildlife officials said Brevard, Dade and Duval traditionally are the counties at the top of the list.

Boats and barges caused the most unnatural manatee deaths — 21 of the slow moving creatures were killed in collisions.

"There are more people, more boats and therefore more collisions," said Dave Peterson, manatee coordinator for the Fish and Wildlife Service.

But Peterson and Barile hope to turn boaters into manatee allies.

"We're getting more calls from boaters who spot injured manatees which can still be saved," Peterson said.

Part of Palm Bay's grant will go toward such programs, Barile said.

"We hope to put out a homeowners' guide to living with the manatee," Barile said. "What to do if they see an injured one. Who to call. What they eat.

"We'll go to the schools," Barile continued. "And maybe hold programs in the city community center."

In addition, Barile wants to recruit volunteer manatee spotters to begin surveying the animals and their travels. In a survey done two years ago, Barile reported that one-third of America's estimated 1,000 remaining manatees visit Brevard every year.

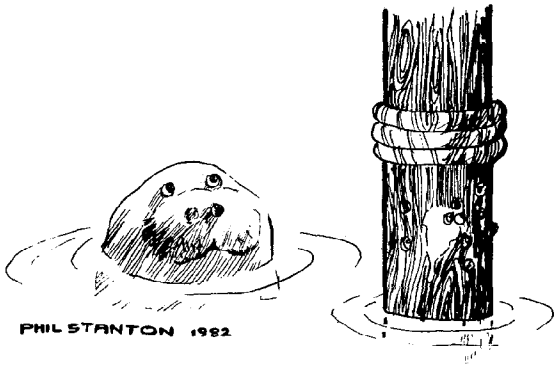
One program Barile is eager to start entails using manatees for aquatic weed control in the Melbourne Tillman Water Control District. The district, which maintains more than 150 miles of canals in the city, spends thousands of dollars every year for weed control chemicals.

Manatees, which grow up to 15 feet long, weigh up to a ton

See MANATEE 2B

Have you seen a doglike whiskered snout following small beady eyes surface briefly, then submerge. Perhaps you have seen a strange large swirl or a rounded gray-brown back near the water's surface.

MEET YOUR NEIGHBOR THE FLORIDA MANATEE



Manateees are huge, fifteen foot 2,000 pound mammals who inhabit coastal streams, bays, rivers and canals close to your home. They are near you most of the year except for cooler winter months when they tend to congregate at warm springs or power plant discharge sites. Usually found in water more than 1 meter (3.3 ft.) deep, manatees migrate during the winter to seek refuge from the cold.

The Florida manatee, or sea cow, is an endangered mammal, entirely vegetarian, munching as much as 150 pounds of aquatic weeds per day with its bristly split upper lip. Gentle, playful and inquisitive, manatees are air breathing, slow moving cousins of the elephant.

Matilda and her friends, some as old as age 50, have seen you move into your Florida home. They have seen shoreline, vegetation, and grassbeds disappear. They have seen your boats injure or kill their families. Many have been harassed, pelleted with stones, even hunted and shot. Still they clean canals of aquatic weeds and provide an invaluable community resource.

MANATEE

The Official City Animal
of Palm Bay, Florida

WE CARE!

For further information contact:

Save the Manatee Club
1101 Audubon Way
Maitland, FL 32751

Florida Dept. of Natural Resources
3900 Commonwealth Blvd.
Tallahassee, FL 32301

Florida Audubon
Post Office Drawer 7
Maitland, FL 32751

Turkey Creek Sanctuary Committee
P.O. Box 1209
Palm Bay, FL 32905

City of Palm Bay
175 NW Palm Bay Road
Palm Bay, FL 32905

written by: Diane D. Barile
drawings by: Stanton Graphics

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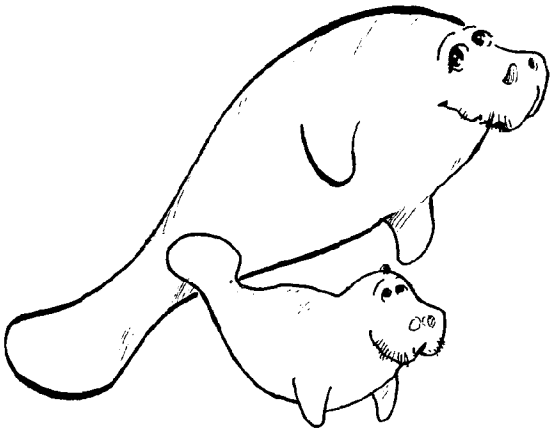
LIVING WITH YOUR MANATEES

A Waterfront Homeowner's Guide



Matilda Manatus, family and friends, are frequent visitors to your neighborhood. You may not see these gentle 1000-2000 pound creatures along your shoreline, under your dock or as you are boating, but they know you!

GET TO KNOW YOUR MANATEE

How to find a manatee:

Sit quietly along warm coastal waters, especially near the protected mouth of freshwater streams. You many see them:

- eating algae from a boat bottom
- rubbing on a dock or piling

Look for:

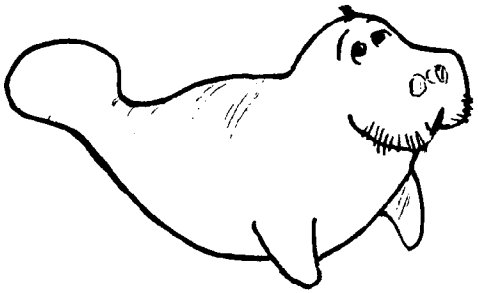
- a dog-like nose to appear near the surface as the animal surfaces to breathe
- a large gray-brown to black back to break the surface
- a broad spade shaped tail flipper descend into the water

Listen for the animal to quietly surface and breathe. Schedule your observations for the early morning or late afternoon to dusk.

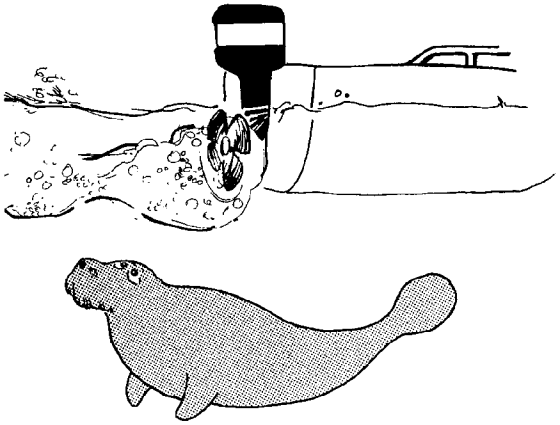
CARE AND FEEDING OF MANATEES

Manatees have rather simple needs:

1. **Food** - sea grasses from grassflats or beds - shoreline vegetation growing on stream and canal banks - floating weeds, waterhyacinth and hydrilla - overhanging branches - algae growing on boat bottoms.
2. **Water** - Some seem to like a supply of fresh water. They often drink from garden hoses or boat bilges.
3. **Warmth** - They move away from water below about 68° (21°c). Manatees are susceptible to pneumonia.
4. **Waterways** - of about 3 feet to migrate to food and warmth.

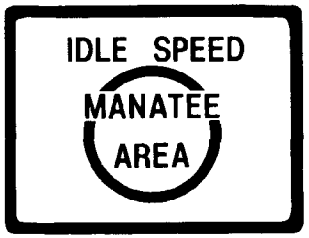


MANATEES, BOATERS AND MOTORS



Manatees don't seem to be able to avoid boats. Ninety percent have scars from boat collisions. Boats are the major cause of manatee mortality.

1. Use care in launching boats.
2. Use idle speed in known manatee waters.
3. Obey manatee enforcement signs.



FISHING

Monofilament line:

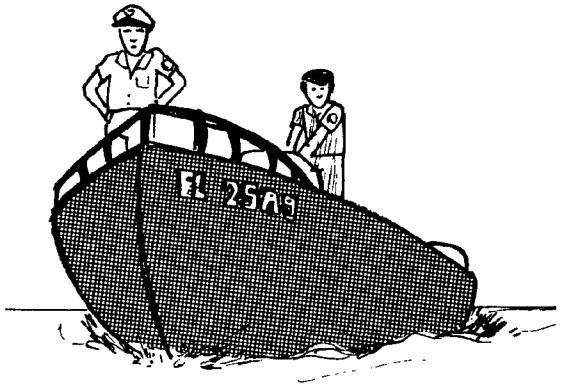
Use care in discarding monofilament line. Manatees as well as other wildlife are often injured when line wraps around flippers, fins or limbs.

Crabtraps:

Use tangle-free line, like hemp, to keep curious manatees from becoming wrapped in the rope, cutting off circulation, causing wounds and infection.

HOW YOU AND YOUR NEIGHBORS CAN HELP

1. Maintain natural shoreline vegetation and grassbeds as a food source and as a protective buffer.
2. Minimize the use of seawalls, artificial revetments and dredging on productive grassbeds.
3. Keep a record of manatee sightings on a calendar or data sheet to help researchers, enforcement officers and boaters in knowing when to look for the animals. (Record-keeping is important.)
4. Inform your neighbors about manatees, when they are present and how to look out for them. Call the Planning Dept. for a presentation for groups, organizations and classes.
5. Join manatee protection groups, like the Save the Manatee Club or local conservation groups like the Turkey Creek Sanctuary Committee.
6. Report incidents of manatee harassment, injury, or death to the City Police Department at 727-7100 or the Manatee Hot Line 1-800-342-1821.



LAWS PROTECTING MANATEES

The Marine Mammals Act and
The Endangered Species Act:

Protect manatees from harassment and killing; conviction can bring prison sentences of one year and/or fines of $10,000-$20,000.

Florida Manatee Sanctuary Act:

Protects manatees in Florida from disturbance, injury, harassment, and regulates boat speed in critical manatee concentration zones; like Turkey Creek, from the mouth to the Melbourne Tillman Canal at Minton Road.

ATTACHMENT III.

SUMMER PROGRAM SCHEDULE

ARTS & CRAFTS - will conducted Monday thru Thursday at the Community Center from 9:00am to 12 noon. Doors will be closed at 9:15, so please be prompt. You be allowed to leave, but not enter. Arts & Crafts will be conducted at Roach Park Tuesday & Thursday.

1st week - "Crafts Around The World"
2nd week - "Soaring Toys"
3rd week - "Weaving & Macrame"
4th week - "Painting & Drawing"
5th week - "Painting & Felt Projects"
6th week - "Woodcraft"
7th week - "Metal, Leather & String"
8th week - "Beads & Things"

PUPPETRY - every Friday from 9:00am to 12 noon at the Community Center. Learn what puppetry is, learn to be puppeteer, put on your own plays/skits and watch other puppeteers (puppet shows). **8 week program.

NATURE STUDY PROGRAM - will be conducted on Wed & Fridays from 9:00am to 11:00am at the Community Center (Room B). ***Open to all children in Palm Bay.

June 23 - Introduction to Turkey Creek (Diane Barile)
June 25 - Marine Fishlife (Leigh Johnson)
June 30 - Reptiles (Sgt. Kotowski)
July 2 - Native Plant Society (Margaret Haines) ?
July 7 - Game & Fish (Dave Cox)
July 9 - Manatee Movie (FPL)
JUly 14 - Artist Marcy Bartlett (sketch the wildlife)
July 16 - " " "
July 21 - Canoe Trips
July 23 - Canoe Trips
July 28 - Manatee (Diane Barile)
July 30 - County Forester (Frank Kler)
Aug 4 - FIT Manatee Presentation (Kirk Smith)
Aug 6 - Audobon Society (Pat Rose)
Aug 11 - CS Game

HUNTER EDUCATION -Purpose of this course is to teach Hunter & Firearm Safety and good sportsmanship(safe hunting habits, game management & ethics). Can become certified and receive a patch.

FREE program to any 10 - 15 year old (boy/girl). Course will run for 8 weeks, starting June 21st on Monday & Tuesday from 9:30am to 10:30am at the Community Center. 16 hour course. Minimum of 10 stu dents!

Conducted by Sgt. Kotowski

GAME ACTIVITIES - will be going on Monday thru Friday from 9:00am to 4:00pm at the Community Center. At Roach Park from 9:00am to 12:00 noon.

THEMES:
1st week - "Friendship Week "
2nd week - "Kite Week"
3rd week - "Games Week"
4th week - "Bike Week"
5th week - "Field Trip Week"
6th week - "Nature Week"
7th week - "Contest Week"
8th week - "Good-Bye Week"

CITY OF
PALM BAY
FLORIDA

175 NW PALM BAY RD. • 32905

February 18, 1982

Florida Marine Patrol
Mitch Needleman
4406 Sherwood Boulevard
Melbourne, FL 32935

Dear Officer Needleman:

The City of Palm Bay, Florida has dedicated itself to the protection of the manatees in Turkey Creek and the Indian River. The City has supported several studies of the manatee and served as a model for the development of a model local government manatee preservation program. A 1979 study reported 700 manatee sightings and identified 33 different individuals using the creek that year. We are currently implementing that program under a grant from the Florida Department of Environmental Regulation.

The Program calls for programs of public awareness and education, purchase of a shallow draft boat for increased enforcement capability, a survey of the manatee population and review of community ordinances for inclusion of manatee protection measures. The Police Department has assigned a conservation officer who, as described in the attached proposal, is to coordinate his efforts with those of the Florida Marine Patrol.

Homeowners on Turkey Creek and the Indian River have volunteered to monitor manatee occurrence and distribution in the creek. At a recent meeting, several of these landowners expressed concern over boat speeds in the creek and offered to support both the conservation officer and the Marine Patrol. This letter is therefore, to indicate support for the designation of Turkey Creek from the mouth to the Melbourne-Tillman dam as a manatee habitat with special restrictions for boat speeds. Earlier studies and recent observations reveal that the animals move from the creek to grass flats just to the north of Castaways Point and south of Palm Bay Point. This area should also be recognized in some way. As we discussed by telephone, twelve miles of canals in the Melbourne-Tillman Water Control District have been designated for navigation access. Some 798 lots have been sold bordering the canal. While there is little traffic there now this may be an area for consideration at a later date.

Thank you very much for your efforts on behalf of the manatees in Turkey Creek. I look forward to working with you in developing an enforcement program which will ensure their continued existence and haven in Palm Bay.

Sincerely,

Diane D. Barile
Project Manager

DDB:dok
Enclosure

Proclamation

CITY OF PALM BAY, FLORIDA

NOTICE AND PROCLAMATION OF

DESIGNATION OF THE FLORIDA MANATEE (TRICHECHUS MANATUS)
AS THE OFFICIAL CITY ANIMAL OF THE CITY OF PALM BAY

IT IS HEREBY PROCLAIMED BY THE MAYOR OF THE CITY OF PALM BAY, BREVARD COUNTY, FLORIDA, that:

WHEREAS, the City of Palm Bay provides refuge for this endangered species, and

WHEREAS, the City of Palm Bay is pursuing an aggressive program to protect and preserve the manatee by implementing conservation programs at a local government level, and

WHEREAS, such program is enthusiastically supported and endorsed by the school children of Palm Bay, along with other citizens of the City.

NOW, THEREFORE, I, William F. Madden, Mayor of the City of Palm Bay, Brevard County, Florida, by virtue of the authority of said office, do hereby proclaim the Florida Manatee as

THE OFFICIAL CITY ANIMAL OF PALM BAY

in recognition of its significance, along with the White Pelican, as a symbol of our natural heritage.

IN WITNESS WHEREOF, the City of Palm Bay has caused to be signed and the Seal of the City to be affixed this Twenty-Fifth day of March, Nineteen Hundred Eighty-Two.

William F. Madden, MAYOR

ATTEST:

Alice Huffer, CITY CLERK

REC'D MAR 29 1982

PLANNING DEPARTMENT

RESOLUTION NO. 82-12

A RESOLUTION OF THE CITY OF PALM BAY, BREVARD COUNTY, FLORIDA, DESIGNATING THE FLORIDA MANATEE (TRICHECHUS MANATUS) AS THE OFFICIAL CITY ANIMAL OF THE CITY OF PALM BAY; PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, the Governor of the State of Florida has recognized the contribution the manatee makes to the unique quality of life in the State of Florida by establishing the Save the Manatee Committee; and

WHEREAS, the City of Palm Bay provides refuge for this dwindling, endangered species and has designated Turkey Creek as an area of critical habitat; and

WHEREAS, the City of Palm Bay, assisted by a Coastal Management Grant for a manatee awareness program from the Florida Department of Environmental Regulation, is pursuing an aggressive program to protect and preserve the manatee by implementing conservation programs at a local government level; and

WHEREAS, such program is enthusiastically supported and endorsed by the school children of Palm Bay Elementary School and supported by all the children along with other citizens of our City;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF PALM BAY, BREVARD COUNTY, FLORIDA, as follows:

Section 1. The City Council of Palm Bay hereby designates the manatee as the official animal of the City of Palm Bay, and as such to take its rightful place with the white pelican as a symbol of the City of Palm Bay's commitment to the preservation of its natural heritage.

Section 2. This resolution shall become effective immediately upon its adoption.

That this Resolution was duly passed and adopted at Meeting Number 82-10 of the City Council of the City of Palm Bay, Brevard County, Florida, on the 25th day of March, 1982.

William F. Madden

William F. Madden, MAYOR

ATTEST:

Alice Huffer

Alice Huffer, CITY CLERK

RESOLUTION NO. 82-11

A RESOLUTION OF THE CITY OF PALM BAY, FLORIDA ESTABLISHING A CRITICAL HABITAT IN TURKEY CREEK AND ESTABLISHING COORDINATION OF BOAT SPEED REGULATION ENFORCEMENT WITH THE FLORIDA DEPARTMENT OF REGULATION; PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, of the 700 to 1,000 manatees known to exist in the United States, 33 individuals have been positively identified in Turkey Creek, and

WHEREAS, the City of Palm Bay Local Government Comprehensive Plan in the Coastal Protection/Conservation Element recognizes the existence of and the need and desire of the people of Palm Bay to protect the manatee population of Turkey Creek, and

WHEREAS, Section 370.12(2), Florida Statutes, provides that it is unlawful to kill, capture, possess, annoy, injure, molest or torture a manatee or sea cow except that the Division of Marine Resources of the Department of Natural Resources of the State of Florida may grant a permit to capture a manatee or sea cow if such is for a scientific or educational purpose, and

WHEREAS, the Endangered Species Act of 1973, 16 U.S.C. SS1531-1543, officially designates manatees as an endangered species which may become extinct unless afforded protection, and

WHEREAS, the beauty of the Turkey Creek area is an attractive wildlife habitat and popular recreational area for boating, hiking, education, and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF PALM BAY, BREVARD COUNTY, FLORIDA, that:

Section 1. The area of Turkey Creek be declared to be an area of critical habitat.

Section 2. The Florida Department of Natural Resources be requested to establish special enforcement zones within the creek and with a subsequent coordination of boat speed regulation enforcement with the Palm Bay Police Department.

BE IT FURTHER RESOLVED that this Resolution shall become effective upon its adoption.

That this Resolution was duly passed and adopted at Meeting Number 82-10 of the City Council of the City of Palm Bay, Brevard County, Florida, on the 25th day of March, 1982.

William F. Madden

William F. Madden, MAYOR

ATTEST:

Alice Huffer

Alice Huffer, CITY CLERK

APPENDIX VII

Proclamation

CITY OF PALM BAY, FLORIDA

NOTICE AND PROCLAMATION OF

TURKEY CREEK DAY
MAY 15, 1982

IT IS HEREBY PROCLAIMED BY THE MAYOR OF THE CITY OF PALM BAY, BREVARD COUNTY, FLORIDA, that

WHEREAS, Turkey Creek forms a valuable recreational asset to the citizens of Palm Bay for boating, fishing, canoeing and swimming, and

WHEREAS, Turkey Creek provides a productive natural environment for a diversity of wildlife, including the white pelican and the manatee, and

WHEREAS, historically the Creek formed the center of life in prehistoric times through indian cultures and later for the early development of the City, and

WHEREAS, the City of Palm Bay is dedicated to the protection of the natural amenities of the Creek and its environs as well as the enhancement of its recreational benefits.

NOW, THEREFORE, I, William F. Madden, Mayor of the City of Palm Bay, Brevard County, Florida, by virtue of the authority of said office, do hereby proclaim May 15, 1982 as

TURKEY CREEK DAY

in recognition of its significance to the natural, recreational, and historic significance to all the people of the community.

IN WITNESS WHEREOF, the City of Palm Bay has caused to be signed and the Seal of the City to be affixed this Sixth day of May, Nineteen Hundred Eighty-Two.

_____
William F. Madden, MAYOR

ATTEST:

_____
Alice Huffer, CITY CLERK

AN ORDINANCE OF THE CITY OF PALM BAY, FLORIDA, ESTABLISHING BOAT SPEED REGULATIONS IN TURKEY CREEK AND PORTIONS OF THE MELBOURNE TILLMAN WATER CONTROL DISTRICT.

WHEREAS, the 800-1000 Florida manatees are among the most endangered animals in the world and the official Florida State marine mammal, and

WHEREAS, the Florida manatee Trichechus Manatus has been proclaimed the official animal of the City of Palm Bay, and

WHEREAS, protection of the Florida manatee is recognized in the Local Government Comprehensive Plan of Palm Bay, and

WHEREAS, the Florida manatee regularly utilizes Turkey Creek for feeding, breeding, nursing the young and protection, and

WHEREAS, the vast majority of the manatees in Florida are scarred from wounds inflicted by power boat collisions, and

WHEREAS, wakes from speeding boats inflict damage to shorelines, vegetation and structures, causing erosion of banks, property damage and sedimentation, and

WHEREAS, the City of Palm Bay has conducted studies of manatee occurrence in Turkey Creek and determined that manatees utilize the Indian River, Turkey Creek, its tributaries and the main canal of the Melbourne-Tillman Water Control District.

NOW, THEREFORE, BE IT ENACTED BY THE CITY COUNCIL OF THE CITY OF PALM BAY, FLORIDA, as follows:

SECTION 1. That a new section of the Code of Ordinances of the City of Palm Bay, Florida entitled "Manatee and Shoreline Protection" is hereby created, which section shall read as follows:

"Section 1. Purpose and Intent:

The purpose of this chapter is to establish regulations for the protection of manatees and shorelines from the hazard of boat collision and destructive wave action.

The intent, in areas inhabited by manatees, is to reduce boat speeds to levels least injurious to the animals while providing navigation access to Turkey Creek. Additionally, it is the intent of this ordinance to control boat speeds to levels that will minimize impacts of boat wakes on soil erosion and wave action on the banks of Turkey Creek.

Section 2. Definitions:

When used in this ordinance, the following words shall have the indicated meanings unless the context clearly indicates otherwise.

1. "Critical area" means the area of Turkey Creek to the Melbourne-Tillman Drainage District central structure MS-1 and all tributaries and channels draining into Turkey Creek including C-1 to C-37.
2. "Idle speed" means the minimum speed that will maintain the steerageway of a motorboat.
3. "Idle speed zone" means a designated area within which it has been established that concentrations of manatees in large numbers are known to exist and within which all motorboat operators shall exercise a high degree of care for manatee presence, and shall not, unless authorized by a valid federal or state permit, either intentionally or negligently annoy, molest, harass, disturb, collide with, injure or harm manatees and shall proceed at the minimum speed that will maintain safe steerageway.
4. "Manatee" means Trichechus Manatus, West Indian manatee or sea cow.

Section 3. Exceptions:

The terms and provisions herein shall apply to all waterways within the reaches of Turkey Creek from a line from the end of Palm Bay Point to the U.S. Geodetic Survey marker on Castaway's Point to the juncture of the Melbourne-Tillman Water Control District Canal C-1 and C-37 with the exception of:

a. Boats of authorized enforcement agencies as the Florida Department of Natural Resources, Marine Patrol and the Palm Bay Police Department.

b. Rescue and emergency vessels, i.e.: U.S. Coast Guard, Power Squadron when responding to emergencies.

Section 4. Penalty:

a) With the exception of those instances listed in Section 3, it shall be unlawful for any person at any time, by any means, or in any manner, to either intentionally or negligently, annoy, molest, harass, or disturb any manatee or to injure, harm or attempt to injure or harm any manatee. Any person violating this provision shall be guilty of a misdeameanor of the first degree, punishable as provided in section 775.082, section 775.083 or section 775.084 F.S.

b) Any person violating or otherwise failing to comply with the rules herein promulgated relating to boat speeds and operation shall be guilty of a misdeameanor of the second degree, punishable as provided in section 775.082 or section 775.083 F.S."

SECTION 2. This ordinance shall take effect immediately upon its passage. READ IN FULL at Meeting Number _____, held on _____; and read in title at Meeting Number _____, held on _____, 1982.

_____
William F. Madden, MAYOR

ATTEST:

_____
Alice Huffer, CITY CLERK

RESOLUTION NO 82-

A RESOLUTION OF THE CITY OF PALM BAY, FLORIDA ESTABLISHING ELIGIBILITY FOR PARTICIPATION IN FLORIDA RECREATION DEVELOPMENT ASSISTANCE PROGRAM AS ADMINISTERED BY THE FLORIDA DEPARTMENT OF NATURAL RESOURCES, REQUESTING FINANCIAL ASSISTANCE UNDER THE PROGRAM, AND TO BE IN COMPLIANCE WITH THE FLORIDA RECREATION DEVELOPMENT ASSISTANCE PROGRAM; PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, the Turkey Creek Nature Sanctuary and Community Center sites have unique historic, educational, recreational and environmental assets and offer habitat for rare and endangered plants and animals which need to be protected and preserved for the present and future enjoyment of the people of Palm Bay and Brevard County, and

WHEREAS, the City of Palm Bay's adopted Comprehensive Plan has indentified the need for additional park sites and recreational opportunities for all of our citizens, and

WHEREAS, the City of Palm Bay's adopted Comprehensive Plan Recreation and Open Space element, policy 3-B6, specifically states that the City should coordinate the use and development of the Community Center site with the abutting property of the Audubon Society.

WHEREAS, the Community Center and Audubon Society sites have and should continue to be an attractive center of recreation for the people of Palm Bay and Brevard County, and

WHEREAS, the City of Palm Bay became incorporated on January 16, 1960, as a city under the authority of the laws of Florida Chapter 61-2629. NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF PALM BAY, BREVARD COUNTY, FLORIDA, that:

Section 1. The City Council is hereby indicating its intent to participate in the Florida Recreation Development Assistance Grant Program.

Section 2. The City Council is hereby requesting financial assistance from the Florida Department of Natural Resources through the Florida Recreation Development Assistance Program for funds to make improvements to the Turkey Creek Sanctuary.

Section 3. The City Council is willing to cooperate with the Florida Department of Natural Resources in matters relating to the City's Application, including operation and maintenance of the facility in accordance with grant criteria.

Section 4. The City Council will assist and support the State of Florida in maintaining its eligibility for program participation.

Section 5. Mrs. Diane Barile, employed by the City as an Environmental Planning Consultant, at the address of 175 NW Palm Bay Road, Palm Bay, Florida, is designated to serve as the liaison agent for matters pertaining to the grant application.

BE IT FURTHER RESOLVED that this Resolution shall become effective upon its adoption.

That this Resolution was duly passed and adopted at Meeting Number_____ of the City Council of the City of Palm Bay, Brevard County, Florida on the _____day of _____1982.

William F. Madden MAYOR

ATTEST:

Alice Huffer, CITY CLERK

SURVEY OF MANATEE IN TURKEY CREEK

by
Todd Gipe

INTRODUCTION

The Florida manatee or sea cow Trichechus manatus is an aquatic mammal of the order Sirenia. The manatees and other Sirenians are unique in that they are the only herbivorous mammals adapted to an entirely aquatic existence. Therefore, the manatees occupy a unique niche in the ecology of Florida's coastal and adjoining inland waters.

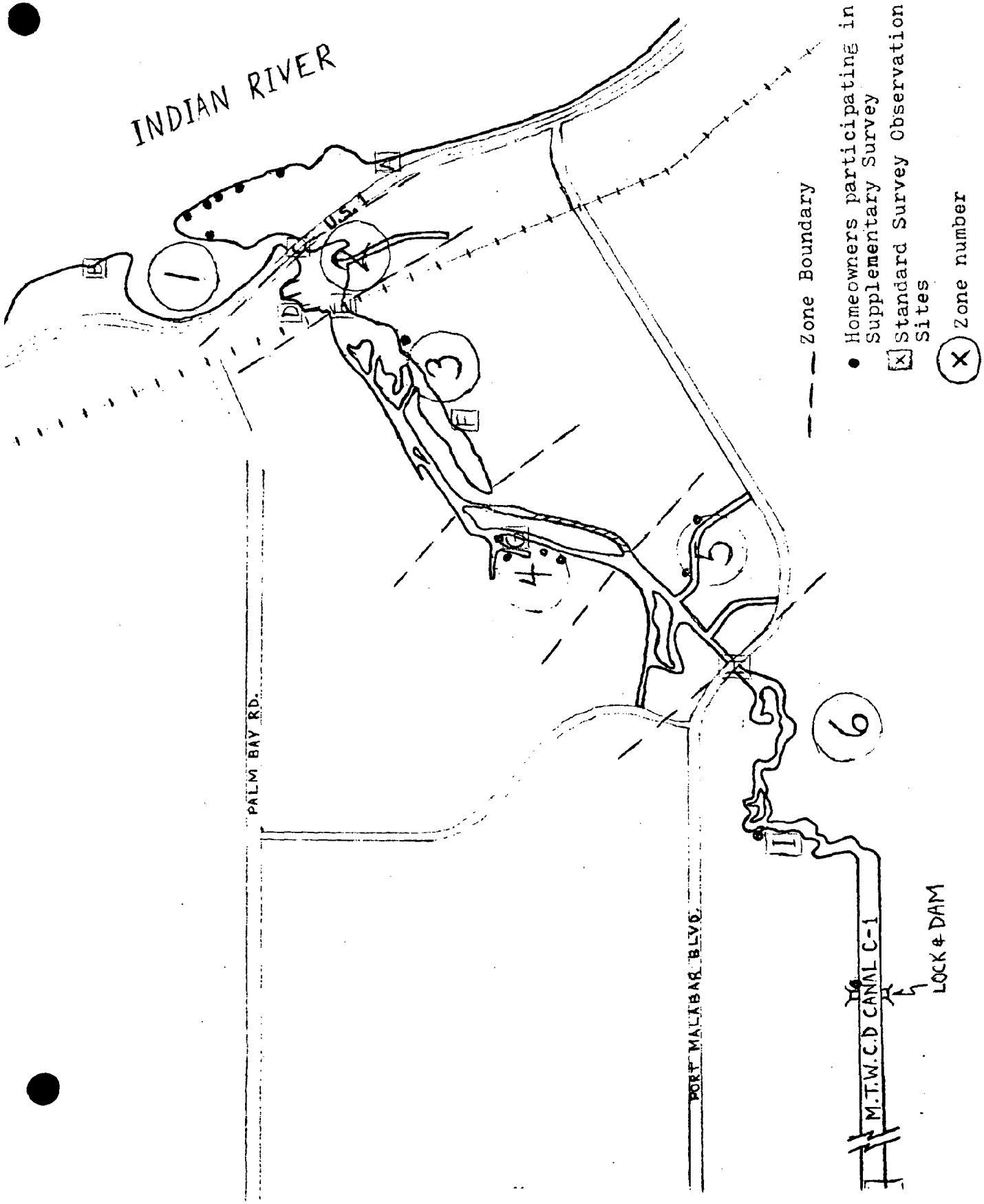
Manatee populations have been reduced to between 800 and 1,000 individuals (Campbell and Powell, 1976; Hartman, 1974) by past exploitation for meat and oil and continual man-related injury or habitat loss. Consequently, Trichechus manatus has been declared a federally endangered species by the United States Department of Interior and is protected by the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, and the Florida Manatee Sanctuary Act of 1979.

Beyond the protection provided by these federal and state laws, local governments can also assume an important role in manatee preservation. A model local government manatee preservation program has been formulated (Barile, Ostergaard, and Tiedemann, 1980) to determine the appropriate steps to be taken. An integral part of this plan is a survey of the local manatee population to determine the characteristics and extent of utilization of the habitat by the manatees. The results of the survey can then be used by the local government to help educate the public, to formulate regulations and city ordinances, and to improve enforcement of legislation. This survey of the manatees of Turkey Creek is part of the city of Palm Bay's efforts to implement the local government manatee preservation program.

A significant portion of Florida's manatee population inhabits or passes through Brevard County waters. Hartman (1974) reports that the area may contain the largest residual population of manatees in Florida. Aerial census (Irvine and Campbell, 1978; Leatherwood, 1979) have documented their presence in Brevard County waters, including the Indian River adjacent to Palm Bay. Herds of manatees in Turkey Creek have been reported as early as the sixties (Layne, 1965). Tiedemann (1979) has established that the manatees utilized Turkey Creek from March through December.

Turkey Creek lies in southern Brevard County between latitudes 28° 0.8' and 28° 2.3' N and longitudes 80° 34.7' and 80° 36.3' W. In 1924, the outlet canal of the Melbourne-Tillman Water Control District was connected to the creek (see Figure 1). The 200 mile system of canals is now the major input into the creek (Barile, 1976). The creek empties into the Indian River after widening into a small bay. A standard biological survey of the manatees extended the entire length of the creek and also included observation sites on the main Melbourne-Tillman Water Control Canal C-1 and on the west bank of the Indian River near the mouth of Turkey Creek. A supplementary survey was performed by volunteer observers located along the creek, river, and drainage canals at various locations as indicated in Figure 1.

FIGURE 1- Map of Study Area and Observation Sites



METHODS

Two surveys were undertaken in order to determine manatee abundance, distribution, and utilization of Turkey Creek, the adjoining canals, and the Indian River adjacent to the city of Palm Bay. A standard biological survey was undertaken. A supplementary survey was performed by a group of waterfront homeowners who volunteered to observe and record the occurrence and activity of manatees seen from their property.

Standard Survey

Ten observation sites were selected on the basis of accessibility and vantage in order to provide a set of locations dispersed throughout the study area. The sites, as shown in Figure 1, are: (a) the Napoli Restaurant patio; (b) the docks of Castaway Point; (c) the U.S. Highway 1 Turkey Creek overpass, both upstream and downstream sides; (d) the Pelican Harbor Marina docks and the seawall to its west; (e) the Florida East Coast Railroad trestle; (f) the Bethesda Retirement Home dock; (g) the seawall off of East Citrus Court; (h) the Port Malabar Boulevard overpass; (i) two sites in the Turkey Creek Nature Sanctuary, i.e. the "swimming hole," and the sand bluff area; and (j) the Babcock Street Bridge.

