University of Miami
Rosenstiel School of Marine and Atmospheric Science
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RECOLLECTIONS OF ENVIRONMENTAl CHANGE 1N THE TEN THOUSAND ISLANDS, FLORIDA BAY AND THE EVERGLADES: THE ORAL HISTORY AND SOCIAL ISSUES OF USER GROUPS IN SOUTHWEST FLORIDA AND THE EVERGLADES

By

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AN INTERNSHIP REPORT

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Recollections of Environmental Change in the Ten Thousand Islands, Florida Bay and the Everglades: The Oral History and Social Issues of User Groups in Southwest Florida and the Everglades. (July 1998)

Abstract of an internship report at the University of Miami, Rosenstiel School of Marine and Atmospheric Science.

Internship supervised by Dr. Larry Brand, Dr. Sarah Meltzoff, Dr. David Letson, and Dr. Edward Baker.

No. 37 of pages in text

Several trips to the Ten Thousand Islands were made to gather this collection of oral histories. Most interviewees reside in Everglades City, Marco Island and Goodland. The interviewing was a one to one discussion about life and work histories. I asked open-ended questions regarding environmental observations and social and political impacts on the locals. This material is compiled with historical information to form a broad perspective, both environmentally and politically, of southwest Florida. General conclusions indicate that since the turn of the century, radical ecological changes have occurred. Some of the ecological changes in the Everglades and Ten Thousand Island backwaters have taken place within the last ten years.

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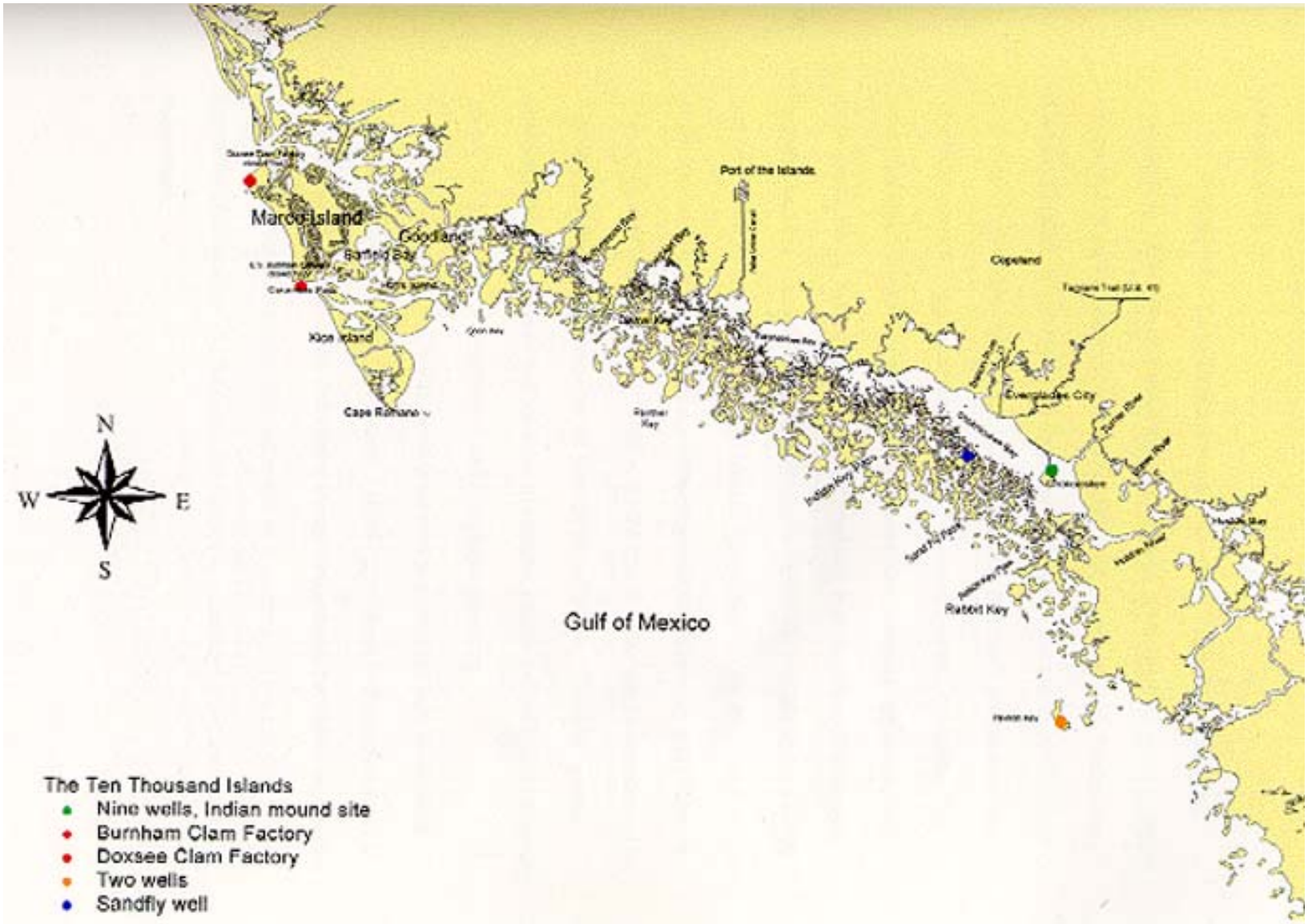
Table of Contents

List of Figures

vi


Marco Island
Goodland
Barfield Bay
Port of the Islands
Copeland
Everglades City
Cape Romano
Gulf of Mexico
Rabbit Key
N
W
E
S
The Ten Thousand Islands
Nine wells, Indian mound site
Burnham Clam Factory
Doxsee Clam Factory
Two wells
Sandfly well

Introduction

As prefaced in Karen DeMaria's anecdotal report, "Memory is a powerful motivation for those who care about the environmental health of places we love. Where environmental quality has declined, past conditions often become goals for the future." Current speculations concerning the degradation of Florida Bay and the reefs include both natural and anthropogenic sources. Understanding this area's present and future condition means trying to establish a past history of environmental conditions. This internship report includes thirty in depth interviews from scientists, commercial and recreational fishers, fishing guides, tour boat operators, park rangers and Miccosukee Indians who live on the southwest coast of Florida. I asked them to talk about their life and work histories in the Ten Thousand Islands, Florida Bay and the Everglades. As part of the conversation, they described environmental conditions observed in the different Bays of the Ten Thousand Islands. Most of the information provided by interviewees on Florida Bay refers to observations in the western part of the Bay. The interviewees described watercolor, clarity and sea level. In addition, I requested information regarding animal and plant life in the backwaters and Everglades tributaries.

Further summarized in this report is the shift in occupation from commercial fishing to tourism in the twentieth century. I asked interviewees to describe a history of their occupation and events that led them to change occupations. Secondary information is presented to further describe historical events near the time and place of the interviewed information. The following information is a summary of the interviewed information.

The Ten Thousand Island

Fish. Most fishers and ex-commercial fishers agreed that less fish are caught today in the Ten Thousand Islands. In the mid 1900's, it was not uncommon for guides to fish an eight-hour day and return with 50 sea trout. When netting was allowed, mullet catches were high and profitable. As one interviewee reported:

"In the 1930's the water was rich in mullet and shrimp. There are fewer fish today than in the 1950's."

In Shark River, it was common to see four to five foot sharks and seven to ten feet sawfish. This area as well as other tributaries from the Everglades had large meat (i.e.: sea trout) and game fish. In the early 1900's through the 1970's, most remembered catching large snook, tarpon, sea trout, and snapper in the Chatham, Huston, Lopez Rivers, and Tarpon Bay. Shark River and Tarpon Bay were named because of the numerous fish caught there.

Shellfish. In the 1930's, clams were abundant throughout the islands. The amount harvested sustained two clam factories on Marco Island. Many locals were employed by these two factories and harvested throughout the islands, Pavillion Key, Cape Romano, and Marco Island. Although the islands consist of oyster beds and mangroves, oysters were not harvested commercially. Some locals ate them but many did not find them appealing because of the little meat and tough shell.

Water Quality. In the backwaters of the Ten Thousand Islands, most observed constant conditions from the 1930's to the present. All noted that freshwater flow from the Everglades tributaries decreased since the early 1900's. Saltwater intruded freshwater areas and mangroves now thrive where saw grass once existed. Most

mentioned the brown tint in the water due to tannic acid formed by decaying detritus. Some noticed that conditions changed specifically towards the Gulf of Mexico.

