

**ANNUAL FISHERIES REPORT**  
**EVERGLADES NATIONAL PARK**

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Thomas W. Schmidt, Mario Alvarado, and John Kalafarski

South Florida Natural Resources Center  
Everglades National Park  
40001 State Road 9336  
Homestead, FL 33034

## INTRODUCTION

National Park Service (NPS) management policies state that recreational fishing is permitted in parks where it is authorized by federal law or is not specifically prohibited, and is in accordance with applicable federal/state laws and regulations. However, the NPS may restrict fishing activities whenever necessary to achieve management objectives. NPS sport fish goals and management objectives are based on the preservation and restoration of the diversity and natural ecological integrity of fish populations. When harvest is permitted, in no case should it be allowed to reduce the reproductive potential of the population or to radically alter its natural (unfished) age structure. Fishing activity and harvest of sport fish from Everglades National Park have been monitored nearly continuously since 1958. The objectives of fisheries monitoring in the park are: 1) to estimate catch rates, relative abundance, age structure, and total harvest, and 2) to estimate boating (and fishing) activity in park waters.

This monitoring program was originally initiated because of concern over greatly increased fishing pressure resulting from the construction of a highway, marina facilities and access canal to Whitewater Bay in 1958. The first ten years of the park's fishery monitoring program (1958- 69) were conducted through contract with the University of Miami, Institute of Marine Science and were directed at evaluating only the sport fishery.

Under the University of Miami program, measures of catch and catch-per-unit-of-effort (CPUE) were made only from those fishermen operating out of Flamingo. These data covered a major area of the fishery but largely missed two other major areas: eastern Florida Bay and the lower Ten Thousand Islands.

In 1965, a permitting system was established for commercial fishermen operating in the park. These fisheries included commercial hook & line (primarily spotted seatrout), netting (mullet and pompano), stone crab trapping, and professional guides. Until 1972, these catch data consisted of monthly total harvest, by species, for each fishermen. The harvest reports did not include any measure of fishing effort or specific area of harvest so it was not possible to monitor populations by ecosystem or management unit, nor to evaluate the degree to which fishermen complied with the reporting requirements of their permits.

In 1972, the NPS expanded the harvest monitoring program to include daily trip ticket reports from commercial permit holders and developed censusing techniques to evaluate total parkwide sport fishing and commercial effort. Primary emphasis of the expanded monitoring was to improve the precision of the catch rate and total fishing effort estimates for both sport and commercial fisheries (Davis 1979a). In 1974, fish size data was added to the information recorded and, in 1980, Chokoloskee-Everglades City and boat ramps along the Florida Keys were added on a routine basis.

In 1978, a second detailed account of the park's fishery database was completed in response to sport fishermen and professional fishing guide complaints of declining stocks. Results of this assessment were incorporated into a document for public review

concerning alternative fishery management options for Everglades National Park (Davis 1979b). This assessment summarized the estimated total harvest of fish from park waters by species, by area, and fishermen type for the years 1973-1977. Although recorded catch rates and annual fishing activity were analyzed for trends, no detailed analysis of catch rate response to changes in effort and harvest or to environmental factors were made. Insufficient fish length data also were available in 1979 to evaluate such important parameters as age structure of the catch, mortality rates, and mortality response to changes in fishing effort and harvest.

Recently, a 1985-88 analysis of the fisheries database, provided Virtual Population Analysis (VPA) cohort stock assessments for the park's major fish species based on a 10-year collection (1974-84) of data on 40,000 fish length measurements. VPA's are statistical models which use primarily catch (harvest) data to produce relative estimates of how many fish of a given species exist or how many species of a particular age class are surviving yearly to become spawners. Park stock assessments included total mortality estimates, age structure, and a yield-per-recruit analysis for the three most commonly caught sport fish (spotted seatrout, red drum, and gray snapper) (Tilmant et al. 1986, Rutherford et al. 1989a, 1989b). This review concluded that environmental factors may explain as much of the variability in fish abundances as does fishing pressure.

More recently, oral presentations of project results were given during January-February at the guide fishermen IBU permitting meetings held in Key West, Islamorada, Everglades City and South Miami, Fla.. A poster on Florida Bay project results was presented at the Florida Bay Science Conference held in Key Largo during December. Data summaries to assist in the evaluation of jewfish and snook/seatrout populations in south Florida were presented at Florida Marine Fisheries Commission Meetings held in Islamorada and Panama City. An evaluation of the Park's recreational shark fishery was prepared for a NPS Technical Report on Sharks of the NPS: Status, Conservation, and Management Options.

Other related activities during the year include the evaluation of several fish kill events. A coastal, cold-snap die-off occurred in February, low dissolved oxygen conditions resulted in a fish die-back in April in Taylor Slough, and thousands of marine catfish were reported dead along the Gulf Coast apparently affected by a marine virus.

A State of Florida health advisory remains in effect for six species of marine species found in northern Florida Bay. The average mercury level of spotted seatrout, crevalle jack, gafftopsail catfish, ladyfish and bluefish is in excess of the state limit for human consumption.

This report represents the second annual fisheries report produced since 1990. Due to severe personnel shortages, only basic data collection activities were maintained from 1991-94 by two port samplers at Flamingo and Everglades City. This report includes a description of the fishery, and relative abundance, and, for the first time, annual estimated total harvest from Flamingo and Everglades City for both the guide and non-guided fishery.

## METHODS

Methods (data collection/recording format) employed to obtain sport fishing monitoring and boating activity data in Everglades National Park have been previously presented by Higman (1967), Davis and Thue (1979) and Tilmant et al. (1986), and are briefly discussed below.

Recreational fishermen are interviewed at boat launch sites (Flamingo and Chokoloskee/Everglades City) upon completion of their trip every weekend. Data recorded include area fished (Fig. 1), reported catch (fish kept and released), harvest (kept only), effort (angler hours fished), species preference, angler residence, and, since 1974, fish lengths. Commercial fishermen and professional guides were required to obtain an annual "no-fee" permit from the park and report their monthly catch and effort on a per trip basis via logbooks supplied with the permit. Prior to 1980, reporting was voluntary. Reporting compliance of the guide fishermen is determined from recorded field observations by park patrol rangers and by port samplers at the boat launch sites. Since the elimination of commercial fishing in Everglades National Park in 1985, only recreational guided and non-guided recreational anglers are permitted to fish within park estuarine and coastal marine waters.

Daily estimates of the total number of fishing boats operating in park waters were made by regressing the daily counts of empty trailers at Flamingo against a known number of boats fishing the same day. Aerial surveys were used to determine the correlation of boat trailers at the Flamingo launch ramp to the total number and distribution of boats within the park. Over 243 flights were conducted using randomly selected weekdays and weekends stratified by month for three sample periods (July 1972 to May 1975; October 1977 to October 1978; and October 1983 to October 1984). Highly significant linear relationships between the number of trailers at Flamingo and total boats observed in the park were obtained during each sampling period. The accuracy of the aerial observers was about 94% (152 known patrol boats on the water; 143 sighted). No significant differences were found among the regression statistics for the three survey periods and therefore all the data were pooled to strengthen the expansion estimates ( $r = 0.84$ ,  $N = 243$ ,  $P < 0.01$ ) (Tilmant et al. 1986). There was no significant difference in the boat count-trailer count regression between weekdays ( $r = 0.65$ ,  $N = 133$ ) and weekends ( $r = 0.70$ ,  $N = 110$ ) ( $P < 0.02$ ). The percentage of recreational boats actually fishing was determined from boater interviews. Most of the recreational fishermen catch data for Florida Bay and the immediate vicinity has come from interviews conducted at the Flamingo boat ramp (Areas 1-5, Fig 1).