In most cases a survey consisted of visiting all the sites. Site (b) was omitted after a few weeks of observation. Because of the location of the two overpasses on the creek, surveys were generally begun at site (g) and visited in a clockwise direction around the creek ending at site (j) (see Figure 1), or begun at site (j) and visited in a counter-clockwise direction ending with site (g). Beginning on May 29th, some surveys consisted of visiting only one or a few sites for an extended period of time.

Surveys were conducted a mode of four days per week and occasionally five or six. Starting times for the survey were distributed throughout the daylight hours to aid in detection of any temporal patterns. Formal surveys began on January 20, 1982 and continued through September 4, 1982.

Upon arrival to any survey site, the time and location were recorded. If manatees were not readily evident, the area was slowly scanned from side to side. Indications of a manatee, such as a swirling surface boil or a glimpse of a possible snout, were checked with binoculars. If no manatees were seen, the site was scanned for a minimum of 15 minutes.

If manatees were sighted, they were observed until an accurate determination of the number of animals present and their activity were assessed, always for a minimum of 15 minutes. Field notes included: the number of manatees present, an estimation of their size when possible, description of individuals and their behavior, and identification of the animals when possible.

Behaviors recorded include:

Cruising - an extended period of swimming

Resting (surface or bottom) - remaining motionless on bottom or surface except to breathe

Feeding

Body Contact

Drinking

Mating

Playing - animals rolling over one another, chasing, or engaging in a follow-the-leader game with rapid movement and frequent body contact

Identification was made when distinguishing characteristics such as color, algae, scars, barnacles, skin blemishes, and fluke notches were evident. Characteristics of identified animals were sketched on a separate identification sheet (See Appendix A) which includes a description, composite drawing, and date and location of the initial sighting and subsequent resightings. This aids in determining the number of identifiable manatees which frequent the creek and their length of habitation.

In addition, other information such as changes in water clarity or level, changes in vegetation, boat activity, and sightings of other animals were recorded when deemed to be pertinent.

Field notes were transcribed into tabular form as to sightings made and behaviors. The sightings are compiled in Appendix B and include the date of each survey, location of manatees sighted, the number seen and time of observation, as well as the number seen per survey for each week's data. Behavioral data from manatees sighted were compiled by zone for each week's data. Data are tabulated in Appendix C and includes the total number of manatees sighted per week and how many of those sighted engaged in each of the behavioral classes considered. Frequency of each behavior per zone was calculated and presented in Table 1.

Supplementary Survey

Volunteer spotters were solicited by advertising in the local newspapers and by distributing flyers to the houses along the creek and river. These volunteers were invited to attend a meeting to educate and instruct them on manatees and procedure for recording data. Appendix A contains the instruction sheet, and sample data and identification sheets which were distributed to the volunteers. The volunteers were urged to make at least one observation per day, as their schedule allowed. They were instructed to observe a minimum of 15 minutes per survey. Each volunteer observed the creek, river, or canal area adjacent to his/her property, often from an excellent vantage point. The field notes were recorded on special data sheets (See Appendix A for a sample) and included the same information as on the standard survey. Observations began in early February and were to continue until the supposed cold-induced absence of manatees in the winter of 1982-83.

TABLE 1- Summary of behaviors by Zone; the total number sighted in the standard survey is given; out of the total sighted, the number of manatees engaging in each behavior is given along with the percentage (in this set-up, it is possible to have 100% of the manatees within a zone to engage in each behavioral class — this occurs because within a given observation period, a manatee may have been active in several behaviors)

ZONE	TOTAL NO. SIGHTED		CRUISING		FEEDING		RESTING		MATING		DRINKING		PLAYING	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	29	8.2	29	100	3	10.3	0	0	0	0	0	0	3	10.3
2	277	78.2	88	31.8	19	6.9	126	45.5	59	21.3	2	0.7	25	9.0
3	36	10.2	27	75.0	1	2.8	6	16.7	4	11.1	0	0	2	5.6
4	4	1.1	4	100	1	25.0	0	0	0	0	0	0	0	0
5	3	0.9	3	100	0	0	0	0	0	0	0	0	0	0
6	5	1.4	3	60.0	1	20.0	1	20.0	0	0	0	0	0	0
TOTAL	354	100	154	43.5	25	7.1	133	37.6	63	17.8	2	0.6	30	8.5

Although 38 waterfront homeowners volunteered for this supplementary survey, only 15 consistently observed and reported their data. The creek was arbitrarily divided into six zones to aid in data analysis. There were six volunteer spotters in Zone 1, none in Zone 2, one in Zone 3, four in Zone 4, two in Zone 5, and two in Zone 6 as indicated in Figure 1. The number of manatees sighted per each zone by the volunteers was compiled and is presented in Table 2 and Figure 5. Behavioral data was treated informally and general patterns, if any, were determined directly from the field data sheets and personal correspondence with the volunteers. All manatee sightings from both surveys were pooled in order to analyze where manatees were located with respect to time of day. These data are plotted in Figure 7.

Data was analyzed and interpreted at face value since statistical tests may have shown where significant differences occurred but not which of the variables was responsible for the differences. Further, the emphasis of this study is not on determining why significant differences in numbers exist, but merely documenting numbers of manatees present at certain locations in order to make preservation recommendations.

RESULTS

Standard Survey

During the 228 days which the study spanned, 141 survey days were logged. The distribution of starting times for the surveys is presented in Figure 8. Forty-five percent of the surveys were begun during the morning and 55 percent were begun during the afternoon hours. A total of 354 sightings was made during the study: 29 in Zone 1; 277 in Zone 2; 36 in Zone 3; 4 in Zone 4; 3 in Zone 5; 5 in Zone 6. Figure 2 shows the average number of manatees seen per survey for each week. This gives us an indication of how the number of manatees utilizing any portion of the study area changes with the seasons. Once they returned in January, the manatees utilized the area throughout the remainder of the study period although number present seemed to decrease toward the end of the summer. Figures 3 and 4 illustrate how the number of manatees observed in each zone changed over the course of the study. It is evident that far more manatees (78.2%) were sighted in Zone 2 than the other areas. Further, Zones 4, 5, and 6 contained fewer sightings than the areas more toward the creek's mouth (Zones 1, 2, and 3).

A total of 41 manatees (12%) were identified including a composite drawing and description of each (See Appendix D). Six animals were resighted: four were resighted once, one was resighted twice, and another was resighted on four separate occasions. Using these resightings, the longest documented period of residence by a manatee was 30 days. Results of behavioral data are presented in Table 1. The most common behavior was cruising, which was shown in 43.5% of all observed manatees. All manatees observed in Zones 1, 4, and 5 were cruising for at least a portion of the observation period. Thirty-seven and six tenth percent (37.6%) of all manatees sighted were resting - 73% of those resting were resting on the bottom and 27% were at the surface; 17.8% of all

TABLE 2

The following depicts the number of manatees sighted by the volunteer observers per zone each week (no volunteers in Zone 2):

WEEK	ZONE 1	ZONE 3	ZONE 4	ZONE 5	ZONE 6
1/24-1/30	0	0	0	0	0
1/31-2/6	1	0	0	0	0
2/7-2/13	2	0	5	0	0
2/14-2/20	1	0	1	0	0
2/21-2/27	2	0	0	0	0
2/28-3/6	12	0	7	0	0
3/7-3/13	10	0	1	0	0
3/14-3/20	9	0	7	0	0
3/21-3/27	3	0	2	0	0
3/28-4/3	8	0	9	0	0
4/4-4/10	22	0	7	0	0
4/11-4/17	7	1	7	0	2
4/18-4/24	8	2	9	0	1
4/25-5/1	20	0	6	0	8
5/2-5/8	5	0	6	0	0
5/9-5/15	7	0	7	0	0
5/16-5/22	29	6	0	0	0
5/23-5/29	9	6	0	0	3
5/30-6/5	37	3	0	0	5
6/6-6/12	19	1	12	0	4
6/13-6/19	20	0	1	0	0
6/20-6/26	24	9	0	0	0
6/27-7/3	12	2	0	3	0
7/4-7/10	12	0	9	0	2
7/11-7/17	6	1	0	8	2
7/18-7/24	6	0	2	0	5
7/25-7/31	0	0	0	3	7
8/1-8/7	3	0	2	0	2
8/8-8/14	2	0	0	1	2

TABLE 2
(Cont'd)

WEEK	ZONE 1	ZONE 3	ZONE 4	ZONE 5	ZONE 6
8/15-8/21	1	0	0	0	0
8/22-8/28	5	0	2	0	0
8/29-9/4	0	0	0	0	1
9/5-9/11	0	0	1	0	0

FIGURE 2- Plot of average number of manatees observed per survey during each week of the standard survey

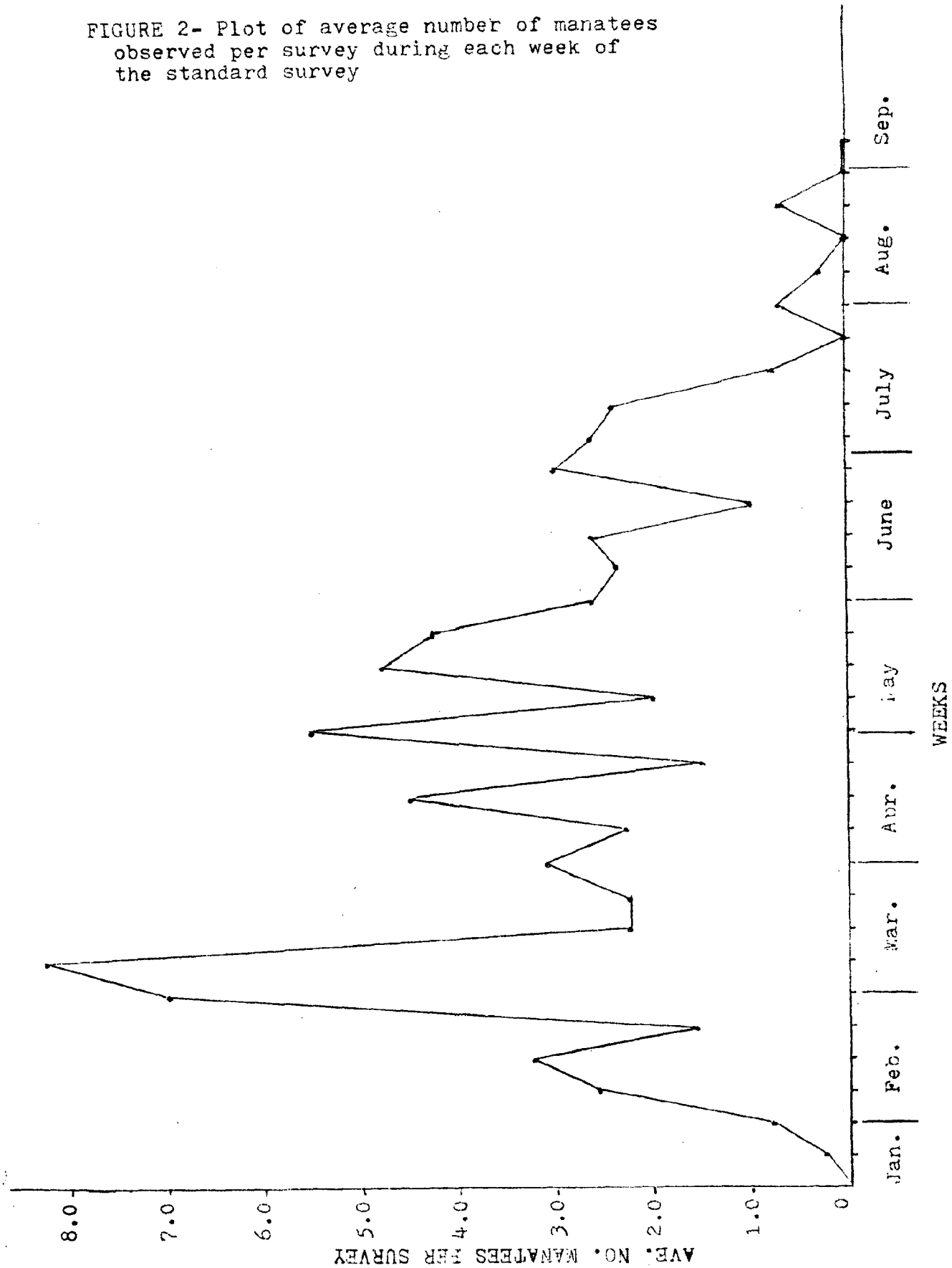


Fig 2

FIGURE 3- Standard Survey; Plot of total number of manatees observed, per week, in Zones 1, 2, and 3

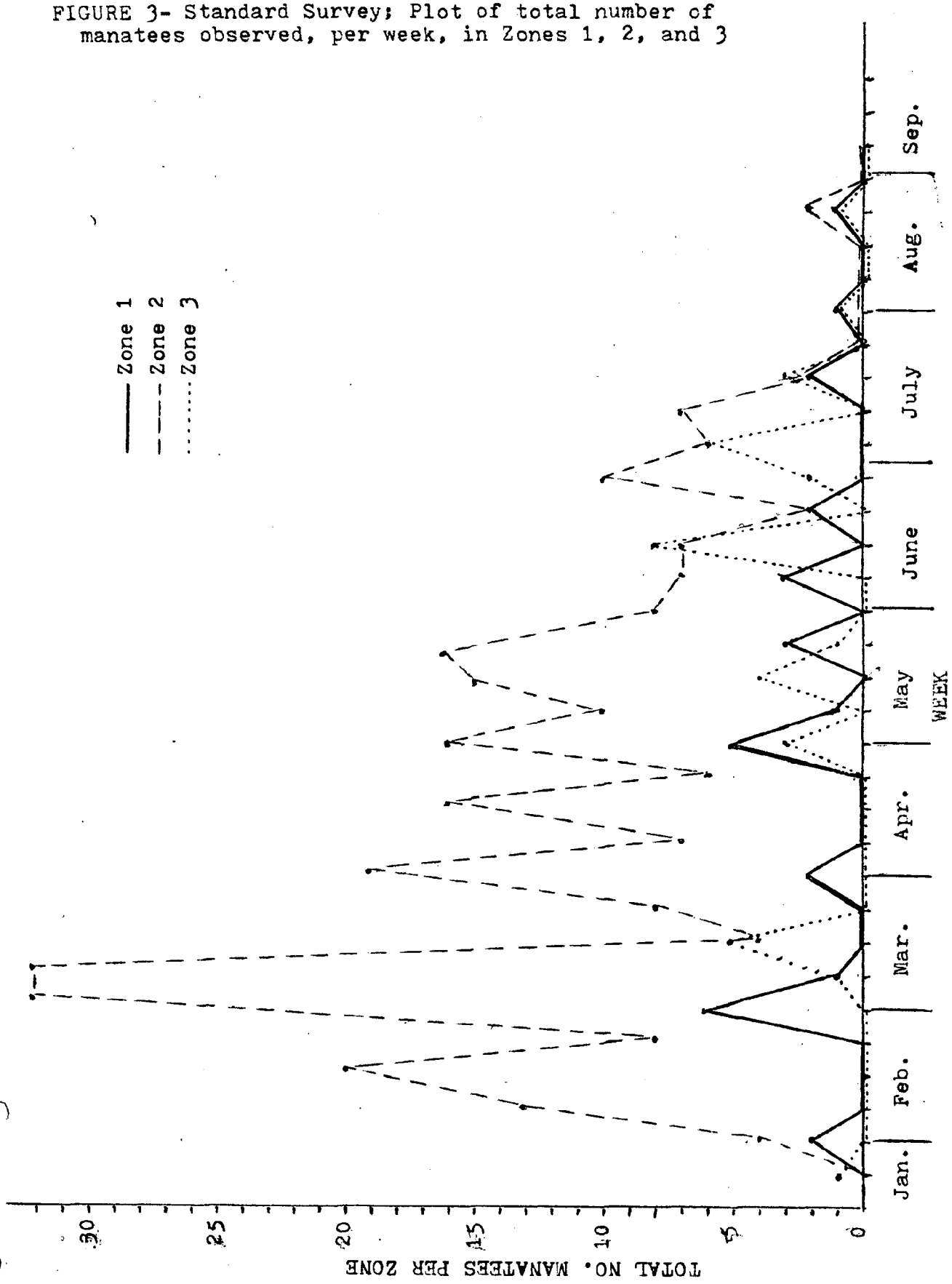


Fig 3

FIGURE 4- Standard Survey; Plot of total number of manatees observed, per week, in Zones 4, 5, and 6

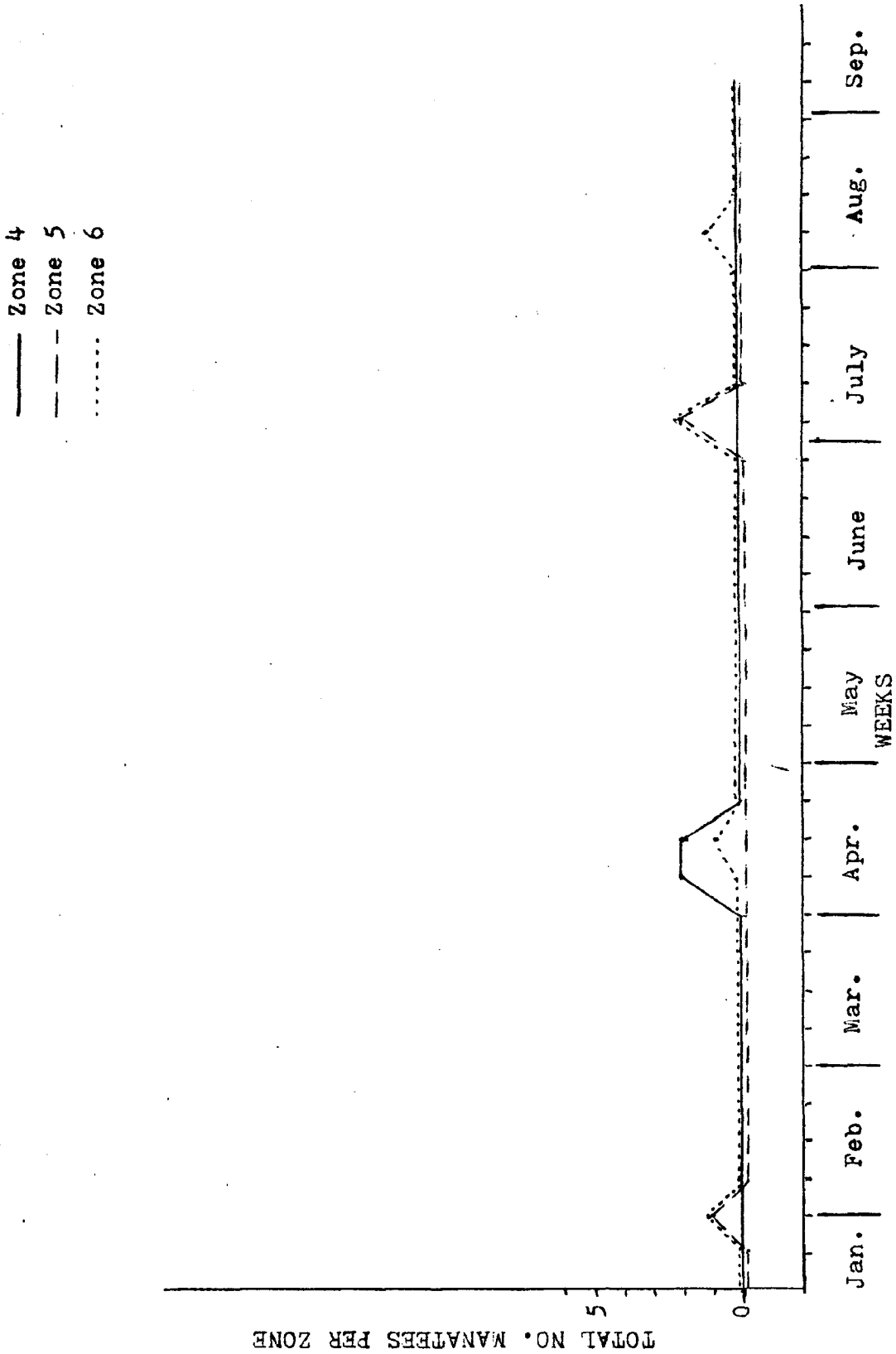


Fig 4

FIGURE 5- Supplementary Survey; Plots of total number of manatees observed, per week, in Zones 1 and 3

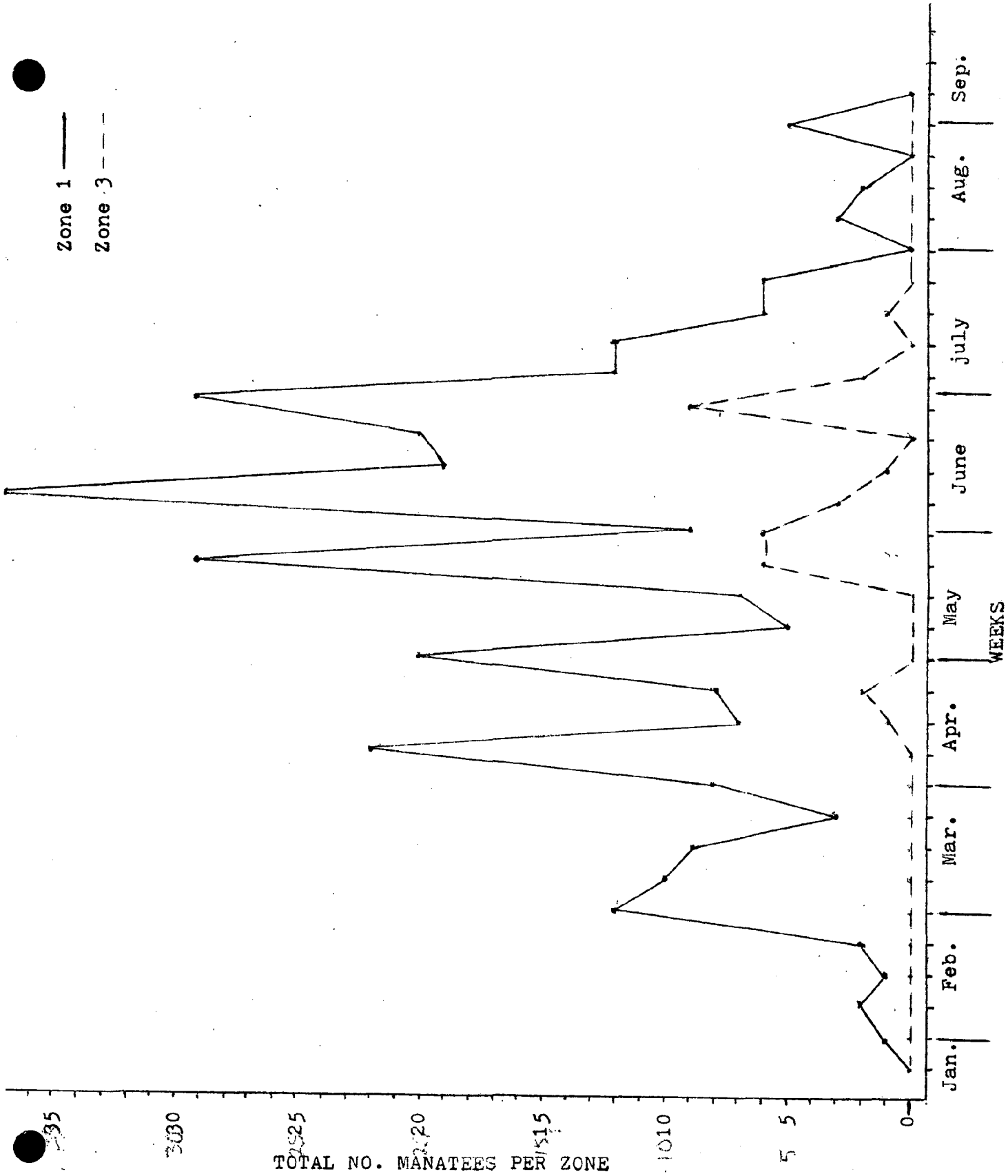
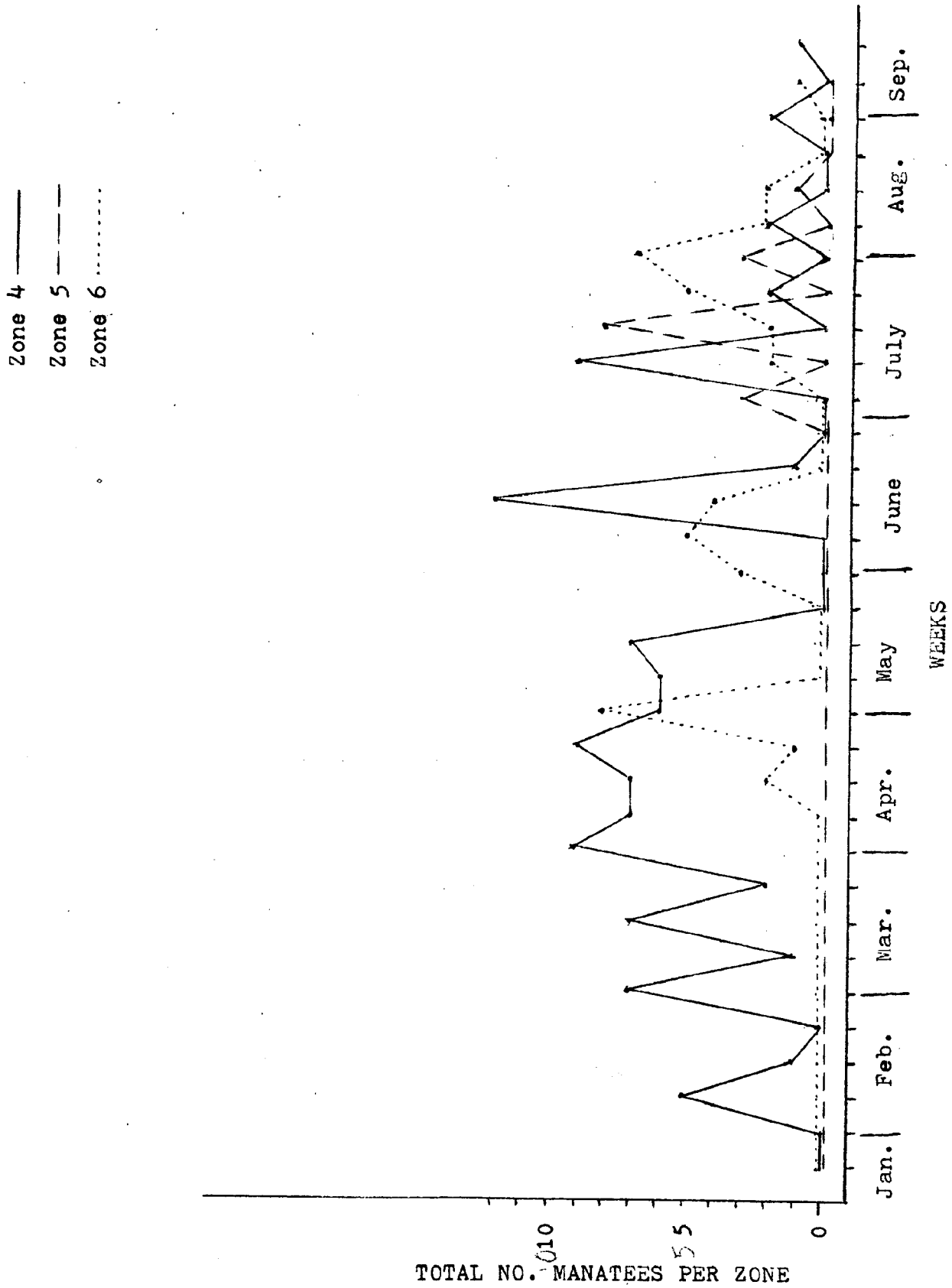


FIGURE 6- Supplementary Survey; Plots of total number of manatees observed, per week, in Zones 4, 5, and 6



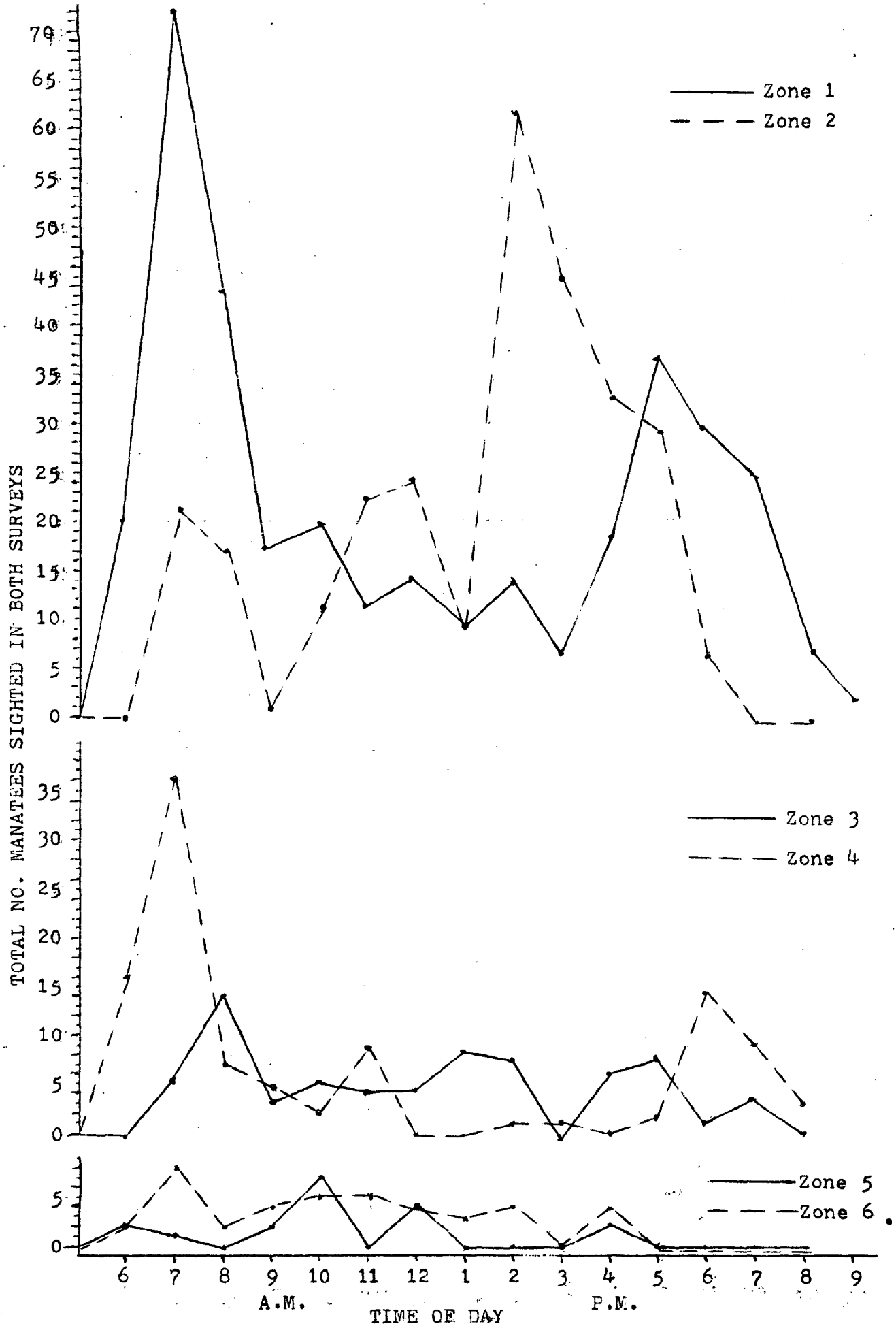
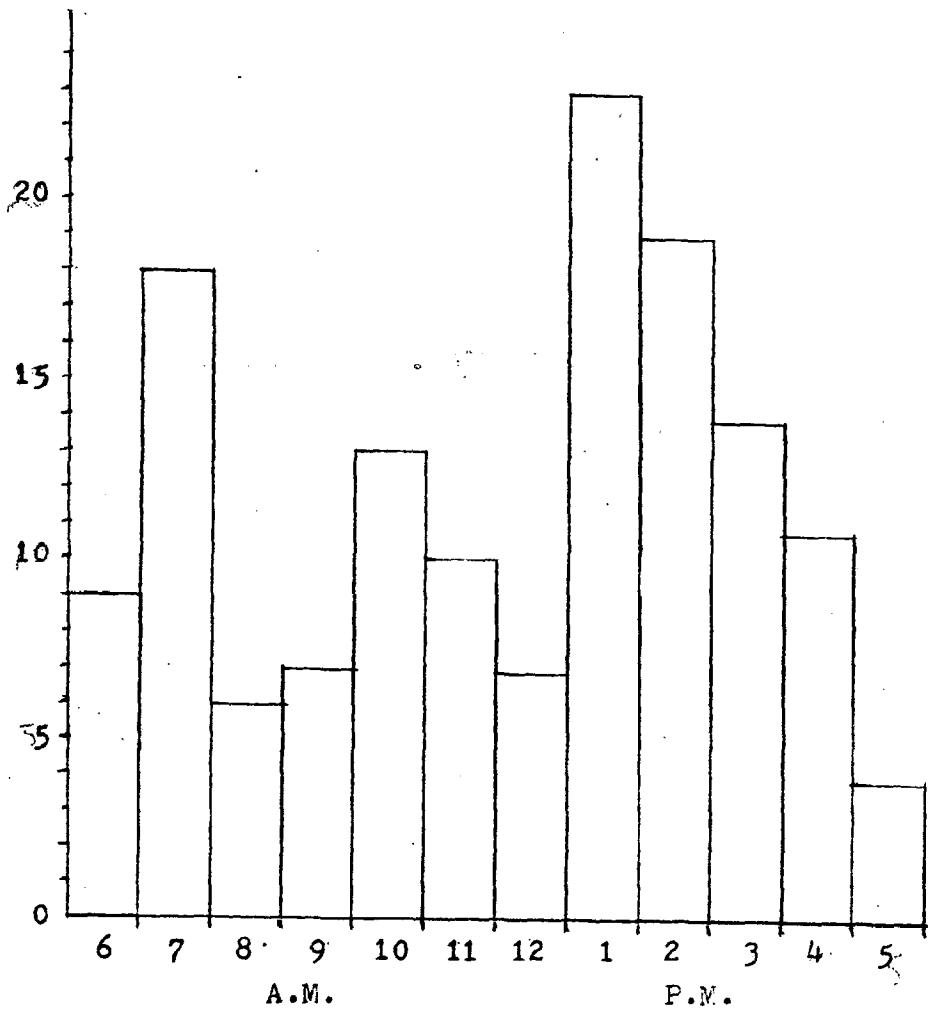


FIGURE 7- Plots of total number of manatees sighted within each zone as related to time of day (indicated by hour intervals, i.e. 6:00 - 6:59, 7:00 - 7:59, etc.)