"In the 30's and 50's, water level was low and swampy but you could see fish out in the distant clear waters. Now, it's not so clear."

Another quoted, "Twenty years ago, I saw more trout and redfish in the grasses."

Another interviewee noticed an increase in algae in the 1960's and in most winters. Where once sea grasses were observed, sand has replaced.

In Huston Bay, "about five years ago, the back end had sea algae mats." However, the interviewee mentioned that it was more clear this year. Many referred to algae as "green moss" or "strands" and said it increased in the 1950's and 60's.

Birds. All agreed that bird populations are lower today than the early 1900's.

The Everglades and Florida Bay

Fish. Like the Ten Thousand Islands area, most interviewees observe less fish than the early and mid 1900's. Lake Ingraham, near Flamingo, "has much fewer fish than in the 1970's," one interviewee recalled. The snook move from the Gulf into the backwaters of Lake Ingraham. Another mentioned that "Lake Ingraham used to be full of mullet. Now, there is just a lot of grass." One scientist who spent time near the Buttonwood Canal in the 1950's found "lots of vegetation and hundreds of species of crustaceans and invertebrates." And in Coot Bay, "practically no shrimp exists compared to what was observed in the 1950's." In Whitewater Bay, "there used to be high plant growth areas of turtle grass and algal beds." Today, interviewees still observe high plant

growth.

Water Quality. Many observed that Florida Bay once had clear water where turbid, murky water now exists. One interviewee mentioned that "In 1940, Florida Bay was clear from Key Largo to Flamingo." Some observed small phytoplankton blooms in the 1950's, but "not like the pea soup ones observed today."

In the Everglades, interviewees mentioned that the water "looks the same as it always has for the last 40 years." They observed the brown tint from tanic acid. However, several used to drink the freshwater from Big Cypress in the 1950's. Now, no one considers it. High nutrients from agricultural runoff and problems with mercury contamination restricts water and fish consumption. As further evidence of high nutrient water, cattails have invaded the Everglades adjacent to US 41. Several interviewees from Everglades City mentioned that cattails first appeared along 41 and extending deep into the Everglades "about seven or eight years ago.

Birds. Like the Ten Thousand Island area, all interviewees observed fewer birds today.

> In the early 1900's, "Cape Sable and Lake Ingraham had numerous amounts of birds."
>
> "Between 300 and 400 white Ibis would feed in the spring time from reservoirs in the Everglades."
>
> "In the 1950's, and 60's, huge flocks of birds were seen in the Everglades. About ten times the present amount."

This report expands on interviewed information by providing some historical background of Florida's southwest coast during the early twentieth century. No attempt

was made to verify interviewed information with scientific reports. Furthermore, sparse scientific data exists between the turn of the century and 1950. Around the time of Hurricane Donna (1960) some monitoring occurs. However, it was not until the sea grass die off began in 1987 that regular sampling occurs in Florida Bay.

Southwest Florida

Florida Bay is located in between south Florida's mainland, which stretches from Cape Sable to US 1, and south to the Florida Keys. It is the "the largest and best protected tropical estuary in North America" (Bancroft, 1993). Both Everglades National Park and NOAA's Florida Keys National Marine Sanctuary provide monitoring and protection. This is essential for Everglades Restoration and preventing further deterioration of the Florida reef tract that lies adjacent to the Florida Keys. Research efforts in south Florida have increased since the late 1980's with $300 million allocated by Congress for 1998 restoration alone (Rosenberg, 1997). In 1960, Hurricane Donna devastated the area and spurred sampling within the Park and parts of Florida Bay. It was not until the mid 1980's that regular sampling efforts occurred in Florida Bay. In the 1990's, the Clinton/Gore administration made the Everglades Restoration Project the focal point of their environmental platform. Government funding for collecting data continues; but with what can present data be compared? Little monitoring of Florida Bay occurred before the 1980s. This internship report is a collection of the Ten Thousand Islands occupants' memories through oral history. All traveled or fished throughout the Everglades, Ten Thousand Islands and/or Florida Bay This report links life and work histories and the human actions that can lead to environmental change. According to those interviewed, it will become apparent to the reader that human influence has detrimentally affected this environment since the turn of the century.

Water flows in a southeastern direction from the Gulf of Mexico where the Ten Thousand Islands lie, around Cape Sable and through Florida Bay, eventually spilling out through channels in the keys to the reef tract (Lee, 1996). Thomas Lee's drifter

trajectories show a recirculation relationship between West Cape Sable and Cape Romano. As water circulates along Florida's west coast, it appears that nutrients from freshwater discharge and groundwater disperse to western Florida Bay and on to the reef tract. Net flow appears highest through the Seven Mile Bridge and Long Key Channel (Lee, 1996). Several tributaries of the Everglades run off into the Gulf of Mexico, eventually mixing and affecting Florida Bay's estuarine environment. As further discussed in this paper, several interviewees described evidences of groundwater which may also be impacting Florida Bay and the Ten Thousand Islands.

History of Florida Bay and the Everglades

Florida Bay was formed over the last 5,000 years and is shallow ranging from a few inches to a few feet (Bancroft 1993). The Bay consists of numerous mangrove islands and shallow carbonate mud banks in the west and central part (Wanless and Tagett 1989). These mangrove islands are nesting sites for many birds such as the roseate spoonbill, ibis, and brown and white pelicans. Because of the decline in bird population of about 90 percent since the early days of the Park (Zaneski and Tomb 1997), boats are now prohibited from docking on these islands. East of Cape Romano is a series of mangrove islands supported on a oyster bed that also began developing around 5,000 years before present (BP). A longshore drift brought quartz material southward which formed a series of shell bars parallel to the coast. When sea level finally settled to its present level, the sand drifted west to form Cape Romano shoals (Widmer, 1990). Oyster development was successful in this area because they need lower salinities to grow (25 ppt). Widmer hypothesized that "a likely origin of

freshwater (to the Ten Thousand Islands) is groundwater seepage into the coastal zone as the water table rose in response to increasing sea level elevation."

The Everglades, directly north of Florida Bay, empties freshwater into Florida Bay via the Shark River Slough and Taylor Slough. Since the early 1900's freshwater flow decreased as canals were built to prevent flooding to a growing south Florida. However, this change to this natural water flow system has impacted flora and fauna populations in the Everglades and consequently Florida Bay. Furthermore, it has affected the way different user groups work and live in or nearby the Everglades. Although several user groups such as farmers, ecotourists, the Miccosukee and Seminole Indians, commercial and recreational fishers and fishing guides use this area on a daily basis, only those impacted on the southwest coast of Florida are discussed in this paper.

The Everglades is essentially a 50-mile river, thus nicknamed "River of Grass" by Marjory Stoneman Douglass. Before the Army Corps of Engineers diverted water flow in the mid 1940's, water flowed from Lake Okeechobee southward emptying into Florida Bay and the Gulf of Mexico. In the summer (the rainy season), water overflowed Lake Okeechobee and the river moved about one half mile per day. In the early 1900's, a dike installed at the south end of Lake Okeechobee controlled flooding (Derr, 1989). However, flooding then became controlled by man. When the water level rose too high the floodgates were opened and Miccosukee land flooded. This was most evident in 1992 when excessive rain and flooding resulted in the opening of floodgates near Okeechobee. The reservation along US 41 was so severely flooded that several hundred deer were killed.

Before the canal work and the creation of the three water conservation areas near Lake Okeechobee, freshwater flowed naturally into several of the Everglades' tributaries such as the Turner River, Shark River, and Taylor Slough. Thousands of small islands, named the Ten Thousand Islands located along the western border of the Everglades, received more freshwater in the early 1900's as several interviewees recalled. "It is the reason (current lack of freshwater) that there are fewer birds and fish around." Most of the interviewees reside in Collier County in Everglades City, Chokoluskee (a small island connected by bridge to Everglades City), and Marco Island which is the largest and northernmost island of the Ten Thousand Islands. They recalled environmental conditions and events leading up to the establishment of Everglades National Park.