Flamingo is by far the greatest single access point to Florida Bay and has been used by 50-60% of the total anglers. During 1972-74 and 1981-84, additional interviews were obtained at ramp sites along the Florida Keys. However, no significant differences were found in the catch composition or success per unit of effort of these anglers when compared to those anglers fishing the same areas interviewed at Flamingo (Tilmant et al. 1986). Catch data from area 6 (Fig. 1) is entirely from Chokoloskee/Everglades City interviews.

Estimates of total recreational catch and harvest of individual fish species for the non-guided fishery were made quarterly during each year by applying the recorded mean catch (or harvest) of that species per successful trip to the estimated total number of fishing trips successful for that species. The estimated total number of recreational fishing trips for a species was determined by applying the proportion of recreational boats, contacted by interviewers, that were successful for the species to the estimated total recreational boats determined by the ramp boat-trailer count.

Estimates of total harvest for the guide fishery were obtained by dividing the reported harvest by the estimated percent reporting compliance of fishermen known to be fishing. Not all guides reported their catch as required and therefore a reporting compliance adjustment was necessary. Reporting compliance estimates as determined through independent field observations of fishing activities ranged from 39-64%, for 1996.

Statistical differences were found between the mean reported catch rates at Everglades City (fishing area 6) and at Flamingo (Fishing area 1-5) (Tilmant et al. 1986). Therefore, total estimated catch and harvest computations were made separately for Everglades City and the Florida Bay region and then added to obtain park-wide estimates.

The seasonal distribution of the number of fishing interviews and fishing effort have not been consistent from year to year. Therefore, all calculations of annual mean catch rates (CPUE), harvest rates (HPUE), and estimated total harvest or effort were calculated by calendar quarters and the four quarters either averaged or summed to obtain comparable annual values. In estimating the average CPUE or HPUE for a calendar quarter, rates of individual trips were calculated after Malvestuto (1983). Only those anglers successful in catching a species were used to calculate a harvest or catch rate to avoid bias in the possible change in the proportion of effort applicable to a species each year.

## RESULTS

All of the non-guided angler catch data for Florida Bay and the immediately adjacent waters, (Cape Sable, Whitewater Bay, and Shark River area, hereafter referred to as Florida Bay) has come from interviews conducted at the Flamingo boat ramps. All of the non-guided catch data for Everglades City (Lostman's River to the northwestern boundary of the park near Chokoloskee) has come from interviews conducted in the Everglades City-Chokoloskee boat ramps and marinas. This report represents the first time that Everglades City guide and non-guided survey and catch data has been presented together in an annual report format.

During 1996, 4,742 boaters were interviewed at Flamingo. Ninety-seven percent of these boating trips were involved in sport fishing activity. Only 6.0% of the anglers did not catch fish.

At Everglades City 3,160 boaters were interviewed. Ninety-five percent of the total boats interviewed were fishing. Only 6.1 % of the fishermen did not catch fish.

### Description of the Fishery

Most (84%) of the anglers fishing out of Flamingo were south Florida residents (Dade County to, and including Ft Lauderdale, excluding local); 2% local (Florida City, Flamingo, Florida Keys), and 13% Florida other than south Florida or local. Only 1% of the anglers came from out of state.

At Everglades City, most (68%) of the anglers fishing were Florida residents other than south Florida (Collier, Dade, Monroe Counties) and local residents. South Florida accounted for 16% of the anglers, while 14% were local (Chokoloskee/Everglades City/Ochopee) residents and 2% came from out of state.

An estimated 26,259 fishing trips, 61,307 anglers, and 27,204 boats made up the boating and fishing activity in Florida Bay. Of these fishing trips, 14% were interviewed at the Flamingo boat ramps. The average trip lasted 7.2 hours with an average fishing time of 5.7 hours and caught an average of 20 fish.

Most anglers interviewed at Flamingo (45%) did not try to catch any particular kind of fish. Snook and red drum were the most popular fish, sought by 16% of the fishermen. For red drum this represents an increase from 7% of the anglers seeking red drum in 1995. The next three species preferred were seatrout (13%), tarpon (3%), and gray snapper (4%). Over 39% of the fishing parties interviewed reported catching spotted seatrout. The next three species most commonly caught were gray snapper (36%), red drum (35%), and snook (23%).

At Everglades City an estimated 16,511 fishing trips, 36,359 anglers, and 16,511 boats made up the boating and fishing activity. Of these fishing trips, 19 % were interviewed at the Everglades City boat ramps. The average trip lasted 7.0 hours with an average fishing time of 5.4 hours and caught an average of 15 fish.

Many anglers interviewed at Everglades City (52%) did not try to catch any particular kind of fish. Snook was by far the most popular fish, sought by 35% of the fishermen. The next four species preferred were seatrout (4%), red drum (4%), tarpon (1%), and gray snapper (less than 1%). Over 40% of the fishing parties interviewed reported catching snook. The next three species most commonly caught were, red drum (35%), seatrout (33%), and gray snapper (22%).

An estimated total of 41,899 fishing trips were reported in park waters during 1996, representing a 7.8% increase in fishing trips compared to fishing activity in 1995. The park was closed nearly 3 weeks during the fall quarter of 1995 due to government shutdowns. The overall trend in recreational fishing boats since 1973 shows high values in 1973-75, with lows in 1979- 80, and a rebound to moderate values in the mid-80's to the highest ever recorded in 1989 (44,861) (Fig. 2). A decline during the early 1990's, is attributed to the impacts of Hurricane Andrew. The park was closed from September

through December, 1992. The recreational effort ( total estimated angler-hours fishing) has followed this trend (Fig. 3).

### **Relative Abundance**

Catch rate is a function of the number of fish caught for a unit of time or effort expended. The number of fish caught for each hour of fishing is used as an index of the abundance of the fish. The 1996 average catch and harvest rates from the sampled anglers for major species in the park fishery are presented in Table 1. For the major species, relationships of 1996 catch/harvest rates to past years are presented in Figures 4 - 6.

### **Estimated Total Harvest**

The catches of the interviewed anglers and the reported catches of the guide fishermen are only samples of the total park harvest. Catch rates calculated from interviews are multiplied by the estimated total number of fishing boats fishing for a particular species to yield estimates of total non-guided harvest. For the guide fishery, the total number of fish reported harvested is divided by the percent of total estimated harvest to yield the estimated total harvest by species. The 1996 estimated total non-guided and guided harvest is shown in Table 2. For the major species, relationships of 1996 catch/harvest, to previous years are shown in Figures 7 - 9.

### **Recent Trends (Florida Bay)**

Overall, 1996 annual guide and non-guided successful catch rates for spotted seatrout, red drum, snook, and gray snapper were nearly as high or higher than the preceding years (1986-1990, 95; data for the years 1991-1994 were not available for analysis). Annual harvest rates and annual estimated total harvest for the major species have decreased steadily over the same time period, except for snook rates and harvest which have increased slightly. Catch rates may be used as an index of abundance, and are directly related to environmental factors such as rainfall, and are generally not directly affected by fishing regulations, while harvest rates most certainly are.

During the 1990's, the annual guide and non-guided harvest rates and estimated total harvest for gray snapper has dropped as low or lower than anytime during the previous record and the trend may continue downward (Figs. 4,5,7,8). The lower harvest may largely be due to the state regulations imposed on the fishery in 1988 and 1990 when the legal minimum size was increased from 6 to 8, and 8 to 10", with a bag limit of 5 fish per person. During 1989-90 and 1995-96, the increase in catch but not harvest may reflect a good stock recruitment of small juvenile fish which are being released because of size regulations. Historically, fewer numbers of sub-adult gray snapper may tend to remain in park waters during lower salinity periods.