FIGURE 8- Histogram of hours in which the standard surveys were begun



Hour in which survey was begun

manatees observed were engaged in mating behavior. Most of the mating (94%) occurred in Zone 2, the rest in Zone 3. Playing was exhibited by 8.5% of all animals observed. Feeding was observed even less often, occurring in only 7.1% of the observations of manatees. Food items listed in order from those eaten most to least often were: Typha, overhanging grass, boat algae, Hydrilla and Eichornia, and Potamogeton. Drinking was observed only twice during the study, both times occurring at a garden hose hanging off of a Pelican Harbor Marina dock (Zone 2).

Supplementary Survey

A total of 490 sightings were made: 307 in Zone 1, (no volunteers in Zone 2), 31 in Zone 3, 93 in Zone 4, 15 in Zone 5, and 44 in Zone 6. The relationships between the number of manatees observed in each zone and the time of year are plotted in Figures 5 and 6. Manatees were seen in Zones 1 and 4 throughout the study period. Manatees were not sighted in Zone 5 until July. Zone 1 had the greatest number of manatees ovserved and was associated with the highest number of observers per zone. Zone 4 had the next greatest number of manatees sighted by the second highest number of volunteers. The remaining zones had only one or two volunteer observers each. Identification of 13 manatees was achieved but no resightings were reported.

From the behaviors recorded, a brief characterization was made for each zone. In Zone 1 the vast majority of manatees were seen cruising north in the Indian River heading up Turkey Creek toward the U.S. 1 bridge from 6:00 to 12:00 a.m. In the late afternoon to evening, they are generally heading out of Turkey Creek and south in the Indian River. They were generally seen cruising, only occasionally playing, feeding, or resting. When traveling in the river, they cruised anywhere from along the shore to near the channel. Violating this general pattern, there may have been a few manatees, at any given time, which were moving opposite the general direction of travel.

In Zone 3 manatees were observed feeding on Eichornia or Typha along the observer's dock and also mating, playing, or cruising either up or downstream. In Zone 4 the majority were seen traveling downstream in the morning from 6:30 to 9:45 a.m. It should be noted that all of those seen traveling downstream did so in that morning time range. Seventy-one percent (71%) of those observed cruising upstream did so in the evening and 29% in the morning. The general activity was cruising, although a few played or fed. In Zone 5, 15 sightings were made for the entire study period. There was a lack of volunteers in this area. A calf which was the victim of a perinatal death was found in the Cadillac Waterway (a residential canal). Eight other sightings of manatees feeding in this same canal were made. The final observation in this zone consisted of a group of six manatees traveling downstream in the morning. In Zone 6, manatees were usually seen feeding near the lock gate and fender on plants that had been flushed from the lock. On two separate occasions, a pair of manatees were seen inside the lock itself, once when the lower gate was still open and once after it had been closed. Several manatees were known to have passed to the west of the lock and dam presumably by swimming under raised radial floodgates. They were observed on the west side twice by the locktender and once by a homeowner living along the canal 2.75 miles from the lock and dam.

All manatee sightings from both the standard and supplementary surveys were combined in order to uncover any daily patterns of distribution in terms of both location and numbers present in a given area at a given time of day. These data are presented in Table 3 and plotted in Figure 7. Manatees sighted in Zones 3, 5 and 6 were spread fairly evenly throughout the daylight hours. The two major peaks in the plot for Zone 1 occur in the morning and evening hours as do the peaks for Zone 4. Zone 2 shows a peak occurrence of sightings in the late afternoon with two subpeaks earlier in the day. Plots for Zones 1, 2 and 4 are skewed enough to suggest that daily patterns may be present.

DISCUSSION

In performing the standard survey, several factors led to reduced effectiveness of observation. Site B, located just north of the mouth of Turkey Creek, was omitted after February 16, 1982. It was a poor vantage point, only slightly above the water level. Thus, even a mild wind would greatly reduce observational ability. The water near Site B was also quite shallow and therefore any manatees sighted would have to be seen over a fair distance. Site A, located south of the creek's mouth on the west bank of the Indian River, was elevated well above water level but was less than ideal because it is far from the water. Again, the water near the shore below Site A was too shallow (one foot) for regular manatee use, resulting in the need to scan an even greater distance for manatees. It is believed that these factors were the reason that no manatees were sighted from this point, since volunteer observers who live along the river have consistently documented manatee presence in this area.

Permission to use the docks of Pelican Harbor Marina (Site D, Zone 2) was denied one month after observations began. Manatees frequent this area and deletion of this site had an adverse impact on survey results. A previous study in Turkey Creek (Tiedemann, 1979) showed that manatees were found at the Pelican Harbor Marina docks more often than any other observation site. Out of the 45 animals that Tiedemann identified, 88.9% were first sighted at the marina docks. Furthermore, 97.4% (112/115) of the resightings of those identified manatees occurred at this site. In the present study, manatees were seen in 12 out of the 14 surveys in which we could utilize the docks as an observation site. It is obvious that an important segment of data was forfeited by the loss of this area as an observation site. The seawall directly west of the docks was introduced to replace the loss of Site D, but it did not afford the access and flexibility of movement that the docks offered.

The supplementary survey which was executed by the volunteers was useful for providing additional data from locations where the standard survey was not possible. In Zones 3, 5 and 6 the data must be looked at as additional sightings only, because the number of volunteers and frequency of their observations was not adequate to make valid conclusions on utilization patterns. However in Zones 1 and 4, there were several observers who regularly observed manatees and consistently reported their findings. These data were sufficiently systematic to allow their use in further analysis.

TABLE 3

Daily Distribution Analysis - Data from both the standard and supplementary surveys are combined and number of manatees sighted in each zone during the daylight hours are presented.

TIME OF DAY (hours)

	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
ZONE 1																
Supplementary	20	69	34	17	19	9	11	8	7	5	18	33	29	24	7	2
Standard	0	3	9	0	0	2	3	1	6	1	0	4	0	0	0	0
Total	20	72	43	17	19	11	14	9	13	6	18	37	29	24	7	2
ZONE 2																
Supplementary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standard	0	21	17	1	11	23	24	9	61	44	32	29	6	0	0	0
Total	0	21	17	1	11	23	24	9	61	44	32	29	6	0	0	0
ZONE 3																
Supplementary	0	1	9	3	4	2	3	1	4	0	0	1	0	3	0	0
Standard	0	4	5	0	1	2	1	7	3	0	6	6	1	0	0	0
Total	0	5	14	3	5	4	4	8	7	0	6	7	1	3	0	0
ZONE 4																
Supplementary	14	34	7	4	2	8	0	0	1	1	0	2	14	9	3	0
Standard	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	36	7	4	2	8	0	0	1	1	0	2	14	9	3	0
ZONE 5																
Supplementary	0	0	0	2	6	0	4	0	0	0	2	0	0	0	0	0
Standard	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Total	2	1	0	2	7	0	4	0	0	0	2	0	0	0	0	0
ZONE 6																
Supplementary	0	8	2	4	4	4	3	3	4	0	4	0	0	0	0	0
Standard	2	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
Total	2	8	2	4	5	5	4	3	4	0	4	0	0	0	0	0

Although there have been isolated reports in the past of manatee sightings in the coldest months, this study discovered an absence of manatees during most of January. The first sighting was on January 30th. It should be noted that this manatee was resting in the effluent of a warm spring entering the creek from Bethesda Retirement Home. Tiedemann (1979) found that there was a cold-induced absence of manatees throughout January and February, the first sighting being made in early March. The winter in which the present study began was relatively mild compared to the winter of '78-79 in which Tiedemann's study occurred. Thus, the dissemination of manatees in the Brevard County waters from the warm water refugia may very well be directly related to water temperature. These results suggest that movement away from the refugia is triggered by thermal and not seasonal or time related stimuli.

Other than cold-induced aggregations at warm water refugia, little is known about seasonal patterns of travel or habitat usage by the manatees. Manatees utilized Turkey Creek throughout the year. As seen in Figures 2 through 6, there is much deviation in the number of manatees observed as it changed with time, in this case represented by weeks. However, there is so much fluctuation that it appears there is no clear-cut pattern. Still, we may make a few assumptions based on the data. It is clearly evident that more manatees were observed in Zones 1 and 2 than in the areas further upstream. However, many animals were observed regularly in Zones 4 and 6. There are indications of daily movement of the manatees in this area which are not readily subject to observation. Therefore, it may be that the manatees utilized the creek equally throughout the year and simply were not observed because of the limitations of the experimental design. It is also possible that utilizaiton of the creek shifts slightly with the season. The beginning of the decrease in numbers observed in the standard survey in Zone 2 coincides with a general increase in the number observed by volunteers in Zone 1. It may be that the manatees utilized the waters of the Indian River with its nearby grass flats more often as the summer progressed. Perhaps a change in vegetation or a change in temperature is responsible for this shift.

There is evidence that the manatees in Palm Bay exhibit a daily pattern in utilization of the creek and river. The standard survey covered only a small portion of Zone 1 just east of the U.S. 1 overpass. Volunteer observers along the bay and river were relied upon to complete the coverage of this area. As seen in Figure 7, the graph of daily occurrence for Zone 1 and 4, show peak numbers at two different times of day - in the early morning and in the evening hours. In addition, direction of travel was almost always in one direction for a given peak time. Manatees sighted in Zone 1 were observed to be heading out towards the river and southward along the west bank in the evening and northward and upstream in Zone 1 in the morning. Conversely, manatees sighted in Zone 4 were seen traveling upstream in the evening and downstream in the morning. This directional factor coupled with the time factor seems to indicate that they are diverging from Zone 2 in the evening and traveling upstream or downstream and, in the morning, the manatees are returning to Zone 2. As Figure 7 illustrates, more manatees were observed in Zone 2 in the late afternoon than

at other times. Hartman (1974) has indicated that the manatees in Crystal River often went on "exploratory sorties" leaving established areas but exhibiting no daily rhythm. Our study also supports the occurrence of these exploratory sorties, but it appears they occur rhythmically. The difference may be that Hartman studied individuals restricted to a certain area because of cold weather. Our study was conducted during warm weather and thus usage of all available aquatic habitat was not restricted by cold water.

Some researchers have found that manatees may utilize an area for extended periods of time. This is confirmed by resightings of identified individuals. Resightings were hindered in this study as described earlier but, nonetheless, the longest period of residence in the creek was at least 30 days. Tiedemann documented continual residence by a manatee for six months and also observed two manatees that left the creek in the winter only to return in the spring. Thus, it appears that at least some of the manatees utilize Turkey Creek for extended periods of time.

Different portions of the creek and river appear to be used in different ways. The volunteers observed that manatees travel south in the Indian River. There are extensive grass flats nearby and occasional observations of manatees feeding here suggest that the trips to the river in the evenings may be food related. In agreement with Tiedemann's data (1979), the remainder of Zone 1, i.e. the bay, was generally used in traveling to or from the river. All animals seen in this area were cruising to another location and about 10% played or fed.

Zone 2 seems to be the most important and most heavily used area. Seventy-eight percent (78%) of all manatees observed in the standard survey were sighted in this zone. The importance as a manatee habitat is evident - this was the zone most often used for mating, resting, and feeding. It is a wide section of the creek and the water is slow moving. There are two marinas which offer escape from the main boat channel, as well as small areas for resting between boats. The boat slips and adjacent cove were the prime areas for resting manatees. Mating occurred between the docks of Pelican Harbor Marina and in the areas to the south and to the west of those docks. Feeding occurred mostly when plant material was concentrated into this area by wind transport. Zone 2 is important as manatee habitat because of the activities that occur there and because of the sheer numbers utilizing the area.

Zone 3 was the area in which 10% of all manatee sightings were made. A few matings occurred there as well. Zones 3, 4, and 5 were generally used to pass to other areas, although they occasionally rested or fed there. Zone 6 was utilized for feeding. Manatees fed on submerged plants and plants flushed from the Melbourne-Tillman Water Control District lock and dam. This area is of great concern because the manatees have been seen in the lock twice, fortunately escaping injury both times. In addition, they have passed through the raised floodgates into the drainage canal system. There is ample food present, but it is possible that they have become confined there and may be killed by low water temperatures of winter. The mechanism of this lock and dam system should be reviewed seriously and protection for the manatees should be provided.

Interactions between manatees and boats were observed several times. Generally, the manatees submerged upon approach of a boat. However, on several occasions the manatees appeared to become disoriented and exhibited erratic behavior. In one example, two small motorboats passed by two manatees one on each side. One of the manatees submerged and the other began swimming rapidly toward one boat, then the other. In a second example, a small motorboat was approaching two manatees at a slow speed. They had ample time to swim out of the way but simply moved about erratically in the boat's path. One of the manatees was struck by the boat. Attempts to locate the manatees after the collision were futile. It was assumed that they fled rapidly.

FINDINGS AND RECOMMENDATIONS

(1) Manatees in Turkey Creek, if absent, are only absent for a short period. Due to the fluctuating dates of return noticed in two separate studies, regulations should be established as though the manatees are present year-round.

(2) Manatees have been observed frequently throughout Turkey Creek and the adjacent Indian River. Signs should be posted and speed regulations should be established to entail the entire area.

(3) Areas of special concern, because of numbers of manatees sighted and boat traffic, are the Yacht Club eastward to the mouth of Turkey Creek and the adjacent Indian River as far as the west side of the boat channel. These areas should be most frequently patrolled by enforcement officers.

(4) Manatees are moving in the creek and river most often during the morning and evening. They are most likely to be in or near the boat channel and sustain injury at these times. Patrolling of the area should be scheduled to include these times.

(5) Manatees congregate in Zone 2, especially in the Pelican Harbor Marina area. Boat owners should be educated and encouraged to use caution in operation of their boats. Marina personnel should be supplied with the Manatee Information Center hotline number (1-800-342-1821) in case of death, harassment, or injury of a manatee.

(6) The Melbourne-Tillman Water Control District, until this study, was unaware that manatee had entered its system and therefore had no procedures for manatee protection. It is recommended that the district continue to monitor manatee occurrence in the canals and establish procedures for manatee protection related to the lock and dam structure.

(7) Suggestions for Future Surveys:

* Weekly aerial surveys (by plane)
* Use two or more observers
* Use a more systematic observation schedule
* Continue volunteer spotter program

APPENDIX A: Instructions given to volunteers for the supplementary survey - includes sample data sheet and sample identification sheet

Appendix

INSTRUCTIONS FOR COMPLETING MANATEE DATA SHEET

Where to observe

Select an easily accessible location where you can see a large portion of the creek or river. Some altitude is helpful. If you have polaroid sunglasses you can see under the water easier.

How to observe

We urge you to make at least one observation every day. If you can observe more often, we will be glad for your contribution. Those with flexible schedules should try to vary their observation times as much as possible. Those having tight schedules should make their observations whenever possible, even if it falls on the same time every day.

How to record observations

Each data sheet covers a period of one week, it contains seven identical blocks. Use one for each day. Be sure to record the date. If you sight any manatee, then fill in all the information requested.

If you looked and did not see any manatees, we need to know - this is as important as spotting them.

If you make observations more than once a day, note the times. Use the back of the sheet for extra information.

If no manatees are observed, write "NONE SEEN" in the remaining space.

If for some reason you do not have a chance to look on a certain day, then fill in the date and write "DID NOT LOOK" in the remaining space.

Instructions for each category

Date: Write the three-letter abbreviation for the month followed by the number of the day - e.g.: Feb. 21.

Time: Record each time you see a manatee and be sure to include whether A.M. or P.M.

Number: To determine number, count heads or noses as the animals surface to breathe. Of course, a count can be made more easily when you get a view of the entire animals.

Description: In this space, record any characteristics that would serve to identify individuals. On certain sightings, you may not see them well enough to record anything here; at other times you may only see that there is a large and a small one, for instance. Occasionally, you may see barnacles, algae growth, scars, scratches, or tail fluke notches. When this occurs, please attempt to sketch these patterns on the forms provided, then fill in other information as requested. Use a separate form for each manatee that you can identify. Keep these forms and return them in July when we request them.

Behavior and activities: Try to describe what the manatees were doing. These are behaviors to look for (among others):

- Resting - motionless near surface or on bottom, surfacing occasionally to breathe.
- Feeding - if possible list the type of vegetation eaten.
- Cruising - merely passing by.
- Playing - animals rolling over one another, playing follow-the-leader, certain types of body contact, etc.
- Sexual - several (4 or more usually) animals pursuing another which is the object of attention.
- Drinking - of creek water or incoming sources.
- Vocalizing - high pitched sounds emitted, record the situation in which emitted.
- Body contact - any form of touching, nuzzling, etc.

Examples

Address Code-

Name: George Smith MANATEE SIGHTING DATA SHEET

Address: 33 NW Citrus Circle

Date: Feb 21 Time: 7A.M; 8-9:30 A.M.
Number:
Description:
Behavior and activities: NONE SEEN

Date: Feb 22 Time:
Number:
Description:
Behavior and activities: DID NOT LOOK

Date: Feb23 Time: 5:30-6:15 P.M.
Number: 3 in a close group
Description: one 9 ft.; one 8 ft.; one 4 ft. ; could only see that large one was dark brou
other two were greyish
Behavior and activities:
The three fed on hyacinths, slowly working their way downstream, occasionally the calf nuzzled or rolled over the back of the largest manatee

---

At the end of each month

Use the first few days of next month as needed to fill in the entire sheet. Then drop your sheets off at the City Hall, or mail them:

Manatee Project
Palm Bay City Hall
175 NW Palm Bay Road
Palm Bay, Florida 32905-2994

Name:

MANATEE SIGHTING DATA SHEET

Address:

Date: Time:
Number:
Description:

Behavior and activities:

Date: Time:
Number:
Description:

Behavior and activities:

Date: Time:
Number:
Description:

Behavior and activities:

Date: Time:
Number:
Description:

Behavior and activities:

Date: Time:
Number:
Description:

Behavior and activities:

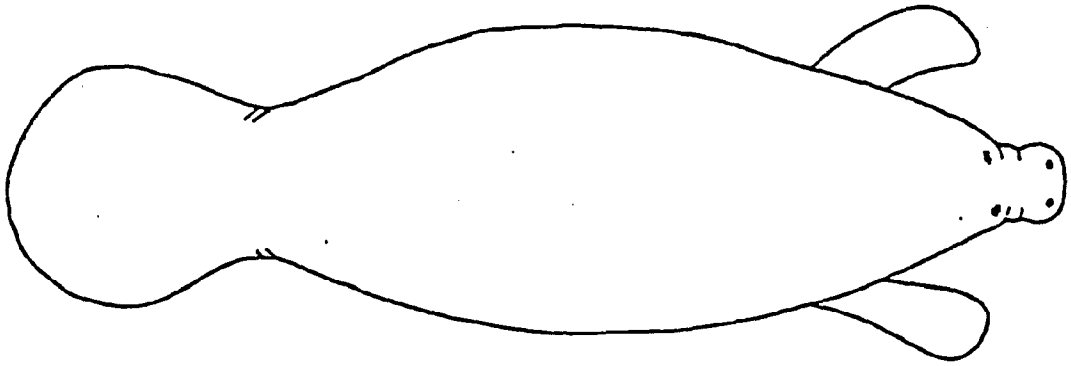
Date: Time:
Number:
Description:

Behavior and activities:

Date: Time:
Number:
Description:

Behavior and activities:

ANIMAL # _____



DESCRIPTION:

SIZE: _____ feet

COLORATION: _____

DISTINGUISHING CHARACTERISTICS:

DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING:

RESIGHTINGS:

COMMENTS:

APPENDIX B: Weekly summary of numbers and locations of manatees sighted in the standard survey

SUMMARY

* indicates data-taking at only one or a few stations for an extended period – not figured in to ave. # seen per survey if none seen

DATE	LOCATION	NO. ANIMALS	TIME (nearest 10 min)	SURVEYS per week	AVE. # seen per s
1/25			1100-1430		
1/26			0930-1210		
1/27			1220-1630		
1/30	#3 BRH	1	0740	4	0.25
1/31	#2→#1	1	1710		
2/1			0610-0740 1350-1610		
2/2			1200-1450		
2/3			1510-1740		
2/5	#2 PHM	2	1230		
	#1→#2	1	1330		
2/6	#6→#5	1	1020	6	0.83
2/8	#2 PHM	1	1440		
2/9	#2 PHM	1/3	0950/1540		
2/10	#2 PHM	2	1720		
2/11	#2 PHM	4	1240		
2/12	#2 PHM	2	1300	5	2.6
2/14	#2 PHM	5	1720		
2/15	#2 PHM	3	1050		
2/16	#2 PHM	1	0820		
2/18	#2 PHM	4	1110		
2/19	#2 PHM	5	1720		
2/20	#2 PHM	2	0710	6	3.33
★Can't use Pel. Har. Docks★ 2/22	#2 PHM	1	1040		
2/23	#2 PHM	4	1250		
2/24	#2 PHM	1	1510		
2/26	#2→#1	1	1540		
	#2 PHM	1	1600		
2/27			0710-1040	5	1.6

DATE	LOCATION	NO. ANIMALS	TIME	SURVEYS	AVE. # SEEN per surv
3/1	#2 PHM	3	1100		
3/2	#2 PHM	5	1010		
3/3	#2 PHM	12	1420		
	#2 → #1	3	1430		
3/4	#2 PHM	5	1620		
	#1	3	1640		
3/6	#2 PHM	4	1530	5	7.0
3/9	#2 PHM	7	1200		
3/10	#2 PHM	11	1510		
	#3 BRH	1	1610		
3/12	#2 PHM	9	1140		
3/13	#2 RR	2	0720		
	#2 PHM	2	0740		
	#1 → #2	1	0800	4	8.25
3/16	#2 PHM	1	1430		
3/17			1310-1550		
3/19	#2 PHM	3	0740		
3/20	#3 RR	5	0830	4	2.25
3/22			1620-1850		
3/24	#2 PHM	6	0830		
3/25	#2 PHM	3	1250		
3/26			1310-1520	4	2.25
3/29	#2 PHM	2	1430		
3/30	#1 → #2	2	0830		
3/31	#2 PHM	4	1600		
Stopped by HMcCoy → 4/1	#2 PHM	6	1630		
4/2	#2 PHM	5	1430		
4/3			0810-1150	6	

	DATE	(ZONE) LOCATION	NO. ANIMALS	TIME	SURVEYS	AVE. # SEEN per surve
	4/5	#2 PHM	6	1450		
	4/6	#4	2	0710		
	4/9			1320-1610		
	4/10	#2 PHM	1	0750	4	2.25
* went to lock only	4/12	#6 MTWCD Lock	1	1120		
	4/13	#2 PHM	4	1510		
	4/14	#2 PHM	6	1610		
	4/16	#4	2	0620		
		#2 PHM	4	0700		
	4/17	#2 PHM	2	1020	4 (without 4/12)	4.5
	4/19	#2 PHM	4	1450		
	4/20	#2 PHM	1	1810		
	4/23			1300-1550		
	4/24	#2 PHM	1	1630	4	1.5
		#2 RR→S	2			
	4/27	#3 RR→#2PBM	2	0750		
		#2 PHM	4	0820		
		#1→E	5	0840		
	4/29	#2 PHM→PBM	1	1700		
		#2 PHM	1	1720		
	4/30	#3	1	1420		
		#2 PHM	3	1440		
	5/1	#2 PHM	3	1740	4	5.5
	5/3	#2 U.S.1→PBM	4	1610		
	5/4	#2 PHM	2	1500		
		#1→#2 PBM	1	1500		
	5/5	#2 S. of PHM	3	1650		
	5/7			2210-2410	5	2.0

DATE	(ZONE) LOCATION	NO. ANIMALS	TIME	SURVEYS	AVE # PER SURVEY
5/11	#2 PHM	4	1540		
5/12	#2 PHM	2	1550		
5/13	#2 PHM	4	1750		
5/15	#2 RR	1	1100		
	#2 channel	3			
	#2 PBM	1			
	#3 Yacht Club	4	1610	4	4.75
5/17	#2 PHM	1	1530		
5/19	#2 PBM	1	1730		
	#2 RR → PHM	4	1810		
5/21	#2 PHM	4	1430		
	#1 → #2	3	1450		
~~5/22~~	~~#3 Yacht Club~~	~~1~~	~~0620 0810~~	~~4~~	~~3.25~~
~~5/26~~	~~#2 PHM~~	~~3~~	~~1400~~		
5/22	#3 Yacht Club	1	0740		
	#2 PHM	3	0810	4	4.25
5/26	#2 PHM	3	1400		
5/27			1640-1940		
5/28	#2 PHM	3	1430		
	#2 PHM	2	1450		
*5/29	(Citrus)		0820-1040	3	2.67
6/2			1230-1500		
*6/3	#2 PHM → #1	3	0780		
6/4	#2 PHM	4	1500		
*6/5	(Hammock + RR)		1710-2000	3	2.33

DATE	(ZONE) LOCATION	NO. ANIMALS	TIME	SURVEYS	AVE # PER SURVEY
6/6			1140-1430		
6/7	#3 → #2 PHM	3			
	#3 RR → West	1	1350		
	#2 RR → #3	3			
6/10	#2 RR → #3 Yacht club	1	1810		
* 6/11	(Sanctuary & Malabar)		0700-0920	3	2.67
6/14	#2 RR → #1	2	1220		
* 6/15	(RR & Pel. Har.)		0650-0900		
* 6/16	(U.S.1)		1640-1840		
6/18			1010-1310	2	1.00
6/21			0900-1150		
6/23	#2 RR	6	1400		
	#2 PHM	1	1420		
6/24			1640-1850		
6/26	#3 BRH	2	1430		
	#2 RR	3	1540	4	3.00
6/28	#2 PHM → U.S.1 → RR	6	1710		
* 6/30	#6 → #5 (Malabar)	2	0640		
7/1			1630-1920		
* 7/2	(Malabar & Pel. Har.)		0630-0830	3	2.67
7/5	#2 RR	2	1450		
	#2 PHM	3	1510		
* 7/6	(Malabar & U.S.1)		0900-1110		
7/7			0840-1110		
7/8	#2 PBM	2	1630	3	2.33

DATE	(ZONE) LOCATION	NO. ANIMALS	TIME	SURVEYS	AVE. # PER SURVEY
7/12	#3 → #2 → #1	1	1150		
	#3 → #2 → #1	1			
7/13			1520 - 1810		
7/15	#3 RR → West	1	1030		
7/17			0630 - 2140	4	0.75
* 7/20	(RR + Malabar)		1720 - 2030		
* 7/21	(Sanctuary + Canals)		1410 - 1600		
7/23			1650 - 1950		
7/24			1300 - 1640	2	0.00
7/26	#1 → East	1	0810		
7/28			0800 - 1040		
* 7/29			0720 - 0950		
7/30	#3 RR	1	1630	3	0.67
8/1			1110 - 1410		
8/4			1300 - 1650		
8/5			1450 - 1750		
8/6	#6 near MTWCD Lock	1	1230	4	0.25
8/9			1150 - 1500		
8/10			1420 - 1730		
* 8/11	(Citrus)		0620 - 0820		
8/13			0700 - 1010	4	0.00
8/16			1520 - 1810		
8/17			0800 - 1040		
8/19	#1 → #2 PHM	1	1230		
	#2 RR → #3 → West	1	1250		
* 8/20			0910 - 1150	3	0.67

DATE	(ZONE) LOCATION	NO. ANIMALS	TIME	SURVEYS	AVE #. PER SURVEY
8/23			1420-1710		
8/24			1320-1600		
8/26			1730-2020		
8/27			1030-1330	4	0.00
* 8/30	(Sanctuary & Babcock)		0920-1150		
9/1			1340-1620		
9/2			1140-1440		
9/4			1700-1940	3	0.00

APPENDIX C: Weekly summary of behavioral data obtained in observations of the standard survey

BEHAVIOR SUMMARY

ZONE 1

Week	Total	Cruising	Feeding	Resting	Mating	Drinking	Playing
1/24 - 1/30	0						
1/31 - 2/6	2	2					
2/7 - 2/13	0						
2/14 - 2/20	0						
2/21 - 2/27	0						
2/28 - 3/6	6	6	1 - Typha				
3/7 - 3/13	1	1					
3/14 - 3/20	0						
3/21 - 3/27	0						
3/28 - 4/3	2	2	2 - Typha - overhang. grass				
4/4 - 4/10	0						
4/11 - 4/17	0						
4/18 - 4/24	0						
4/25 - 5/1	5	5					
5/2 - 5/8	1	1	~~Typha~~				
5/9 - 5/15	0						
5/16 - 5/22	3	3					3
5/23 - 5/29	0						
5/30 - 6/5	3	3					
6/6 - 6/12	0						
6/13 - 6/19	2	2					
6/20 - 6/26	0						
6/27 - 7/3	0						
7/4 - 7/10	0						
7/11 - 7/17	2	2					
7/18 - 7/24	0						
7/25 - 7/31	1	1					
8/1 - 8/7	0						
8/8 - 8/14	0						
8/15 - 8/21	1	1					
8/22 - 8/28	0						
8/29 - 9/4	0						

-2-

BEHAVIOR SUMMARY

ZONE 2

Week	Total	Cruising	Feeding	Resting	Mating	Drinking	Playing	
1/24-1/30	0							
1/31-2/6	4	2		2 - bottom		1		
2/7-2/13	13	2	2 Typha boat algae	3 - surface 10 bottom		1		
2/14-2/20	20			5 - surface 15 - bottom				
2/21-2/27	8	2	2 Typha overhang, grass	6 - bottom				
2/28-3/6	32	3	2 boat algae	10 - surface 16 - bottom				calf weaning
3/7-3/13	32	5	3 overhang, grass Typha Hydrilla	12 - surface 10 - bottom	3			
3/14-3/20	4	1		3 - bottom				
3/21-3/27	8			1 - surface 1 - bottom	7			
3/28-4/3	19	8	4 Typha overhang, grass boat algae	1 - bottom	14		2 (?)	
4/4-4/10	7	4		1 - bottom	6			
4/11-4/17	16			7 - bottom	3 [2(?)]		2 [2(?)]	
4/18-4/24	6			2 - bottom 1 - surface	3			
4/25-5/1	16	5	1 boat algae	6 - bottom 2 - surface			(2?)	
5/2-5/8	10	6	1 Typha boat algae	2 - bottom	3			
5/9-5/15	15	2		4 - bottom 1 - surface	9			
5/16-5/22	16	11		2 - bottom	3		3	
5/23-5/29	8	3			5			
5/30-6/5	7	4	1 - hyacinth				2	
6/6-6/12	7	7	2 - Typha					
6/13-6/19	2	2						
6/20-6/26	10	9		1 - bottom			6	
6/27-7/3	6	6					6	
7/4-7/10	7	2		2 - bottom	3			collision w/ ba
7/11-7/17	2	2						
7/18-7/24	0							
7/25-7/31								
8/1-8/7								
8/8-8/14								
8/15-8/21	2	2	1 - Typha					
8/22-8/28	0							
8/29-9/4	0							
	277							

BEHAVIOR SUMMARY

ZONE 3

Week	Total	Cruising	Feeding	Resting	Mating	Drinking	Playing
1/24-1/30	1			1 - bottom			
1/31-2/6	0						
2/7-2/13	0						
2/14-2/20	0						
2/21-2/27	0						
2/28-3/6	0						
3/7-3/13	1	1		1 - bottom			
3/14-3/20	5			1 - surface	4		
3/21-3/27	0						
3/28-4/3	0						
4/4-4/10	0						
4/11-4/17	0						
4/18-4/24	0						
4/25-5/1	3	2		1 - bottom			
5/2-5/8	0						
5/9-5/15	4	4					
5/16-5/22	1			1 - bottom			
5/23-5/29	0						
5/30-6/5	0						
6/6-6/12	8	8	1 - hyacinth				
6/13-6/19	0						
6/20-6/26	2	2					2
6/27-7/3	6	6					
7/4-7/10	0						
7/11-7/17	3	3					
7/18-7/24	0						
7/25-7/31	1			1 - bottom			
8/1-8/7	0						
8/8-8/14	0						
8/15-8/21	1	1					
8/22-8/28	0						
8/29-9/4	0						
	31						

4

BEHAVIOR SUMMARY

ZONE 4

week	Total	Cruising	Feeding	Resting	Mating	Drinking	Playing
1/24 - 1/30	0						
1/31 - 2/6	0						
2/7 - 2/13	0						
2/14 - 2/20	0						
2/21 - 2/27	0						
2/28 - 3/6	0						
3/7 - 3/13	0						
3/14 - 3/20	0						
3/21 - 3/27	0						
3/28 - 4/3	0						
4/4 - 4/10	2	2					
4/11 - 4/17	2	2	1. hyacinth				
4/18 - 4/24	0						
4/25 - 5/1	0						
5/2 - 5/8	0						
5/9 - 5/15	0						
5/16 - 5/22	0						
5/23 - 5/29	0						
5/30 - 6/5	0						
6/6 - 6/12	0						
6/13 - 6/19	0						
6/20 - 6/26	0						
6/27 - 7/3	0						
7/4 - 7/10	0						
7/11 - 7/17	0						
7/18 - 7/24	0						
7/25 - 7/31	0						
8/1 - 8/7	0						
8/8 - 8/14	0						
8/15 - 8/21	0						
8/22 - 8/28	0						
8/29 - 9/4	0						
	4						