In 1850, the Swamp Lands Act was passed and gave ownership of much of the area in the Everglades to the state for agricultural use once the area was drained (Derr 1989). The alteration of Everglades natural water flow began as early as 1892. A surveyor for the Henry Plant rail line intended to include a line that would cross the upper Everglades to Lake Okeechobee and on to Biscayne Bay. He concluded that crossing the Everglades was too difficult and agriculture was better land utilization. In 1905, then governor Napoleon Bonaparte Broward established a Board of Drainage Commissioners to dig canals from Lake Okeechobee to the west and east coasts of Florida. Surveys from U.S. Dept. of Agriculture engineers informed newly elected Albert Gilchrist that all water in the Everglades came from Lake Okeechobee. If the best use of the land is for agriculture, they needed to drain Lake Okeechobee. By digging

184 miles of canals during Gilchrists' term, Lake Okeechobee's water level dropped from 21 to 16.5 feet above sea level.

In 1916, the state built Tamiami Trail (U.S. 41 that connected Miami west through the Miccosukee territory to Everglades City and the Gulf of Mexico and continuing north. One interviewee remembers that the water along 41 used to be thick with green water snakes. What the Department of Transportation did not kill, the people in Everglades City caught and sold them to the Serpetariam in Miami. This road became increasingly more important to Everglades City, as trading and selling became more accessible by car. Residents and traders used the road to run rum and seafood such as mullet, shrimp, crabs. Major trading products later included drugs, leading to the 1983 Everglades City drug bust. Most of these items were brought in by boat from the Ten Thousand Islands and sold in Miami.

Some interviewees once owned small farms in Copeland and Ochopee. In an area near where people used to raise vegetables in Ochopee, along US 41, is the home of the nation's smallest post office. Farmers loaded shipments of oranges, tangerines, and other citrus onto trucks headed for Miami or sold the goods along side of 41. With the invention of airboats in the 1920's, others opened tourist attractions. As the fishery in the Ten Thousand Islands began dwindling and the net ban in 1994 commenced, several more commercial fishers moved into the airboat industry. By the late 1980's, commercial fishing was banned within Everglades National Park waters. The only exception with some limitations is blue crab fishing.

Everglades and Ten Thousand Island Fishers

Many of the interviewees at one time in their lives were commercial fishers. Those who are not retired today make their livelihood at crab fishing or as fishing guides or airboat captains. Some say that "crab fishing is the worst it has ever been in the last three years." Yet, traps are still set. Those in the airboat industry are apprehensive that they may be pushed out of the Park since airboats are considered noise pollutants. In addition, the United States government traded prime downtown land in Phoenix, Arizona for land owned by the Collier family in Carnestown nearby Everglades City. Since this land is now incorporated into the National Park, the Miccosukee Indians filed a lawsuit. Because the Miccosukees continue to maintain sole rights to airboat concessions within Everglades National Park, they feel that they alone should run airboat concessions on this newly acquired land.

Likewise, those in the crab business fear government interference will affect their industry. The only exception to no commercial fishing in the park is blue crabs. Setting five blue crab traps is allowed but take home is only a 5-gallon bucket worth per person. In an area where fishers once enjoyed commercial fishing rights even after the Park was established, limitations slowly became enforced. Those still interested in continuing commercial fishing moved to Louisiana and Belize where there are more fish, less restrictions, and netting is still allowed. Netting is allowed seven miles offshore from the national park, but it is about 6 miles from Everglades City to the outer limits of the park. Since the net ban, many noticed that sea trout and mullet populations in the park's waters were returning. One long time fishing guide remembers his grandfather speaking about the national park in 1947. He said that "fishing guides and

commercial fishers at that time were not all against the park." Some were in agreement with conservation because they predicted dwindling fish populations. Tourists would not return to empty fishing grounds. Today, a few guides share this same philosophy. A proposition for taking only one snook per person per day is opposed by many. Most want to continue with two snook per person per day. However, some realize that they may not have a business if limitations are not imposed. Most fishers have a long family history in the trade as they are fourth and fifth generation fishing guides and fishers in Everglades City. "Fishing was the motivation of settlement to the islands," said one native.

Many of the fishers' ancestors moved to the west coast of Florida before the turn of the century. Other than the Calusa Indians who inhabited this area from about one century B.C. to eight or nine hundred A.D (Voegelin, 1963), many of the pioneers of the 19" century moved to the small islands looking for privacy - some were outlaws. Most made their money in trading/selling dry goods, fruits and vegetables, and fishing/guiding (Tebeau, 1976). Many did not hold deeds to their property and were forced to leave once the area was incorporated into the National Park.

While the settlers in the Ten Thousand Islands were making their living on the west coast, men and women in Miami formed the Florida Society of Natural History in 1922. The Society and botanist David Fairchild lobbied for the formation of Everglades National Park which was established in 1947. However, by the 1960's, the Army Corps of Engineers dug over 1,400 miles of canals to divert water flow to three water conservation areas on the east coast to a more populated South Florida which included

Miami, Ft. Lauderdale, agricultural and citrus farms, and sugar land. (Derr, 1989). The population was also moving more into the Florida Keys.

A railway that goes through Homestead to Key Largo was completed in 1912. However, a hurricane destroyed the railroad in 1935 and construction began on overseas highway which continues from U.S. 1 through the Florida Keys (Cantillo, A. 1995). One interviewee, the late Dr. Donald Moore a Florida native Professor Emeritus in Marine Geology and Geophysics at the University of Miami, Rosenstiel School of Marine and Atmospheric Sciences (RSMAS), helped construct this road.

SCIENTIST'S (RSMAS) ACCOUNTS OF FLORIDA BAY

After high school in 1939, Dr. Moore joined the Civilian Conservation Corps (CCC). This was a government-run "camp" organized by retired or semi-retired army officers which gave young men work and skills. When work on the road commenced, "old Dixie in places still continued from Big Pine Key to Key West with wooden bridges." Matecumbe to Big Pine was a toll road where "a car would come by only about a dozen times to 50 (a day)," Dr. Moore recalled. Fishers used to gather conchs and place them in a corral not too far from where they surveyed the bridge heads. The seawall was undercut about a foot with "many good-size spiny lobsters lined up and were caught with a pitch fork."

Dr. Gil Voss who also was a professor at RSMAS, spent many years in South Florida fishing in Flamingo. Flamingo, once a small fishing village, is now a camping destination in Everglades National Park. His Wife, Nancy Voss gave me permission to use a portion of Dr. Voss' unpublished manuscript. An excerpt from the manuscript talks about a once small fishing village on Cape Sable called Flamingo which is now part of

Everglades National Park. Flamingo was once a fishing village with "weathered" houses that sat on stilts eight to ten feet high on the eastern edge of a wet marl prairie. Life for the fisherman in the early I 900's meant living off the land. They shot birds and cooked swamp cabbage (a.k.a. the Sable Palm). They also ate the heart of palm by boiling it with bacon using it in a salad much like coleslaw. Before Everglades National Park establishment, cattail plants (currently abundant along US 41) were boiled until browned and then eaten.

A few fish houses lined the waterfront and fishing was successful in the 1940's. One interviewee's family had a shrimp house in Flamingo where a seaplane came to pick up the shrimp for export. Nets for catching mullet were dragged along the bottom of the Gulf of Mexico. However in addition to catching fish, the nets stirred up the sediment and plants. Net size restrictions went in 10-year cycles and limited fishers to only large fish. Since the fishers spent weeks fishing during season, they stayed on houseboats off of Cape Sable. Running boats brought their catch to fish houses in Flamingo. Crocodiles in search of food were a threat to the fishers, specifically in West Lake when the mullet fishing was good. Crocodile slides and nests were on almost every one of the offshore keys as one interviewee recalled.