During 1989-90, and 1995-96, a similar general pattern can be seen for the annual guide and non-guided harvest rates and estimated total harvest of spotted seatrout taken out of Flamingo, as that shown by harvest of gray snapper (Figs. 4,5,7,8). The lack of increase in

harvest may be due to state regulations imposed on the fishery in 1989 which raised the legal size limit from 12 to 14", and then in 1996, for the south Florida populations (15" minimum size/5 fish bag limit/Nov-Dec closure), to reduce harvest to achieve the Florida Marine Fisheries Commission's (FMFC) spawning potential ratio (SPR) objective of 35%. The SPR is the ratio of the spawning stock biomass of the exploited fish population to the spawning stock biomass of the same population in an unfished condition.

Greater numbers of seatrout were caught and released in 1996 than in 1995. This increase in catch is probably due in part to the 1996 regulatory restrictions, providing a good stock recruitment of small juvenile seatrout. Presumably an increase in coastal rainfall and lower salinity results in an increase in larval recruitment and/or juvenile survival (Rutherford et al. 1989a).

For red drum, during 1989-90 and 1995-96, the annual harvest rate and estimated total harvest for guides and non-guided anglers in the Florida Bay region has followed a pattern of stability (Figs. 4,5,7,8). The lack of increase in the harvest rate is probably due to the 1989 bag limits of 1 fish per person following almost two full years of prohibited harvest (1987-88). Increased size limits (12" to 18") and a closed season imposed on the fishery in September 1985 probably accounted for the large declines in average harvest in 1986, however, the sharp declines in harvest rates during 1985 suggest the possibility of overharvest or poor recruitment. Based on the faster than anticipated state-wide recovery of this species, the FMFC in 1996 eliminated the March, April, May closed seasons, allowing year round fishing. This probably attributed to higher catch rates observed in 1996, when compared to catches reported in 1995. Previous studies have shown that periods of generally higher rainfall may lead to increased abundance of red drum in the park

During the most recent annual periods analyzed, 1990 and 1995-96, snook guided and non-guided catch and harvest rates were higher than in 1988-89. The increase may again reflect a stock recruitment of small juvenile snook which were released in prior years because of size restrictions and are now being recruited to the fishery (Figs 4,5,7, 8). High recruitment years probably occurred during 1986 and possibly 1991, based on the 4-year time period needed for snook to recruit to the park fishery. Recruitment may also be enhanced by increased rainfall/runoff. Because of regulations and possible changes in fishing behavior, as discussed in 1995-96 quarterly reports, an unknown number of fishermen are presumably releasing their catch in response to catch-and-release fishing promotions.

Despite the bag limits, minimum size limits, and closed seasons placed on this fishery to date, harvest has not been reduced. Even though there was a state-wide snook die-off due to cold weather in 1989-90, and a similar but much smaller cold-snap die-off reported in SW Florida during the winter of 1996, this year represents the greatest number of non-guided fishing parties (1054) catching snook over the period of record (1958-1990, 1995-96). Only 30 non-guided boats reported catching snook in 1982. According to the most recent MRFSS statistics for Florida, the increase in snook catch/harvest rates over the past 5-10 years appears to be a state wide occurrence, particularly on the east-central

coast (Taylor et al. 1996). By reducing the state bag limit from two to one per day for Florida's west coast as proposed, the SPR for snook would come close to the FMFC's SPR target of 28%.

The professional guide fishery is largely directed at a few highly prized gamefish species within the park. Two of these species, tarpon and bonefish, are of little food value and are not sought by the majority of the of non-guided anglers. They are the trophy species of the guide fishery. Since harvest of tarpon only occurs for the purposes of mounting the catch as a trophy, catch rate is more indicative of the stock than harvest rate. The catch rate rebounded in 1983, from a low in 1982, experienced a slow decline in the mid- 1980's, until reaching an apparent high value in 1995 (Fig. 6). Since 1978, tarpon catch rates have not varied throughout the park. The estimated annual total catch for tarpon in 1996 has reached is apparent highest level since 1980, suggesting that more anglers are fishing for, and catching tarpon (Fig. 9).

Like tarpon, bonefish are not harvested unless the angler desires to mount the catch. Bonefish catches show an almost cyclic trend since 1980, with a low value in 1983, steadily increasing to the late 1980's, with slight declines in 1995-96 (Fig. 6). Nearly all bonefish are released when caught and, therefore, it is highly unlikely that fishing mortality has played any significant role in determining bonefish stock abundance. Although sufficient harvest data are not available to reasonably evaluate the impacts of fishing activity on these two species, reported catch rates of tarpon and bonefish suggest that the stocks are relatively stable.

### **Fish Kills**

A wide-spread cold-snap, die-off was reported during the first week of February from Whitewater Bay - Cape Sable to the NE Florida Bay shoreline. Water temperature data from Park continuous monitoring telemetry stations showed a rapid overnight drop from the low 70's to a low of 50<sup>0</sup> F during February 4-5. Hundreds of tropical species were affected including mostly snook, cichlids, and mojarra. This event was the largest cold snap kill since the Christmas Freeze of 1989. Low dissolved oxygen levels reported at Royal Palm during several overcast days in April produced a die-back of hundreds of mostly adult blue tilapia in Taylor Slough. Marine sea catfish were affected by a virus which resulted in several die-offs of thousands between June and October in the Ten Thousand Islands. This coastal event was reported from the Everglades to Texas

## **CONCLUSIONS**

While the current sport fish monitoring project is evaluating various aspects of catch/harvest rates, relative abundance, total estimated harvest, and fishing/boating activity, additional areas of work are needed. These include: (1) current stock assessments on major game fish species using, as needed, VPA, separable virtual population analysis (SVPA), SPR, & sequential population analysis (SPA), , (FMRI/NPS snook/seatrout

assessments are proposed for 1997), (2) new age-length keys for major species, especially resident species, snook & seatrout (seatrout otoliths/scales are being collected by the park and analyzed at Florida Marine Research Institute; collection and analyses of snook hard parts is pending), (3) analysis of a 15 year non-guide/guide database at Everglades City (FMRI/NPS cooperative project underway for short-term analysis), (4) analysis of fish length measurements; (5) incorporate the fisheries database into the park's GIS system for spatially oriented ecological applications, (6) long-term park-wide/Florida Bay CPUE/HPUE data analysis, and (7) develop a new fishery data management handbook.

### **ACKNOWLEDGMENTS**

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**Table 1.** Recreational catch/harvest rates (per angler-hours) in Florida Bay, Everglades National Park, 1996.