-5-

BEHAVIOR SUMMARY

ZONE 5

Week	Total	Cruising	Feeding	Resting	Mating	Drinking	Playing
1/24-1/30	0						
1/31-2/6	1	1					
2/7-2/13	0						
2/14-2/20	0						
2/21-2/27	0						
2/28-3/6	0						
3/7-3/13	0						
3/14-3/20	0						
3/21-3/27	0						
3/28-4/3	0						
4/4-4/10	0						
4/11-4/17	0						
4/18-4/24	0						
4/25-5/1	0						
5/2-5/8	0						
5/9-5/15	0						
5/16-5/22	0						
5/23-5/29	0						
5/30-6/5	0						
6/6-6/12	0						
6/13-6/19	0						
6/20-6/26	0						
6/27-7/3	2	2					
7/4-7/10	0						
7/11-7/17	0						
7/18-7/24	0						
7/25-7/31	0						
8/1-8/7	0						
8/8-8/14	0						
8/15-8/21	0						
8/22-8/28	0						
8/29-9/4	0						
	3						

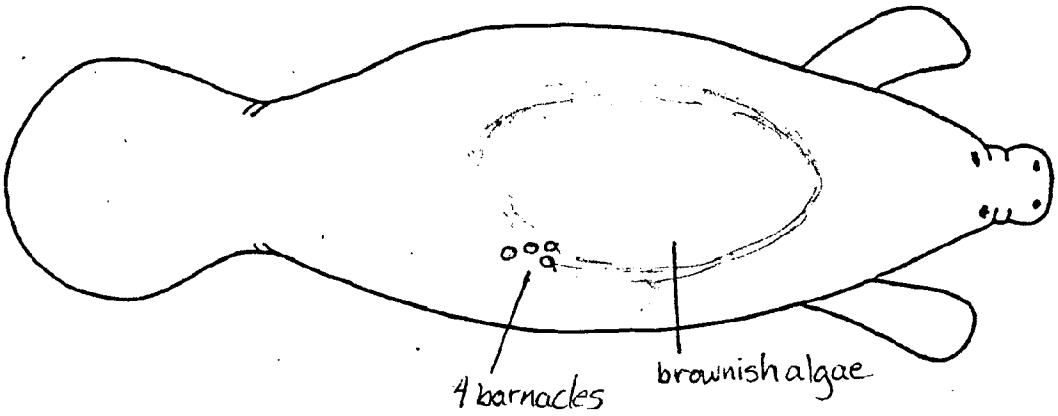
BEHAVIOR SUMMARY

ZONE 6

Week	Total	Cruising	Feeding	Resting	Mating	Drinking	Playing
1/24-1/30	1	1					
1/31-2/6							
2/7-2/13	0						
2/14-2/20	0						
2/21-2/27	0						
2/28-3/6	0						
3/7-3/13	0						
3/14-3/20	0						
3/21-3/27	0						
3/28-4/3	0						
4/4-4/10	0						
4/11-4/17	1			1 - bottom			
4/18-4/24	0						
4/25-5/1	0						
5/2-5/8	0						
5/9-5/15	0						
5/16-5/22	0						
5/23-5/29	0						
5/30-6/5	0						
6/6-6/12	0						
6/13-6/19	0						
6/20-6/26	0						
6/27-7/3	2	2					
7/4-7/10	0						
7/11-7/17	0						
7/18-7/24	0						
7/25-7/31	0						
8/1-8/7	1		1 - Potamogeton				
8/8-8/14	0						
8/15-8/21	0						
8/22-8/28	0						
8/29-9/4	0						
	5						

APPENDIX D: Sketches and descriptions of identified manatees

ANIMAL # 1



DESCRIPTION:

SIZE: 4-5 feet

COLORATION: greyish

DISTINGUISHING CHARACTERISTICS:

Brownish algae in oval pattern on back
4 barnacles

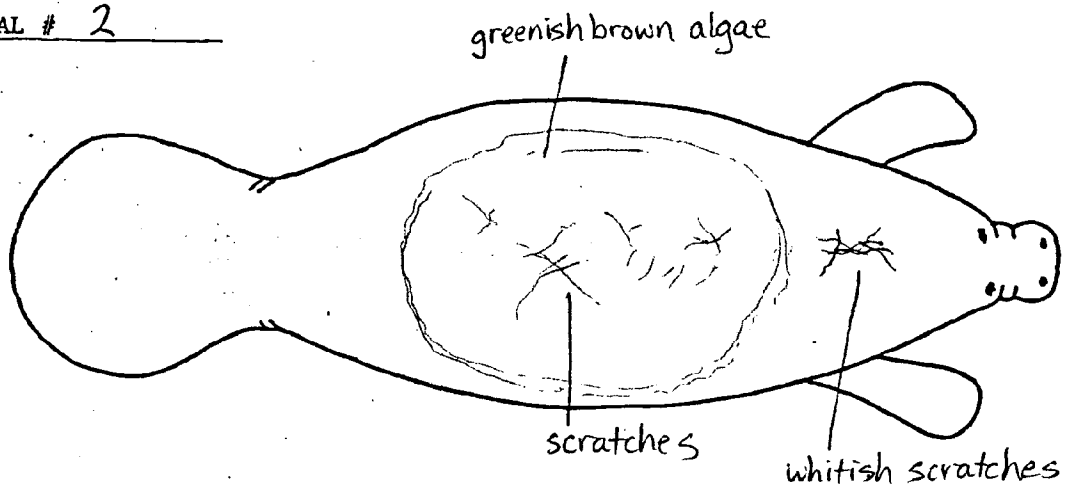
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 1/30/82; in channel between islands at Bethesda (or at ~~well~~ spring)

RESIGHTINGS:

COMMENTS: First positive sighting was made in the channel, but 10 minutes prior it was seen at well and cruised away (presumably) to the channel

ANIMAL # 2



DESCRIPTION:

SIZE: ~6 feet

COLORATION: _____

DISTINGUISHING CHARACTERISTICS:

algae w/ scratches

whitish scratches on nape

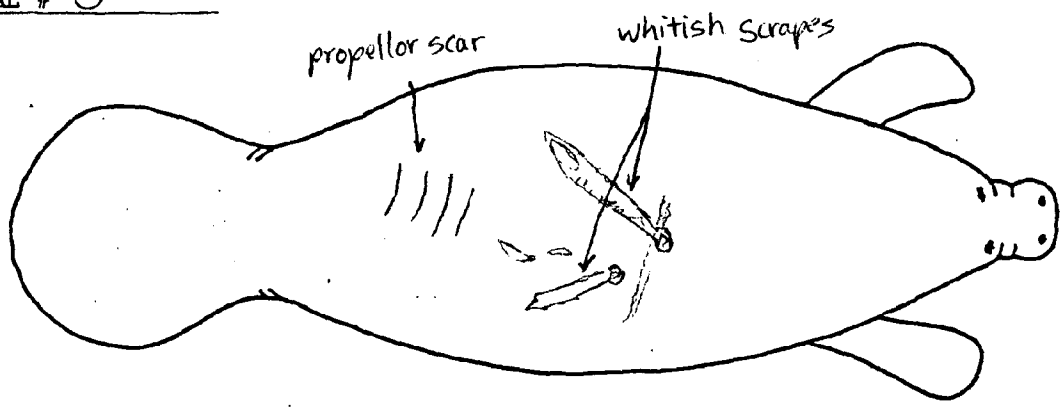
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 1/31/82; passing under U.S. 1 from NW dock

RESIGHTINGS:

COMMENTS: initial sighting seen only briefly as it passed beneath bridge

ANIMAL # 3



DESCRIPTION:

SIZE: 8 feet

COLORATION: greyish

DISTINGUISHING CHARACTERISTICS:

two deep scraping wounds
four slash propellor scar
other light scrape marks & scratches

DATES/LOCATIONS SIGHTED:

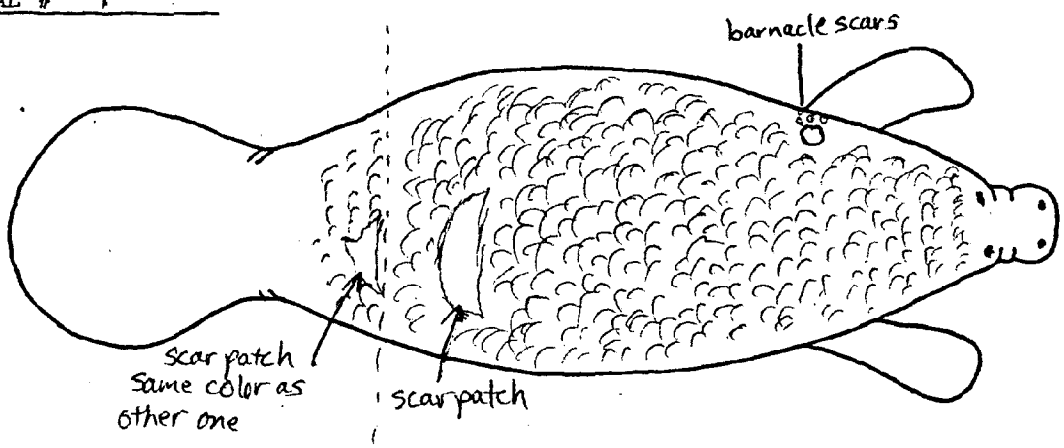
INITIAL SIGHTING: 2/5/82 ; Pelican Harbor docks

RESIGHTINGS:

COMMENTS:

Have pictures

ANIMAL # 4



DESCRIPTION:

SIZE: 7 feet

COLORATION: dark brn

DISTINGUISHING CHARACTERISTICS:

dark brownish fuzzy growth covered body
brown clouds of silt flowed from it with movement
one scar patch
didn't see rear portion

DATES/LOCATIONS SIGHTED:

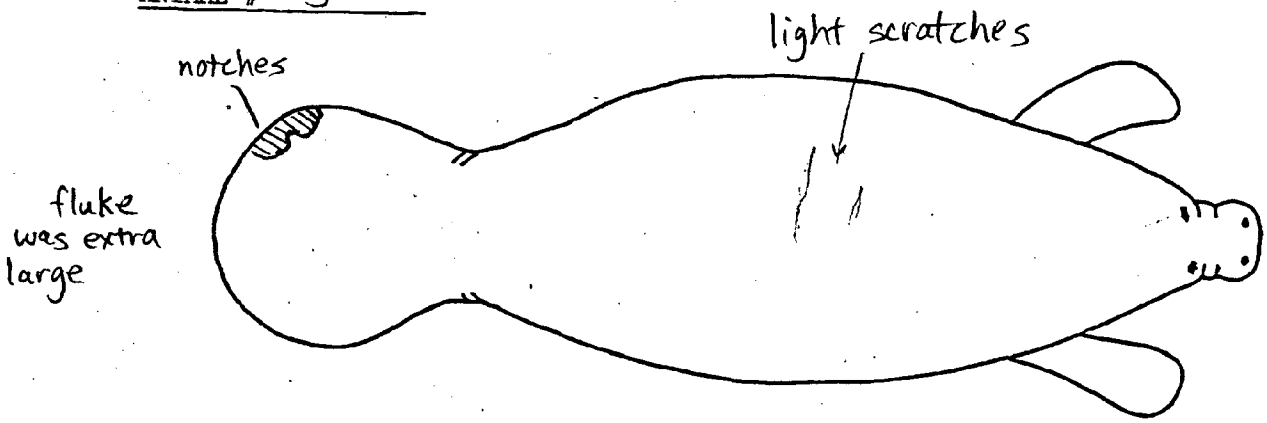
INITIAL SIGHTING: 2/5/82 ; Pelican Harbor docks

RESIGHTINGS: 2/9/82
2/11/82
2/12/82
2/14/82

COMMENTS:

Have pictures; first seen together w/ An. #3
Saw rear portion on 2/9/82 at 3:38P.M.

ANIMAL # 5



DESCRIPTION:

SIZE: 8 feet

COLORATION:

DISTINGUISHING CHARACTERISTICS:

very large fluke w/ notches

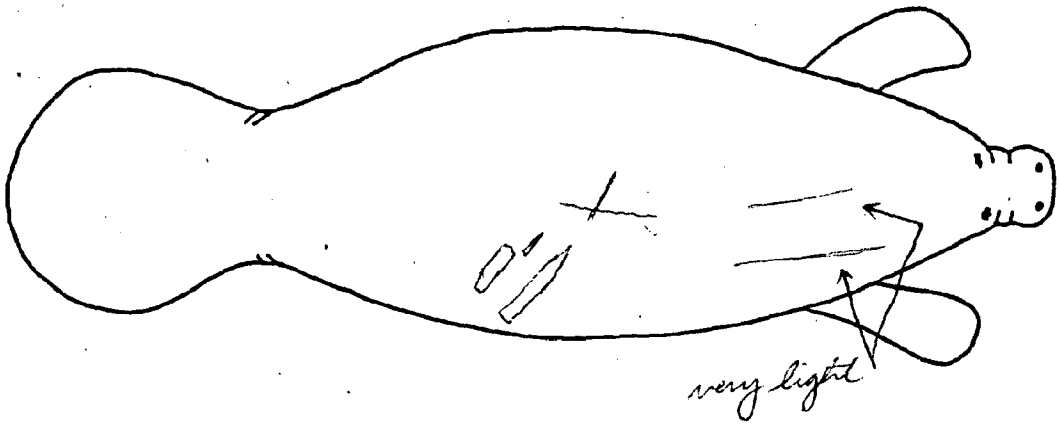
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 2/5/82 ; beneath U.S.1 bridge

RESIGHTINGS:

COMMENTS: poor view initially except fluke

ANIMAL # 6



DESCRIPTION:

SIZE: 7-8 feet

COLORATION: med. grey brown

DISTINGUISHING CHARACTERISTICS:

scars

scratches

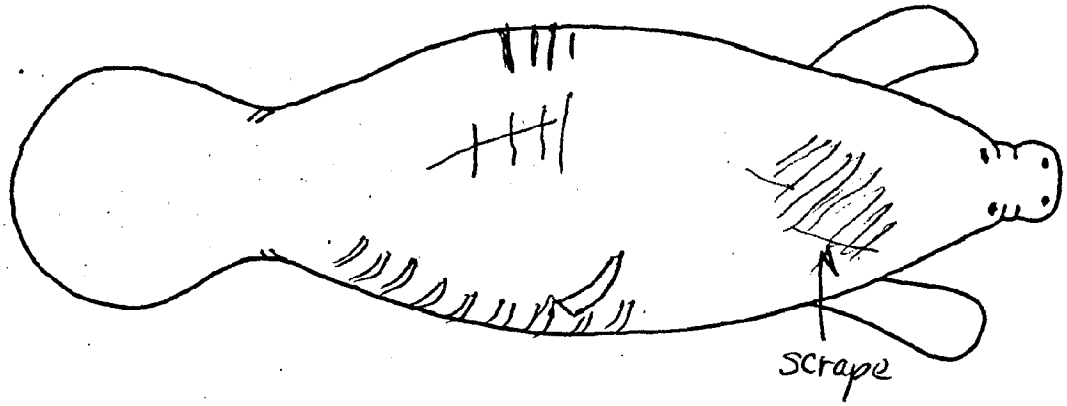
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: Pel. Har. Dock #2; 3:38 P.M.

RESIGHTINGS:

COMMENTS: seen w/ dark calf (no I.D. on calf)

ANIMAL # 7



DESCRIPTION:

SIZE: 8 feet

COLORATION: grey

DISTINGUISHING CHARACTERISTICS:

multiple scars & scrape
very broad

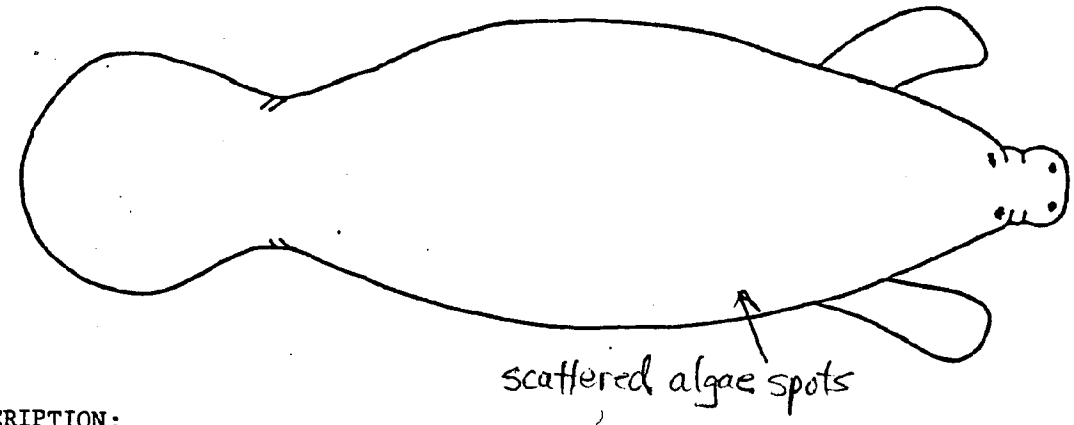
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 2/11/82

RESIGHTINGS: 3/20/82 W of RR bridge
4/12/82 E of MTWCD Lock

COMMENTS:

ANIMAL # 8



DESCRIPTION:

SIZE: 4-5 feet

COLORATION: mottled brown

DISTINGUISHING CHARACTERISTICS:

color & size

DATES/LOCATIONS SIGHTED:

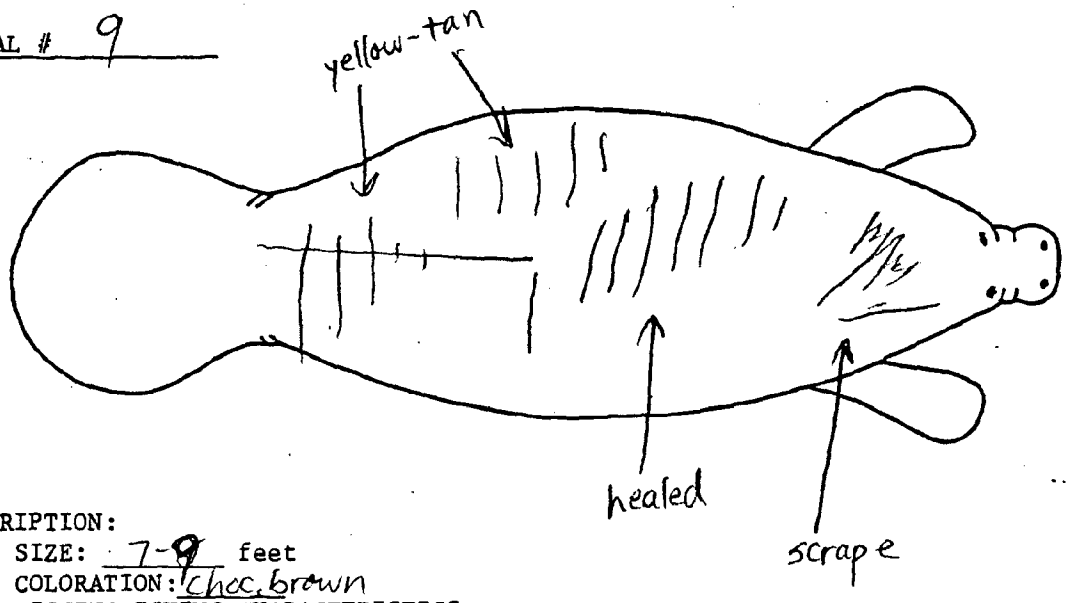
INITIAL SIGHTING: 2/11/82 Pel. Har. Marina

RESIGHTINGS:

COMMENTS:

calf of #7 presumably

ANIMAL # 9



DESCRIPTION:

SIZE: 7-9 feet

COLORATION: choc. brown

DISTINGUISHING CHARACTERISTICS:

scar pattern

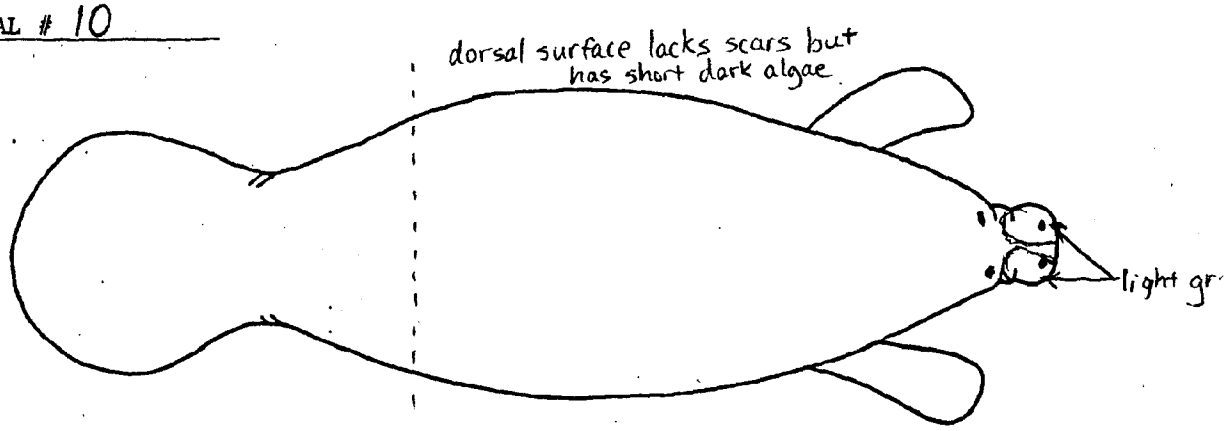
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 2/12/82 Pel. Har. Marina

RESIGHTINGS:

COMMENTS:

ANIMAL # 10



DESCRIPTION:

SIZE: 7 feet

COLORATION: med. brown

DISTINGUISHING CHARACTERISTICS:

No visible scars

Entire dorsal surface mottled w/ short dark brown algae

Muzzle light grey where indicated

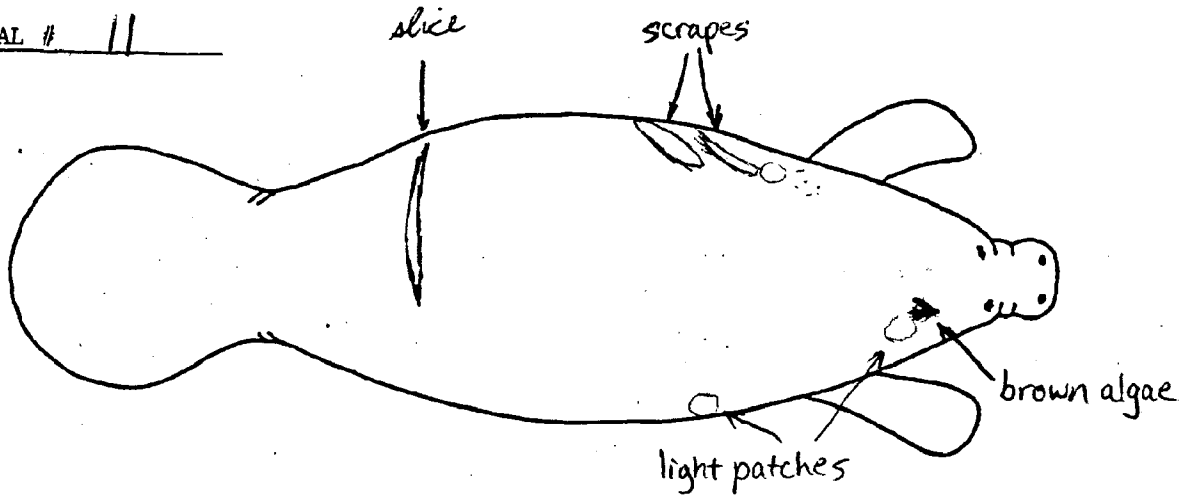
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 2/14/82; Pel. Harbor Mar., Dock # 2 E

RESIGHTINGS:

COMMENTS: Didn't see fluke region on initial sighting

ANIMAL # 11



DESCRIPTION:

SIZE: 6-7 feet

COLORATION: grey-brown

DISTINGUISHING CHARACTERISTICS:

one slice on back
two scrapes on left side
several patches of light-colored skin
a bit of brown algae above right eye

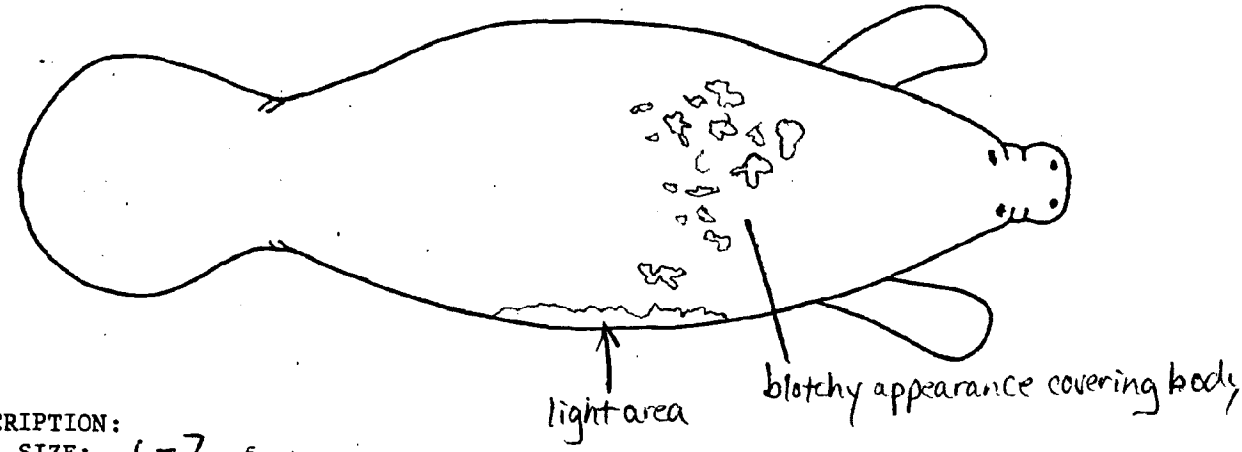
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 2/19/82 Pelican Harbor, Dock # 2E

RESIGHTINGS: 3/20/82 N. of RR Bridge

COMMENTS:

ANIMAL # 12



DESCRIPTION:

SIZE: 6-7 feet

COLORATION:

DISTINGUISHING CHARACTERISTICS:

patchy, blotchy, crusty appearance ~~that is~~ partly algal growth but may also be dead skin patches

skin very leathery in appearance

blotches on underside of right side were light colored may have been algae, but skin appeared to be scaling off

DATES/LOCATIONS SIGHTED:

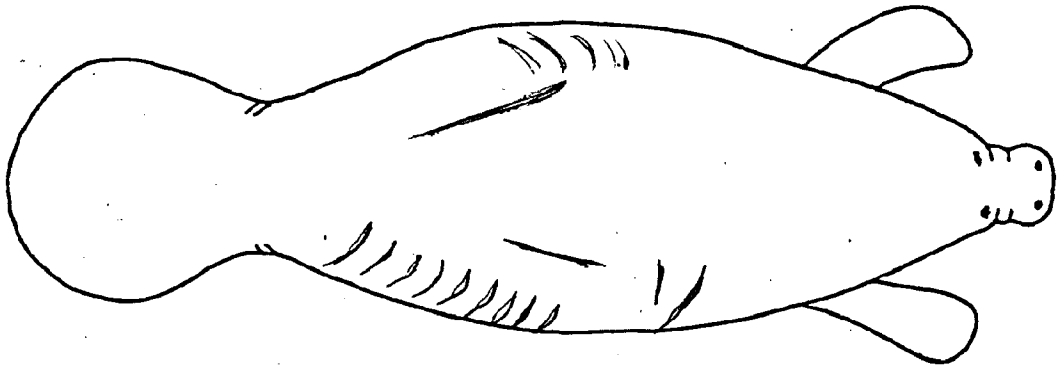
INITIAL SIGHTING: 2/19/82, Pelican Harbor, beneath Dock #2

RESIGHTINGS:

COMMENTS:

very wide

ANIMAL # 13



DESCRIPTION:

SIZE: 8(-9) feet

COLORATION: med.dark brown

DISTINGUISHING CHARACTERISTICS:

very broad back
scars along each side
two long straight scars
no algal growth

DATES/LOCATIONS SIGHTED:

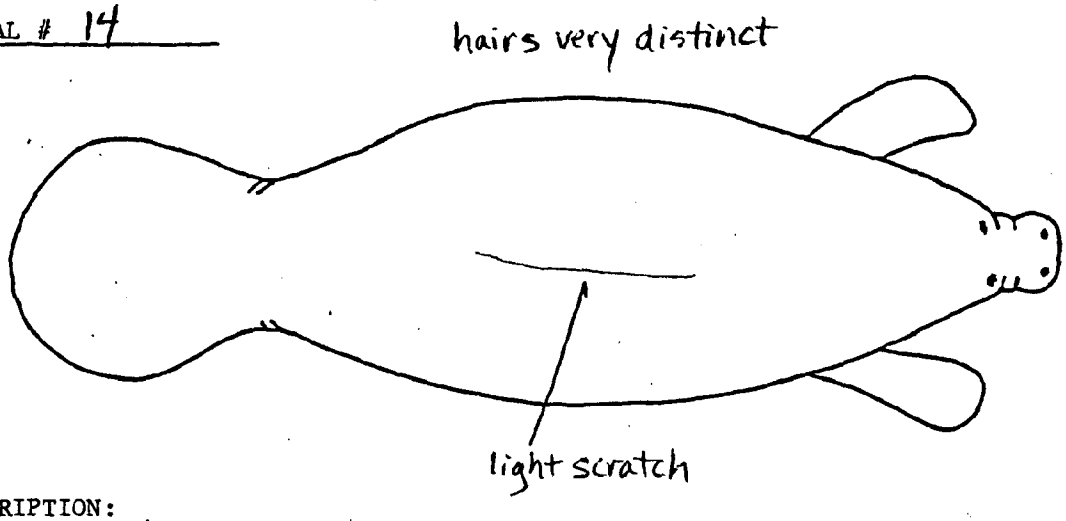
INITIAL SIGHTING: 2/19/82 ; Pelican Harbor, Dock #2E

RESIGHTINGS: 2/20/82 Pelican Harbor, Dock # 2W

COMMENTS:

There were more scars, but these are the only ones seen well enough to record, didn't see fluke region on initial sighting

ANIMAL # 14



DESCRIPTION:

SIZE: 4-5 feet

COLORATION: grey

DISTINGUISHING CHARACTERISTICS:

one long dorsal scratch

hairs distinct - either long & dark or each one had algae growing on it

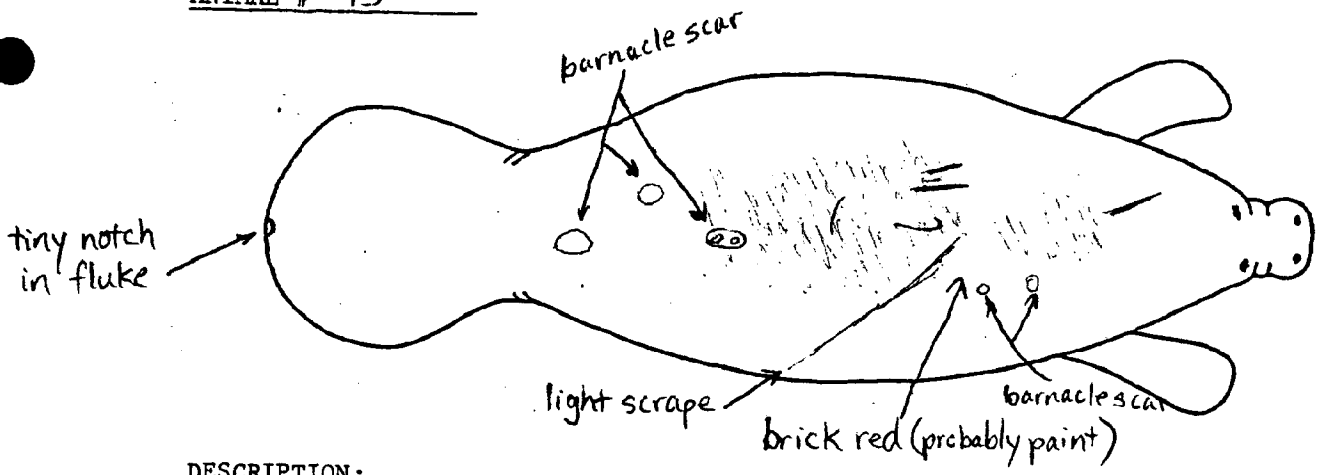
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: Pelican Harbor Marina; 12/23/82 Dock #2W

RESIGHTINGS:

COMMENTS:

ANIMAL # 15



DESCRIPTION:

SIZE: 5½ feet

COLORATION: grey-brown

DISTINGUISHING CHARACTERISTICS:

☆ red paint

no deep scars, just barnacle scars or scrapes

small fluke notch

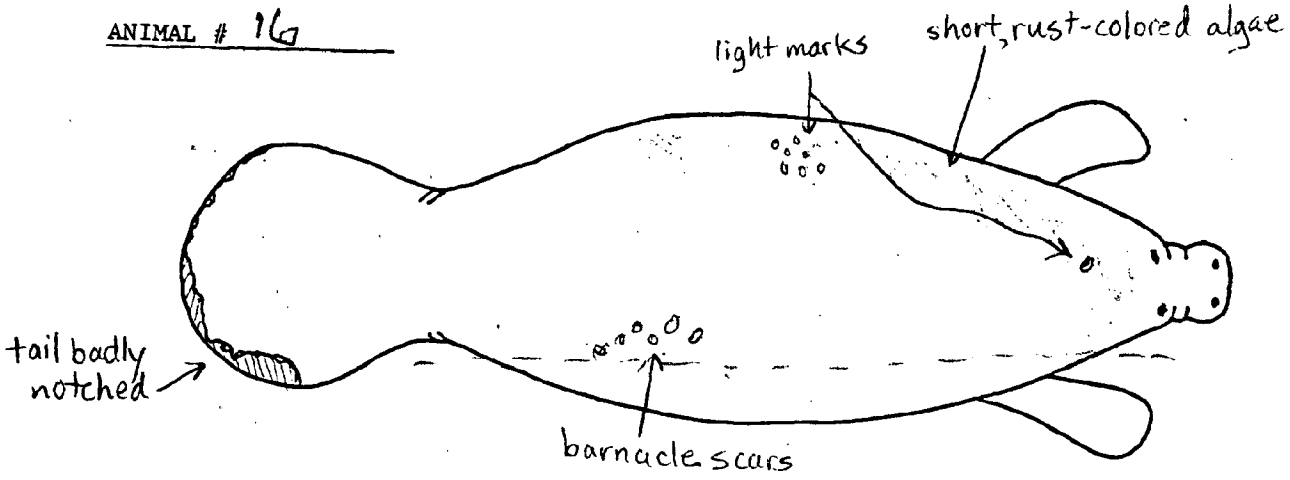
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 2/23/82 ; Pelican Harbor Marina, Dock #2W