Fishers used either airboats or "wheel boats." A "wheel boat is a boat with an inboard engine and underwater propellers or wheels." Wheel boats were used for fishing mullet on the high tide whereas the airboat was used for fishing on the banks or channels. Dr. Voss observed that these propellers dug into the turtle grass and marked trails through Dildo Bank. Not only did this area sustain numerous amounts of mullet, snapper, redfish, grouper, and grunts; it was diverse with birds. On Cape Sable around Lake

Ingraham, pink curlew or roseate spoonbills dredged in the mud for food. "The area had numerous osprey, white ibis, wild *flamingos, egrets,* and pelicans. On Dildo Bank, eagles nested in large dead trees. Low tide, exposed tops of turtle grass along with low, white worm mounds. The water immediately around each key near Cape Sable was deep, six feet or more, and gin clear." (Voss, G. *Florida Fishing: A Personal Account).*

Interviewees gave several explanations for such a decrease in bird populations in the Everglades and Florida Bay. Prized for their plumes around the turn of the century, large populations were shot and killed (Derr, 1989). Interviewees state that further decline in populations are due to a decrease in fresh water flow and declining fish populations. Another interviewee noted that many of the birds died due to DDT runoff in Florida Bay waters. DDT was used during WW II to combat mosquitos in the south Pacific, Florida Bay and the southern Florida peninsula. In the 1930's routine spraying limited mosquito larva until DDT was banned around 1968. When the tide went out, two to three foot deep "white spots" were visible on nearby Flamingo mudbanks. The birds that ate the fish eventually made soft eggshells due to this new pollutant in the environment. In 1935, the interviewee could fire a gun and see hundreds of water birds. However, around 1946, he noticed that many were gone. In 1960, Hurricane Donna destroyed several nesting sites including Pelican Key and Duck Rock bird roosts. "After Hurricane Donna, about half as many white ibis were counted" (Tebeau, 1968). Some species never fully recovered.

In 1957, Dr. Durbin Tabb's research at RSMAS commenced. During the first few years, he spent time in Coot and Whitewater Bays trolling two times a month both before and after the Buttonwood Canal was finished. Whitewater Bay is located

between the Everglades and Cape Sable and is connected to Florida Bay through the Buttonwood Canal. Before the Canal was opened, he saw " lots of vegetation and hundreds of species of crustaceans and invertebrates." He found higher oxygen values in areas of greatest plant growth with turtle grass and algal beds in Whitewater Bay. Lower oxygen concentration was found in Coot Bay and eastern Whitewater Bay during late summer and fall when runoff was highest and plant cover was less dense (Tabb et al, 1962). He found a large variety of species of both plant and animals near Sandy Key and East Cape Sable in stable but fairly high salinities (30-45 ppt). Summaries of historical park fish kills found that 38 occurred since 1944. Seven took place during cold fronts and 31 occurring between March and November from hypoxic conditions. Nearly half occurred in Whitewater or Florida Bays and 24 percent occurred east of Flamingo in Snake Bight (Cantillo, 1995).

Coot Bay was named for the Coot (bird) that fed on *Ruppia* and *Chara* in the Bay. Once the Canal opened, the fish left the Bay. *Ruppia* which is a brackishwater sea grass "used to be thick to the surface." *Chara* which is a scratchy calcareous algae used to be thick in Coot Bay as well. Both plants disappeared because the water turned milky, not allowing enough light. The Canal lowered the original water level by "about half of a foot at the peak of the rainy season and broke a connection that used to exist between Coot Bay, Bear Lake and a marshy area behind Cape Sable." This marshy area was a large bird feeding area that dried out. Recently, a Buttonwood plug was put into the Canal to reconnect Coot Bay to Bear Lake.

Bear Lake Canal, running west to Cape Sable, is an area where fish concentrated around flowing springs that bubbled to the surface. The North River and Watson River

channels by Whitewater Bay also had boiling groundwater. However, when the canals no longer had as much freshwater running, the groundwater boiling stopped. Part of Dr. Tabb's dissertation included the hypothesis that input of groundwater in Florida Bay occurred when groundwater in the Redlands well got up to six feet. Shark River moving southeast used to spill over into this well and raise the water level. To his knowledge, no one is disputing his hypothesis. Although he witnessed these accounts of groundwater boiling elsewhere in the Bay, he did not witness boiling near his eight sampling stations in north central Florida Bay.

Dr. Tabb also observed environmental conditions affecting Florida Bay's nursery. Pink shrimp, *Penaeus duorarum,* that enter the Coot Bay area as post larvae reach abundant levels in the spring and early summer. They enter on the flooding tides at night through the Buttonwood Canal and usually move out of the Bay once the carapace reaches a length of about 25 mm (Tabb, D., Dubrow, D. and Jones, A 1962). Durbin tagged shrimp using a Petersen tag to see if Florida Bay contributed to the fisheries in the Dry Tortugas. A tagged shrimp was found 123 days later by a fisherman fishing in the Dry Tortugas. After the Buttonwood Canal opened, Coot Bay and the migration route of shrimp were affected. The shrimp stopped going to Shark River and instead went directly out into Florida Bay. Fewer juveniles were observed in Whitewater Bay and "within ten years, the Canal doubled its width due to bank swamping and tidal erosion." One interviewee from Everglades City said that "there are practically no shrimp compared to what was observed in the 1950's (in Florida Bay)." Another ex-commercial fisherman stated that "in the 30's and 50's, the water level was low and swampy that you could see

fish in the distant clear water. It was rich in shrimp and mullet. The water started to get bad in the 1960's when the green moss (algae) got more plentiful."

Durbin's sampling stations included the northern and central parts of Florida Bay starting near Flamingo and eastward. "There was deep mud, but lots of sea grass that kept it down." In the late 1950's, salinity readings would be as high as 70 ppt. In the rainy season, it fell to normal seawater salinity (around 36 ppt). The Army Corps of engineers had diverted freshwater to the west which damaged Taylor Slough which originally kept salinity levels lower. One interviewee recounted that Taylor Slough had an opening into Florida Bay that used to be much wider - "About one mile wide" He used to see fish around this area about 20 years ago, but not anymore. High salinities greater than 50 ppt were also observed in the central part of the bay during the late spring by Robblee et al (1989) in 1956. In the northeast area, lower salinities prevailed mostly during the late summer. (Cantillo et al., 1995)

More sea grass such as *T. testudinum*, shoal grass *(Halodule wrightii)*, and manatee grass *(Syringodium filforme)* grew in the western part of the Bay. According to Dr. Tabb, "The Delta (northern Bay) areas were all sandy mud. West of Cape Sable there was no sea grass. East of Cape Sable and Shark River in Florida Bay was all sea grass." When freshwater was flowing into the Bay, Ruppia with its narrow blades dominated the northern bay; whereas Thalassiosira dominated middle from Flamingo to the southeast part of the bay. There was algae, but "(I) never saw an algae bloom like they talk about now a days," said Dr. Tabb. In 1987, a sea grass die off was first recorded in Florida Bay, affecting areas such as Johnson Key Basin, Rabbit Key Basin, Rankin Lake, Cross Bank, and Sunset Cove. Rainfall was lower than average, temperature was high, and a

reduction of tropical storms from 1986-1989 contributed to hypersaline conditions. The die off (about 18% of the total Bay area) also affected many pink shrimp, sponges and juvenile Florida spiny lobsters as their numbers declined. (Boesch et al. 1993). Some scientists believe that the die off was largely due to an salinity increase, dry season, temperature increase and/or algal blooms. However, as discussed earlier, hypersaline and high temperature conditions were observed previously in Florida Bay yet seagrasses survived. "During all but unusually high rainfall years, evaporation exceeds upland runoff into Florida Bay and hypersaline conditions (>35 ppt) prevail throughout much of the main body of the Bay (since data was available in 1956) (Robblee et al., 1989).

Durbin's original field data from 1964-1966 recorded about 100 different species of mollusks at the broad River Delta (from the Shark River to the Chathum River and up to Everglades City including the Ten Thousand Islands). *Telina promera* (clam species) was found in the Everglades City area. *Porcilinid* crabs were observed living in the oyster bars. Crustaceans such as isopods and decapods were also abundant in the trawls. The Crown Conch in Florida Bay were usually "dwarfed because of the hostile salinity."

During Dr. Tabb's time sampling near Flamingo, he saw about 25-30 mullet fishing boats. This was the big mullet fishing era when the fishers would listen to the splash of the mullet, estimate its size, and then move towards that area. Collier County resident Franklin Adams said that in 1970, "you could see the muddy bottom and grasses from the surface. Florida Bay was clear in the 40's from Key Largo to Flamingo. In these last years, fewer fish exist compared to populations in the past. Fishers had house boats or `running boats' that ran their catch back to the fishing village of Flamingo while the fishers continued fishing." Commercial fishing reached a

peak between 1977 and 1978 when over 350 people had permits to guide or fish. Florida Bay was added to Everglades National Park in 1950. In 1951, some regulations were on fish harvest were enacted but nets, hook and line, and/or traps were still allowed (Tilmant, 1989). Durbin recollected that in the 1950's, the park wanted the people out of the Flamingo fishing village permanently. A ranger ordered them to leave. Instead, the villagers burned the buildings.