<b>Non-Guide Anglers</b>				
<b>Species</b>	<b>CPUE</b>	<b>HPUE</b>	<b>Sample Size *</b>	
	<b>±95% Conf. Interval</b>	<b>±95% Conf. Interval</b>	<b>CPUE/HPUE</b>	
Snook	0.2365 ± 0.0204	0.1232 ± 0.0095	1054	350
Red Drum	0.3587 ± 0.0250	0.1143 ± 0.0046	1591	779
Spotted Seatrout	0.8333 ± 0.0537	0.2937 ± 0.0161	1806	1120
Gray Snapper	0.7931 ± 0.0578	0.3342 ± 0.0214	1638	899
<b>Guide Anglers</b>				
<b>Species</b>	<b>CPUE</b>	<b>HPUE</b>	<b>Sample Size *</b>	
	<b>±95% Conf. Interval</b>	<b>±95% Conf. Interval</b>	<b>CPUE/HPUE</b>	
Snook	0.2880 ± 0.0182	0.1339 ± 0.0092	1158	533
Red Drum	0.4704 ± 0.0322	0.1121 ± 0.0052	1342	503
Spotted Seatrout	1.2889 ± 0.0801	0.3834 ± 0.0221	1307	564
Gray Snapper	1.4999 ± 0.1363	0.5771 ± 0.0420	666	374
Tarpon	0.2055 ± 0.0157	0.0375 ± 0.0245	610	2
Bonefish	0.3067 ± 0.0359	N/A	223	N/A

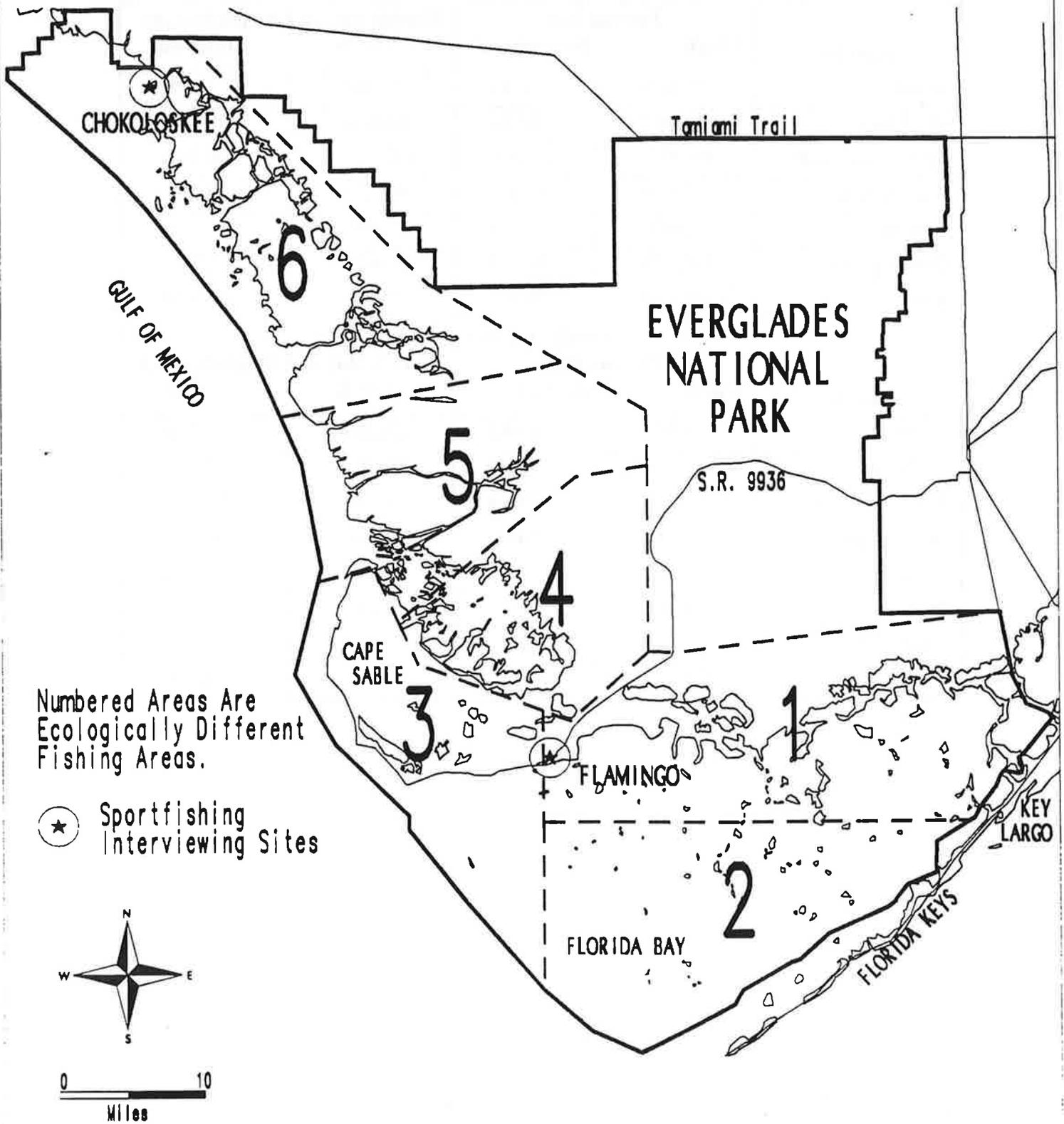
\* Number of fishing parties.

**Table 2.** Total estimated fishery catch/harvest by recreational anglers from Everglades National Park, 1996.

<b>Non-guide Anglers</b>				
<b>Species</b>	<b>Florida Bay</b>		<b>Florida Bay &amp; Everglades City</b>	
	<b>Catch</b>	<b>Harvest</b>	<b>Catch</b>	<b>Harvest</b>
Snook	18,688	3,189	43,604	7,420
Red Drum	43,003	6,588	60,568	10,316
Spotted Seatrout	102,406	23,366	147,035	30,944
Gray Snapper	83,776	21,637	106,178	23,487
Tarpon	2636	0	3099	0
Other species	138,035	14674	201624	23902
<b>Total</b>	<b>502,124</b>	<b>79,925</b>	<b>742,169</b>	<b>110,840</b>
<b>Guide Anglers</b>				
<b>Species</b>	<b>Florida Bay</b>		<b>Florida Bay &amp; Everglades City</b>	
	<b>Catch</b>	<b>Harvest</b>	<b>Catch</b>	<b>Harvest</b>
Snook	8,674	1,882	20,204	3,389
Red Drum	16,155	1,824	30,291	3,601
Spotted Seatrout	41,635	7,094	57,702	11,050
Gray Snapper	22,317	5,640	26,192	8,371
Tarpon	2,633	4	3,093	6
Bonefish	1,060	2	1,062	4
Other Species	37,980	3,337	47,080	4,660
<b>Total</b>	<b>130,454</b>	<b>19,783</b>	<b>185,624</b>	<b>31,081</b>

Fig. 1:

# ECOLOGICALLY DIFFERENT FISHING AREAS EVERGLADES NATIONAL PARK



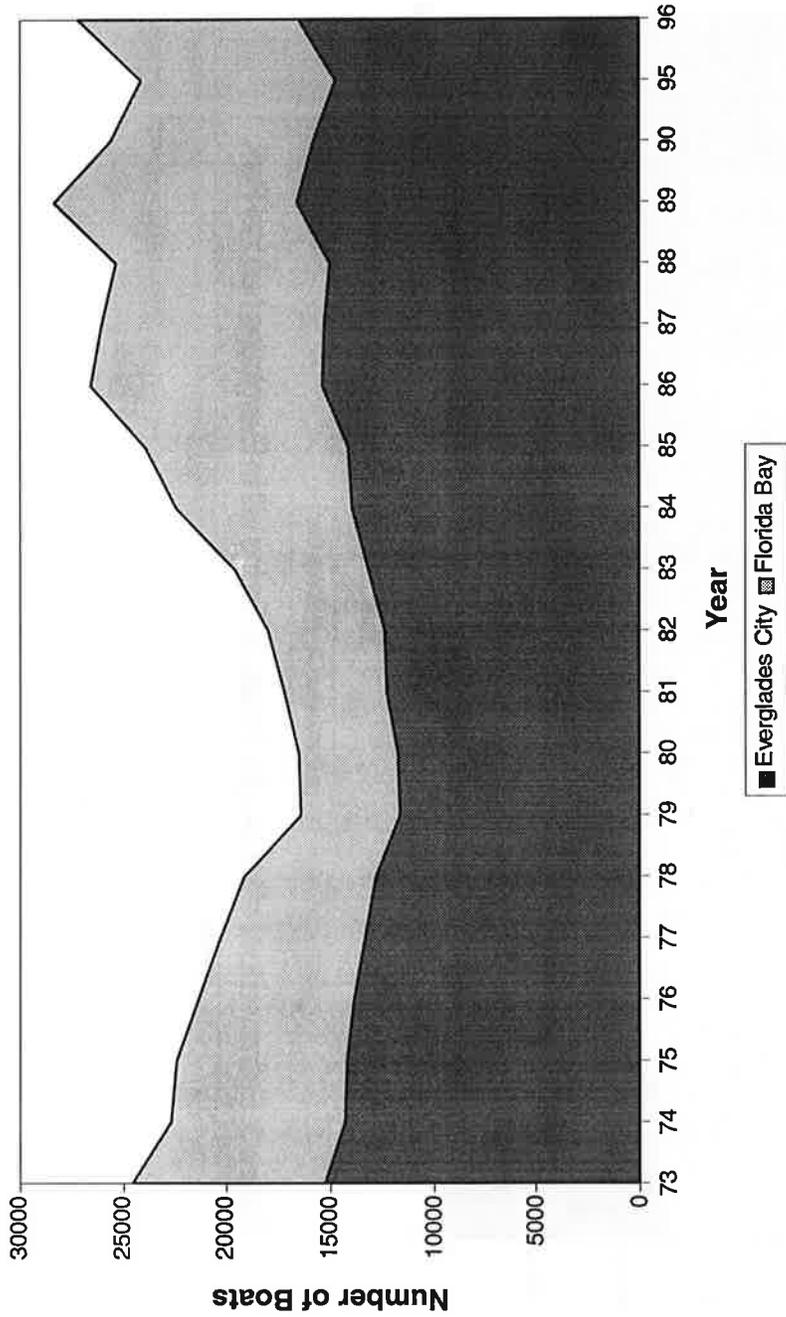
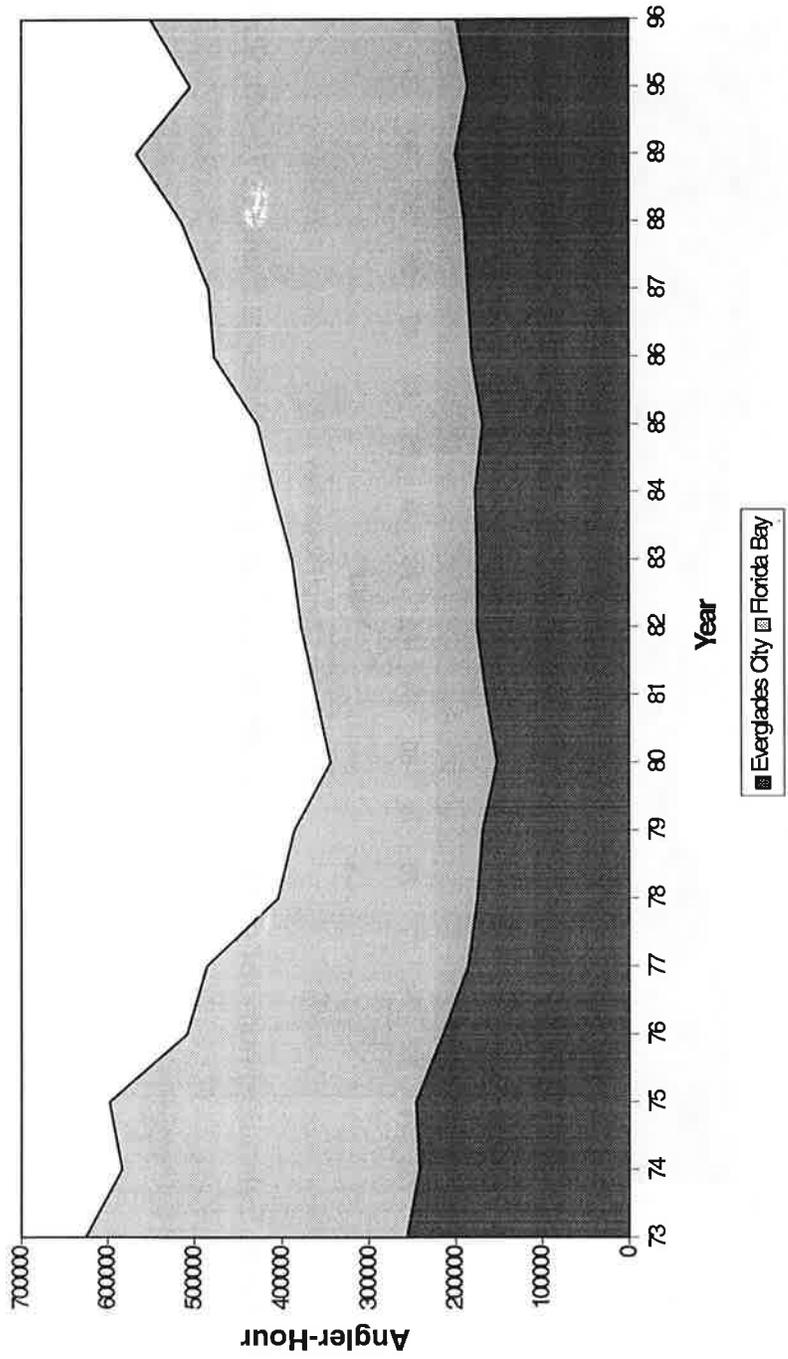
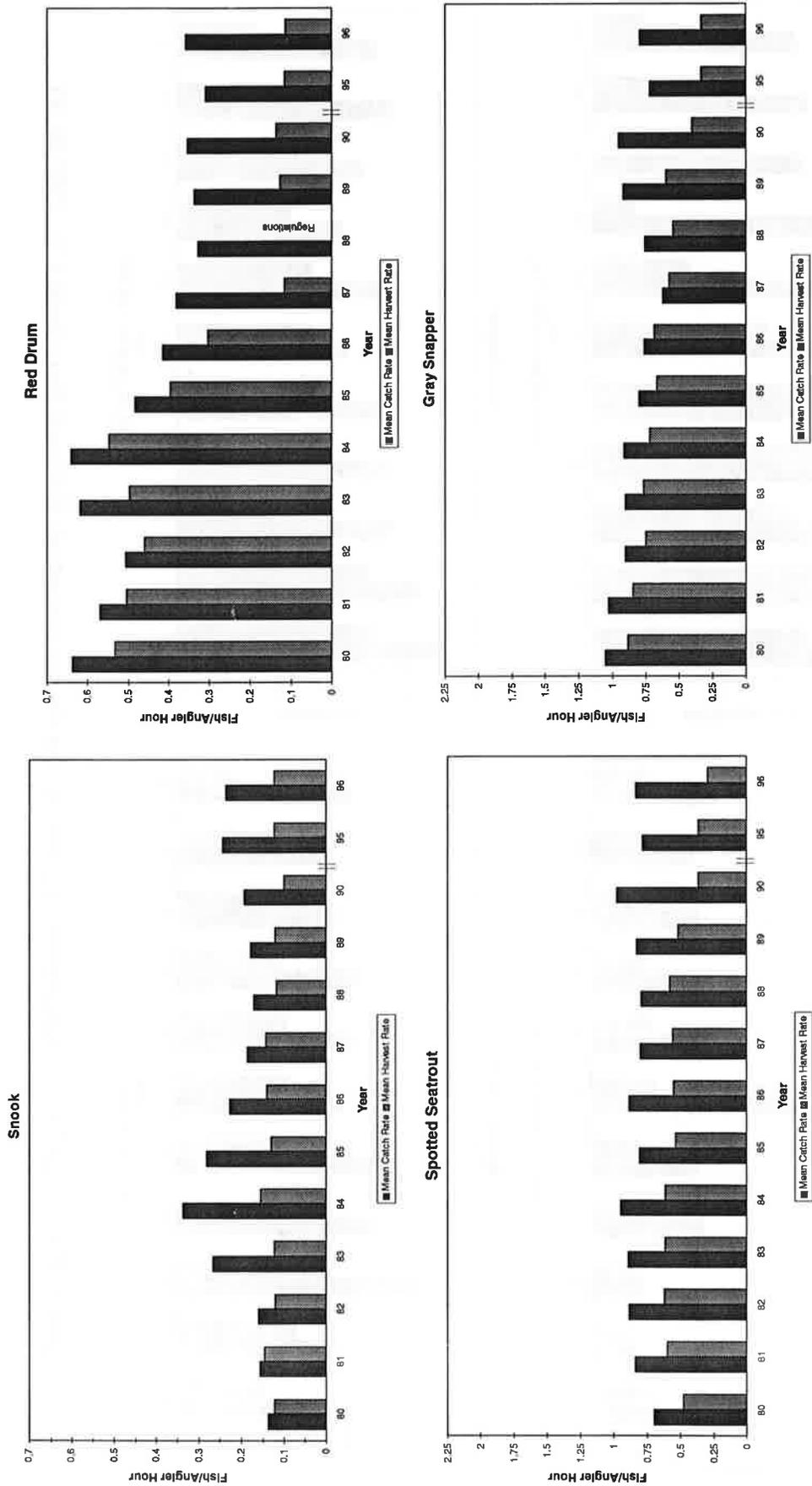