RESIGHTINGS:

COMMENTS:

ANIMAL # 16



DESCRIPTION:

SIZE: 4-5 feet

COLORATION: grey-brown

DISTINGUISHING CHARACTERISTICS:

Part of body crusted w/ light brown silt

Algae along side

Fluke notches

Barnacle scars

DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 2/26/82 Pelican Harbor Marina, Dock # 2W

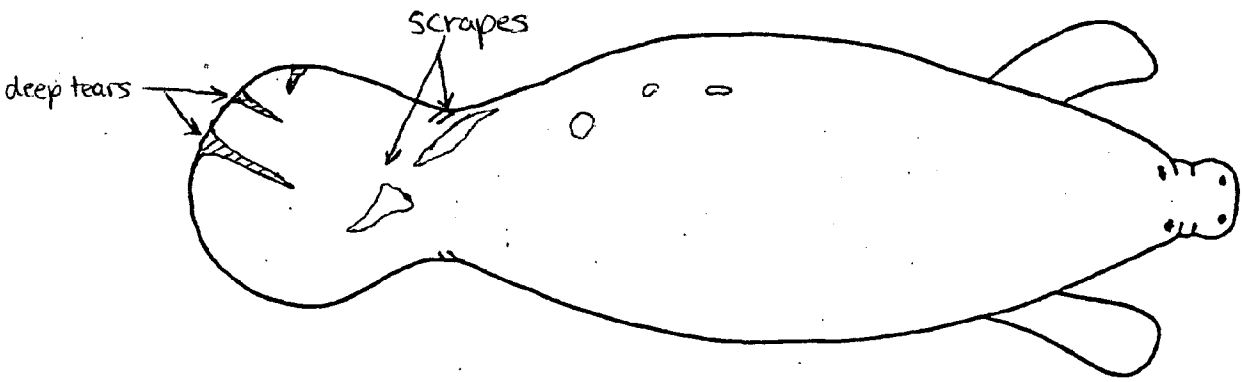
RESIGHTINGS: 3/13/82 U.S. 1

COMMENTS:

Didn't see right side on initial sighting

Have pictures

ANIMAL # 17



DESCRIPTION:

SIZE: 8-9 feet

COLORATION: grey brown

DISTINGUISHING CHARACTERISTICS:

torn tail

scrapes

DATES/LOCATIONS SIGHTED:

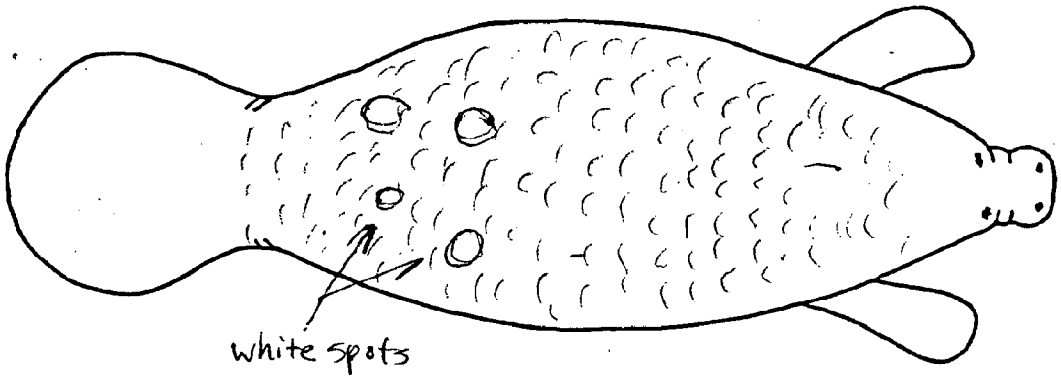
INITIAL SIGHTING: 3/3/82 Pel. Harbor Marina

RESIGHTINGS:

COMMENTS:

Mother of Ani # 18

ANIMAL # 18



DESCRIPTION:

SIZE: 4 feet

COLORATION: dark

DISTINGUISHING CHARACTERISTICS:

short, fuzzy-appearing brown algae

a few clear (no algae) white spots

one scratch near head

DATES/LOCATIONS SIGHTED:

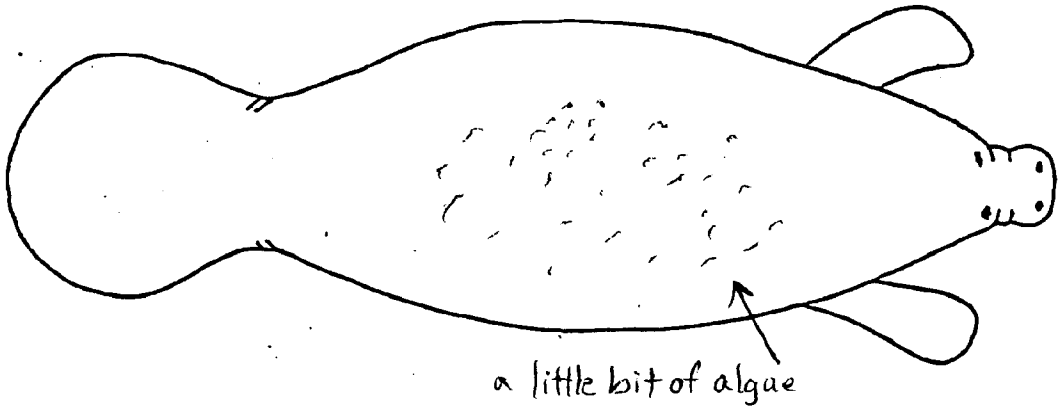
INITIAL SIGHTING: 3/3/82 Pel. Har. Marina

RESIGHTINGS:

COMMENTS:

calf of #17

ANIMAL # 19



DESCRIPTION:

SIZE: 8 feet

COLORATION: grey

DISTINGUISHING CHARACTERISTICS:

a little algae

no visible scars

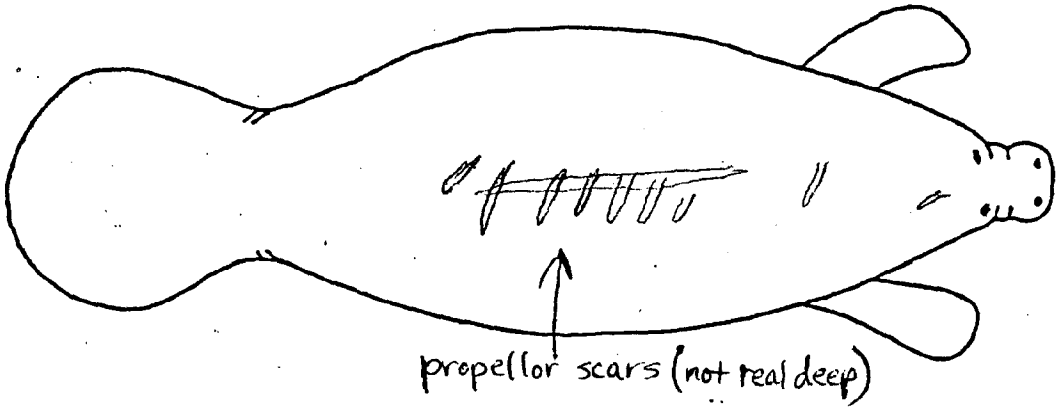
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 3/3/82 ; Pel. Har. Marina

RESIGHTINGS:

COMMENTS:

ANIMAL # 20



DESCRIPTION:

SIZE: ~~6~~ 8 feet

COLORATION: grey-brown

DISTINGUISHING CHARACTERISTICS:

propellor scars on mid-back

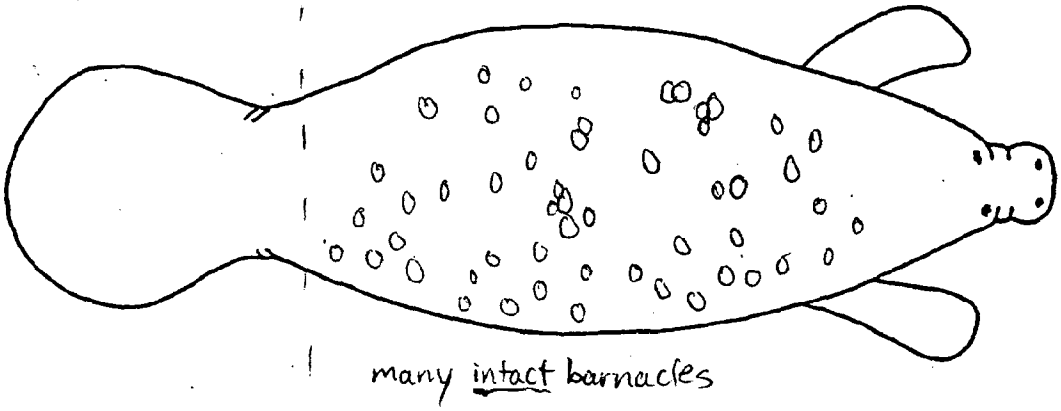
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 3/3/82 ; Pel. Har. Marina

RESIGHTINGS:

COMMENTS:

ANIMAL # 21



DESCRIPTION:

SIZE: 6-7 feet

COLORATION: grey

DISTINGUISHING CHARACTERISTICS:

barnacles

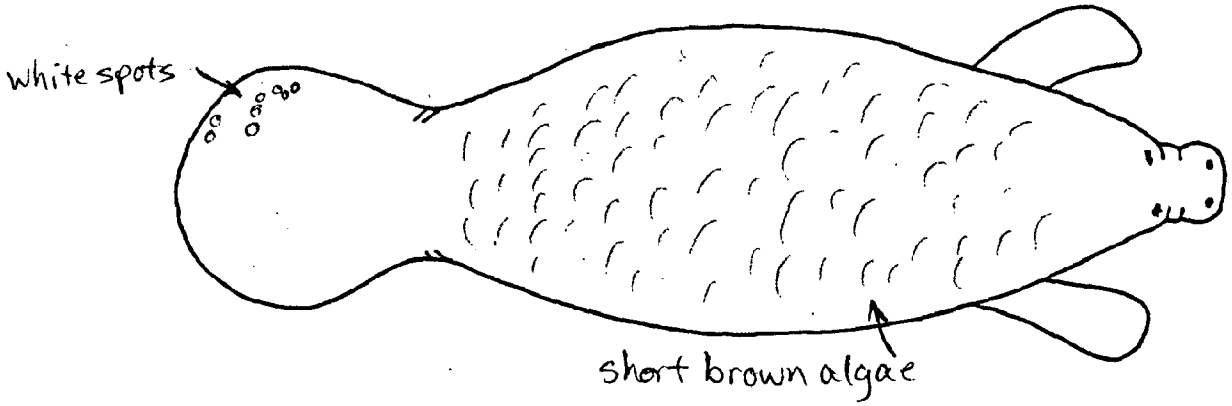
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 3/3/82 ; Pel. Har. Marina

RESIGHTINGS: 3/4/82

COMMENTS:

ANIMAL # 22



DESCRIPTION:

SIZE: 7 feet

COLORATION: dark brown

DISTINGUISHING CHARACTERISTICS:

white fluke spots

short algae

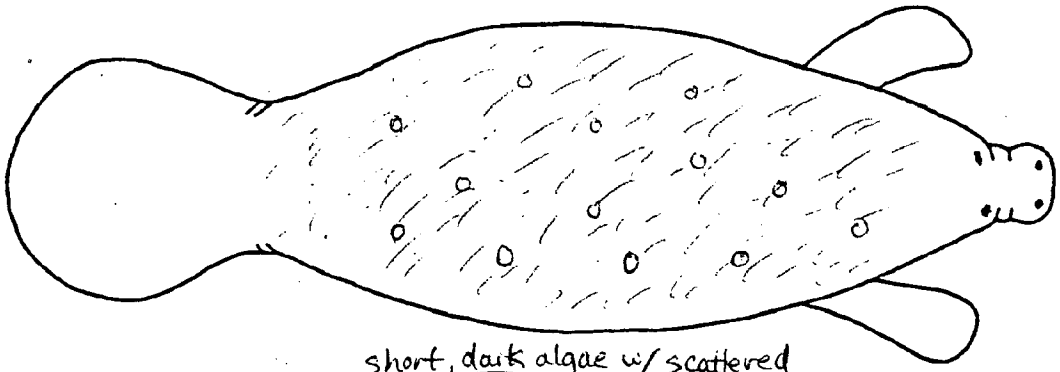
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 3/3/82 ; Pel. Har. Marina

RESIGHTINGS:

COMMENTS:

ANIMAL # 23



short, dark algae w/ scattered intact barnacles

DESCRIPTION:

SIZE: 6-7 feet

COLORATION: brown

DISTINGUISHING CHARACTERISTICS:

short dark algae

barnacles

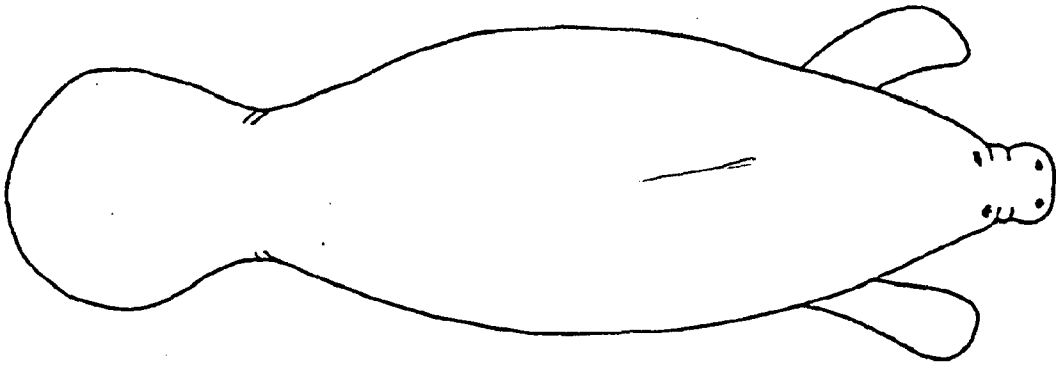
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 3/3/82; Pel. Har. Marina

RESIGHTINGS:

COMMENTS:

ANIMAL # 24



DESCRIPTION:

SIZE: 7-8 feet

COLORATION: grey-brown

DISTINGUISHING CHARACTERISTICS:

one scratch on mid-back

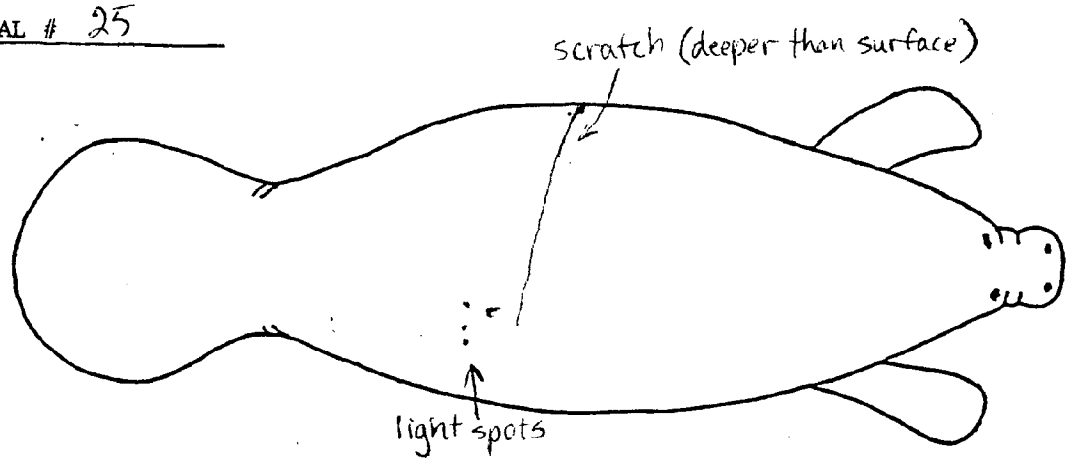
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 3/3/82 ; U.S.1 off E side

RESIGHTINGS:

COMMENTS:

ANIMAL # 25



DESCRIPTION:

SIZE: 7-8 feet

COLORATION: med. brown

DISTINGUISHING CHARACTERISTICS:

fairly deep scratch running across back

a few spots

clean skin

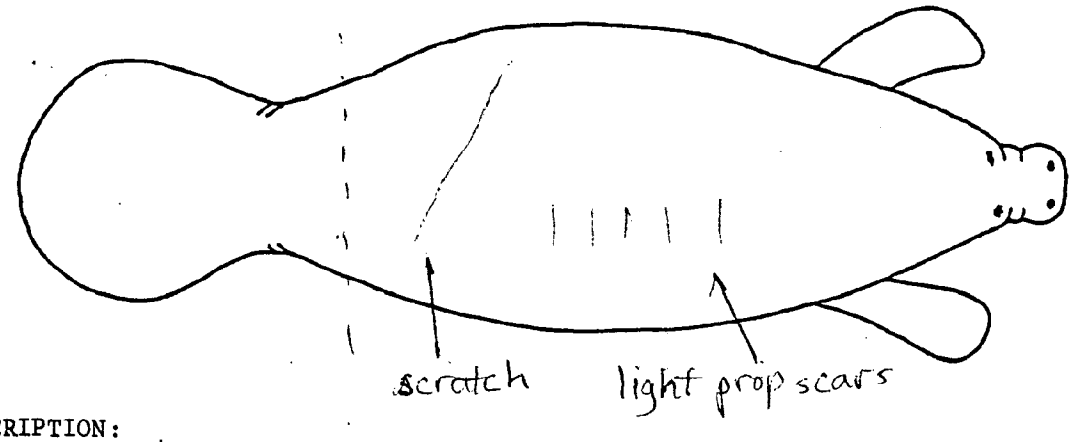
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 3/4/82 ; U.S.1 off E side

RESIGHTINGS:

COMMENTS:

ANIMAL # 26



DESCRIPTION:

SIZE: 6-7 feet

COLORATION: grey-brown

DISTINGUISHING CHARACTERISTICS:

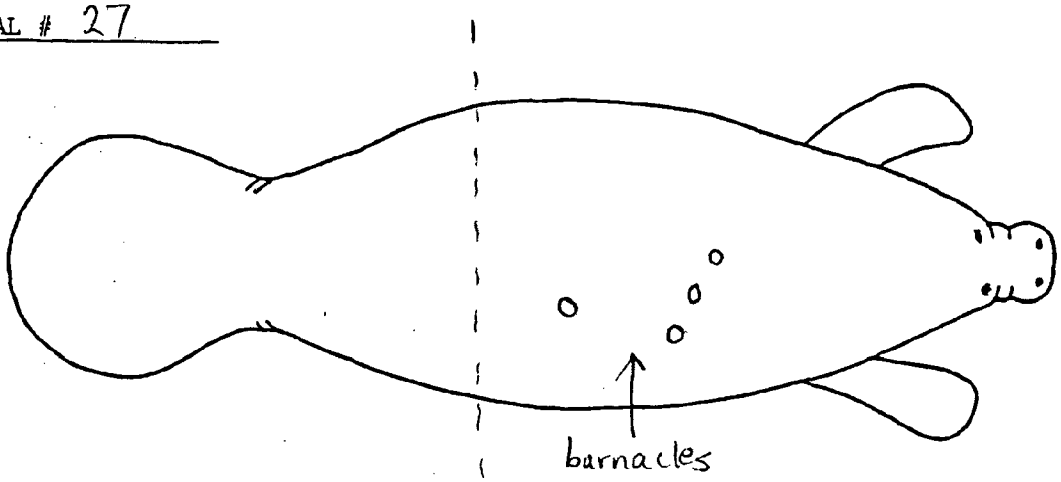
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 3/20/82 ; w. of RR

RESIGHTINGS:

COMMENTS:

ANIMAL # 27



DESCRIPTION:

SIZE: 8-10 feet

COLORATION: grey-brown

DISTINGUISHING CHARACTERISTICS:

4 barnacles on back

DATES/LOCATIONS SIGHTED:

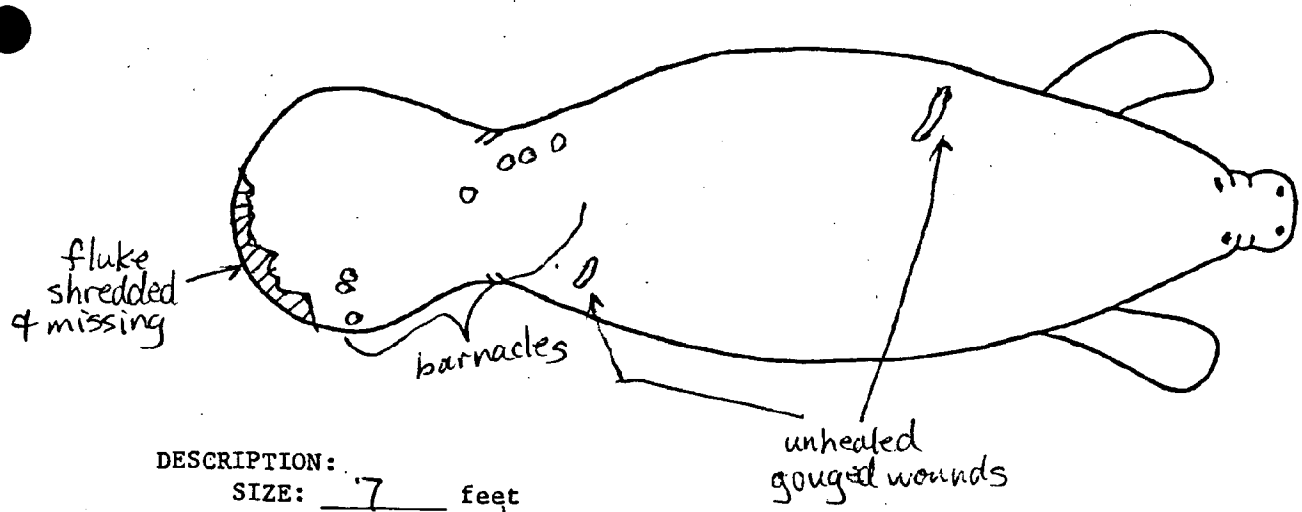
INITIAL SIGHTING: 3/29/82 Pel. Harbor Marina, Dock #2W

RESIGHTINGS:

COMMENTS:

Saw only its back & head from a distance, initially

ANIMAL # 28



DESCRIPTION:

SIZE: 7 feet

COLORATION: gray-brown

DISTINGUISHING CHARACTERISTICS:

fluke torn
7 barnacles
two gouged wounds

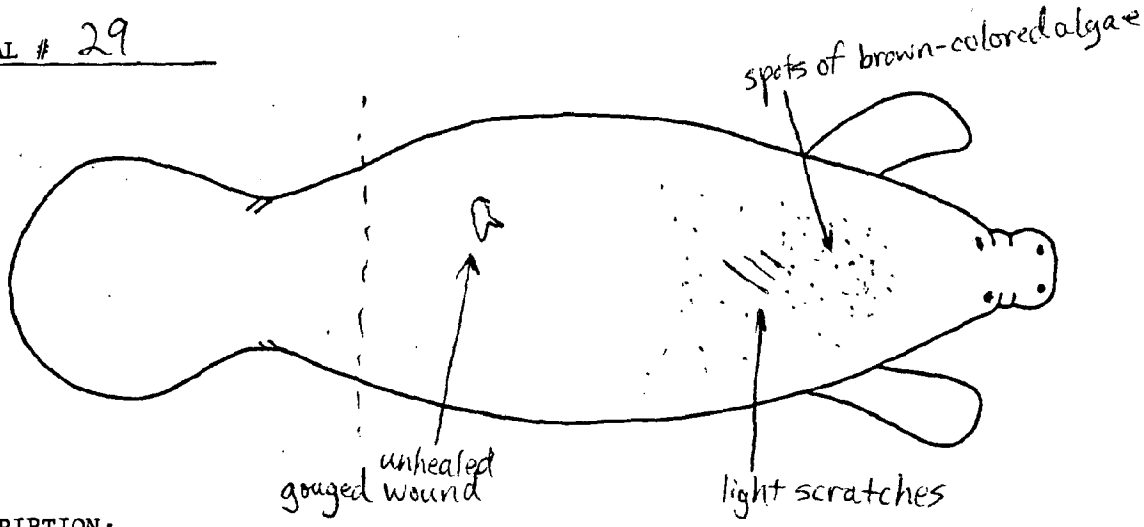
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 3/30/82 S.E. Bank of U.S. 1

RESIGHTINGS:

COMMENTS:

ANIMAL # 29

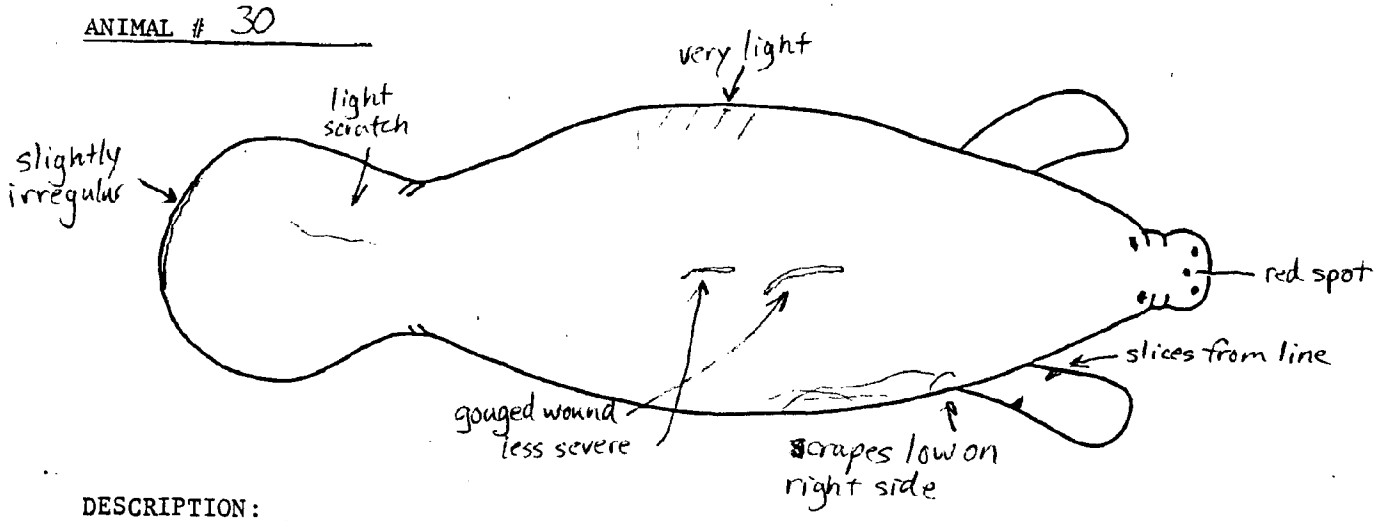


DESCRIPTION:
SIZE: 5 feet
COLORATION: gray
DISTINGUISHING CHARACTERISTICS:
3 light scratches
single gouge wound

DATES/LOCATIONS SIGHTED:
INITIAL SIGHTING: 3/30/82 S.E. Bank of U.S. 1
RESIGHTINGS:

COMMENTS: possibly calf of #28
didn't see fluke region

ANIMAL # 30



DESCRIPTION:

SIZE: 6-7 feet

COLORATION: grey

DISTINGUISHING CHARACTERISTICS:

small brick-red spot on snout

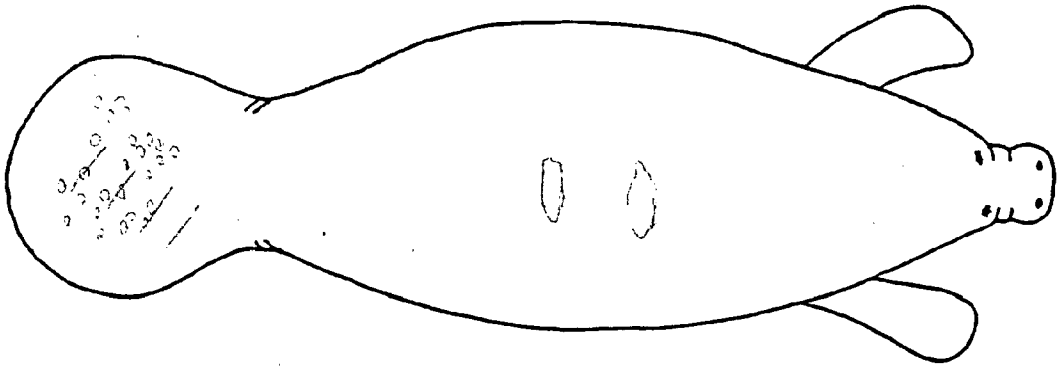
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 3/31/82 Pel. Har Marina, Dock # 2 W

RESIGHTINGS:

COMMENTS:

ANIMAL # 31



DESCRIPTION:

SIZE: 7 feet

COLORATION: brown

DISTINGUISHING CHARACTERISTICS:

two unhealed wounds on back

4 slice propellor scar on fluke

many white spots on tail

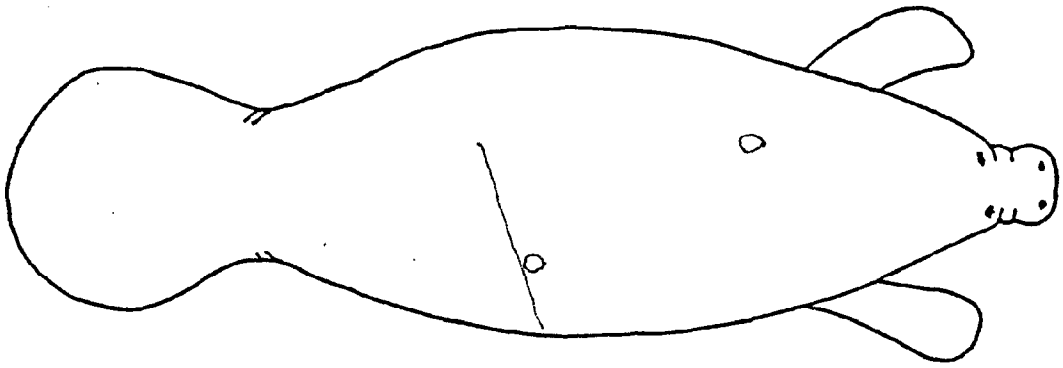
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 1/6/82 ; Citrus Ct., headed East

RESIGHTINGS:

COMMENTS:

ANIMAL # 32



DESCRIPTION:

SIZE: est. 7-8 feet

COLORATION: dark brown

DISTINGUISHING CHARACTERISTICS:

scattered dark algae

2 lumps on back (maybe dead barnacles – were dark)

one dorsal scar

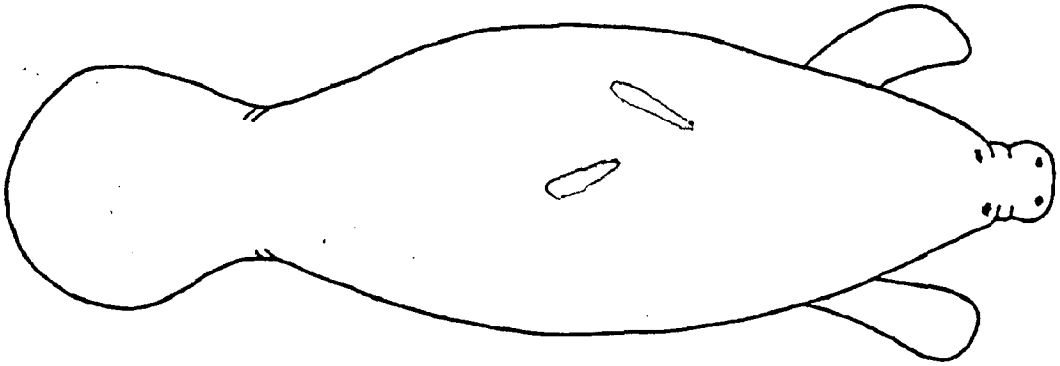
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 4/14/82 Pel. Har. Mar.; Dock # 2W

RESIGHTINGS:

COMMENTS: Saw only back and right side initially

ANIMAL # 33



DESCRIPTION:

SIZE: est. 7-8 feet

COLORATION: grey-brown

DISTINGUISHING CHARACTERISTICS:

2 unhealed scrapes on back

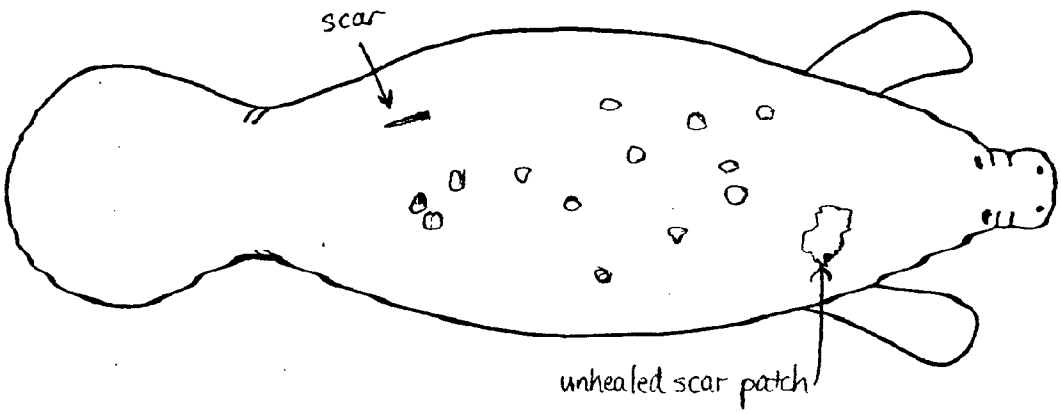
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 4/19/82 ; Pel. Har. Mar : S of Dock # 2

RESIGHTINGS:

COMMENTS:

ANIMAL # 34



DESCRIPTION:

SIZE: 7 feet

COLORATION: light brown

DISTINGUISHING CHARACTERISTICS:

scattered brownish barnacles - location above inexact

one scar patch

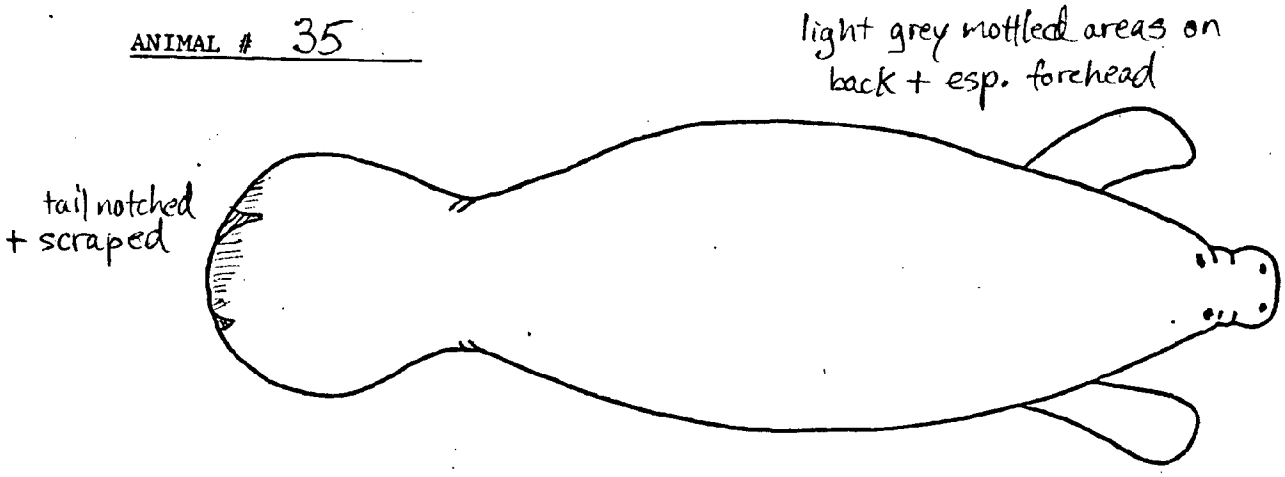
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 4/27/82 ; RR bridge

RESIGHTINGS:

COMMENTS:

ANIMAL # 35



DESCRIPTION:

SIZE: _____ feet

COLORATION: light grey brown

DISTINGUISHING CHARACTERISTICS:

mottled areas

tail notched + scraped

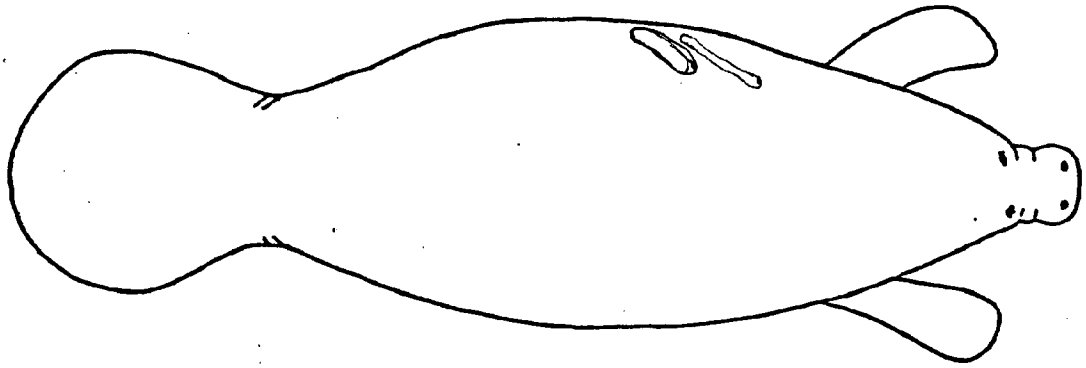
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 5/11/82 ; Zone #2 PHM

RESIGHTINGS:

COMMENTS:

ANIMAL # 36



DESCRIPTION:

SIZE: _____ feet

COLORATION: elephant gray

DISTINGUISHING CHARACTERISTICS:

two fairly fresh (pinkish white) wounds on left side
most of back was clean

DATES/LOCATIONS SIGHTED:

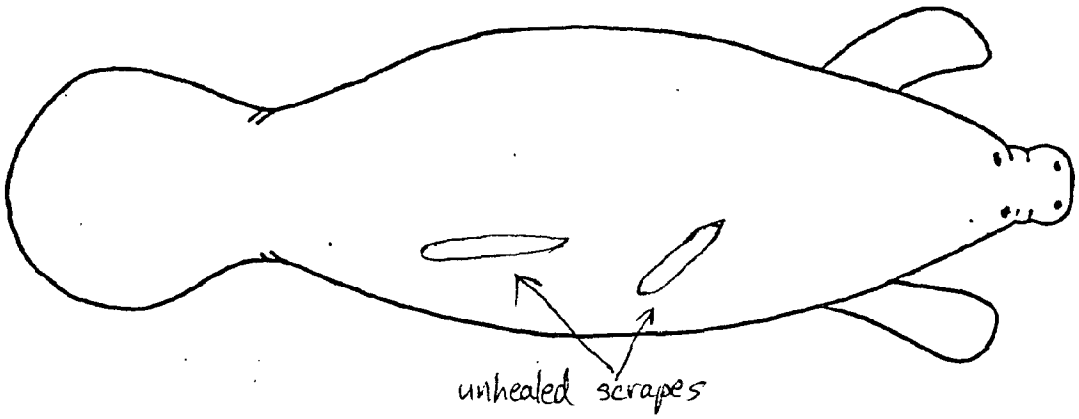
INITIAL SIGHTING: 5/11/82; Zone #2 PHM

RESIGHTINGS:

COMMENTS:

only got a partial view

ANIMAL # 37



DESCRIPTION:

SIZE: 9 feet

COLORATION: milk choc. brown

DISTINGUISHING CHARACTERISTICS:

DATES/LOCATIONS SIGHTED:

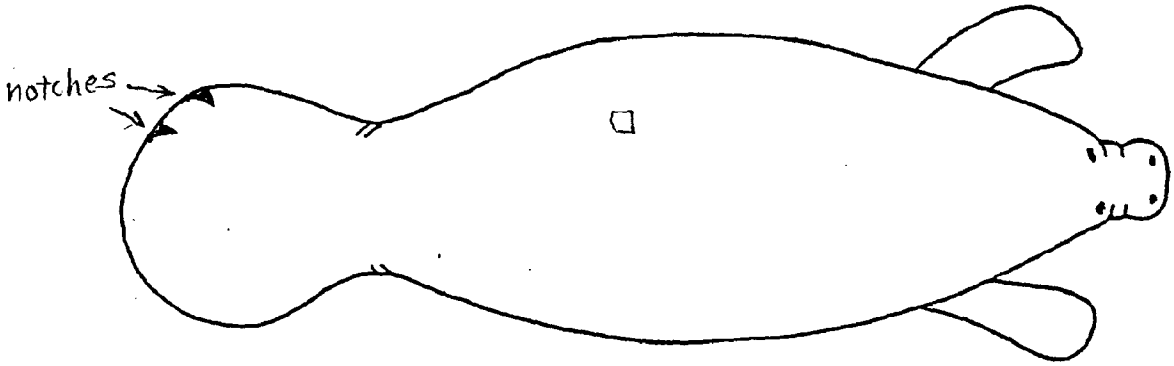
INITIAL SIGHTING: 5/21/82 ; #1 → #2

RESIGHTINGS:

COMMENTS:

got only quick glimpse – may be more marks present

ANIMAL # 38



DESCRIPTION:

SIZE: ~8 feet

COLORATION: water too dark w/ ~~tails~~

DISTINGUISHING CHARACTERISTICS:

tail notches

one squarish dorsal scar

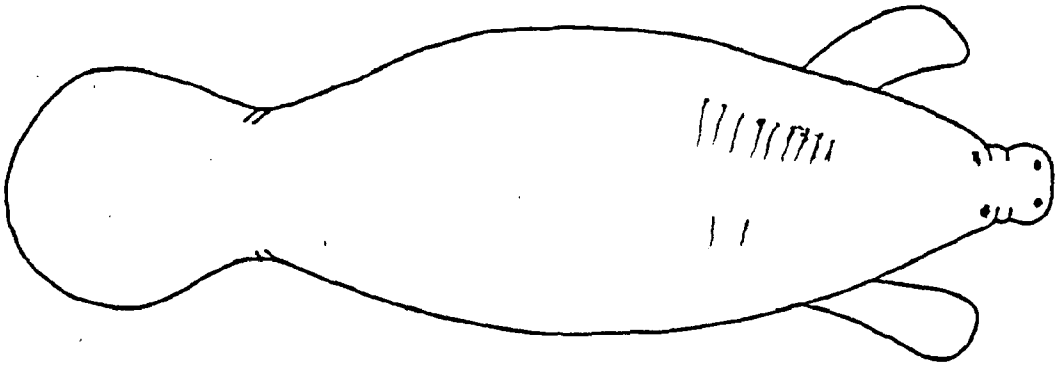
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 6/7/82 ; #3 → #2

RESIGHTINGS:

COMMENTS:

ANIMAL # 39



DESCRIPTION:

SIZE: ~7 feet

COLORATION: water too dark w/ acids

DISTINGUISHING CHARACTERISTICS:

many closely spaced scars

two scars on right mid-back

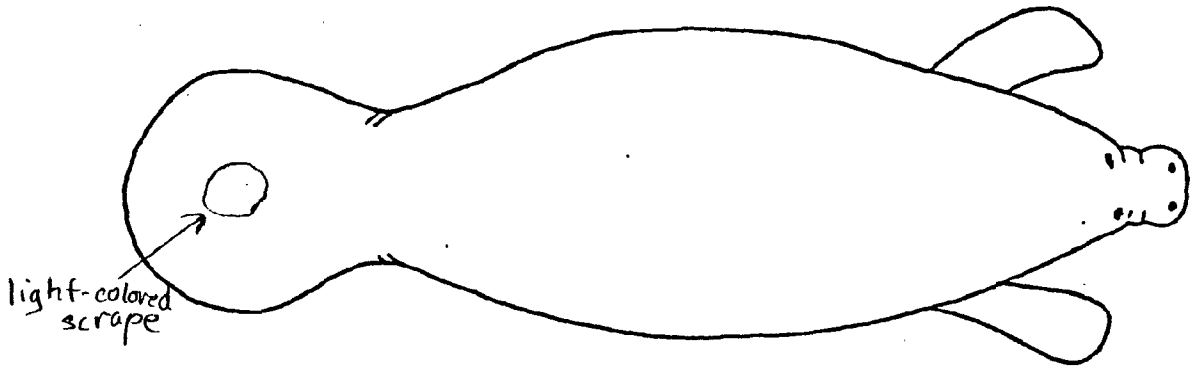
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 6/7/82; #3 → #2

RESIGHTINGS:

COMMENTS:

ANIMAL # 40



DESCRIPTION:

SIZE: ~6 feet

COLORATION: water too dark w/ acids

DISTINGUISHING CHARACTERISTICS:

light colored scrape on fluke

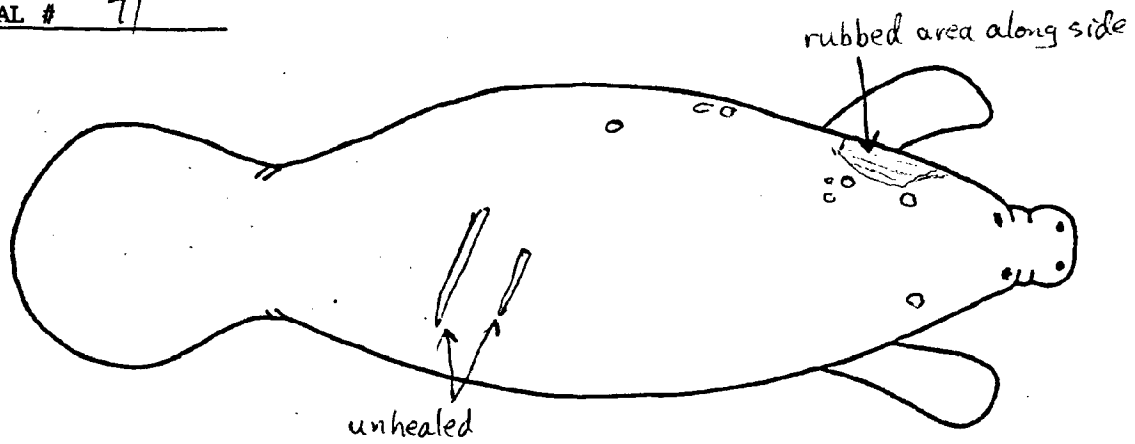
DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 6/7/82 ; #3 → # 2

RESIGHTINGS:

COMMENTS:

ANIMAL # 41



DESCRIPTION:

SIZE: 7-8 feet

COLORATION: water too dark

DISTINGUISHING CHARACTERISTICS:

Various white spots
two unhealed scars
rubbed area along left side

DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING: 6/7/82 ; #2 → 3 → 2 → 3

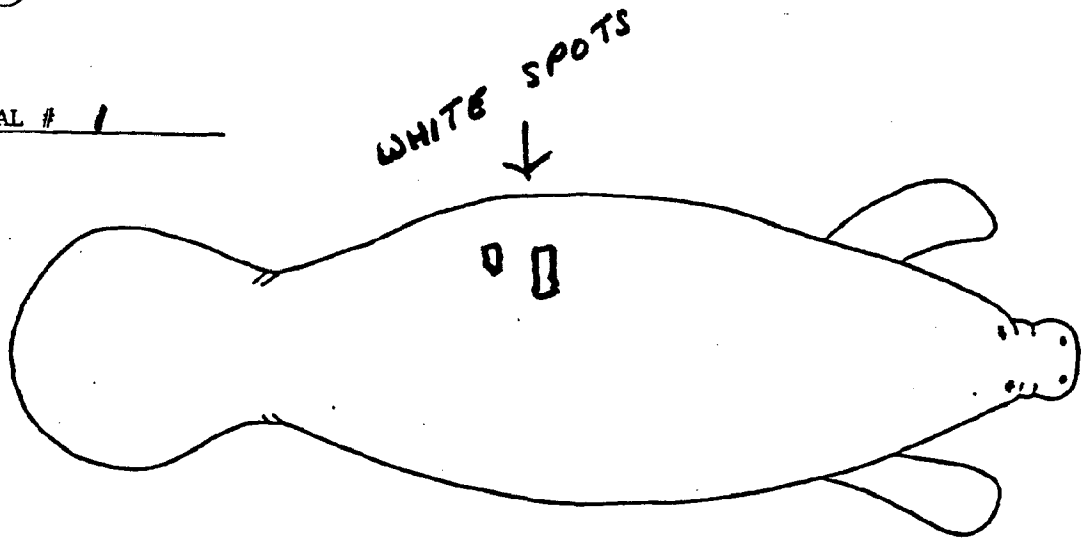
RESIGHTINGS:

COMMENTS:

Manatees Identified by Volunteer Observers

DOMINITIS

ANIMAL # 1



DESCRIPTION:
. SIZE: 6? feet
COLORATION: GRAY
DISTINGUISHING CHARACTERISTICS:

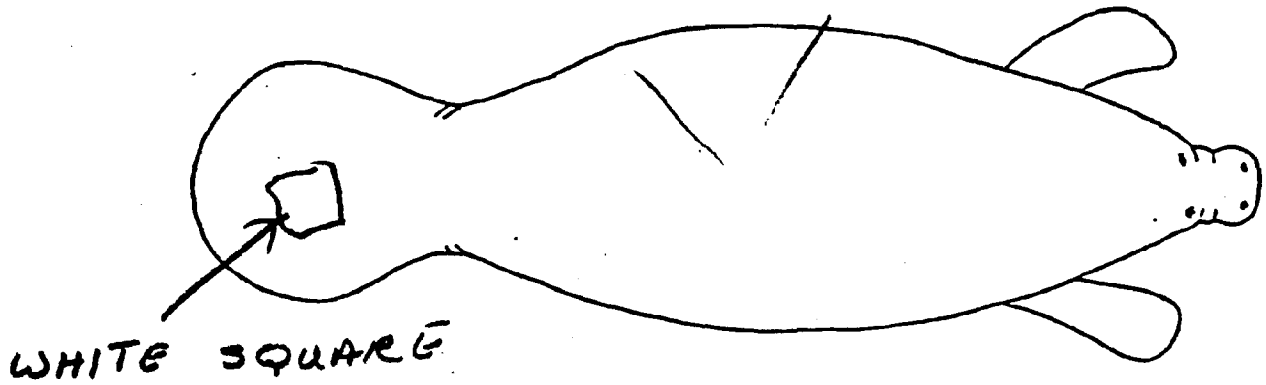
2 WHITE SPOTS ON LEFT REAR FLANK

DATES/LOCATIONS SIGHTED:
INITIAL SIGHTING: 0715 4-6-82
RESIGHTINGS:

COMMENTS:

DOMINITIS

ANIMAL # 2



DESCRIPTION:
SIZE: 5 feet
COLORATION: GRAY
DISTINGUISHING CHARACTERISTICS:

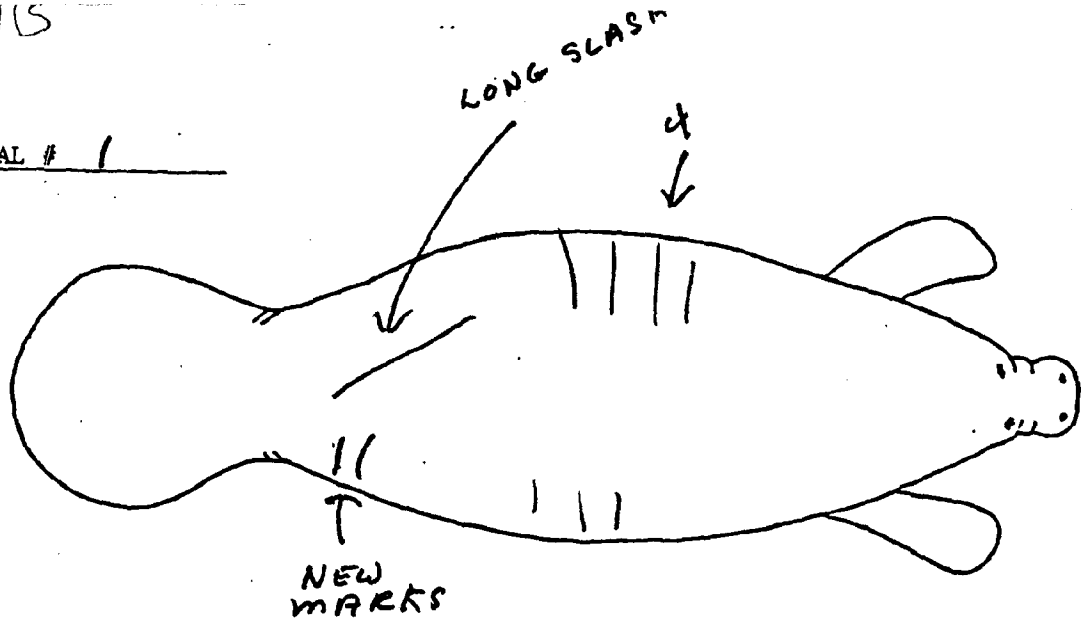
2 BACK SCARS

DATES/LOCATIONS SIGHTED:
INITIAL SIGHTING: 4-9-0715
RESIGHTINGS:

COMMENTS:

DOMINICA

ANIMAL # 1



DESCRIPTION:

SIZE: 6 feet

COLORATION: DARK GRAY

DISTINGUISHING CHARACTERISTICS:

SEE PROP SLASHES - UNABLE TO CLEARLY SEE RIGHT SIDE

DATES/LOCATIONS SIGHTED:

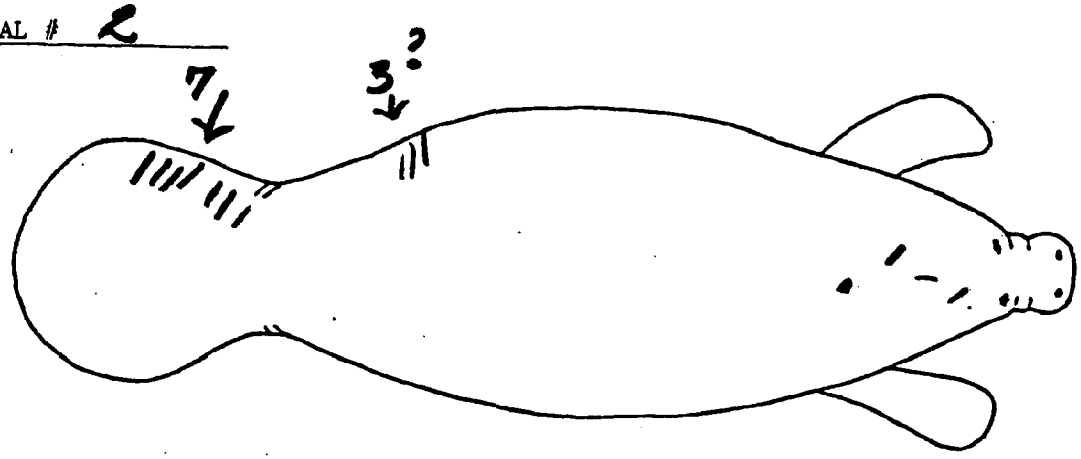
INITIAL SIGHTING:

RESIGHTINGS:

COMMENTS:

DOMINICIS

ANIMAL # 2



DESCRIPTION:

SIZE: 4+ feet

COLORATION: LT GRAY

DISTINGUISHING CHARACTERISTICS:

PROP MARKS ON TAIL AND FLANK
4 RANDOM MARKS ON TOP OF HEAD

DATES/LOCATIONS SIGHTED: 3-11-82

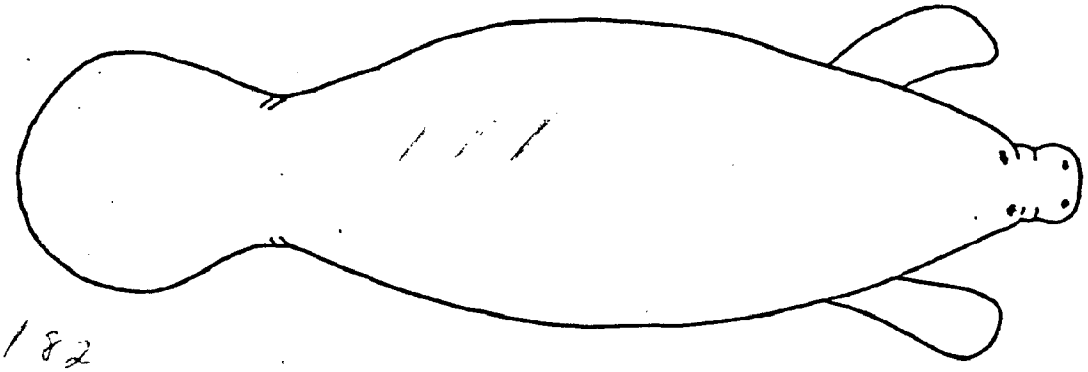
INITIAL SIGHTING: 1080 BEHIND GARAGE. BROWSED IN CANAL AND AT 1030

RESIGHTINGS: MOVED UPSTREAM IN TURKEY CREEK

COMMENTS:

MTW CD

ANIMAL # _____



Adgg 12/82

DESCRIPTION:

SIZE: 6+7 feet

COLORATION: _____

DISTINGUISHING CHARACTERISTICS:

DATES/LOCATIONS SIGHTED:

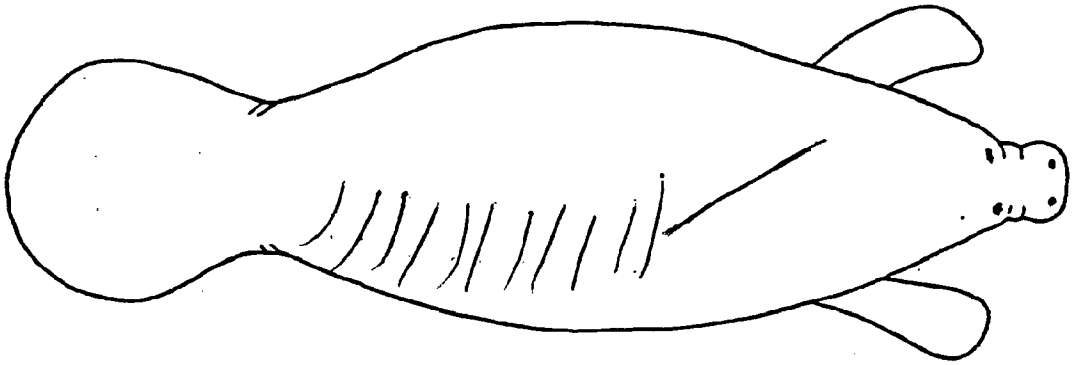
INITIAL SIGHTING:

RESIGHTINGS:

COMMENTS:

MTWCD

ANIMAL # _____



DESCRIPTION:
SIZE: 8' feet
COLORATION: Dark Green
DISTINGUISHING CHARACTERISTICS:
Scars on Right Side

DATES/LOCATIONS SIGHTED: 6-8-82
INITIAL SIGHTING: 1:30 pm
RESIGHTINGS:

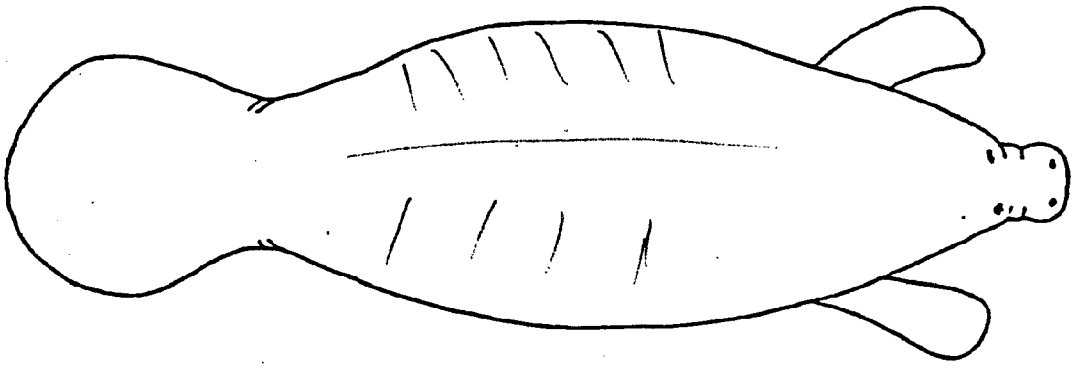
COMMENTS:

7

MTWCD

4-26-82

ANIMAL # 3



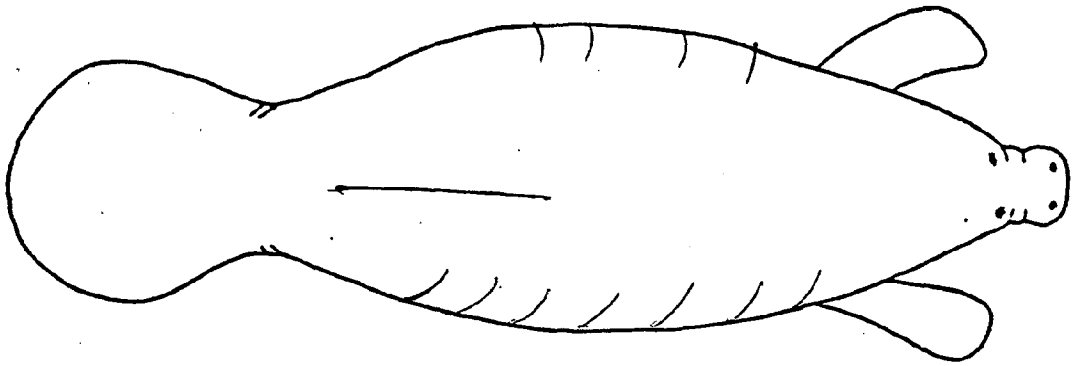
DESCRIPTION:
SIZE: 6 feet
COLORATION: grey
DISTINGUISHING CHARACTERISTICS:
Mother + Baby
~~[illegible]~~ and
medium size

DATES/LOCATIONS SIGHTED:
INITIAL SIGHTING: 10 10 Am
RESIGHTINGS:

COMMENTS: 300 yds below Dam going down Stream

MTWCD

ANIMAL # 2



DESCRIPTION:

SIZE: App 8 AND 6 feet

COLORATION: GRAY

DISTINGUISHING CHARACTERISTICS:

YELOW STRIPED MARKING ON BOTH SIDES.

PROP. CUT ALONG REAR AREA ON 8 FOOT MANATEE

DATES/LOCATIONS SIGHTED:

INITIAL SIGHTING:

RESIGHTINGS:

FIRST SIGHTING APRIL 12 1982 AT APP. 8:00 AM

MELBOURNE TILLMAN LOCK & DAM SITE.

SECOND SIGHTING SAME DATE. 12:30 PM.

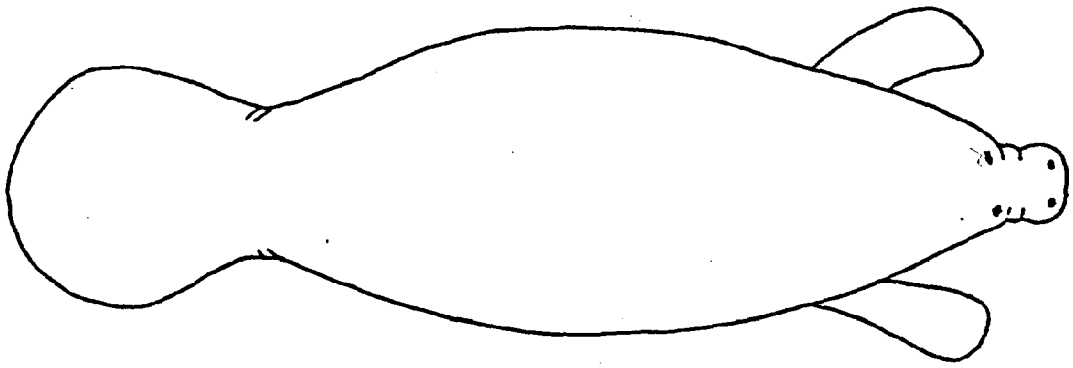
SMALLER IN SIZE APP 6 FEET LONG

COMMENTS:

FEEDING AROUND LOCK GATES.

MTWCD

ANIMAL # _____



DESCRIPTION: 8'
SIZE: _____ feet
COLORATION: _____
DISTINGUISHING CHARACTERISTICS:
- Big one Scars on Right Side
2 Small ok

3 Seen

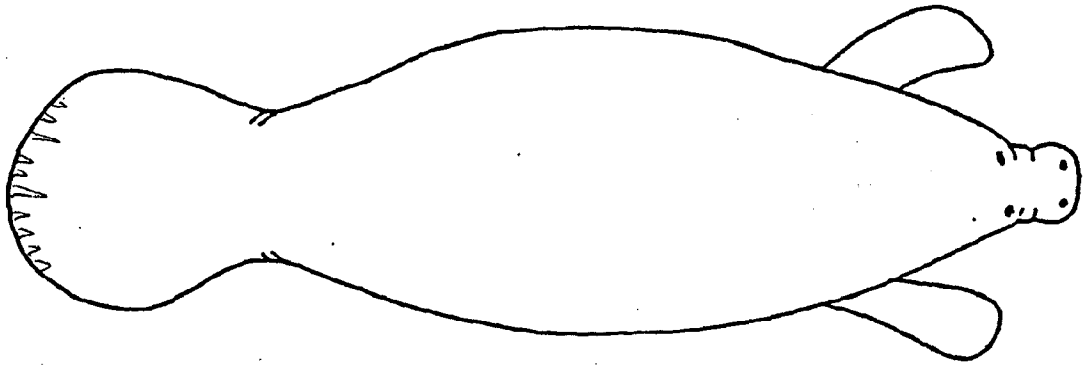
DATES/LOCATIONS SIGHTED:
INITIAL SIGHTING:
RESIGHTINGS:

6 – 10
9:30 A.M.