FLORIDA BAY WEATHER HISTORY

Freezes, droughts, and hurricanes are significant in altering and controlling the composition of communities. Freezes can affect abundance and productivity of seagrasses and macroalgae. A drought can alter stream flow causing it to decline thereby increasing dissolved solids. Lastly, a hurricane can have destructive affects on an ecosystem destroying flora and fauna and causing rapid storm runoff (Cantillo, 1995).

The occurrence of severe weather events in south Florida over approximately the last 80 years:

Freezes (severe)	Droughts	Hurricanes (in the Atlantic)
		Frequency below normal:
1917	1916	1894-1930
1928	1920	1911-1921 (sp. Low)
1934	1926	
1940	1930	
1947	1938	
about every 7-10 years up until 1981	1942	Frequency above normal: (increased from 1930 through 1982)
1982 & 1983	1949-1951	1933-1938
1985	1954-1956	1945-1952
1989	1987	1964-1966

Adapted from Cantillo et al (1995).

"Hurricane Donna (1960) was the last hurricane that significantly impacted Florida Bay." It damaged mangroves along Flamingo and Cape Sable. Hurricane Andrew, which devastated south Florida in 1992, passed over Homestead and Biscayne Bay with little effect on Florida Bay. Southeastern keys such as Clive Key, Buoy Key, and Palm Key suffered with many large coconut and cabbage palms that were torn away. Silt was carried over some of these keys and changed their structure. Sand Key was cut into two parts, Cape Sable beaches were altered, and Bear Lake canal was filled with organic deposits and marl from the Bay. Dildo Key had "moats built up to 10 feet deep and 50 feet wide on the northeast, east, or southeast side against the mangroves. Some marl was moved so that bedrock was exposed (Craighead and Gilbert, 1962).

The Everglades - Environmental Observations

Franklin Adams used to catch huge trout (Gator Trout) in "very clear water." In the 1950's, he drank the surface water in Big Cypress Preserve. Large cattails were witnessed in Big Cypress, miles from the road near borrow pits or fill pits that are about 40x50 ft. The cat tails were first noticed about 7 or 8 years ago. In the summers (wet season), Franklin remembers water and fish flowing across US 41. It was a time (1950's) when the Everglades had more birds, "especially the white Ibis. Between 300-400 white ibis would feed in the spring as water retreated into reservoirs that were filled with crayfish." Snook were plentiful in the summer and entered the mouth of the Turner River at the Gulf of Mexico.

The Turner River had an oyster and clamshell bottom that was from a time when ancient Indians lived in the area. Fish found shelter under the shells which is now under about one foot of detritus and muck (due to lack of freshwater flow). Alligators that were abundant before the canals were built used to eat the crawfish or "crawdads." Racoons that lived on the edge of the Everglades in the mangroves waded out to get the crawdads and were sometimes caught by an alligator.

After WWII, the alligator was seen as a "nuisance," was valued and killed, then sold for its' hide to the point of being endangered in the 1960's. Due to hunting restrictions, the population has since recovered. The alligator's movement over the land provided small tributaries in the Everglades. One interviewee remembered several periods of drought during the thirties and early forties. An alligator would take advantage of a small area of water and thrash around, making a four foot pond or "gator hole" also known as "wallering out a hole." As the alligators moved over the

Everglades, they formed a "dragover" or a winding trail where other animals followed them to water. Fish followed these tributaries from pond to pond eventually becoming food for the Bator. According to the interviewee, the thousands of small river-like inlets through the mangroves in Flamingo, Shark Valley, and Cape Sable, were formed by these trails.

The Ten Thousand Islands

In 1962, drought hit the Ten Thousand Islands and saltwater infiltrated the brackish waters killing the bass. The numbers never came back. In the 1960's, Franklin "could taste the brackish water in the Turner River, and it was not uncommon to see 4-5ft. black tip and lemon sharks in the back country where Snook used to be very plentiful." The people of Everglades City used to eat Coon Oysters (named because raccoons eat them) from Fakahatchee Bay up until the 1970's. "Once dredging of the Fakahatchee Canal began which ends at the Port of the Islands Hotel (located along U. S. 41 just southeast of Marco Island) people stopped eating them." Another interviewee remembers the islands filled with non-edible shellfish like coquinas in the 1960's. Now, "very few are observed."

Gary Thompson, a fishing guide who spent much of his youth fishing in Everglades City said that the ecology in Everglades City has changed. Mangroves and cattails are replacing sawgrass. The bays in the Ten Thousand Islands are also changing. Gary recounted that until this year, "the back end of Huston Bay had sea algae mats. It was particularly worse in the last three years." In Huston Bay and Northwater, he could

only push pole back there as it was thick with algae. The winter months with lower water level are "worse for green slime." The water is stagnant and little freshwater is getting through the middle of the Ten Thousand Islands. Lake Ingram (near Flamingo) has been dammed and there are few fish. He remembers when it was a once a big estuary for redfish and snook. Snook would come out of the Gulf to the backwaters of Lake Ingram. "Snook heads for freshwater to get rid of parasites and gulp water." They have their babies in back country and head up the rivers. "The snook turn black and gold instead of their familiar silver color. When the snook's bellies are cut open (to judge what to use for bait) they are often found empty, some with mullet, lady fish and baby blue crabs."

Settlement on the Islands

Gary Thompson is one example of many fishing guide families and a fourth generation fishing guide in Everglades City. His relatives used to guide from fishing's famous Rod and Gun Club. Gary's great uncle Jim Thompson, grandfather Rob Thompson, and his father Lamar Thompson were all Everglades fishing guides. Gary's uncle (Lamar's brother) Jackie Thompson is a fishing guide in Marco Island. Most of the early guiding was done by the Brown, Bogess, Daniels, Hamilton, Lopez, McKinney, Smallwood, and Thompson families (Carr, 1997).

Gary's great grandfather Henry Thompson, boat captain for Ed Watson of Killing Mr. Watson, settled on Pavilion Key in 1873. He was a well liked, but feared tall thin man with a long beard and wooden leg that he lost due to a car accident. Originally, his family came from England and Scotland, settled in the Bahamas and then Key West. Henry Thompson used to haul goods items such as sugar cane and

vegetables between Key West and Everglades City. Finally, he settled on Pavillion Key.

Other original families to the Ten Thousand Islands are Hamilton, Brown, Thompson, Raffield, Noble, Daniels, Lopez, Johnson, and Anderson. Many settled on the smaller nearby islands. However, most homesteads in the Ten Thousand Islands were burned in 1947 when the area became part of Everglades National Park. One "cabin" still exists in Huston Bay. The original owner is in his late 70's and possesses the original deed to the house. However, upon his death, the land and cabin will become part of the Park. Most squatters received little or no relocation money to move to Chokoloskee and Everglades City. This is still a sore point among the people of Everglades City.

Freshwater Holes - Artesian Wells in The Ten Thousand Islands

South of Cape Sable and about 8 miles north of the seven-mile bridge along the border of the Gulf of Mexico and Florida Bay, an interviewee pointed out two mudbanks. In between these shallow mud banks was a "hole." In this hole, you could see the change from a dark muddy flat to a sandy light colored hole about 10 to 15 feet in diameter. The interviewee fished this area about 30 years ago and said that it used to be an excellent spot for grouper and sea trout. Many of the freshwater holes mentioned in this report were reported by the local guides as "excellent for fishing and diving." Because of the productivity in these "holes," their locations are important to the fishing guide or dive boat operator. Many return customers specifically seek these areas and vacation in the Ten Thousand Islands because they are still regarded as a successful recreational fishing location.

Moving further north into the Ten Thousand Islands, "about 8 miles off Cape Romano a 65 foot deep hole full with big loggerhead turtles sits. They come up with mud on their backs and you can see the water boil." In addition to this hole, there are several offshore holes with freshwater you can taste. The Blue Hole is a few miles off Marco Island, about half way between Marco Island and Naples. One local fisherman provided me with the Loran coordinates of some of these freshwater holes. In addition, many others that I spoke with also mentioned these freshwater upwelling areas and described the holes' condition and animal life that they saw on a regular basis. In the network of small mangrove islands, "a number of deep, natural channels exist including West, Indian Key, Sandfly, Chokoluskee, Rabbit Key, and Fakahatchee. These usually have at their entrances obstructions of sand, mud, or oyster bars" (Tebeau, 1968).