Figure 2: Estimated number of fishing boats within Everglades National Park, 1973-90, 95-96.



**Figure 3: Estimated total effort (Angler-Hours) of fishing within Everglades National Park, 1973-89, 95-96.**



**Figure 4:** Recreational non-guided catch/harvest rates for the major game fish species in Florida Bay (Areas 1-5), 1980-90, 95-96.

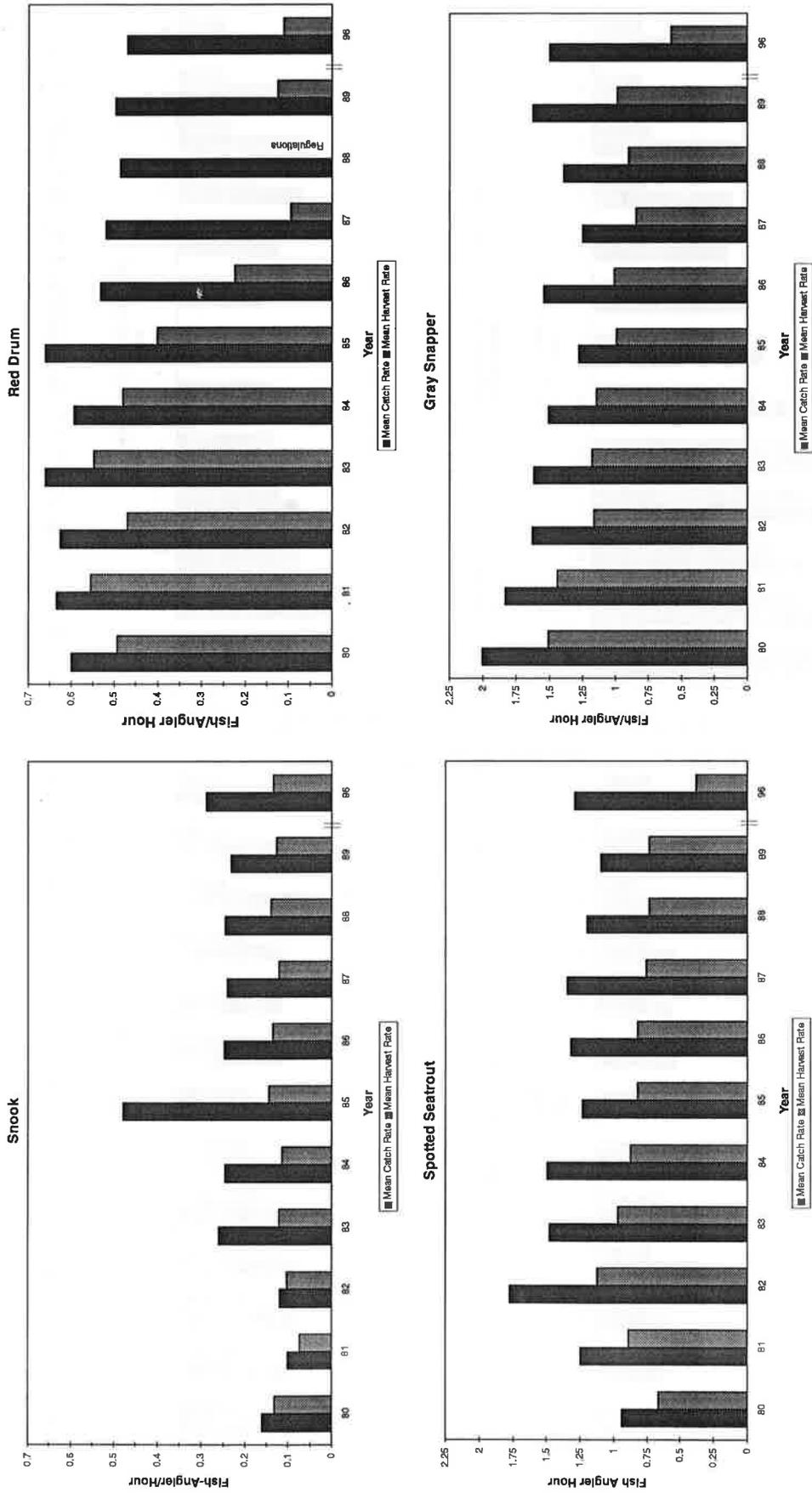
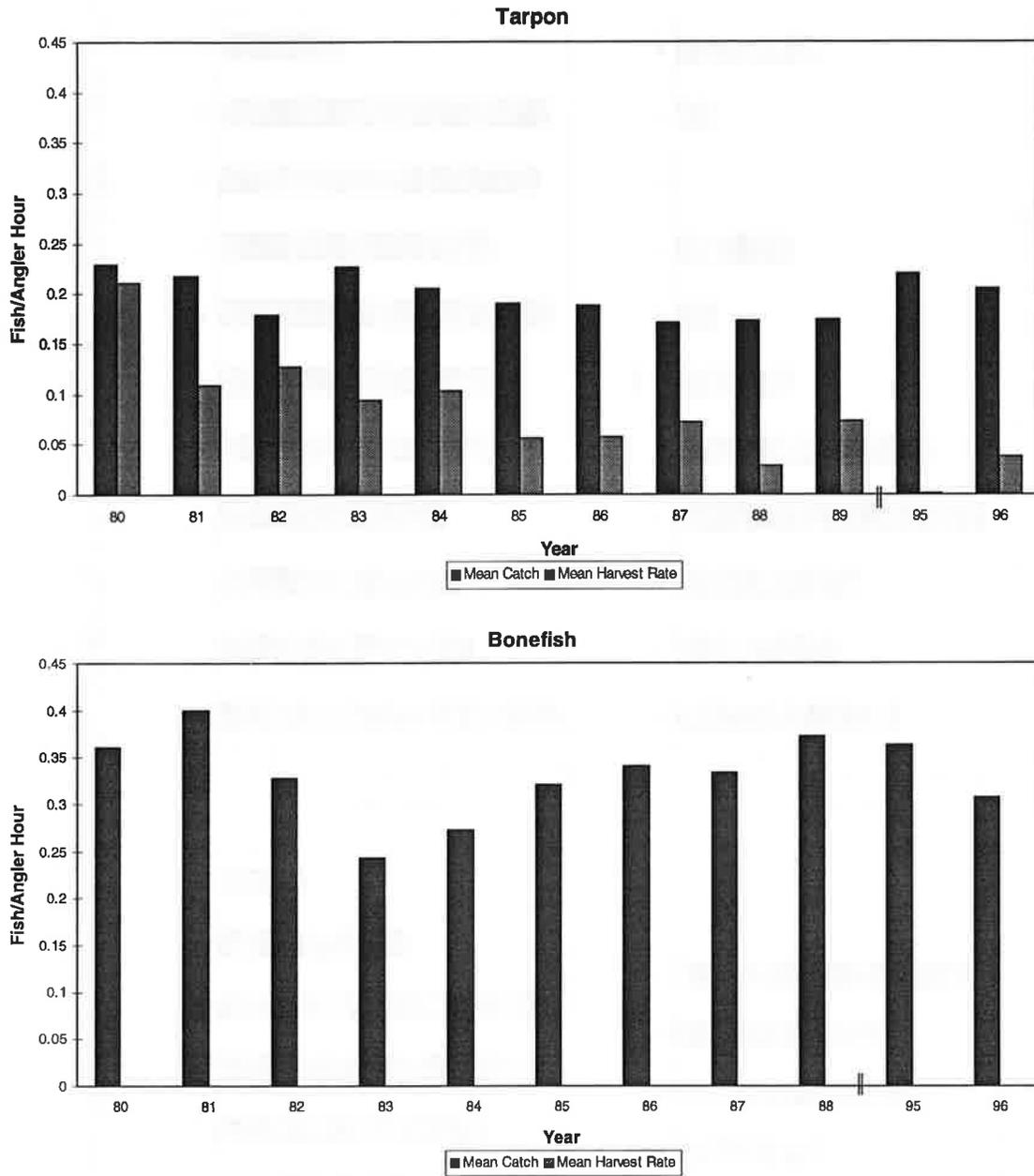
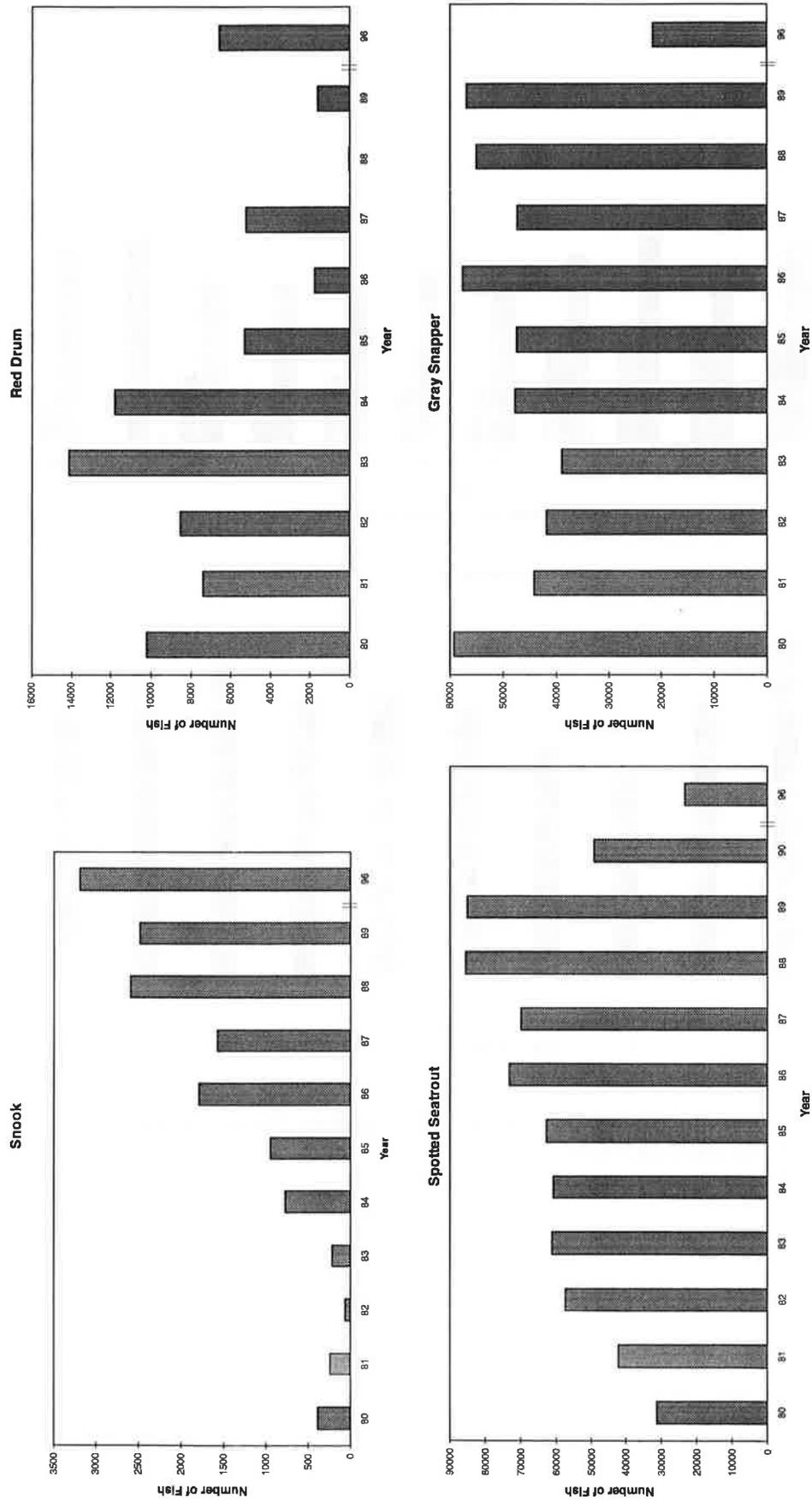