COMMENTS:

BILL LUDDY

ANIMAL # 1



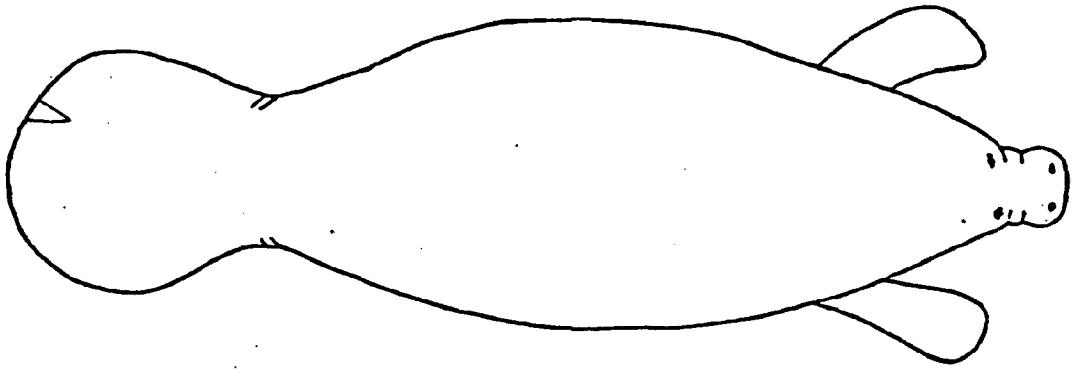
DESCRIPTION:
SIZE: _____ feet
COLORATION: _____
DISTINGUISHING CHARACTERISTICS:

DATES/LOCATIONS SIGHTED: 6-3 IN CHANNEL IN FRONT OF MY HOUSE
INITIAL SIGHTING:
RESIGHTINGS: PLAYING FOR OVER 3 HOURS

COMMENTS:

LIDDY

ANIMAL # 2



DESCRIPTION:

SIZE: _____ feet

COLORATION: _____

DISTINGUISHING CHARACTERISTICS:

DATES/LOCATIONS SIGHTED: L-3

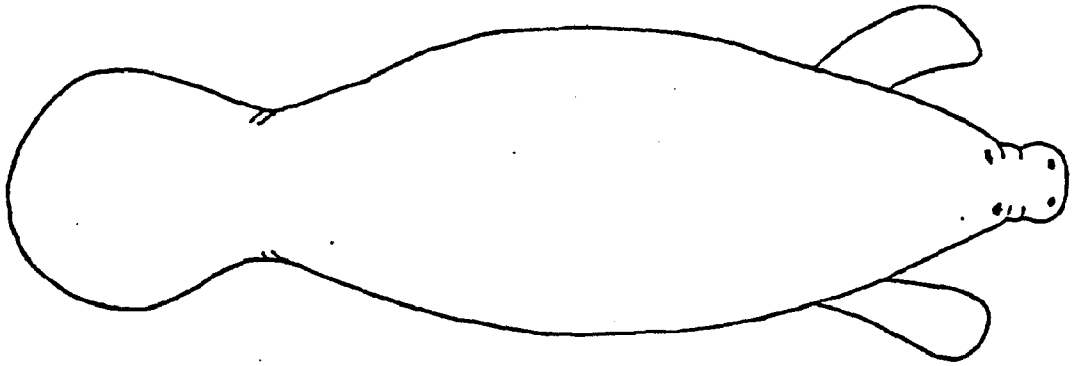
INITIAL SIGHTING:

RESIGHTINGS:

COMMENTS:

LIDDY

ANIMAL # 3



DESCRIPTION:

SIZE: _____ feet

COLORATION: _____

DISTINGUISHING CHARACTERISTICS:

DATES/LOCATIONS SIGHTED: 6-3

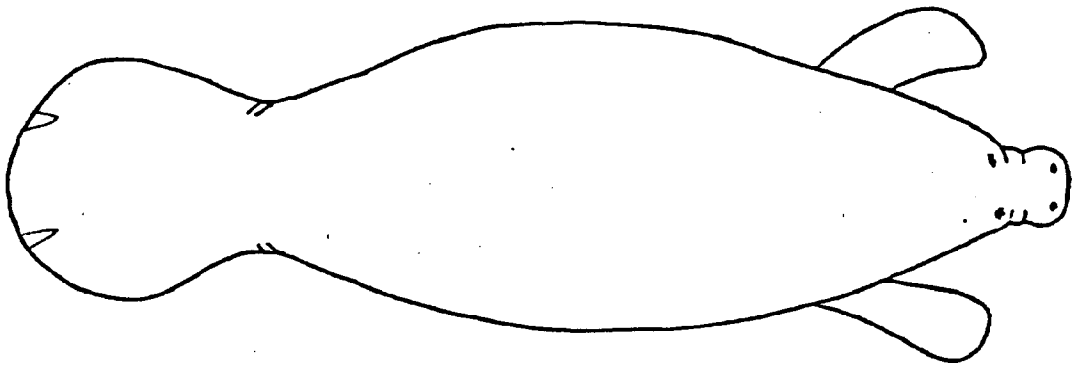
INITIAL SIGHTING:

RESIGHTINGS:

COMMENTS:

LIDDY

ANIMAL # 4



DESCRIPTION:

SIZE: _____ feet

COLORATION: _____

DISTINGUISHING CHARACTERISTICS:

DATES/LOCATIONS SIGHTED: 6-3

INITIAL SIGHTING:

RESIGHTINGS:

COMMENTS:

THE FEASIBILITY AND ECONOMIC VALUE OF THE MANATEE AS A WEED CONTROL AGENT IN THE MELBOURNE-TILLMAN WATER MANAGEMENT DISTRICT, PALM BAY, FLORIDA

By
Kevin D. McMillen

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Bibliography

Introduction

In 1980, Florida Institute of Technology's Center for Coastal Zone Management produced a local government manatee preservation program for the city of Palm Bay, Florida. This plan evaluated the possible impacts of a manatee preservation program in various phases of local government activity and proposed a model community program with specific policy recommendations (Barile, 1980). This paper is an evaluation of one of the policy recommendations, the use of the manatee for aquatic weed control.

The study site is the Melbourne-Tillman Water Management District, a canal system contiguous with the main channel of Turkey Creek. The manatees of Palm Bay inhabit the waters of the Indian River and Turkey Creek in Brevard County. A survey completed in concurrence with this study shows that manatees enter the Melbourne-Tillman through the radial gates of the MS-1 water control structure.

The Melbourne-Tillman invests a great deal of time and energy to control aquatic weeds. In FY '81, the district spent $85,092 or 41 percent of their total operating budget on chemical weed control. The district wanted to know how they could benefit from using manatees as weed control agents and if it was feasible for manatees to enter the canal system.

The purpose of this study is to determine the feasibility and economic benefit of using manatees as weed control agents in the Melbourne-Tillman. This is the first study ever done in Florida which attempts to evaluate the economic value of a manatee. This paper is in no way attempting to put a wholesale value on these creatures. The manatee is an endangered specie, and with the threat of extinction persisting, their value as an entity is considered beyond quantification. This study simply attempts to qualify the value of the work done by manatee toward the elimination of nuisance aquatic vegetation in the Melbourne-Tillman system.

Background and Study Site

Melbourne-Tillman Water Control District

The Melbourne-Tillman drainage system is approximately 11½ miles wide by 8½ miles long (Barile, 1976). The system encompasses 62,750 acres (Ghioto, 1977) or 95.5 square miles (Foose, 1980) and is drained by 203 canals. The drainage system diverted waters of the St. Johns marsh eastward to Turkey Creek and the Indian River for agricultural development. The drainage system is now composed of undeveloped but subdivided land - residential, commercial, and rural/agricultural land.

The Melbourne-Tillman has expressed its proposed plans in several master planning documents. The latest master plan, the 1977 Revised Plan of Reclamation, expresses concern over maintaining water quality as development proceeds within the drainage basin. The Reclamation Plan suggests a water quality monitoring program (Ghioto, 1977). A water control structure (MS-1) was built to prevent overdrainage and restoration of the water table. Prevention of overdrainage is accomplished by a water level regulation schedule. During the wet season of June through October, water levels are maintained at a maximum of four feet. High water levels are maintained at a maximum of eight feet during the dry season of November through April. The water control structure has a navigational lock to fulfill a contractual commitment by General Development Corporation (GDC) to property owners in the area (Ghioto, 1977).

Chemical Control in the Melbourne-Tillman

The Melbourne Tillman spent $85,092 to control aquatic plants in FY'81. This represents 41 percent of the Melbourne-Tillman's total operating budget. The state of Florida helps to defray this cost through a cost sharing arrangement through DER's Bureau of Aquatic Plant Control and Research Program. Through this program, it is possible for the Melbourne-Tillman to obtain funding for as much as 1/3 of its control costs. A breakdown of chemical control expenditures, chemicals used, and aquatic plants treated is presented in Table 1.

The control of aquatic plants is essential if the Melbourne-Tillman is to fulfill its flood control objective. Control of aquatic vegetation prevents the choking of drainage canals which could otherwise reduce canal flow capacity by as much as 60 percent (Bogart, 1948). Large snags of water hyacinth can obstruct the flow of water through the MS-1 water control structure. Beds of hydrilla clog boat props thus preventing boating in areas where there are navigational commitments. The elimination of aquatic weeds also provides several environmental benefits. The removal of water hyacinth can reduce the breeding ground for mosquitos (Mulrennan, 1962), increase reaeration of water (Penfound, 1948) and reduce water loss due to evapotranspiration (Timmer, 1967).

TABLE 1

CHEMICAL AQUATIC PLANT CONTROL EXPENDITURES[1]

OCTOBER 1980 - SEPTEMBER 1981

$43,229.50	Salaries	State Funding (1/3 match)
7,544.97	Benefits	$28,364.31
23,346.00	Chemicals	
10,972.47	Equipment	
$85,092.94	Total Cost	

Acres Treated

Floating	Emergent	Submerged	Ditch & Bank
580	575	32	680

Breakdown of Aquatic Acres Treated

Total (1187 ac)	Floating	Emergent	Submerged
100%	49%	48%	3%

Chemicals Used

Dalapon	2.4-D	Banvel-720	Hydout
5600 lbs.	640 gal.	195 gal.	2350 lbs.

1. Mike Mahler, Bureau of aquatic plant control and research, DNR. Grant Section.

The use of chemical herbicides to control aquatic weeds is standard practice in Florida (Corp of Engineers, 1973) and is used almost exclusively in the Melbourne-Tillman canal system. At present, chemical control has proven to be the most effective and feasible means of control available when taking into account limited funding, the need for control, and the safety of the environment (Corp of Engineers, 1973). The use of chemical herbicides has several adverse environmental impacts (Corp of Engineers, 1973). The application of chemical herbicides results in a temporary reduction in water quality. The death and decay of large areas of aquatic plants results in a reduction in the amount of dissolved oxygen in the water available for other life. Nutrients previously taken up by and contained in the aquatic plants are released into the water, refueling plant growth and adding to the demand for dissolved oxygen. Detritus from the decaying plants falls to the bottom of the canal, causing a buildup of organic sediments. The large water area of the Melbourne-Tillman, the rapid growth rate of aquatic vegetation, and the limited effectiveness of chemical controls makes it necessary to continually repeat applications of these chemical herbicides. The long term effects of this on the environment are not known. However, it can be assumed that repeated applications prolong or exaggerate these environmental effects making them a persistant problem.

Turkey Creek

The Melbourne-Tillman discharges its water through the MS-1 structure into the west branch of Turkey Creek. The headwaters of Turkey Creek have been channelized to facilitate the rapid discharges of water from the canal system. The creek takes on a more natural look, 200 yards downstream, meandering through a small pine and oak hammock area known as the Turkey Creek Sanctuary. The creek straightens and passes under the Port Malabar bridge into a low density residential area. A few channelized areas and small tributaries provide creek access to waterfront homes off the main channel. The northern bank of the main channel is spotted with waterfront homes. The south side of the main channel consists of low lying herbaceous wetlands and Typha marshes that remain undeveloped. As Turkey Creek makes its final approach to the Indian River, the flow decreases and the creek bottom widens forming a bay area. The property surrounding the bay area is a mixture of residential and commercial property. Two marinas border the north and south banks. Palm Bay and Castaway Point, two developments at the confluence of Turkey Creek with the Indian River, provide single family residential waterfront living.

Turkey Creek has been classified as having fair water quality by Brevard County's 208 Wastewater Treatment Plan. Total phosphorous is above the suggested limits (less than .5 mg/1) and there are occasional violations of BOD_5 (less than 4 mg/1) and TKN (less than 1 mg/1) (Brevard 208, 1979). Dissolved oxygen has also been in violation of the minimum state standard of 4 mg/1. Data collected in 1979 showed DO levels ranging from 2.8-8.4 mg/1 (Fall, 1980). Putman (1973) conducted a study to collect data on the water quality of Turkey Creek prior to the construction of the MS-1 water control structure. Major conclusions were that DO levels were depressed, low BOD_5 and high total organic carbon indicate a large contribution by leaf litter and plant detritus material and coliform loading by sewage in some samples.

Turkey Creek receives nutrient discharges from two main sources: GDU's Port Malabar Sewage Treatment Plant and the Melbourne-Tillman. The Port Malabar Sewage Treatment Plant discharges .75 million gallons per day of secondary treated sewage (Brevard 208, 1979). Effluent discharge concentration of TP is 4.6 mg/1, results in 9,832 lbs. of total phosphorous/year into the Turkey Creek system.

Future nutrient loadings from urban runoff into the Melbourne-Tillman in all likelihood will be large. The Melbourne-Tillman comprises 82 percent of the drainage basin of Turkey Creek. The city of Palm Bay is the fastest growing community in Brevard County. Eighty-one percent of Palm Bay is within the Melbourne-Tillman Drainage District. Based on existing and committed subdivided land alone, Palm Bay may reach a population of over 180,000 persons at buildout (Palm Bay, 1981).

Turkey Creek is classified by the state as Class III waters (Brevard 208, 1979). Class III surface waters are designated for recreation, propagation and management of fish and wildlife. Nutrient concentrations in these waters are not to cause an imbalance in the natural population of aquatic flora and fauna. To protect Turkey Creek, DER has set a zero discharge requirement for point source discharges (Wiekowicz, 1980). This imposition will require the Port Malabar Sewage Treatment Plant to eventually comply with this requirement. Although DER rules (17-3-031, 17-4.01, and 17-4.243) allow dischargers to apply for appropriate relief, movement to clean up nutrient discharges is forthcoming.

The Manatees of Turkey Creek

The manatee is a nearly year round resident in Turkey Creek (Tiedeman, 1980). They have been observed by Tiedeman throughout his study area during the warm season (April-November). Tiedeman (1980) correlated the sitings of manatees with water temperature, which showed that manatees tend to leave Turkey Creek when water temperatures approach 20°c. Campbell and Irvine (1978) suggested that water temperatures of 20°c or below stimulate manatee movement to warm water refugia.

Warm water outfalls from electrical power plants in the Indian River at Delespine and Vero Beach provide the closest refugia for manatees in Turkey Creek.

Seven hundred and ninety-one manatees were sited by Tiedeman throughout 1978-79. Forty-five individuals were identified. Although manatees frequent areas throughout Turkey Creek, they tend to concentrate in the calm waters of the bay. The marina located on the north bank of the bay was shown to be an area of high manatee concentration. Tiedeman's study did not cover the upper reaches of Turkey Creek. In concurrence with this study, a new siting survey was conducted to document the occurrence of manatees in the Turkey Creek hammock and the Melbourne-Tillman canal system. Preliminary results of this survey show that manatees pass through the hammock area to the channelized approach to the MS-1 water control structure. Here the manatees wait for water hyacinths to be flushed through the MS-1 and have been observed entering the lock to eat vegetation.

Locktenders have observed manatees bumping against the radial flood gates attempting to pass under them and enter the canal system and, on July 21, four manatees did so. In the canal, the manatees were observed foraging on water hyacinth (Eichhormia crassides) and hydrilla (Hydrilla verticillata). The same day, manatees were observed foraging in canal C-37. They were not observed leaving the canal system so the length of their stay is unknown.

There have been two manatee deaths recorded in Turkey Creek since a mortality network was set up in 1974. A dependent calf was found in June of 1982, and an adult was found with a gun shot wound in September of 1981 (Bondy, pers. comm).

The Manatee as a Weed Control Agent

The manatee is a totally herbivorous aquatic mammal native to more than 40 tropical and subtropical countries of the Americas and Africa. The genus Treichechus is composed of three species: T. Mantus, the Caribbean or Florida manatee; T. Inunguis, the Amazon manatee; T. Senegalensis, the West African manatee. Manatees belong to the order Sirenia. They may reach a length of 13 feet and weigh over half a ton. The Florida manatee is an endangered species inhabiting rivers, estuaries, and coastal waterways. Its primary habitat is Florida waters, seeking refuge from cold in warm water springs and power plant discharges (Layne, 1965).

The population of the Florida manatee is estimated at 800-1,000 (Irvine & Campbell, 1978). There is evidence that Brevard County may contain the largest population of manatees in Florida (Hartman, 1974). There is insufficient historical data to state absolutely whether the manatee population is stable, increasing or decreasing in Florida (Wray, 1978). However, Florida's increasing population and the accompanying growth has resulted in serious threats to the viability of the population. These threats include collisions with power boats and barges, drowning in flood control gates, vandalism and poaching, and entanglement in fishing gear (Wray, 1978).

Mortality due to flood control gates is of particular interest in this study since manatees must pass through the MS-1 to enter the Melbourne-Tillman.

From 1974-77, six percent of recorded manatee deaths resulted from automatic flood gates and canal locks (Irvine, 1978). Ten of the 11 deaths were caused by automatic flood gates operating during the rainy season from May to October. Manatees drown when they are sucked down into the gates as they open in response to rising water level.

Manatees are opportunistic feeders and have been observed grazing on a wide variety of aquatic plants. Manatees prefer submerged plants to floating and emergent (Allsopp, 1969; Hartman, 1979). They have also been observed feeding on algae that grows on pilings and mooring lines (Hartman, 1979). Captive Manatees have been recorded to eat up to one-fourth of their body weight per day in wet greens, or as much as one kilogram of vegetation per five centimeters of body weight (Hartman, 1979).

During the 1960s and '70s, a number of studies were conducted to determine the effectiveness of manatees controlling aquatic weeds. Manatees were first used as a natural and economic agent for aquatic weed control in Guyana in 1916 (Anon, 1974). Manatees were observed to consume as much as 20 percent of their body weight and were considered highly affective in clearing weed choked canals. Two manatees, 7½ feet long, were capable of clearing a canal 22 feet wide and 1,600 yards long in 17 weeks.

The Canal Zone Governemnt studied the weed clearing ability of manatees in an attempt to remove surface vegetation providing breeding areas for mosquitos (MacLaren, 1967). Manatees became selective in their eating havits when there was abundant vbegetation, often choosing the softer submergent plants. It was observed that five manatees were incapable of clearing a seven acre lagoon. The canal zone would need a herd of 1,000-2,000 manatees to fulfill their needs.

A study was conducted by Florida Atlantic University in 1964 to test the effectiveness of the manatee as a weed control agent in a more northern extension of the genus's range. The manatees were found to be effective weed control agents. However, manatees confined to the canals over the winter months died of respiratory failure (Sguros, 1966).

Lomolino (1977) studied the ecological role of the manatee in water hyacinth dominated ecosystems. He found that manatees were efficient removers of water hyacinth from aquatic systems, digesting 82.6 percent of their dry matter intake. As nutrient removers they did not fair as well, assimilation efficiencies for phosphorous were a low 5.1 percent.

Methods

To determine the value derived from the use of manatees as weed control agents, the costs of the current method of control, chemical herbicides, was applied to the equivalent amount of control provided by a manatee. The cost of chemical control was considered to be the cost of application of the herbicides and the indirect cost of the dredging of organic sediments and the removal of phosphorous released by the decay of the plant material.

Application Cost of Chemical Control

The cost of chemical control was evaluated in acres per year and in tons of aquatic weed controlled. The cost per acre was derived by the total expenditure on weed control for FY'81 divided by the number of acres controlled. The cost per ton was determined by a representative standing density of aquatic plants per acre and dividing by the cost per acre determined above. This method includes the following assumption: the standing densities of aquatic plants cited by Bagnal (1981) is representative of the Melbourne-Tillman.

Application Cost of Chemical Control

Amount of Control	Cost
One Acre	$ 45.58
1,867 Acres	$85,093.00
One Ton Plant Material	.75

Organic Sediment Deposition Cost

The method to evaluate the cost of organic sediment deposition was to assign it as part of the cost of dredging. The weight of organic material that causes dredging to commence was related to the annual productivity of aquatic plants after the leaching of macronutrients was accounted. From this, the number of years it takes to deposit the amount of organic material to trigger dredging was determined. The number of years of deposition was used to determine the dredging costs attributed to organic sedimentation each year.

This method includes the following assumptions:

1) Dredging commences when 13.5 inches of sediment is deposited (Panebianco, pers. comm.).
2) The annual dry matter productivity of aquatic plants cited by Bagnal (1981) is representative of the Melbourne-Tillman.
3) The percent of composition of macronutrients in aquatic plants cited by Easley(1974) and Steward (1970) is representative of plants in the Melbourne-Tillman.
4) There is complete leaching of macronutrients and the leaching of micronutrients is insignificant.
5) There is no loss of organic sediment from the canal system.

Potential Organic Sediment Deposition Cost

Amount Deposited*	Cost
1 ton	$ 24
6.4 tons/acre/year	160
1.4×10^2 tons/acre/22 years	3,400
7,600 tons/year	180,000

*dry weight

Total Phosphorous Release Cost

The method to evaluate the cost of phosphorous release from chemical control was to assign it the value of phosphorous removal at the Port Malabar Sewage Treatment Plant. The amount of phosphorous release was related to a representative acre of dry matter productivity and the percentage composition of phosphorous. The value of phosphorous removal at the Port Malabar Sewage Treatment Plant was evaluated by the cost of installing ferric chloride addition and the amount of phosphorous that could be removed by this method.

The following assumptions are included in this method:

1) The annual dry matter productivity cited by Bagnal (1981) is representative of the Melbourne-Tillman.
2) The percentage composition of phosphorous cited by Easley(1974) and Steward (1970) is representative of the Melbourne-Tillman.
3) The Port Malabar Sewage Treatment Plant uses the ferric chloride addition method for phosphorous removal.

Potential Total Phosphorous Release Cost

Amount Released	Cost
1 lb.	$ 3.24
73.2 lbs/acre/year	237.00
86,900 lbs/year	282,000.00

Weed Clearing Capacity and Value of a Manatee

The weed clearing capacity of a manatee was evaluated by determining the possible consumption of a manatee in the Melbourne-Tillman and relating it to the representative average plant standing density. The weed clearing capacity was assigned the value of the equivalent cost of chemical removal.

This method includes the following assumptions:

1) A standard 1,000 pound manatee consumes 20 percent of its body weight a day (Anon, 1974).
2) Plant standing densities cited by Bagnal (1980) are representative of the Melbourne-Tillman.
3) Manatees do not discriminate between plant types.
4) A manatee resides in the canal system for 153 days and in Turkey Creek for 300 days.

Potential Weed Clearing Capacity/Value

In Melbourne-Tillman

Amt. of Control	Quantity	Value
1 Manatee	.25/acres/yr.	$11.50
1 Manatee	15.3 tons/yr.	$11.50
In Turkey Creek		
1 Manatee	30 tons/yr. .49 acres/yr.	$22.50
45 Manatees	1350 tons/yr. 22 acres	$1012.00

Organic Sediment Removal Capacity and Value

The organic sediment removal capacity of a manatee was evaluated by determining the possible consumption of a manatee in the Melbourne-Tillman and relating that to the dry matter digestive efficiency of water hyacinth. The benefit of organic matter removal was valued at the cost of removing an equivalent amount by dredging.

This method includes the following assumptions:

1) A standard 1,000 pound manatee consumes 20 percent of its body weight per day (Anon, 1974).
2) Plant standing densities cited by Bagnal (1981) are representative of the Melbourne-Tillman.
3) Manatees consume only water hyacinth.
4) A manatee resides in the canal for 153 days and in Turkey Creek for 300 days.

Potential Organic Sediment Removal/Value

In the Melbourne-Tillman

Amount	Quantity Removed*	Value
1 Manatee	.63t/yr	$ 15
In Turkey Creek		
1 Manatee	1.3 tons/yr.	$ 31
45 Manatees	58 tons/yr.	$1,400

*dry weight

Phosphorous Removal Capacity and Value of a Manatee

The phosphorous removal capacity of a manatee was evaluated by determining the possible consumption of a manatee in the Melbourne-Tillman and relating that to the assimilation efficiency of a manatee consuming water hyacinth. The benefit of phosphorous removal was valued at the cost of a equivalent amount of removal at the Port Malabar Sewage Treatment Plant. The assumptions for this method are the same as those included under organic sediment removal capacity.

Potential Phosphorous Removal/Value

In Melbourne-Tillman

Amount	Quantity Removed	Value
1 Manatee	.43 lbs/yr.	$ 1.39
	In Turkey Creek	
1 Manatee	.84 lbs/yr.	$ 2.72
45 Manatees	38 lbs/yr.	$122.00

Feasibility

The feasibility of using manatees as weed control agents in the Melbourne-Tillman was determined through the examination of their weed clearing ability regulations that effect manatee management and threats to their survival in the canal system.

Discussion

Chemical Control

The Melbourne-Tillman Water Management District controlled 1,187 acres of aquatic weeds with aquatic herbicides. The application of these chemicals to heavy concentrations of aquatic plants results in a deterioration of water quality. The death and decay of large quantities of plants results in a recycling of nutrients into the water column, a temporary reduction in the amount of dissolved oxygen, and a buildup of organics in the bottom sediments.

When the impacts of chemical control are evaluated according to the cost incurred on dredging expenditures and the cleanup of the potential phosphorous released into the water column, chemical plant control becomes a very costly method for controlling aquatic weeds. The initial application costs are only $45.58/acre. (Table 2). However, when the costs to mitigate these two adverse impacts are accounted for the total cost of chemical control becomes approximately $443/acre. The calculated amount of phosphorous incorporated within the plant structure each year in the Melbourne-Tillman is 73.2 lbs/acre/year. When 1,187 acres were treated by chemical herbicides in FY'81, this resulted in the potential release of 86,900 lbs of phosphorous. Currently the Port Malabar Sewage Treatment Plant discharges only 11 percent of the total phosphorous that is potentially released

TABLE 2

CHEMICAL CONTROL

	Application	Sediment Contribution	Phosphorous Release	Total
Cost/Year	$85,093	$180,000	$282,000	$547,093
Cost/Acre/Year	$45.58	$ 160	$ 237	$ 443

The cost of phosphorous removal was calculated by examining the costs that the Port Malabar Sewage Treatment Plant will have to bear to comply with DER's zero discharge requirement into Turkey Creek. The ferric chloride addition method for phosphorous removal, a fairly inexpensive method, would remove approximately 85 percent of the current effluent discharge of phosphorous. Although this method does not meet the zero discharge requirement, it may be an intermediate solution that satisfies appropriate relief. Annual costs of ferric chloride addition are $27,000. Implementation of this method would result in the removal of 8,345 lbs/year at a cost of $3.24/lb. (See Appendix 3). If the cost of phosphorous removal at the sewage treatment plant is applied to the annual release of phosphorous by chemical control, the cost of phosphorous release would be $237/acre/year. Total cost for the treatment of 1,187 acres would be approximately $282,000/year. The Melbourne-Tillman does not currently pay for its phosphorous discharge. However, the Melbourne-Tillman could technically be a point source and may be required to restrict its discharge of phosphorous in the future.

When herbicides are used to control aquatic plants, the plants decay and fall to the bottom of the canal. The Melbourne-Tillman dredges canals that become filled with sediment and aquatic plants. Dredging is a costly method of removing organic sediments from the canal system. Dredging is contracted at a cost of $3,406/surface acre. Chemical control causes a canal to fill up at a rate of 6.4 tons (dry weight)/acre/year. After 22 years of deposition, 140 tons of organic sediment is deposited which fills a volume of approximately one acre to a depth of 13.5 inches. Dredging is contracted out when this volume is reached (Panebianco, pers. comm.). The cost of dredging organic material deposited by chemical control is calculated at $160/acre/year or $24/ton. Since 1,187 acres were chemically controlled in FY'81, dredging cost contributed by chemical control would be approximately $180,000.

Alternative methods of weed control such as biological or mechanical do not have the environmental effects exhibited by chemical control. Their extensive use could have a positive influence on the water quality in the Melbourne-Tillman/ Turkey Creek system. The digestion or harvesting of aquatic plants would remove nutrients and organic matter from the aquatic system and leave dissolved oxygen levels at their ambient levels. Mechanical harvesting of aquatic plants removes the phosphorous and organic sediment from the canal system. The total cost of chemical control compares favorably with the harvesting cost of mechanical control. A 1972 study by the Florida Game and Freshwater Fish Commission concluded that under optimal conditions, water hyacinth could be mechanically harvested at a cost of $406/acre (Phillippy, 1972). When the benefit of phosphorous and sediment removal is subtracted from the harvesting cost of mechanical control, the total cost of mechanical control would be $13.83/acre.

Potential Value of a Manatee as a Weed Control Agent

The potential value of a manatee for weed control in the Melbourne-Tillman, when considering clearing capacity and phosphorous and sediment removal, is $28/year (Table 3). This value was calculated by applying the cost of chemical control to the equivalent amount of control provided by a manatee. The weed clearing

TABLE 3

POTENTIAL VALUE OF MANATEES AS WEED CONTROL AGENTS

Benefit	Weed Control	Sediment Removal	Phosphorous Removal	Total
Manatee/Year in Melbourne-Tillman	$11.50	$15.00	$1.39	$28.00
Manatee/Year in Turkey Creek	$22.50	$31.00	$2.72	$56.00
Population/Year in Turkey Creek	1,012	$1,400	122 lbs.	$2,500

ability of a manatee was based on the consumption of 200 lbs/day of aquatic weeds and a stay within the canal system of 153 days. The weed clearing value of a manatee was calculated by applying the chemical application cost to the plant consumption of a manatee. At $.75/ton, the weed control value of a manatee is $11.50/year.

The phosphorous removal capacity of manatees is not significant. If a manatee was to feed exclusively on water hyacinth, the animal could consume 8.4 lbs/year. However, the assimilation efficiency of phosphorous by manatees is only 5.1 percent (Limolino, 1977). Therefore, the maximum possible phosphorous removal capacity of a manatee in the Melbourne-Tillman is approximately .43 lbs/year. The value of phosphorous removal by manatees was calculated by assigning the cost of removal at the Port Malabar Sewage Plant. At $3.24/lb (See Appendix 3), the maximum value of phosphorous removal by a manatee is $1.39/year.

The benefit of the manatee as an organic sediment remover is the highest of the three values calculated. The manatee has a 86.6 percent digestive efficiency (Limolino, 1977) per dry weight material enabling him to remove .63 tons (dry weight)/year. The high cost of dredging ($3,406/acre or $24/day dry weight ton) imparts a $15/year value to manatee organic sediment removal.

Although the small numbers of manatees that enter the Melbourne-Tillman and their short stay limit their value as weed control agents, the benefits they do provide are free. The benefit can be expanded to Turkey Creek if the assumption is made that the 45 residents spend 10 months out of the year consuming aquatic weeds in Turkey Creek. Making these assumptions, their benefit is approximately $2,500/year. Applying these same assumptions to the statewide population estimate of 1,000, their benefit could be as high as $56,000/year. The statewide estimate doesn't recognize regional differences of the cost parameters used to develop the value of weed control by manatees. The statewide estimate is an arbitrary number based on the local economics of Palm Bay and may not accurately reflect the statewide value.

The current philosophy protecting endangered species like the manatee are that they are part of our natural heritage and that their loss will make our world, and man, a little less complete; that the species deserves to exist in its own right; that through the loss of this gene pool, man will lose forever benefits which have not been realized. The evidence that these feelings exist for the manatee are undeniable. The Florida manatee is protected under no less than eight federal and state statutes and numerous county and city laws and resolutions.

The manatee is fortunate in that its benefit has been realized for quite some time and is no longer a nebulous philosophical argument. The utility of the manatee presented in this paper can form the basis for the presentation of the manatee's economic niche in Florida's local economy. It can be shown that investment into the preservation and expansion of the state population will benefit, not only the species itself, but will yield an economic return. The idealistic principles of preservation along with the manatees economic utility provide a more comprehensive plan for protection and enhancement of the Florida manatee.

Feasibility of Using Manatees as Weed Control Agents

The feasibility of using manatees as weed control agents can be assessed by examining three general catagories:

1) Their potential to clear aquatic weeds in the Melbourne-Tillman.
2) The ability to manage the species for effective control
3) Threats to survival due to passage through the MS-2 and confinement in the canal system

Potential to Clear Aquatic Weeds

Although individual manatees consume large quantities of aquatic plants, their numbers are too few and their control time too limited to be used as a primary method of control. The manatee is limited in its time spent controlling aquatic plants by the water level regulation of the Melbourne-Tillman. Manatees enter the Melbourne-Tillman by passing under the radial gates. The radial gates are open only during the rainy season of June through October. This limits weed control to a maximum of 153 days/year. Furthermore, manatees can only enter the canal when water levels are high enough downstream to permit enough clearance to get over the gate sill. A water level of four feet seems to be sufficient. The water level requirement downstream further limits the time they can spend controlling aquatic weeds.

Although an individual adult manatee may consume as much as 200 lbs/day (Appendix 1), their small population does not provide the numbers needed to consider them a primary method of weed control. Based on 200 lbs/day and a stay of 153 days, a manatee could consume 30,600 lbs. or 15.3 tons. The possible clearing capacity of one manatee is a quarter of an acre based on an average plant standing density of 61.1 tons/acre (Appendix 1). The total population of Turkey Creek (45) would only be able to clear 11.25 acres. This represents a linear distance of a little over one mile on the C-1 canal or approximately the distance from the MS-1 to the Babcock bridge. The 11.25 acre/year represents only .9 percent of the annual weed control needs of the Melbourne-Tillman.

Hydrilla is a problem in the C-2 canal around the MS-1 lock and dam. Because Hydrilla is a submergent, it is more difficult and expensive to kill with herbicides. Manatees seem to prefer the softer submergent species like hydrilla over floating and emergent plants. Manatees would be able to exert a greater control over areas of submergents due to their lower standing density. The annual wet matter productivity of submergents is 17 tons/acre/year based on figures by Bagnall (1981) with a calculated consumption of 15.3 tons/manatee/year. One manatee would be able to completely remove .9 acres/year of hydrilla. Thirty-six (36) manatees could control the 32 acres of submergent plants controlled in FY'81.

The weed clearing ability stated previously represents the manatees maximum potential in the Melbourne-Tillman. It is an unreasonable assumption to think that the population of manatees in Turkey Creek would stay in the canal system for 153 days. These figures represent their maximum potential under ideal conditions. Only if the population were to significantly increase along with contact time should manatees be considered as a method of weed control in the Melbourne-Tillman.

Management of Manatees for Effective Weed Control

If manatees are to be effective as weed control agents in canal systems, they must be concentrated in these areas. Inducement in the canal system by some form of manipulation which disrupts their normal behavior pattern is illegal. The Marine Mammal Protection Act and the Endangered Species Act prohibit the taking of manatees within the territorial seas or high seas (PL. 93-205, Sec. 9 (c)). Harassment is included in the definition of take and is defined as follows: "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to breeding, feeding, or sheltering: (50 CFR17). Harassment of manatees can carry a $10,000-$20,000 fine or a year in prison or both (PL. 92-522, Sec. 105 (a) (b)). Permits are granted for actions which are prohibited under the Endangered Species Act and the Marine Mammal Protection Act. It is extremely doubtful that a permit could be obtained to manipulate manatees for aquatic weed control. The federal wildlife permitting process insures that only projects which are for scientific purposes or that enhance the propagation or survival of the species are authorized (PL. 93-205, Sec. 10 (a)). The manipulation of manatees for weed control does not fit this criteria. Therefore, manatees cannot be herded or transported through the lock or confined in the canal system.

The alternative approach is to provide more opportunities for the manatees to enter the canal system according to their normal behaviorial patterns. If the time span of "free access" in and out of the canal system can be increased, so can their weed clearing capacity. "Free access" can be defined as a means for manatees to enter and leave the canal system according to their own needs and following their own biological timetable. Currently, "free access" occurs when the radial gates are in operation and water levels downstream approach four feet. This provides a very narrow time span of free access. Free access could be possibly increased by structural alterations on the MS-1 or changes in water level regulations. Structural alterations in the MS-1 would only be cost beneficial after many years and, if significant gains in population were achieved, changes in water level regulations would interfere with flood control and probably would not be approved. Since free access is the only safe and legally permitted way to get manatees into the canal system, and this method can't be justified under current conditions, it is not feasible to use manatees for weed control in the Melbourne-Tillman.