Name	Loran	Description of Location	Description of Hole
Artesian Spring off Cape Romano	43864.20W 14082.80N	Twelve miles from Marco Pass. Known for Jewfish, Cobia, Snook, Permit, and one 10-12ft. Tigershark.	Depth:32-80 ft "Can see bubbles and feel change to cold."
Caxambas Pass		Kice Island (water overflows into the middle of the island)	"A very plush, green area with lots of sulfur."
Old Marco Village		Artesian well in the middle of the parking lot.	Small waterfall that flows into a pond.
The Spring	43864.OOW 14028.50N	About 23 miles from the Marco Buoy	
Blue Hole		About 20 miles offshore between Naples and Marco	
Creature Hole	43653.70W 14072.90N	About 15 miles from Marco Pass	Large Sharks

"Two cool artesian springs were located near what is now known as Caxambas Pass. The Calusa Indians used to live on shell mounds in Caxambas that rose to 67 feet high; whereas others lived in huts on present day Old Marco Village. Caxambas, Indian for *fresh water,* is located on the southern end of Marco Island. In the 1700's, the Spaniards stopped at Caxambas for freshwater before returning to Spain (Coleman, 1995). Further south along the chain of islands, Chokoluskee Island and surrounding areas also have sources of underground springs.

Chokoloskee is approximately 150 acres and lies barely above sea level, but it's highest point rises to more than 20 feet. In 1918, Ted Smallwood, pioneer and general store owner, explored for water and tapped into a "flowing well" (Tebeau, 1976). This and two other "artesian wells" were found. In the early 1920's, Barron Collier also found freshwater which still flows today on Sand Fly Island. In addition, about 10 miles from

Everglades City lies another artesian well in Copeland. Another interviewee said that there were nine wells on Chokoluskee. The following three are still in use:

1) Hamilton Stone crabs - west side of the island near Chokoloskee Island Park
2) Doc Brown's house. Penny Brown currently resides there.
3) The Blue Heron Hotel - up hill from the Smallwood Store

There are two artesian wells on Highlands Beach. This beach is unique to the Ten Thousand Islands because of the islands' hammock and Key deer. One well is located on the north end nearby where the Hamilton family homesteaded.

On the east side of state road 29 in Copeland, Jim Webb is fourth generation Copeland land owner and owns the Win-Car Hardware store in Everglades City. Looking across 29 from his hardware store, he pointed out that sugar cane was raised where sawgrass flats used to exist in that area before the installation of U. S. 41. His family used to farm until price and labor forced them out in 1962. The Lopez River is named after his great grandfather Gregorio Lopez. Mr. Webb spoke about the artesian well in Copeland that "flowed all the time and no one knows how it got there." In Everglades City, he spoke about a capped off well near Everglades Fish Company along the Barron River. He recalled that "before 29, 41, and 75, you could drink the water east of Pavillion Key (on the flats) in the summer time."

One artesian well on the north side of Marco Island supplied the means to steam clams before shipping via railcar to Key West or by freighter to New York. Currently, the well lies in between a parking lot at the Snook Inn restaurant and a trailer park. The

Snook Inn sits on a mound of clam shells topped with fill that came from the Doxsee Clam Factory.

The Doxsee and Caxambus Clam Factories

Around the 1930's, an abundance of clams inspired Bill Collier to dredge for clams in deeper waters around the islands. Collier invented a motorized clam dredging machine in 1908 that sped clam harvesting and provided two clam canneries thirty years of business on Marco Island (Coleman, M. 1995). *Nature's Tonic* or clam juice is just one of the clam products that came from Doxsee's Clam Factory. Nancy Doxsee Naftal is the granddaughter of J. Harvey Doxsee who established the Doxsee Clam Factory on Marco Island in 1910. I spoke with J. Harvey's son Capt. Ralph, who worked in the factory, and Ralph's niece Nancy. The clam factory employed about 50 people and harvested 300 to 400 bushels per day. The "softball size" clams were dredged 24 hours per day from along the coast of Marco Island to Bird Key. Since the dredge could not be maneuvered close to shore, hand diggers off Pavillion Key dug about 15 bushels per day. Near the mouth of the Chatham River was another source of clams. "Men camped in tents on Little Pavillion Key and clams were hand dug on the outgoing tide until the tide returned (Storter, 1972).

Another interviewee who dug for clams off Pavillion Key mentioned that the clams were easier to harvest and had more "meat" on them than the oysters. This is the reason that oysters were not harvested for commercial purposes. "The dredging of the area and the silt that was stirred up did not seem to affect the oysters. If it was an organism that killed the clams, it did not affect the oysters." Many interviewees gave

several explanations for the clam die off: overfishing, an invasive organism and/or dredging nearby areas. However, with the information and pictures gathered of the clam dredging operation, the area was severely overfished (see Figs. 1 through 4). The E. S. Burnham Cannery was located south of Doxsee's cannery in Caxambas. It opened seven years prior to Doxsee's but closed in 1929 about eighteen years before Doxsee closed his cannery in 1947 (Coleman, 1995). I have not found any recent studies of current clam populations and locals feel that their numbers are returning. Many find clam shells about the size of one's fist continues to wash up on Cape Romano and off Marco Beach. As clam product shipments decreased, the Atlantic Coast Line railroad finally discontinued service to Marco in 1947. Incidentally, shipment by rail service to and from Everglades City and Copeland was discontinued in 1959.

Both early 20th century pioneers and archaic Calusa Indians harvested the, shellfish of the Ten Thousand Islands. In addition to large quantities of shells found in mounds on Marco Island, Caxambas (now called Marco Estates), and Goodland; the mounds are common throughout the Ten Thousand Islands. On nearby Horr's Island which is now an exclusive housing development named Key Marco shell mounds were placed by the Calusas. In 1877, John Foley Horr's success at cultivating pineapples on this island led him to build a produce supply center and packing plant (Coleman, 1995). William H. Sears, archaeologist, examined mounds near the Turner River and concluded that "the shells must have been deposited on submerged still-growing mud flats under normal high tide lever, and that the black middens containing cultural debris were built up at a later date" (Tebeau, 1968).

GOODLAND

Goodland is located in the southeast part of Marco Island adjacent to Caxambas. It too has evidence of Calusa inhabitants and underground sources of fresh water. For example, a 40-acre shell mound once existed on Goodland (Coleman, M. 1995). One excerpt out of a local newspaper *The Islander* quotes that during World War II, shells from an Indian mound that once stood about 22 feet above sea level were used for the foundation of the Naples Airport (Suhay, 1997). Near the Mar-Good Marina "an ancient artesian well runs under a large rubber tree." Elhanon Combs, the owner of the marina, is quoted saying that he runs a faucet near his dock from this source of water and that the tree was described as being very large back in the 1800s.

Cecilia Weeks spent most of her lifetime in Goodland. She was born in 1924 near Lostman's River then moved to Caxambas for elementary school. Her father drove the mailboat and they lived near a large pineapple plantation. "The pineapple plantation used to go across Roberts Bay and Barfield Bay." Before the canals were dug on Marco, this area used to be land. Cecilia and her family along with other families were moved in 1949 to Goodland when Barron Collier's (no relation to Capt. Bill Collier) heirs wanted to develop Caxambas. Families and their homes were moved to Goodland once development of the island commenced.

Conclusions

This report discusses the lives of those living in southwest Florida from their perspective. Many have occupations that place them on the waters of the Ten Thousand Islands, Florida Bay, and/or the Everglades daily. Although environmental and political conditions forced numerous commercial fishers offshore or entirely out of the occupation, many continue to work water-related jobs. Specifically, Everglades City has several hundred fishing guides in the Ten Thousand Islands. Others opened small airboat operations. These fairly new businesses may be forced to close in the near future because Miccosukee Indians legally have sole rights to airboat operations in the Park. Net fishers that wanted to continue commercial fishing after the net ban moved to Louisiana. Others moved to Belize where their government has little "interference" with fishing.

Environmentally, the majority of interviewees observed some water quality change in the Everglades and its' tributaries. In the canal that runs along US 41 near the Miccosukee Reservation, some observed that the water hyacinth problem is greater today. The "water hyacinths have not always been the same here. It has been a problem for at least the last 14 years." Some of the backwater bays also have changed. Huston Bay had periods where some observed dense algal mats. Closer to the Gulf of Mexico and east of Cape Sable, some observed periodic algal blooms. However those that witnessed the "large, thick, green pea soup" bloom in western Florida Bay, said that the smaller blooms were not as dense.