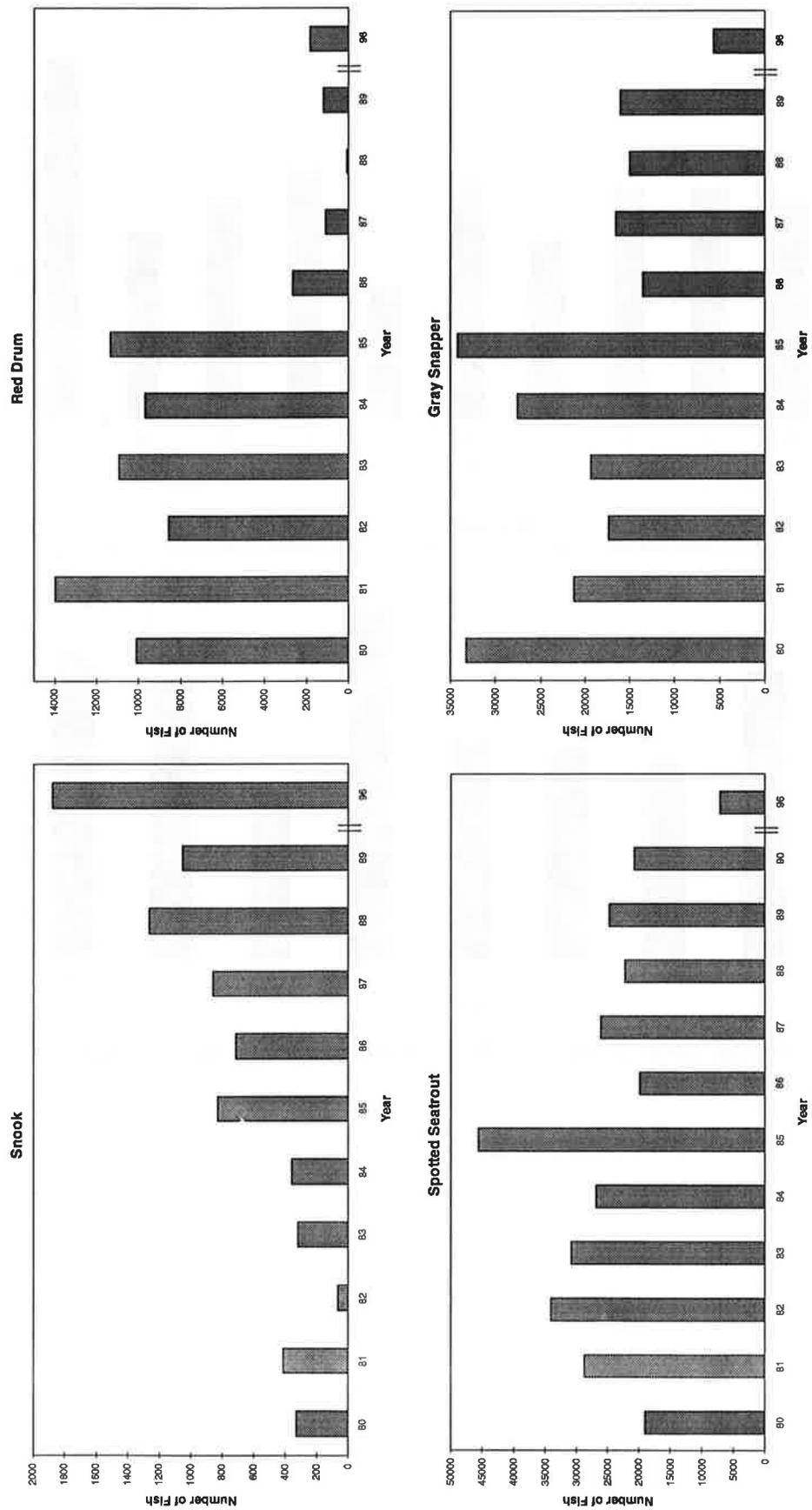
Figure 5: Recreational guide catch/harvest rates for the major game fish species in Florida Bay (Areas 1-5), 1980-90, 96.



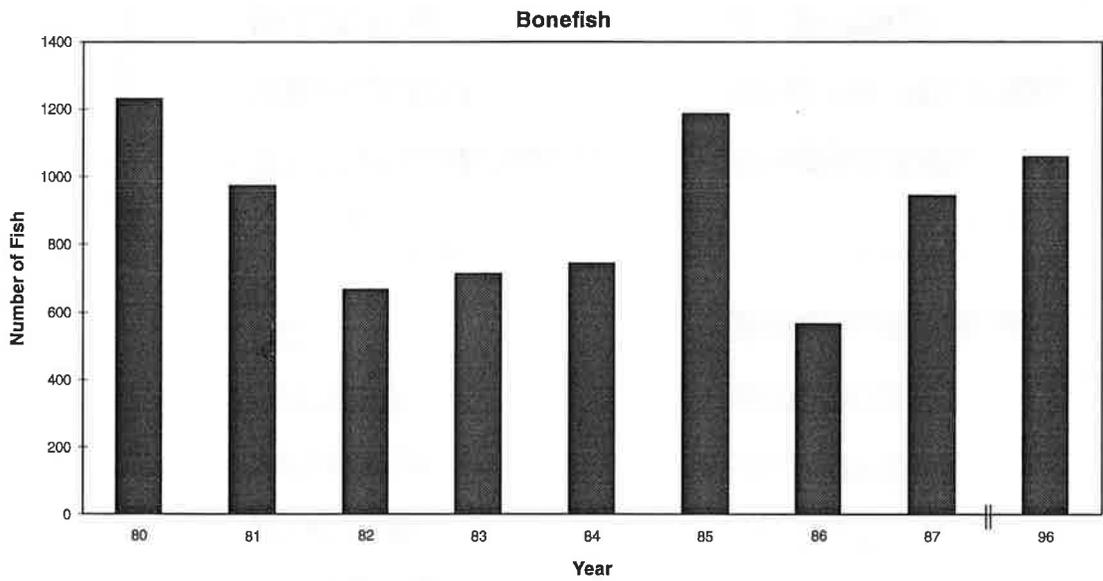
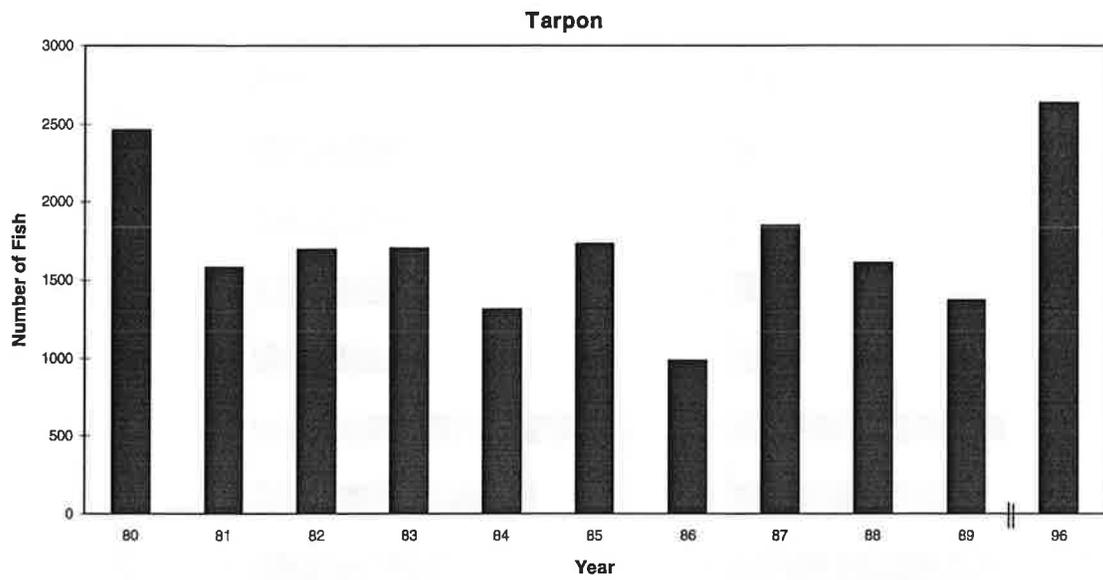
**Figure 6:** Recreational guide catch/harvest rates for tarpon and bonefish in Florida Bay (Areas 1-5) 1980-89, 95-96.



**Figure 7:** Estimated total harvest of snook, red drum, spotted seatrout and gray snapper by non-guided anglers in Florida Bay (Areas 1-5), 1980-89, 96.



**Figure 8:** Estimated total harvest of snook, red drum, spotted seatrout and gray snapper by guide anglers in Florida Bay (Areas 1-5), 1980-89, 96.



**Figure 9:** Estimated total catch of tarpon and bonefish by guide anglers in Florida Bay (Areas 1-5), 1980-87, 96.