Safety of Manatees in Canal System

When discussing the feasibility of any project that involves an endangered species, projects that may result in the death or injury of the species are usually denied. The threat of injury or death in the use of manatees for aquatic weed control in the Melbourne-Tillman can be evaluated by examining the known, man-induced causes of death and determining whether manatee mortality would increase. Collisions with power boats and barges would decrease with the time spent in the Melbourne-Tillman. There is very little power boat traffic in the canal system. Extensive hydrilla beds and the lack of launching areas makes boating inconvenient. The demand for the use of the lock on the MS-1 is limited to an occasional

researcher. The only regular boat traffic is the Melbourne-Tillman's air boat used for the application of herbicides.

Manatees in the Melbourne-Tillman would probably not be submitted to any increase in vandalism or poaching. The C-1 canal where most of the manatees would congregate is spotted with residential homes and there are service roads along the canal that could be used for patroling. The discharge of firearms is illegal within Palm Bay city limits. Palm Bay also conducts one of the largest public education programs on manatee preservation in the state. The danger of entanglement in fishing line is small. There is no commercial fishing in the Melbourne-Tillman and very little recreational fishing. The key to the success or failure of a manatee project in the Melbourne-Tillman depends on the interaction of the manatees with the MS-1 water control structure. Mortality due to flood control structures has been one of the leading causes of death and any mortality due to the MS-1 would doom the project to failure.

The MS-1 lock and dam spans 120 feet across the C-1 canal at its confluence with Turkey Creek. The structure consists of a boat lock, two amil gates, and two radial gates. The boat dock poses a safety problem for manatees. The lock has two 18 foot doors which swing laterally into insets in the revetment. The doors are operated from a control panel which is not in the line of sight of the sweep radius of the lock doors. The downstream door swings into the lock and the upstream door swings outward into the canal. Approximately 35 feet of the boat lock is clear of the downstream door during the locking operation. Manatees within the sweep radius (Figure 1) could be crushed against the revetment. The amil gates are used to maintain high pool levels during the dry season. The two gates have a span of 30 feet each. These gates operate in response to rising water levels greater than eight feet. The required balance to trip the gates the required opening is provided by two ballast tanks located above the gates and floats along the gate's circular surface. Hydraulic dampers prevent the gates from slamming against the gate sill (See Figure 2). The amil gates also pose a safety problem. These gates are in operation during November, April and May when manatees are frequently sited in Turkey Creek. Manatees have never been observed to pass under the amil gates nor have they been spotted in the canal system during their months of operation but their passage under the amil gates is possible. The amil gates open in response to rising water levels and have been known to bounce violently during storm surges when the dampers are low on hydraulic fluid. Manatees could be crushed during their passage through the gates.

The radial gates are used to maintain low pool levels during the wet season. The two gates have a span of 20 feet each. They are raised and lowered manually by a gate hoist located on a catwalk near the gates. The gates can be opened to a maximum height of 8 feet above the gate sill (See Figure 3). During the wet season of June through October, when water levels are maintained at the four foot level by the radial gates, is the time period when manatees have been observed entering the canal system. When water levels are nearly equal on the up and downstream side and the radial gates are open at least 2½ feet, manatees are able to swim under the gates.

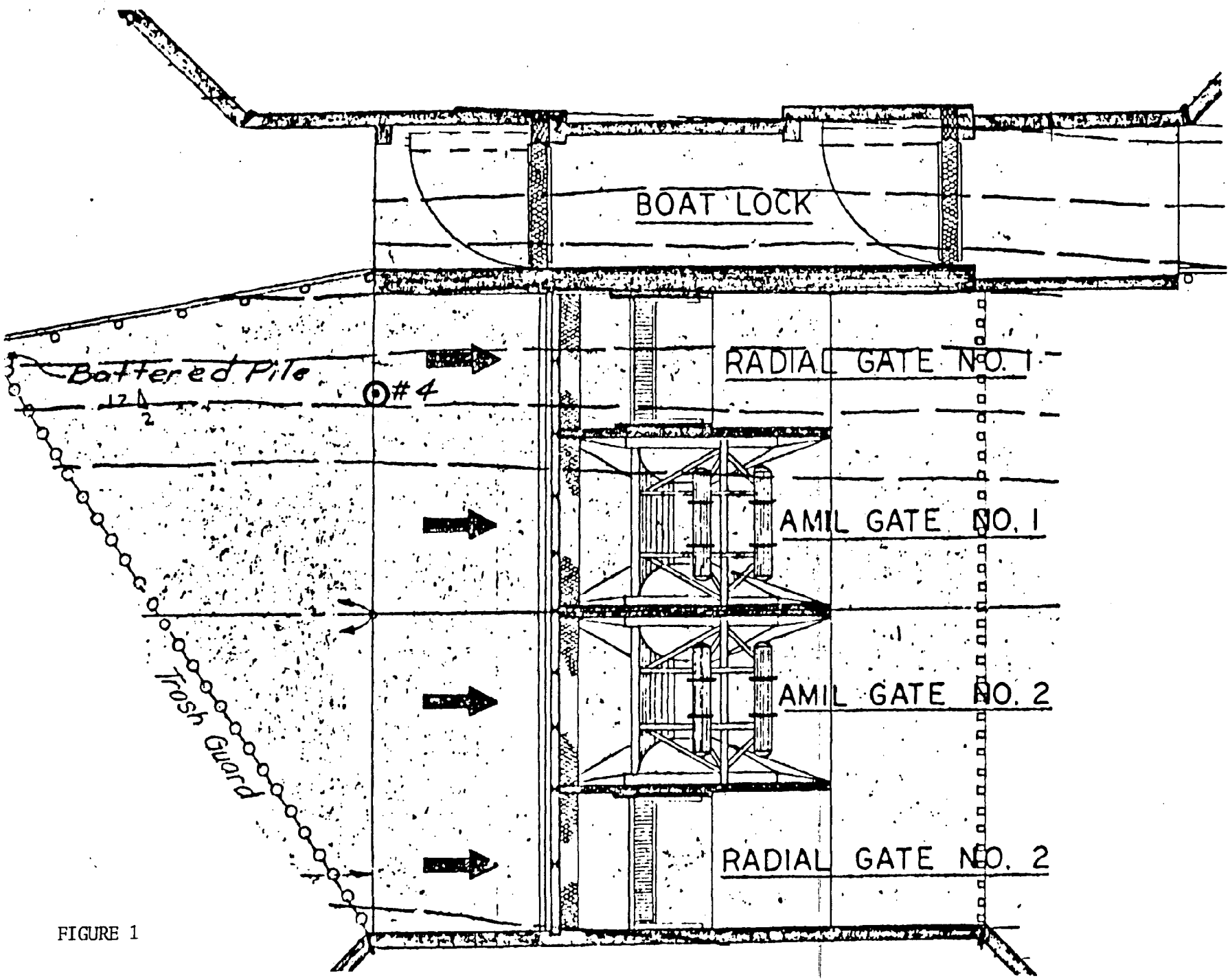
BOAT LOCK
RADIAL GATE NO. 1
AMIL GATE NO. 1
AMIL GATE NO. 2
RADIAL GATE NO. 2
Battered Pile
#4
Trash Guard

FIGURE 1

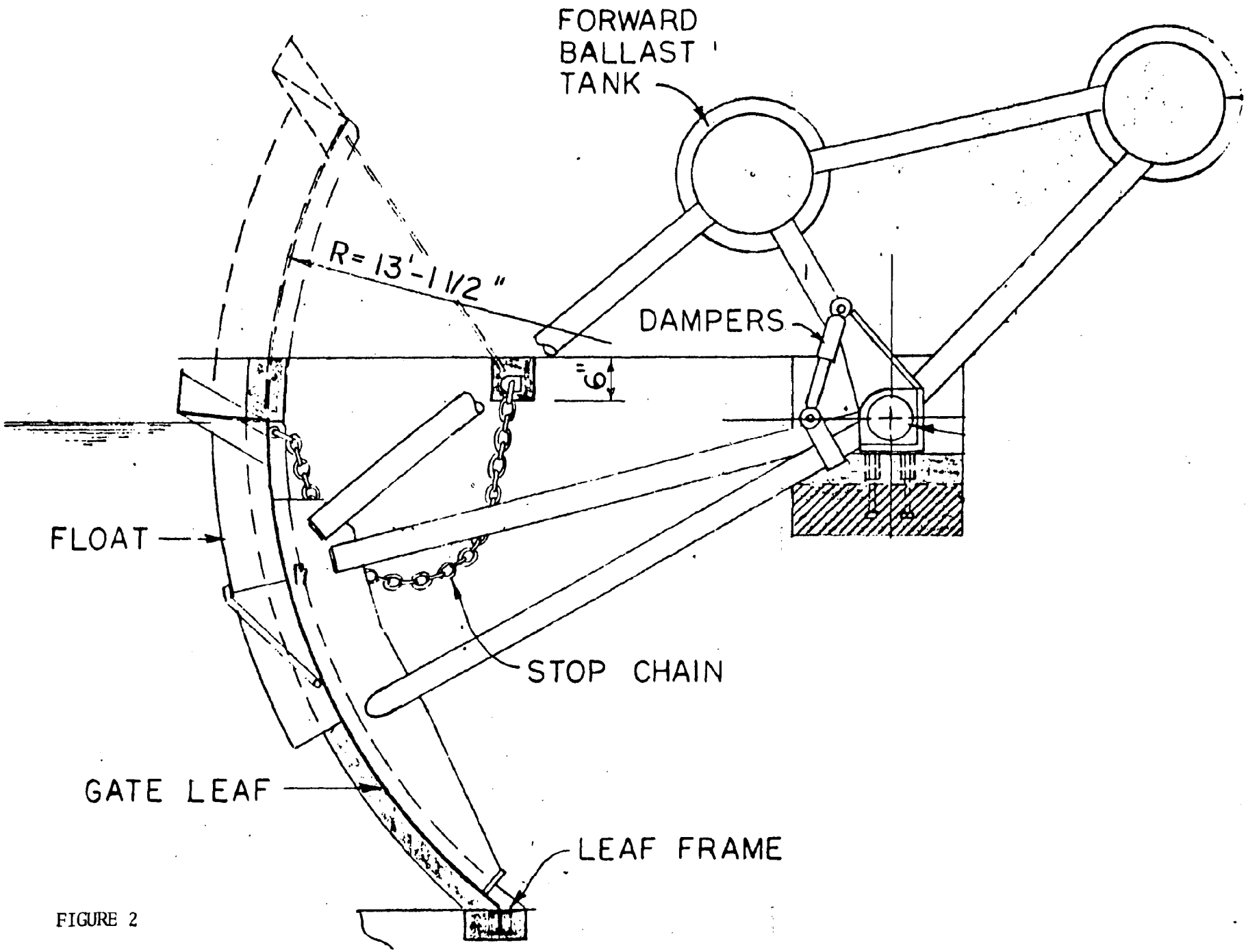
FORWARD
BALLAST
TANK
R= 13'-1 1/2"
DAMPERS
9"
FLOAT
STOP CHAIN
GATE LEAF
LEAF FRAME

FIGURE 2

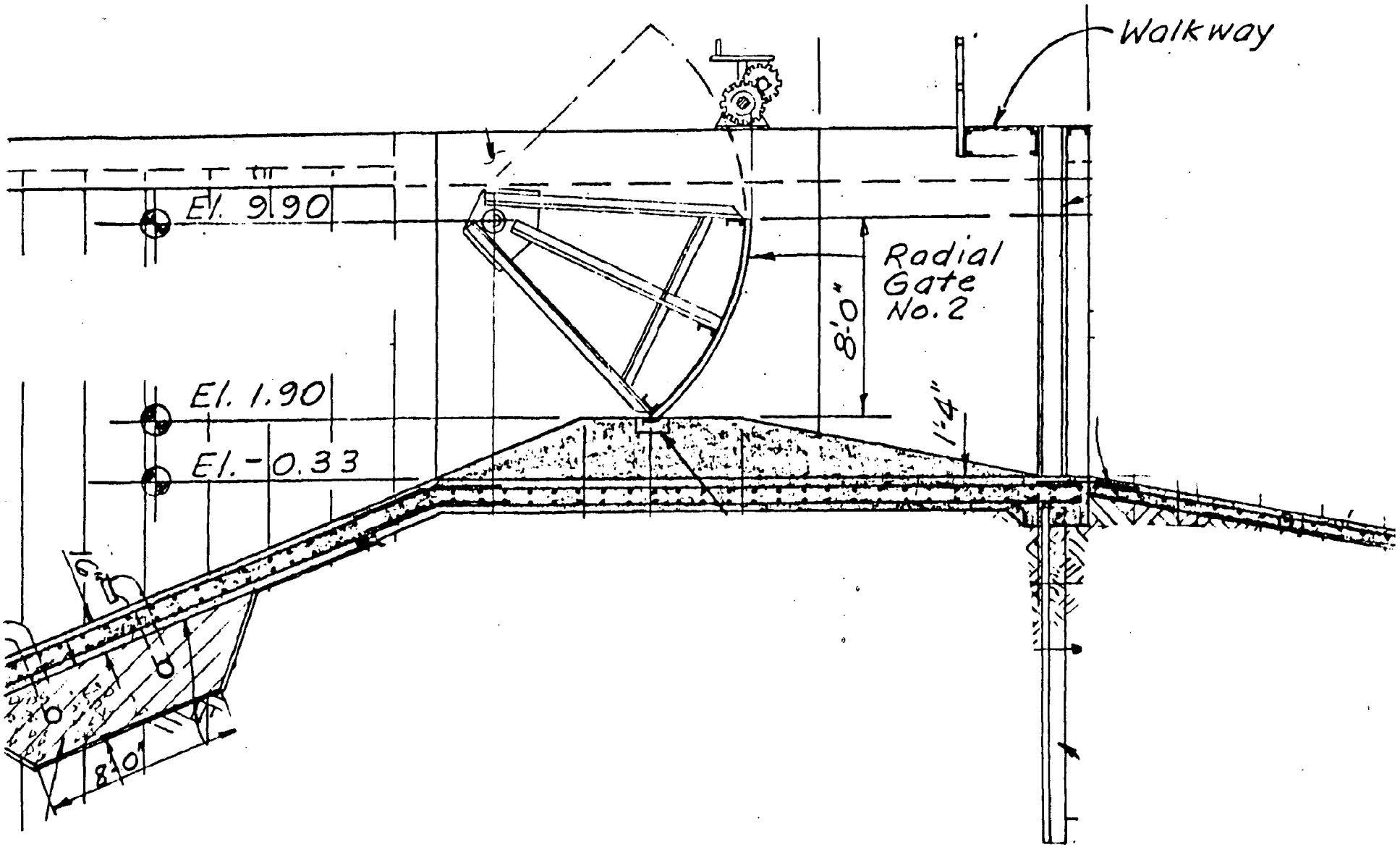

FIGURE 3

The manually controlled radial gates do not pose a safety problem like the automated flood control gates of the South Florida Water Control District (Odell, 1977). The casing of the gate requires that personnel turn winch located on the catwalk. The location of the winch provides an unobstructed view of the gates. Any problems the manatees would have as a result of this gate could easily be remedied by the personnel at hand. Entrapment in the canal system when the radial gates are in operation is unlikely. The radial gates are nearly always open at least 2½ feet. Water levels are kept at four feet and the elevation of the gate sill is 1.9 feet. Thus, at least 2.1 feet of water is always flowing through the radial gates.

It could be assumed that the absenses of manatee deaths attributed to the lock and dam structure signifies that although there are structural aspects of the MS-1 which pose dangers to manatees, the timing of the flood gate operation and the careful use of the boat lock has mitigated these threats.

The effect of herbicides on manatee is not known. Data is not available on how much of these chemicals is accumulated in the tissues of manatees, nor is there information about the effect they may have (Wray, 1978). Two, 4-D is a herbicide widely used in the Melbourne-Tillman and throughout Florida. In 1973 the U.S. Corps of Engineers assessed the effect of the 2, 4-D on the environment in its environmental impact statement on aquatic plant control. They considered it to be rapidly degraded and moderately toxic to animals but has not been found to be tumorigenic, carcinogenic or teratogenic. Controversy surrounded this statement and currently these effects still remain in doubt. The U.S. Fish and Wildlife Service in Gainesville currently investigating the possible accumulation of herbicides in manatee tissue.

Conclusions

Chemical Control

The use of herbicides to control aquatic plants is an expensive method of control:

1) The total cost of chemical control is approximately $443/acre when taking into account the application cost, organic sediment deposition and phosphorous release costs associated with the death and decay of the aquatic plants.
2) The yearly potential total phosphorous release by the decay of aquatic plants could be eight times greater than the yearly discharge at the Port Malabar Sewage Treatment Plant.
3) The potential cost of phosphorous release by chemical control is approximately $282,000/year.
4) The potential costs of dredging organic plant material contributed by chemical control is approximately $180,000/year.

Economic Value of a Manatee

1) The total potential value of a manatee as a weed control agent in the Melbourne-Tillman, considering weed control, sediment and phosphorous removal, is $28/year.

2) The total potential value of the population of manatees residing in Turkey Creek as weed control agents is approximately $2,500/year.

Feasibility

It is not feasible at this time to consider manatees as a method of weed control in the Melbourne-Tillman.

1) Although individual manatees consume large quantities of aquatic plants, their numbers are too small and their control time to limited to be used as a primary method of weed control. At their maximum weed clearing potential, the manatees of Turkey Creek could provide only .9 percent of the annual control of weeds in the Melbourne-Tillman.

2) The Endangered Species Act and the Marine Mammal Protection Act prevent the manipulation of manatees for weed control.

3) Free access is the only safe and legal way for manatees to enter the canal system. Increasing free access is not presently economically sound due to structural alteration costs or interference with water level regulation schedules.

Recommendations

1) A monitoring program should be conducted at the radial gates to determine the frequency and duration of stay of the manatees in the canal system.

2) The hydraulic dampers on the amil gates should be checked routinely to prevent the slamming of gates and possible injury to the manatees.

3) The Melbourne-Tillman should investigate biological and mechanical methods of weed control to reduce phosphorous release and organic deposition by chemical control.

4) The Melbourne-Tillman should consider increasing free access into the canal system if there are significant gains in the manatee population, adequate measures are implemented to reduce dangers due to the MS-1, and the possible dangers of herbicides are proven false or can be mitigated.

APPENDIX 1

Application Cost of Chemical Plant
Control in the Melbourne-Tillman
October 1980 - September 1981

Cost of Chemical Plant Control Per Acre:

$85,092.94/year[1] ÷ 1867 acres[1] = $45.58/acre/year

Cost of Chemical Plant Control Per Ton

Standing Density of Aquatic Plants as a Function of Percent Composition of Treated Plant Types:

Submergent - 24.5 t/Ha[2] standing density x .03[3] = .74 t/Ha

Emergent - 7 t/Ha[2] standing density x .48[3] = 3.36 t/Ha

Floating Plants - 300 t/Ha[2] standing density x .49[3] = 147 t/Ha

Average standing density of aquatic plants = 151.1 t/Ha

Average Standing Density in Tons/Acre:

$$151.1 \text{ t/Ha} \times \frac{1 \text{ Ha}}{2.471 \text{ acres}} = 61.1 \text{ T/acre}$$

Cost of Chemical Plant Control in Dollars/t:

$$\$45.58/\text{acre/year} \times \frac{1 \text{ acre}}{61.1 \text{ tons}} = \$.75/\text{ton/year}$$

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1. Table 1. Chemical Aquatic Plant Control Expenditures.
2. Larry O. Bagnal, 1981. Aquatic Plant Harvesting and Harvesters. American Society of Agricultural Engineers Paper No. 81-5019, pp 2-5.
3. Table 1. Breakdown of Aquatic Acres Treated.

APPENDIX 2

Chemical Plant Control's
Contribution to Dredging Costs

Weight of Organic Sediments/Acre to Which Dredging Will Commence:

Volume of organic sediments in 1 mile of the C-37 canal:

$V = 114\ in^1 \times 13.5\ in^2 \times 63{,}360\ in = 97{,}511{,}040\ in^3$

Water surface area that will be dredged:

$A = 9.6\ ft^3 \times 5{,}280\ ft = 50{,}160\ ft^2$

$50{,}160\ ft^2 \times \frac{2.2957 \times 10^5\ acres}{ft^2} = 1.15\ acres$

Volume of organic sediments per acre:

$97{,}511{,}040\ in^3/1.15\ acres = 84{,}792{,}209\ in^3/acre$

Volume of organic sediments in ml.

$84{,}792{,}209\ in^3/acre \times 16.4\ ml/in^3 = 1.39 \times 10^9\ ml/acre$

Volume of organic sediments in grams of dry material:

$1.39 \times 10^9\ ml/acre \times \frac{1.4g\ organic\ sed.\ (dry\ weight)}{15.0\ ml\ of\ wet\ organic\ sed} = 1.3 \times 10g^8\ dry\ sed/acre$

Weight of dry organic sediment/acre in tons:

$1.3 \times 10g^8\ dry\ sed/acre \times \frac{1\ ton}{907{,}200g} = 1.4 \times 10^2\ tons\ dry\ sed/acre$

Average Annual Dry Matter Productivity of Aquatic Plants in the Melbourne-Tillman

1 ton/Ha/yr[5] dry matter annual productivity emergents x .03[6] =	.03t/Ha/yr
3 ton/Ha/yr. dry matter annual productivity submergents x .48 =	1.44t/Ha/yr
35 ton/Ha/yr dry matter annual productivity floating plants x .49 =	17.15t/Ha/yr
Average dry matter annual productivity aquatic plants	18.62t/Ha/yr

APPENDIX 2
(Cont'd)

Subtract Macronutrients

Percent Dry Weight[7]	Ca	Ph	K	Mg	Na	N
Water Hyacinth						
Water Hyacinth	10.8	.32	2.7	.59	1.17	4.0
Hydrilla	2.2	.50	4.1	.59	.94	3.9
Typha	--	.18[8]	--	--	--	1.5
	6.5	.33	3.4	.59	1.06	3.13

Weight of Macronutrients/Ha/yr of dry organic sediments in tons:

Ca	Ph	K	Mg	Na	N	Total
1.2	.06	.63	.11	.20	.58	2.78

Weight of leached dry organic sediments/Ha/yr

18.62 tons average (Dry weight) matter/Ha/yr
-2.78 tons dried leached macronutrients/Ha/yr
15.84 tons leached dry organic sediment/Ha/yr
or 6.4 tons/acre/yr

Number of Years Needed to Deposit the Required Amount of Organic Deposits to Commence Dredging

1.4×10^2 tons dry sed/acre ÷ 6.4 tons leached dry organic sed/acre/yr = 22 years

Chemical Plant Control Contribution to Dredging Costs

$3917[9]/mile or $3917/1.15 acres = $3406/acre

$3406/acre/22 years = $155/acre/year

$155/acre/year ÷ 6.4 tons/acre/yr = $24/ton

$155/acre/year x 1187[10] acres = $183985/year

Sediment Deposited/Year:

6.4 tons/acre/yr x 1187 acre = 7596,8 tons/year

APPENDIX 2
(Cont'd)

1. Reynolds, Smith & Hill, 1977. Melbourne-Tillman Drinage District, Palm Bay, Florida. Revised Plan of Reclamation, Technical Appendicies.
2. Joe Panebianco, Field Supervisor of Melbourne-Tillman Water Management District. The Amount of Sediment Accumulation Need for Dredging to Commence.
3. Reynolds, Smith & Hill, 1977. Melbourne-Tillman Drainage District, Palm Bay, Florida. Revised Plan of Reclamation, Technical Appendicies. Bottom width of C-37 canal adjust to width at four feet water level and 2:1 side slope.
4. The dry weight of 15 ml of wet organic sediment taken from the bottom of C-1. Sediment was put in a 500 ml beaker and stirred. Fifteen milliliters of organic matter was scooped from the top and put in graduated cylinders. The cylinder was covered and the sediment allowed to settle. More sediment was added when needed to maintain the volume at 15 ml. After seven days, the sediments were freeze dried and weighed. A triplicate was run and the weights averaged.
5. Larry O. Bagnal, 1981. Aquatic Plant Harvesting and Harvesters. American Society of Agricultural Engineers. Paper No. 81-5019, pp 2-5.
6. Table 1. Breakdown of Aquatic Acres Treated.
7. J.K. Easley, R.L. Shirley, 1974. Nutrient Elements for Livestock in Aquatic Plants. Hyacinth cont. 5, 12:82, pp. 82-85.
8. K.K. Steward, 1970. Nutrient Removal of Various Aquatic Plants. Hyacinth control, vol. 8, pp 34-35.
9. Joe Panebianco, Field Supervisor of Melbourne-Tillman Water Control District. Cost of Dredging per mile.
10. Table 1. Total Acres of Aquatic Plants Controlled.

APPENDIX 3

Chemical Plant Control's
Contribution to Phosphorous Removal Cost

Average Weight of Phosphorous/Acre of Aquatic Plants:

.03 tons/Ha/yr[1] (dry matter productivity of emergent in MT) x .18%[2] phosphorous content = .1 lbs P/Ha/yr

1.44 tons/Ha/yr[1] (dry matter productivity of submergents in MT) x 32%[3] phosphorous content = 9.2 lbs P/Ha/yr

17.15 tons[1]/Ha/yr (dry matter productivity of floating plants in MT) x .50%[3] phosphorous content = 171.5 lbs P/Ha/yr

.1 lbs P/Ha/yr weight of P in emergents
9.2 lbs P/Ha/yr weight of P in submergents
171.5 lbs P/Ha/yr weight of P in floating plants
180.8 lbs P/Ha/yr weight of P in aquatic plants in MT

$$180.8 \text{ bls P/Ha/yr} \times \frac{1\text{Ha}}{2.47/\text{acre}} = 73.2 \text{ lbs P/acre/year}$$

Pounds of Phosphorous Released by Chemical Control/Year:

73.2 lbs P/acre/year x 1187 acres treated = 86,888.4 lbs P/year

Contribution of chemical control to phosphorous removal costs in the Turkey Creek system:

86,888.4 lbs P.yr x $3.24[4]/lb - $281,518.40/year

Cost/acre/year:

73.2 lbs P/acre yr x $3.24[4]/lb = $237.17 acre/yr

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1. Appendix 2. Average Annual Dry Matter Productivity of Aquatic Plants in the Melbourne-Tillman.
2. K.K. Steward, 1970. Nutrient Removal Potentials of Various Aquatic Plants. Hyacinth Control J, vol 8, pp 34-35.
3. J.F. Easley, R.L. Shirley, 1974. Nutrient Elements for Livestock in Aquatic Plants. Hyacinth Control, J. 12:82, pp. 82-85.
4. Cost of phosphorous removal at the Port Malabar Sewage Treatment Plant using the ferric chloride addition method.

APPENDIX 3
(cont'd)

Port Malabar Sewage Treatment Plant
Phosphorous Removal Costs

4.3 mg/l[1]	Current Average Effluent Concentration
-.65 mg/l[2]	Final Average Effluent Concentration Based on Ferric Chlorida Addition
3.65 mg/l	Phosphorous Removed

$$3.65 \text{ mg/l} \times \frac{1\text{l}}{.264\text{g}} \times \frac{1\text{g}}{1000\text{mg}} \times \frac{1\text{Kg}}{1000\text{g}} \times \frac{2.205\text{lbs}}{1\text{Kg}} \times 750{,}000 \text{ gal/day}^{1}$$

$$\times\ 365 \text{ days/year} = 8345 \text{ lbs/phos/year}$$

Cost of Ferric Chloride Addition[2]

Capital Costs: $30,000 10 depreciated in 10 years = $3000 yearly cost = $24,000 annual OTM = $27,000 annual cost

$27,000/8345 lbs = $3.24/lb of phosphorous

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1. Brevard County 208, 1979. Areawide Waste Treatment Management Plan, pp 7-13.
2. James Christopher, Water Resource Engineer, Brevard County Water Resource Department.

APPENDIX 4

Weed Clearing Capacity of Manatees
and Assignment of Value

Weed Clearing Capacity of One Manatee

Possible amount of plant material eaten by one (1) manatee/year in Melbourne-Tillman:

1,000 lb manatee x .20/day[1] x 153[2] days/year = 30,600 lbs/manatee/year or
15.3 tons/manatee/year

Weed clearing capacity in surface acres:

61.1 tons/acre[3] x 2,000 lbs/ton = 122,200 lbs/acre average plant standing density

30,600 lbs/manatee/year ÷ 122,200 lbs/acre = .25 acres/manatee/year

Weed Clearing Capacity of Total Population

45 manatees[4] x .25 acres/manatee/year = 11.25 acres/year

Distance Cleared in C-1 Canal

Acres cleared by total population in feet^2

$$11.25 \text{ acres/year} \times \frac{43{,}560 \text{ feet}^2}{\text{acre}} = 490{,}050 \text{ feet}^2$$

Area of C-1 Canal[5]:

A^1 = 144 x 528 =	76,032 feet^2	mile station lock to .1 miles
A^2 = 74 x 4752 =	351,648 feet^2	.1 miles to 1 mile (Babcock)
Total Area	427,680 feet^2	

490,050 feet^2 clearing capacity @ 427,680 feet^2 area of C-1 to Babcock Bridge.

Value of Weed Control by Manatees

Amount of weeds consumed in tons:

$$30{,}600 \text{ lbs/manatee/year} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} = 15.3 \text{ tons/manatee/year}$$

Value of weeds removed/manatee

15.3 tons/manatee/year x $.75/ton[6] = $11.48/manatee/year

APPENDIX 4
(cont'd)

Value of population in Turkey Creek

300 days/year x $\frac{200 \text{ lbs}}{\text{day}}$ = 60,000 lbs/year or 30 tons/year

30 tons/year x $.75/ton = $22.50

30 tons/year x 45 manatees = 1350 tons/year

1350 tons/year x $.75/ton = $1012/year

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1. The amount of plant material consumed per day. Anon, 1974. An international centre for manatee research report of a workshop held 7-13 Feb, 1974, Georgetown, Guyana.
2. Maximum possible days a manatee could enter the canal system through the MS-1.
3. Appendix 1. Standing Density of Aquatic Weeds in Tons/Acre.
4. John Tiedemann, 1980. Population of Manatees in Turkey Creek. Behavior and Ecology of the West Indian Manatee, Trichechus Manatus, In Turkey Creek, Palm Bay, Brevard County, Florida. Master Thesis, Florida Institute of Technology.
5. Reynolds, Smith & Hill, 1977. Melbourne-Tillman Drainage District. Palm Bay, Florida. Revised Plan of Reclamation. Technical Appendicies P.
6. Appendix 1. Cost of Chemical Control in Dollars/Ton.

APPENDIX 5

Sediment Removal Capacity of Manatees
and the Assignment of Value

Manatee Consumption of Plant Material in Dry Weight:

15.3 tons/manatee/year[1] (wet weight) x 5%[2] dry matter content = .765 tons (dry matter)/manatee/year

The Amount of Organic Material (dry weight) Digested (removed from canal system):

.765 tons (dry matter)/manatee/year x 86.6%[3] digestive efficiency = .632 tons/manatee/year

Value of Organic Sediment Removal:

.632 tons/manatee/year x $24[4]/ton = $15/manatee/year

Manatees in Turkey Creek:

30 tons/manatee/year x 5% dry matter content = 1.5 tons/manatee/year

Amount of Organic Material Removed from Canal System:

1.5 tons/manatee/year x 86.6% digestive efficiency = 1.30 tons/manatee/year

Value of Organic Sediment Removed:

1.30 tons/manatee/year x $24/ton = $31.2/manatee/year

Value of Turkey Creek Population:

1.30 tons/manatee/year x 45 individuals = 58.5 tons/year

58.5 tons/year x $24/ton = $1404

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1. Appendix 4. Consumption of Aquatic Weeds by One 1,000 Pound Manatee.
2. Larry O. Bagnal, 1981. Aquatic Plant Harvesting and Harvestors. American Society of Agricultural Engineers Paper No. 81-5019, pp 2-5.
3. Lomolino, M.V., 1977. Mean Digestive Efficiency for Dry Weight in Water Hyacinth. The Ecological Role of the Florida Manatee (Trichechus Manatus Latirostris) in Water Hyacinth-Dominated Ecosystems. Masters Thesis, University of Florida.
4. Appendix 2. Cost of Sediment Removal by Dredging.

APPENDIX 6

Phosphorous Removal Capacity of Manatees and Assignment of Value

Dry Matter Consumption of Water Hyacinth by One Manatee in the Melbourne-Tillman Per Year:

30,600 lbs/manatee/year[1] x 5.5%[2] dry matter content = 1683 dry matter lbs/manatee/year

Consumption of Phosphorous/Year by One Manatee:

1683 lbs/manatee/year x .50%[3] P = 8.4 lbs P/manatee/year

Pounds of Phosphorous/Year Assimilated by One Manatee:

8.4 lbs P/manatee/year x 5.1%[4] assimilation efficiency = .43 lbs P/manatee/year

Value of Phosphorous Removal:

.43 lbs P/manatee/year x $3.24/lb of P[5] = $1.39/manatee/year

Value in Turkey Creek

Pounds of P Removed by One Manatee:

30 ton/manatee/year x 5.5% dry matter x .5% P x 5.1% assimilation = .84 lbs/manatee/year

Value:

.84 lbs/manatee/year x $3.24/lb = $2.72

Value of Population:

.84 lbs/manatee/year x 45 manatees = 37.8 lbs

37.8 lbs x $3.24/lb = $122

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1. Appendix 4. Amount of Plant Material Eaten by One Manatee/Year in the Melbourne-Tillman.
2. Larry O. Bagnal, 1981. Aquatic Plant Harvesting and Harvesters, American Society of Agricultural Engineers, Paper No. 81-5019, pp 2-5.
3. J.F. Easley, R.K. Shirley, 1974. Nutrient Elements for Livestock in Aquatic Plants. Hyacinth Control J. 12:82, pp 82-85.
4. Assimilation efficiency for phosphorous by manatees eating water hyacinth.
5. Appendix 3. Cost of Phosphorous Removal by the Port Malabar Sewage Treatment Plant.

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