Observations by the interviewees indicate less fish in Florida Bay, the Ten Thousand Islands, and the Everglades. However since the net ban was implemented,

some feel that mullet and seatrout populations are returning. In addition, most felt that significantly fewer bird populations exist in southwest Florida than in the early 1900's.

This internship report offers a preliminary overview of local user groups' environmental observations based on open-ended interviews. In the absence of adequate historical scientific records, oral history allows comparison of past environmental conditions with those of the present. Documenting oral history provides a "goal for the future where environmental quality has declined." This comparison is instrumental for setting goals for the preservation of the environment.

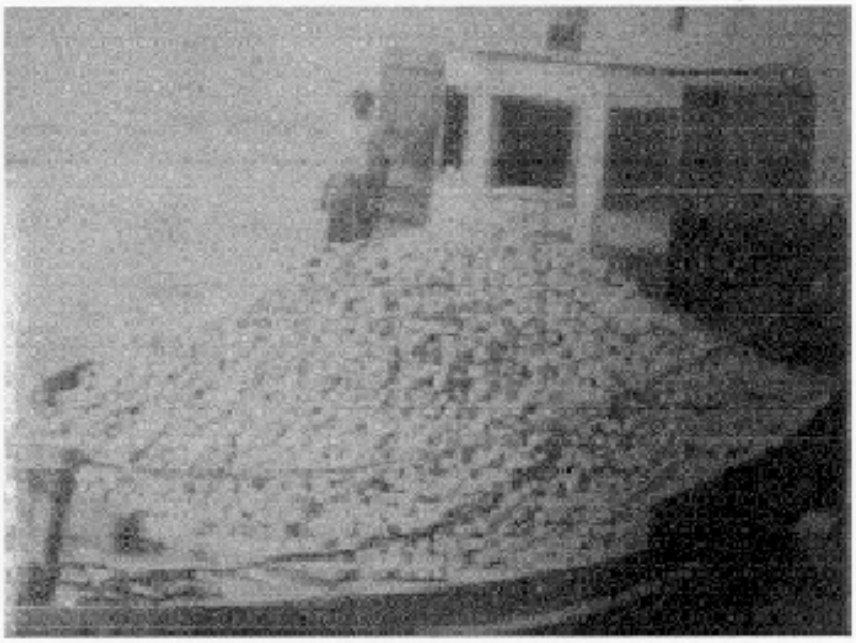


Figure 1. Doocee Clam Factory - Clams Dredged from the Ten Thousand Islands.

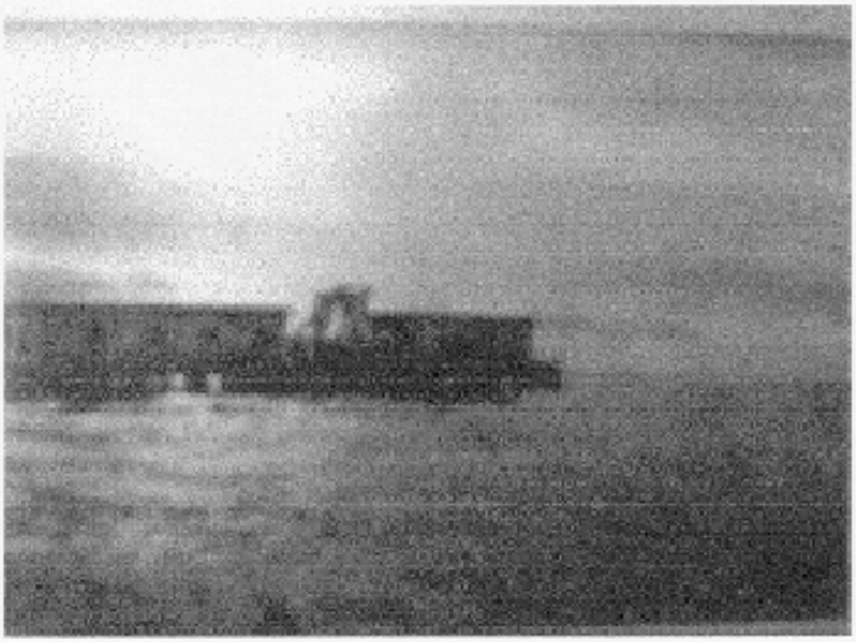


Figure 2. Doocee Clam Factory - Dredge

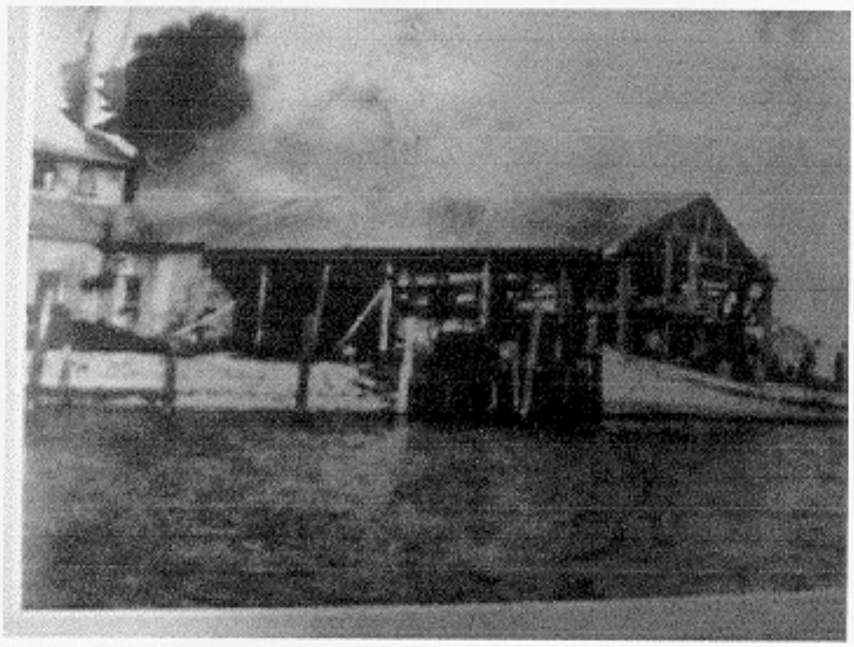


Figure 3. Doxsee Clam Factory

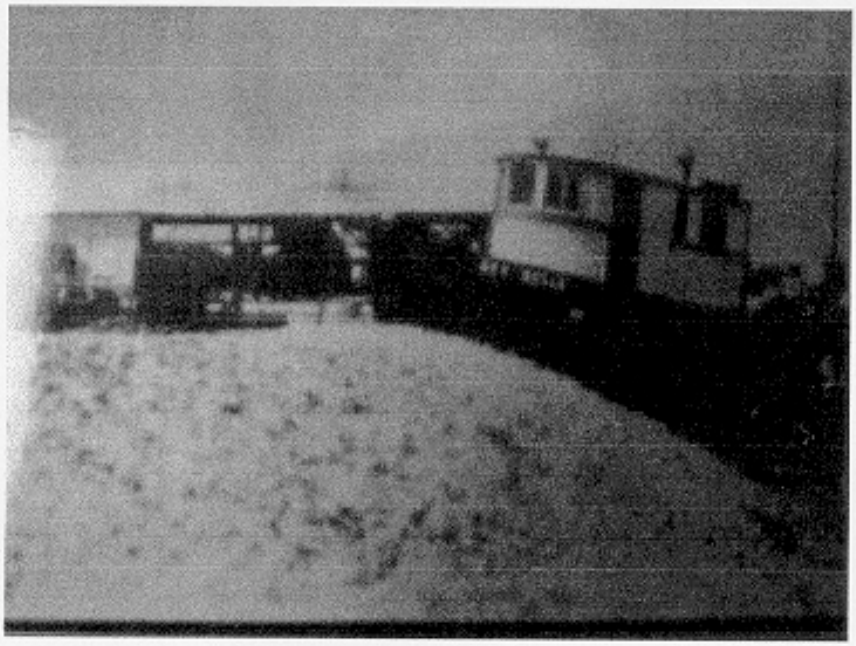
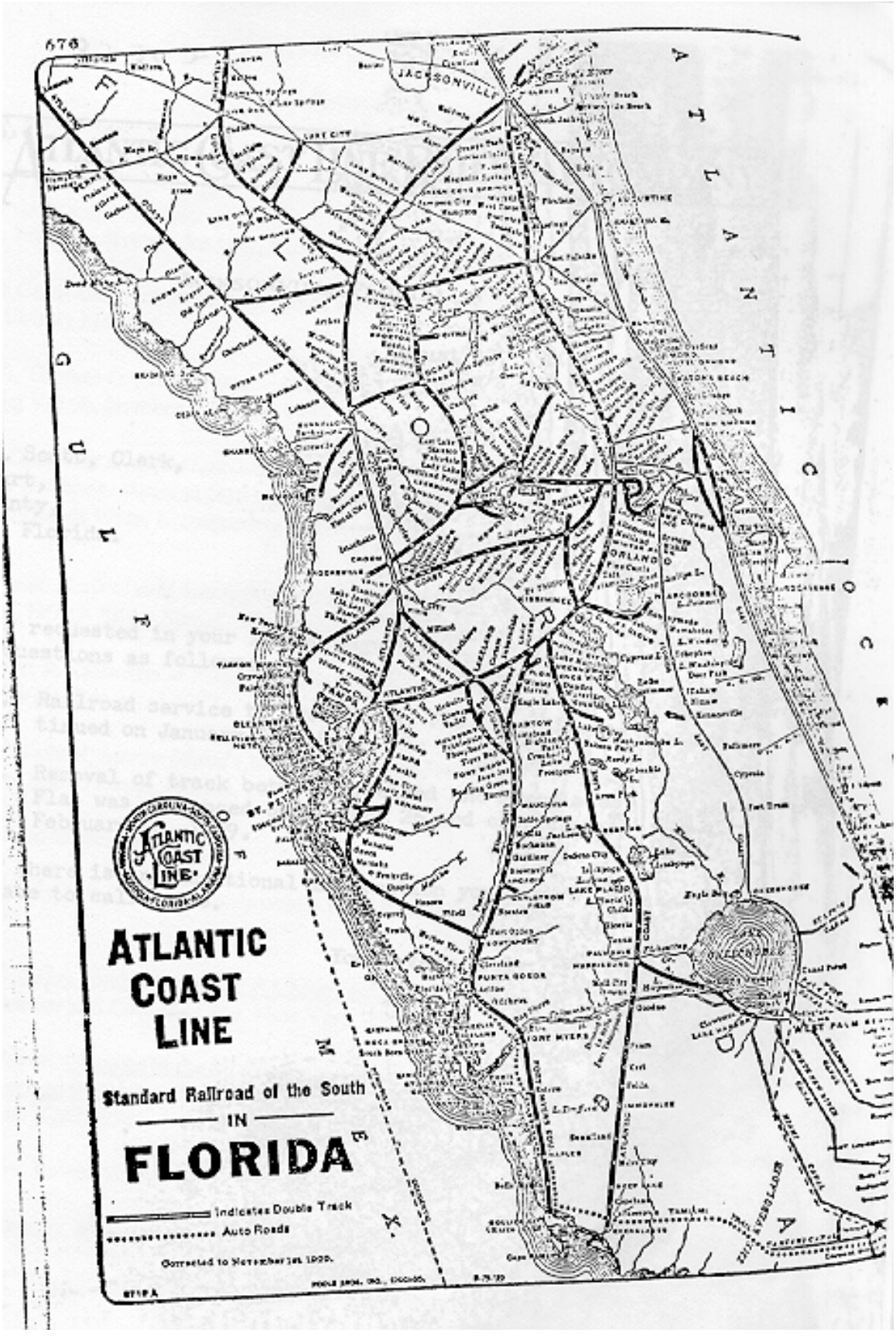


Figure 4. Doxsee Clam Factory - Clam Shells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JACKSONVILLE
ATLANTIC OCEAN
GULF OF MEXICO
ORLANDO
TAMPA
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ATLANTIC COAST LINE
Standard Railroad of the South
IN
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Auto Roads
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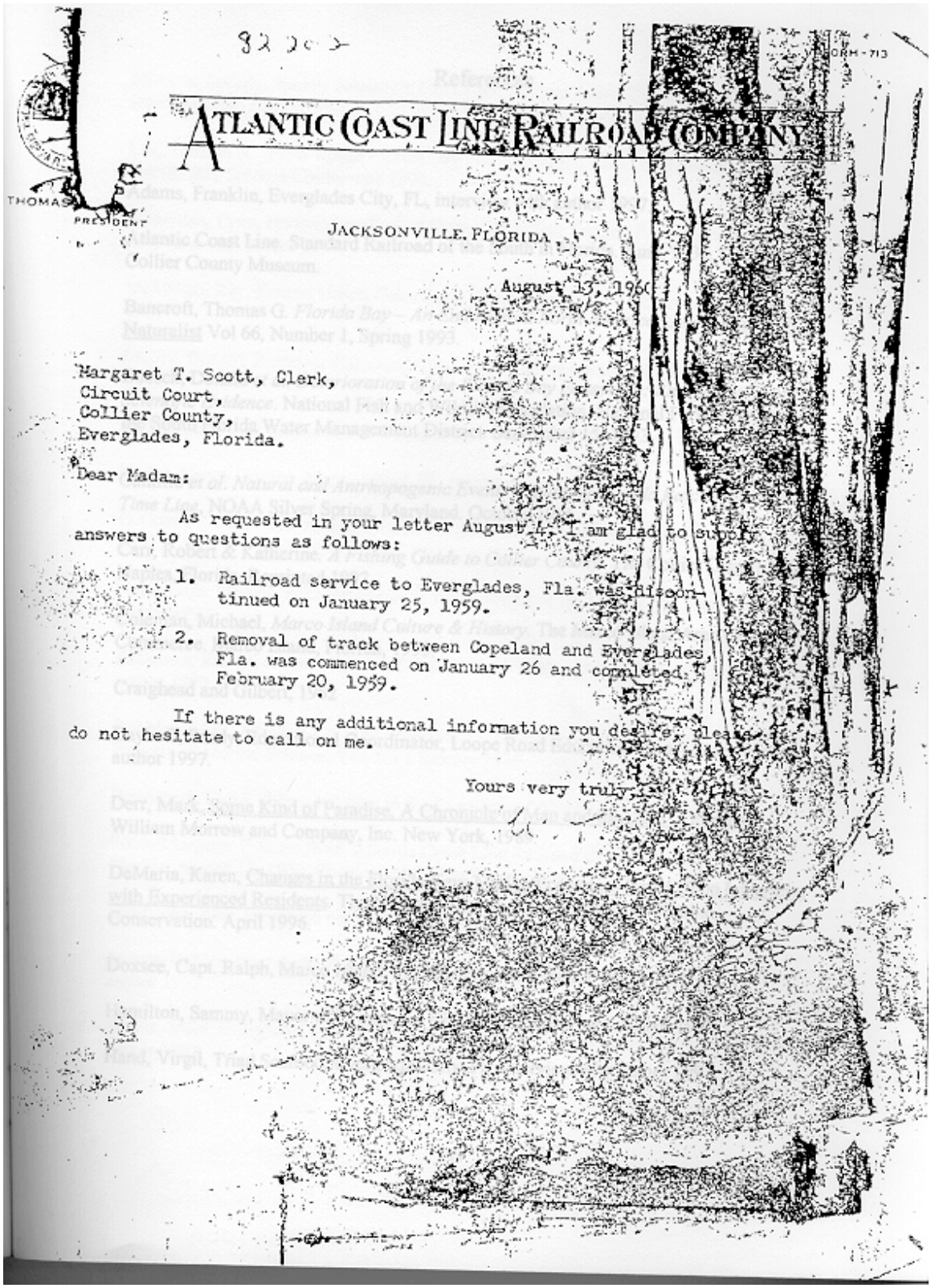

ATLANTIC COAST LINE RAILROAD COMPANY

THOMAS ... PRESIDENT

JACKSONVILLE, FLORIDA

August 13, 1960

Margaret T. Scott, Clerk,
Circuit Court,
Collier County,
Everglades, Florida.

Dear Madam:

As requested in your letter August 4, I am glad to supply answers to questions as follows:

1. Railroad service to Everglades, Fla. was discontinued on January 25, 1959.

2. Removal of track between Copeland and Everglades, Fla. was commenced on January 26 and completed February 20, 1959.

If there is any additional information you desire, please do not hesitate to call on me.

Yours very truly,

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